REPORT ON MERCURY TESTING

WHEELABRATOR SOUTH BROWARD, INC.
UNIT 3 FF OUTLET
FT. LAUDERDALE, FL

CLIENT REFERENCE NO: 11800237
CLEANAIR PROJECT NO: 10455-7
REVISION 0: OCTOBER 23, 2008

CleanAir.

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Performed for:
WHEELABRATOR SOUTH BROWARD, INC.
UNIT 3 FF OUTLET
FT. LAUDERDALE, FL

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Revision 0: October 23, 2008

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.

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REVISION HISTORY

REPORT ON MERCURY TESTING

Revision History

DRAFT REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
D0a	10/15/08	All	Draft version of original document.

FINAL REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
0	10/23/08	All	Final version of original document.

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PROJECT OVERVIEW

Wheelabrator South Broward, Inc. operates a Refuse to Energy facility, located in Ft. Lauderdale, Florida. The facility's emission levels are regulated by the Florida Department of Environmental Protection. Wheelabrator South Broward, Inc. contracted Clean Air Engineering (CleanAir) to perform a compliance test program at their municipal waste combustor (MWC) facility in Ft. Lauderdale, Florida. Testing was conducted in accordance with 40 CFR 60 Subpart Cb and applicable sections of PSD–FL-105(B) and PA85-21. The sampling was conducted at the Unit 3 Fabric Filter (FF) Outlet on September 18, 2008.

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 South Broward, Inc.
B. Preksta - CleanAir

Chuck Faller of Wheelabrator South Broward Inc. provided all the process (operating) data. This data is presented in its entirety in Appendix H. CleanAir's test runs are all based on the facility's (Bailey) time.

Table 1-1 outlines the schedule adhered to during the test program. Table 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 3 Outlet	USEPA Method 29	Mercury	09/18/08	07:55	10:11
2	Unit 3 Outlet	USEPA Method 29	Mercury	09/18/08	10:27	12:41
3	Unit 3 Outlet	USEPA Method 29	Mercury	09/18/08	13:01	15:15

Table 1-2:
Summary of Test Results

Source Constituent	Sampling Method	Average Emission	Permit Limit[1]
Unit 3 FF Outlet			
Mercury (µg/dscm @7% O_2)	EPA M29	9.3	70

[1] Limits obtained from 40 Code of Federal Register part 60 Subpart Cb - Emission Guidelines and Compliance Times for Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994 published in Federal Register as 62 FR 45123 on December 19, 1995 as modified on August 25, 1997, 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 3 FF Outlet - Mercury

Run No.		1	2	3	Average
Date (2008)		Sep 18	Sep 18	Sep 18	
Start Time (approx.)		07:55	10:27	13:01	
Stop Time (approx.)		10:11	12:41	15:15	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.5	184.4	184.3	**184.4**
P_1	SDA Outlet Temperature - (°F)	318	315	315	**316**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.6	10.0	9.6	**9.7**
CO_2	Carbon dioxide (dry volume %)	9.4	9.0	9.4	**9.3**
T_s	Sample temperature (°F)	297	295	295	**296**
B_w	Actual water vapor in gas (% by volume)	21.6	21.0	22.1	**21.6**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	186,348	191,914	190,578	**189,613**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	99,471	103,548	101,363	**101,461**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	75.10	76.19	75.95	**75.75**
%I	Isokinetic sampling (%)	101.0	98.4	100.2	**99.9**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	16.0970	16.8952	15.1569	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	16.0970	16.8952	15.1569	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	4.7E-10	4.9E-10	4.4E-10	**4.7E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	5.8E-10	6.2E-10	5.4E-10	**5.8E-10**
C_{sd}	Concentration (µg/dscm)	7.6	7.8	7.0	**7.5**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	9.3	10.0	8.7	**9.3**
$E_{lb/hr}$	Rate (lb/hr)	0.0028	0.0030	0.0027	**0.0028**

RESULTS

Table 2-2:
Quality Assurance and Quality Control

Run Number		FH Front Half	BH H_2O_2/HNO_4	A Empty Impinger	B $KMnO_4$	C HCl
		RPD RESULTS				
U3 FF O-S R1		NA	0.4%	NA	NA	NA
U3 FF O-S R2		NA	1.1%	NA	NA	NA
U3 FF O-S R3		NA	0.4%	NA	NA	NA
South Field Blank		NA	NA	NA	NA	
South Reagent Blank		NA	NA	NA	NA	NA
		Sample Spike and Recovery				
U3 FF O-S R3	#1	98%	94%	104%	94%	88%
	#2	98%	93%	102%	94%	89%
		Reagent and Field Blank Results				
South Field Blank	#1	< 0.1	< 0.3	< 0.2	< 0.5	
	#2	< 0.1	< 0.3	< 0.2	< 0.5	
South Reagent Blank	#1	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4
	#2	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4

End of Section 2 – Results

DESCRIPTION OF INSTALLATION

PROCESS DESCRIPTION

The South Broward Resource Recovery Facility operates three 750 tons per day municipal refuse fired, water wall boiler trains. The trains were manufactured by Babcock and Wilcox to produce electricity for sale to a local utility company. 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 fabric filter 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 3 FF Outlet as shown in Figure 3-2 on page 3-2.

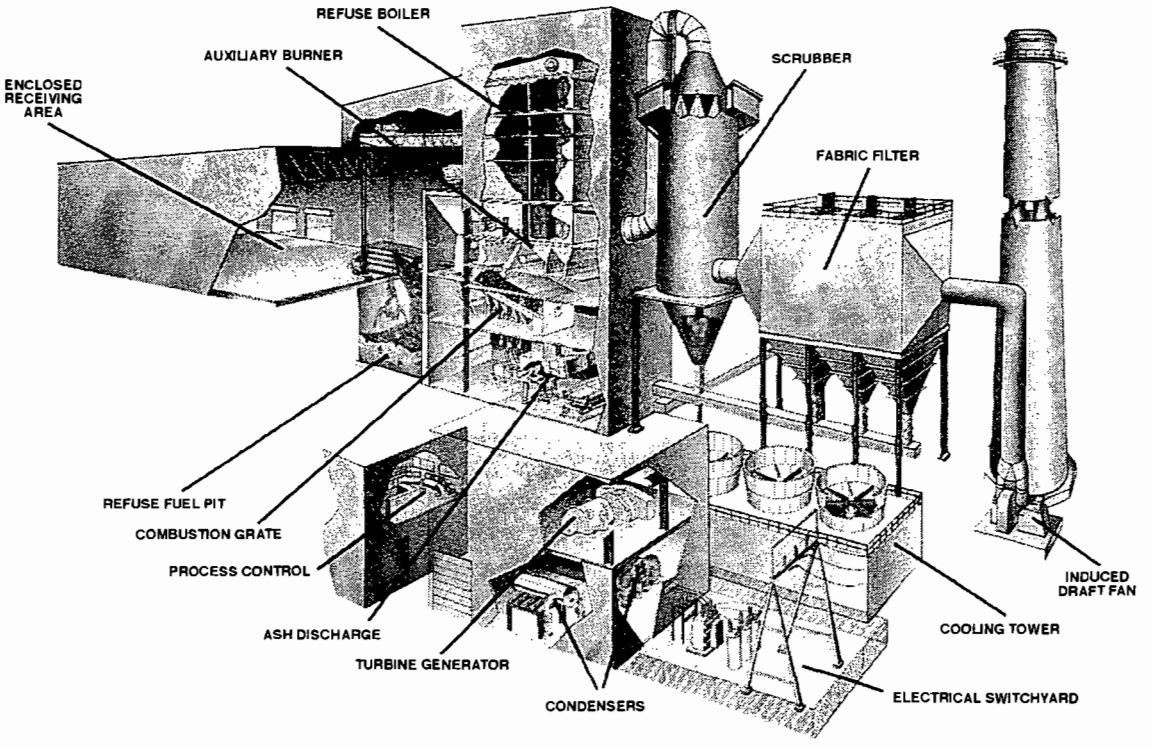


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

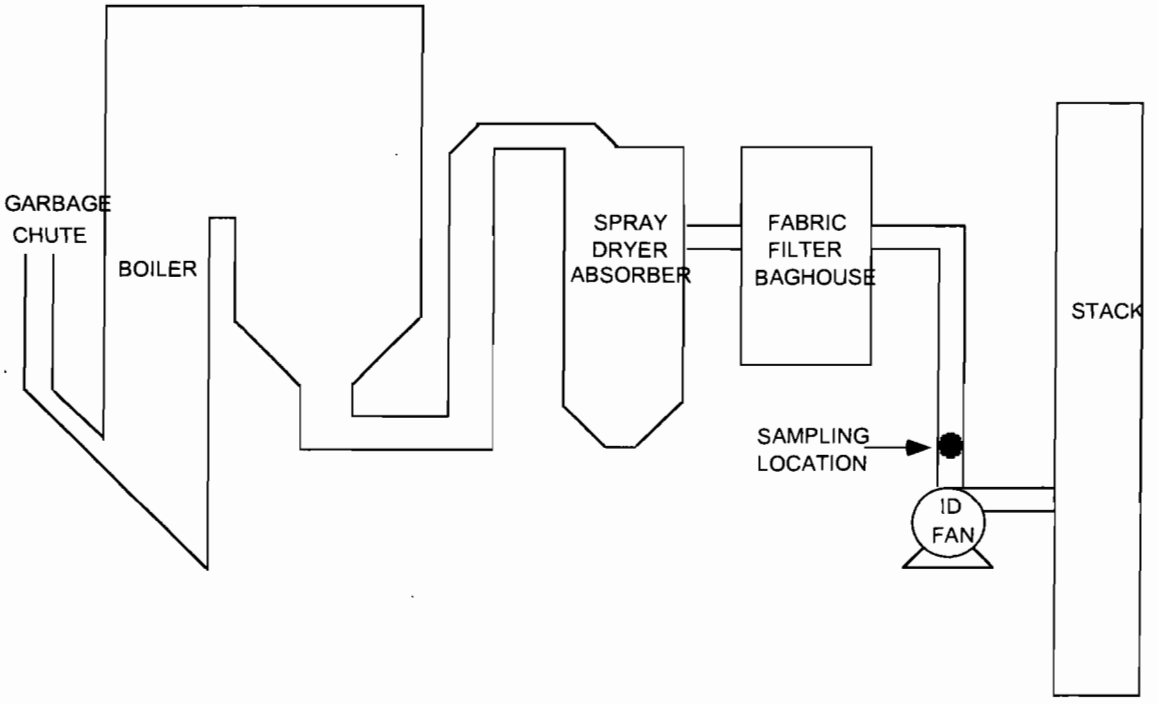


Figure 3-2: Process Schematic

DESCRIPTION OF INSTALLATION

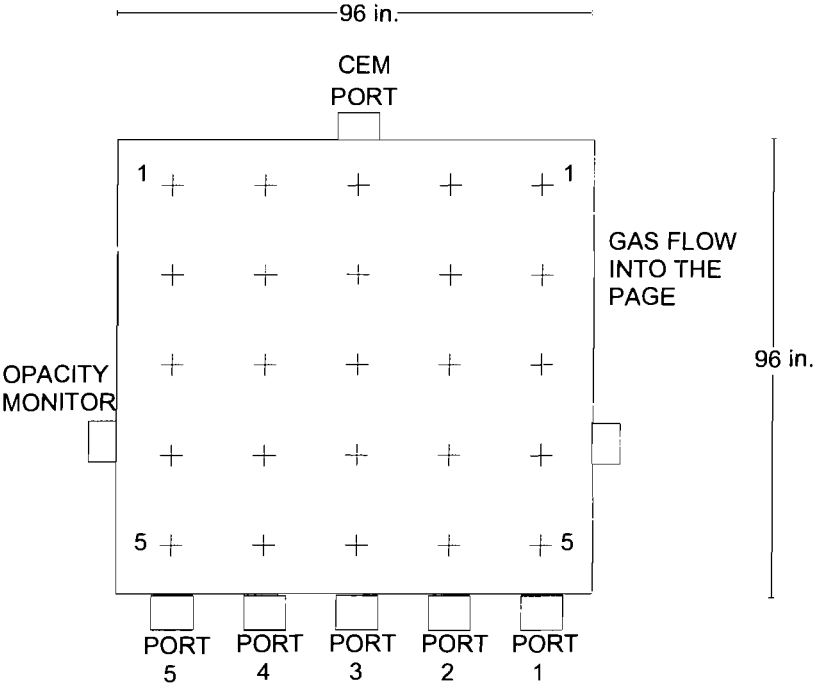
DESCRIPTION OF SAMPLING LOCATION(S)

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 3 FF Outlet	Mercury	29	4-6	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 3 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.

Clean Air Engineering followed specific quality assurance and quality control (QA/QC) procedures as outlined in the individual methods and in USEPA "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 Clean Air Engineering are summarized in Appendix D.

End of Section 4 – Methodology

APPENDIX

TEST METHOD SPECIFICATIONS ..... A
SAMPLE CALCULATIONS ..... B
PARAMETERS C
QA/QC DATA ..... D
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TEST METHOD SPECIFICATIONS

A

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Specification Sheet for EPA Method 29

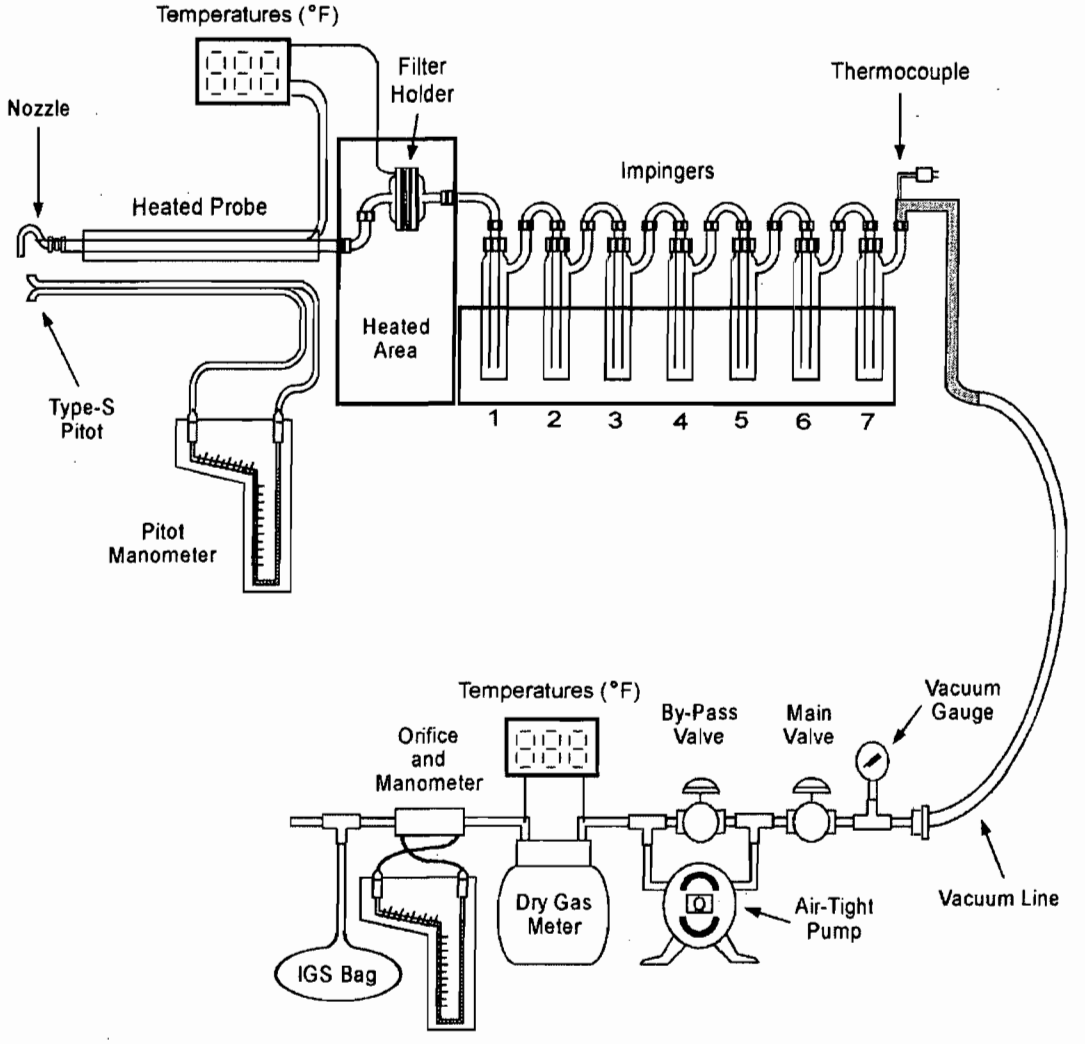
Source Location Name(s)	Unit 3 FF Outlet
Pollutant(s) to be Determined	Mercury
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	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	0.84
Pitot Tube Calibration by	Geometric or Wind Tunnel	Geometric
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

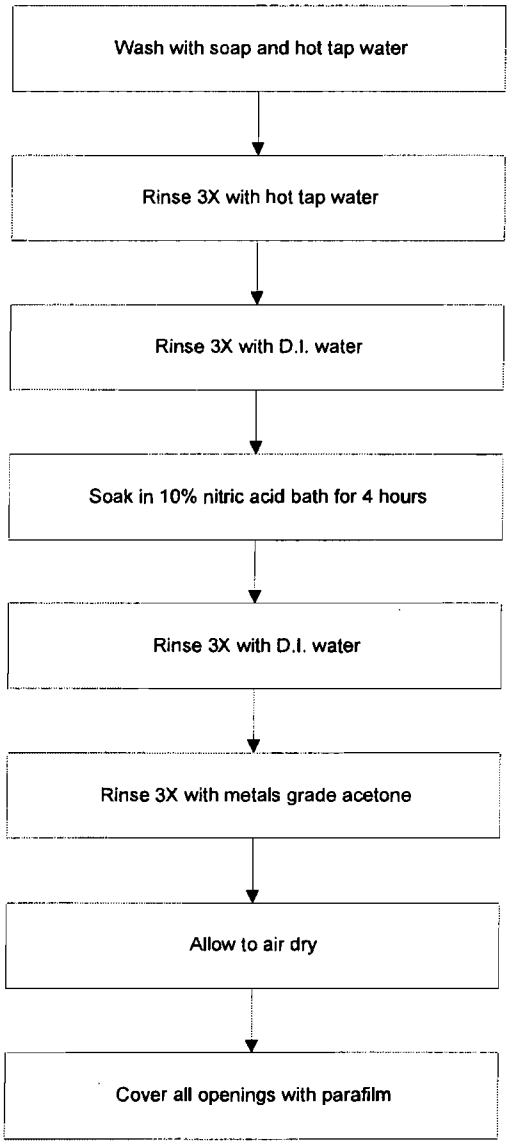
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types		
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 HNO_3

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 HNO_3

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 HNO_3

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 HNO_3

Container 8B
Water Blank
250 ml Plastic

100 ml of water

Container 9
5%HNO_3/10%H_2O_2 Blank
500 ml Plastic

200 ml of absorbing solution

Container 10*
Permanganate Blank
500 ml Glass

100 ml $KMnO_4$ solution

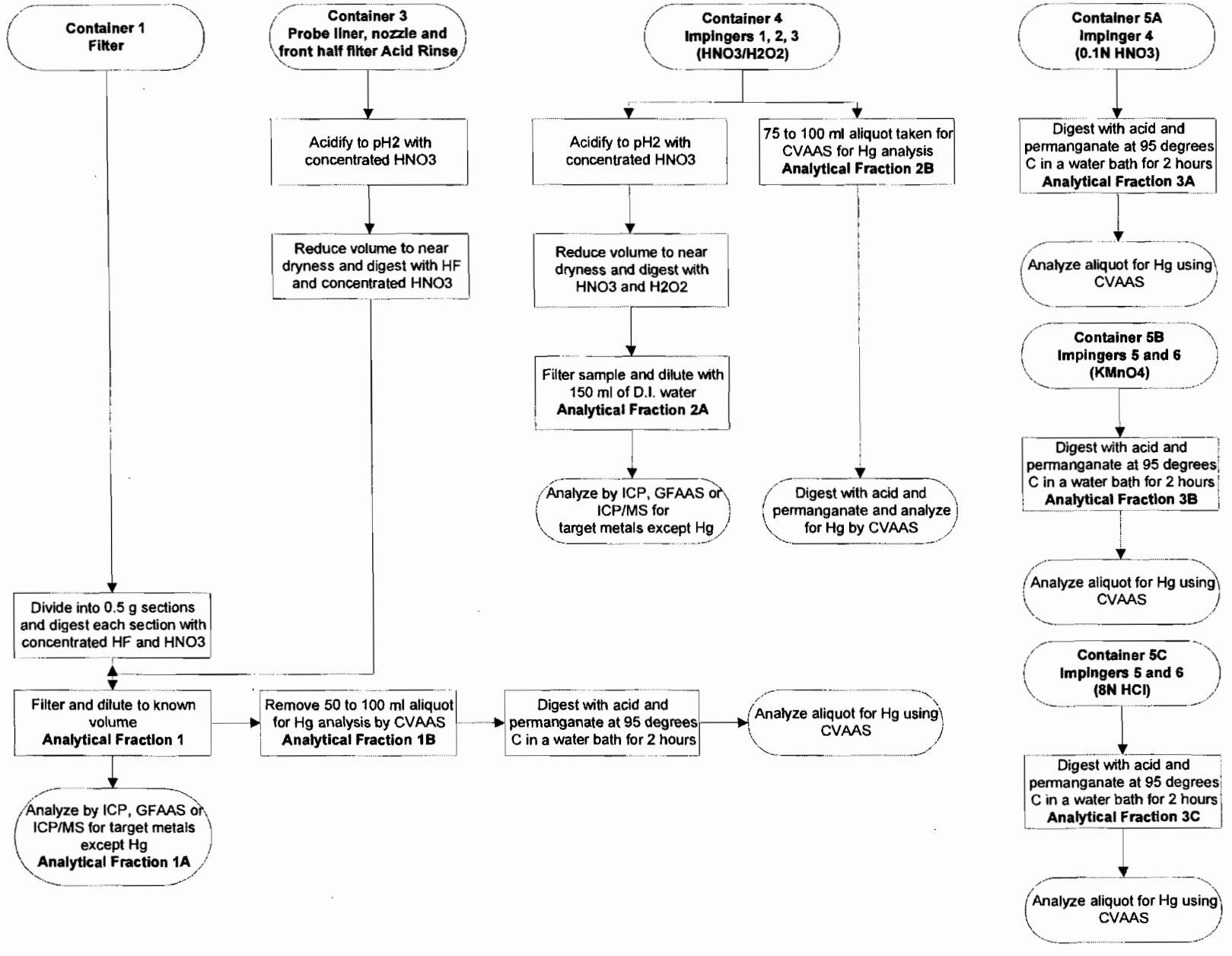
Container 11
HCl Rinse Blank
250 ml Glass

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)



SAMPLE CALCULATIONS

B

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

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

Sample data taken from Run 1

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

101408 142249
L

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04707)(V_{lc})$$

Where:

V_{lc}	= total volume of liquid collected in impingers and silica gel (ml)	=	440.6	ml
0.04707	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04707	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	20.74	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)	=	29.95	in. Hg
T_m	= average dry gas meter temperature (°F)	=	91.98	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	79.33	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9860	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.26	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)	=	75.097	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)	=	29.95	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-9.70	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.24	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)	=	297.40	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	29.24	in. Hg

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

$$P_v = P_s$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.24	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.24	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)	=	75.097	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	20.74	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2164	
		=	21.64	%

QA/QC _____
Date _____

7. Saturated moisture content (% by volume)

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

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.24	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.24	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

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

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2164	
B_w	= actual water vapor in gas	=	0.2164	
		=	21.64	%

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 (%)	=	9.4	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.6	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.00	%

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

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

Where:

M_{CO2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.4	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.6	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.0	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.89	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	=	0.2164	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.89	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)	=	27.32	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.84	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.32	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.24	in. Hg
T_s	= average sample gas temperature (°F)	=	297.40	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.694	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	48.53	ft/sec

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

$$Q_a = (60)(A_s)(V_s)$$

Where:

A_s	= cross sectional area of sampling location (ft^2)	=	64.00	ft^2
V_s	= sample gas velocity (ft/sec)	=	48.53	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	186,348	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)	=	186,348	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.24	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	297.4	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	126,941	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	=	0.2164	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	126,941	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	99,471	dscfm

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

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

Where:

Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	99,471	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.6	%
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)	=	80,865	dscfm

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	99,471	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,968,231	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)	=	99,471	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)	=	169,024	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)	=	169,024	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)	=	157,499	dry Nm^3/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.265	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2164	
P_s	= absolute sample gas pressure (in. Hg)	=	29.24	in. Hg
T_s	= average sample gas temperature (°F)	=	297.4	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	75.097	dscf
V_s	= sample gas velocity (ft/sec)	=	48.53	ft/sec
θ	= total sampling time (min)	=	125	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
I	= percent of isokinetic sampling (%)	=	100.98	%

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)	=	79.33	dcf
T_m	= average dry gas meter temperature (°F)	=	91.98	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.8221	
P_{bar}	= barometric pressure (in. Hg)	=	29.95	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.255	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.89	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.118	√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	=	0.9835	

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LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

1. Logic for Determining Total Blank ($m_{Total\text{-}B}$) 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	$m_{Total\text{-}B}$ = Sum D, 1-5	$m_{Total\text{-}B}$ = Sum D	$m_{Total\text{-}B}$ = < Sum ND
ND=1x	$m_{Total\text{-}B}$ = Sum D, 1-5	$m_{Total\text{-}B}$ = Sum D	$m_{Total\text{-}B}$ = < Sum ND
ND=0.5x	$m_{Total\text{-}B}$ = Sum D, 1-5	$m_{Total\text{-}B}$ = Sum D	$m_{Total\text{-}B}$ = < 0.5 Sum ND

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

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

	CASE 1 All 5 fractions are D. $m_{Total\text{-}B}$ = D	CASE 2 1 to 4 sample fractions are ND $m_{Total\text{-}B}$ = D	CASE 3 All 5 fractions are ND $m_{Total\text{-}B}$ = D	CASE 4 Any type of fractions $m_{Total\text{-}B}$ = ND
Rule				
ND = 0	$m_{T\text{-}B\text{-}allow}$ = M29 Rule	$m_{T\text{-}B\text{-}allow}$ = M29 Rule*	$m_{T\text{-}B\text{-}allow}$ = 0	$m_{T\text{-}B\text{-}allow}$ = 0
ND=1x	$m_{T\text{-}B\text{-}allow}$ = M29 Rule	$m_{T\text{-}B\text{-}allow}$ = M29 Rule*	$m_{T\text{-}B\text{-}allow}$ = 0	$m_{T\text{-}B\text{-}allow}$ = 0
ND=0.5x	$m_{T\text{-}B\text{-}allow}$ = M29 Rule	$m_{T\text{-}B\text{-}allow}$ = M29 Rule*	$m_{T\text{-}B\text{-}allow}$ = 0	$m_{T\text{-}B\text{-}allow}$ = 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. $m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow} \geq$ MIN(MDL)	CASE 2 1 to 4 sample fractions are ND $m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow} \geq$ MIN(MDL)	CASE 3 All 5 fractions are ND $m_{Total\text{-}S}$ and $m_{T\text{-}B\text{-}allow}$ anything	CASE 4 Any type of fractions $m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow}$ < MIN(MDL)
Rule				
ND = 0	$m_n = m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow}$	$m_n = m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow}$	m_n = < $m_{Total\text{-}S}$	m_n = < MIN[MDL]
ND=1x	$m_n = m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow}$	m_n = < [$m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow}$]	m_n = < $m_{Total\text{-}S}$	m_n = < MIN[MDL]
ND=0.5x	$m_n = m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow}$	m_n = < [$m_{Total\text{-}S} - m_{T\text{-}B\text{-}allow}$]	m_n = < $m_{Total\text{-}S}$	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.

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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O

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	=	<0.2000	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	=	<1.4000	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	=	16.0970	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	16.0970	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	=	<1.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	16.0970	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	0.8048	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	=	16.0970	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	16.0970	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	=	16.0970	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	16.0970	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	16.0970	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	=	16.0970	µg
m_{n-3a}	= mercury corrected for blank - prorated for Fraction 3a	=	<0.2000	µg
m_{n-3b}	= mercury corrected for blank - prorated for Fraction 3b	=	<0.5000	µg
m_{n-3c}	= mercury corrected for blank - prorated for Fraction 3c	=	<0.4000	µg

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USEPA Method 29
Mercury Sample Calculations

Sample data taken from Run 1

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L_O

1. Mercury concentration (lb/dscf)

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

Where:

m_n	= mercury collected in sample (total µg)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	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)	=	4.7264E-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)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= mercury concentration (µg/dscm)	=	7.5687E+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)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	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)	=	7.5687E-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)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	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)	=	8.1225E+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)	=	4.7264E-10	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.6	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= mercury concentration corrected to x% oxygen (lb/dscf)	=	5.8139E-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)	=	4.7264E-10	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.4	%
C_{sdy}	= mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	6.0337E-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)	=	4.7264E-10	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	99,471	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	186,348	acfm
C_a	= mercury concentration at actual gas conditions (lb/acf)	=	2.5229E-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)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	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)	=	99,471	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= mercury emission rate (lb/hr)	=	2.8208E-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)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	99,471	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)	=	3.5536E-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)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	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)	=	99,471	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)	=	1.2355E-02	Ton/yr

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

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

Where:

m_n	= mercury collected in sample (total µg)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	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)	=	9,750	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.6	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= mercury emission rate - Fd-based (lb/MMBtu)	=	8.5232E-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)	=	16.0970	µg
V_{mstd}	= volume metered, standard (dscf)	=	75.0970	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 (%)	=	9.4	%
100	= conversion factor	=	100	
E_{Fc}	= mercury emission rate - Fc-based (lb/MMBtu)	=	9.1511E-06	lb/MMBtu

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 18	Sep 18	Sep 18	
Start Time (approx.)		07:55	10:27	13:01	
Stop Time (approx.)		10:11	12:41	15:15	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9860	0.9860	0.9860	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-9.7000	-9.8000	-9.8000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.95	29.95	29.95	**29.9500**
D_n	Nozzle diameter (in.)	0.2650	0.2650	0.2650	
O_2	Oxygen (dry volume %)	9.6000	10.0000	9.6000	**9.7333**
CO_2	Carbon dioxide (dry volume %)	9.4000	9.0000	9.4000	**9.2667**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.0000	81.0000	81.0000	**81.0000**
V_{lc}	Total Liquid collected (ml)	440.60	430.60	458.10	
V_m	Volume metered, meter conditions (ft^3)	79.3300	81.5600	80.9500	
T_m	Dry gas meter temperature (°F)	91.9800	99.4600	96.9800	
T_s	Sample temperature (°F)	297.4000	295.1200	295.3600	**295.9600**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2552	1.3352	1.3080	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	20.7390	20.2683	21.5628	**20.8567**
V_{mstd}	Volume metered, standard (dscf)	75.0970	76.1907	75.9525	**75.7467**
P_a	Sample gas pressure, absolute (in. Hg)	29.2368	29.2294	29.2294	**29.2319**
P_v	Vapor pressure, actual (in. Hg)	29.2368	29.2294	29.2294	**29.2319**
B_{wo}	Moisture measured in sample (% by volume)	21.6401	21.0124	22.1122	**21.5882**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.6401	21.0124	22.1122	**21.5882**
√ΔP	Velocity head (√in. H_2O)	0.6939	0.7161	0.7098	**0.7066**
M_d	MW of sample gas, dry (lb/lb-mole)	29.8880	29.8400	29.8880	**29.8720**
M_s	MW of sample gas, wet (lb/lb-mole)	27.3154	27.3521	27.2593	**27.3090**
V_s	Velocity of sample (ft/sec)	48.5281	49.9777	49.6298	**49.3785**
%I	Isokinetic sampling (%)	100.9798	98.4159	100.2229	**99.8729**
Q_a	Volumetric flow rate, actual (acfm)	186,348	191,914	190,578	**189,613**
Q_s	Volumetric flow rate, standard (scfm)	126,941	131,094	130,140	**129,392**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	99,471	103,548	101,363	**101,461**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	80,865	81,200	82,403	**81,489**
Q_a	Volumetric flow rate, actual (acf/hr)	11,180,869	11,514,855	11,434,697	**11,376,807**
Q_s	Volumetric flow rate, standard (scf/hr)	7,616,438	7,865,655	7,808,419	**7,763,504**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,968,231	6,212,893	6,081,805	**6,087,643**
Q_a	Volumetric flow rate, actual (m^3/hr)	316,649	326,107	323,837	**322,198**
Q_s	Volumetric flow rate, standard (m^3/hr)	215,702	222,760	221,139	**219,867**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	169,024	175,953	172,240	**172,406**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	137,408	137,977	140,023	**138,469**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	200,995	207,572	206,061	**204,876**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	157,499	163,956	160,497	**160,651**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	128,039	128,570	130,476	**129,028**

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2008)		Sep 18	Sep 18	Sep 18	
Start Time (approx.)		07:55	10:27	13:01	
Stop Time (approx.)		10:11	12:41	15:15	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.5	184.4	184.3	**184.4**
P_1	SDA Outlet Temperature - (°F)	318	315	315	**316**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,750	9,750	9,750	**9,750**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.6000	10.0000	9.6000	**9.7333**
CO_2	Carbon dioxide (dry volume %)	9.4000	9.0000	9.4000	**9.2667**
T_s	Sample temperature (°F)	297.4000	295.1200	295.3600	**295.9600**
B_w	Actual water vapor in gas (% by volume)	21.6401	21.0124	22.1122	**21.5882**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	186,348	191,914	190,578	**189,613**
Q_s	Volumetric flow rate, standard (scfm)	126,941	131,094	130,140	**129,392**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	99,471	103,548	101,363	**101,461**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	80,865	81,200	82,403	**81,489**
Q_a	Volumetric flow rate, actual (acf/hr)	11,180,869	11,514,855	11,434,697	**11,376,807**
Q_s	Volumetric flow rate, standard (scf/hr)	7,616,438	7,865,655	7,808,419	**7,763,504**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,968,231	6,212,893	6,081,805	**6,087,643**
Q_a	Volumetric flow rate, actual (m^3/hr)	316,649	326,107	323,837	**322,198**
Q_s	Volumetric flow rate, standard (m^3/hr)	215,702	222,760	221,139	**219,867**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	169,024	175,953	172,240	**172,406**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	137,408	137,977	140,023	**138,469**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	200,995	207,572	206,061	**204,876**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	157,499	163,956	160,497	**160,651**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	128,039	128,570	130,476	**129,028**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	75.0970	76.1907	75.9525	**75.7467**
%I	Isokinetic sampling (%)	100.9798	98.4159	100.2229	**99.8729**
Laboratory Data					
m_{n-1b}	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
m_{n-2b}	Fraction 2B (µg)	16.0970	16.8952	15.1569	
m_{n-3a}	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m_{n-3b}	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m_{n-3c}	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	16.0970	16.8952	15.1569	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	4.7264E-10	4.8896E-10	4.4003E-10	**4.6721E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	5.8139E-10	6.2353E-10	5.4127E-10	**5.8206E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	6.0337E-10	6.5194E-10	5.6173E-10	**6.0568E-10**
C_a	Concentration (lb/acf)	2.5229E-10	2.6382E-10	2.3404E-10	**2.5005E-10**
C_{sd}	Concentration (µg/dscm)	7.5687E+00	7.8300E+00	7.0464E+00	**7.4817E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	9.3101E+00	9.9850E+00	8.6677E+00	**9.3209E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	9.6621E+00	1.0440E+01	8.9954E+00	**9.6992E+00**
C_{sd}	Concentration (mg/dscm)	7.5687E-03	7.8300E-03	7.0464E-03	**7.4817E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	9.3101E-03	9.9850E-03	8.6677E-03	**9.3209E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	9.6621E-03	1.0440E-02	8.9954E-03	**9.6992E-03**
C_a	Concentration (µg/m^3 (actual,wet))	4.0401E+00	4.2247E+00	3.7478E+00	**4.0042E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	8.1225E+00	8.4029E+00	7.5620E+00	**8.0291E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	9.9913E+00	1.0716E+01	9.3019E+00	**1.0003E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.0369E+01	1.1204E+01	9.6536E+00	**1.0409E+01**
$E_{lb/hr}$	Rate (lb/hr)	2.8208E-03	3.0378E-03	2.6761E-03	**2.8449E-03**
$E_{g/s}$	Rate (g/s)	3.5536E-04	3.8270E-04	3.3713E-04	**3.5839E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	8.5232E-06	9.1410E-06	7.9351E-06	**8.5331E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	9.1511E-06	9.8878E-06	8.5196E-06	**9.1862E-06**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 18	Sep 18	Sep 18	
Start Time (approx.)		07:55	10:27	13:01	
Stop Time (approx.)		10:11	12:41	15:15	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	<2.9362E-12	<2.8941E-12	<2.9031E-12	**<2.9111E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.6118E-12	<3.6906E-12	<3.5711E-12	**<3.6245E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.7483E-12	<3.8587E-12	<3.7061E-12	**<3.7711E-12**
C_a	Concentration (lb/acf)	<1.5673E-12	<1.5615E-12	<1.5441E-12	**<1.5576E-12**
C_{sd}	Concentration (µg/dscm)	<4.7019E-02	<4.6344E-02	<4.6490E-02	**<4.6618E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<5.7838E-02	<5.9100E-02	<5.7186E-02	**<5.8041E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<6.0024E-02	<6.1792E-02	<5.9348E-02	**<6.0388E-02**
C_{sd}	Concentration (mg/dscm)	<4.7019E-05	<4.6344E-05	<4.6490E-05	**<4.6618E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<5.7838E-05	<5.9100E-05	<5.7186E-05	**<5.8041E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<6.0024E-05	<6.1792E-05	<5.9348E-05	**<6.0388E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.5098E-02	<2.5005E-02	<2.4727E-02	**<2.4943E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.0460E-02	<4.9735E-02	<4.9891E-02	**<5.0029E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<6.2070E-02	<6.3424E-02	<6.1371E-02	**<6.2288E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<6.4417E-02	<6.6314E-02	<6.3691E-02	**<6.4807E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.7524E-05	<1.7980E-05	<1.7656E-05	**<1.7720E-05**
$E_{g/s}$	Rate (g/s)	<2.2076E-06	<2.2651E-06	<2.2243E-06	**<2.2323E-06**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<5.2949E-08	<5.4104E-08	<5.2353E-08	**<5.3135E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<5.6850E-08	<5.8524E-08	<5.6210E-08	**<5.7195E-08**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 18	Sep 18	Sep 18	
Start Time (approx.)		07:55	10:27	13:01	
Stop Time (approx.)		10:11	12:41	15:15	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	4.7264E-10	4.8896E-10	4.4003E-10	**4.6721E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	5.8139E-10	6.2353E-10	5.4127E-10	**5.8206E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	6.0337E-10	6.5194E-10	5.6173E-10	**6.0568E-10**
C_a	Concentration (lb/acf)	2.5229E-10	2.6382E-10	2.3404E-10	**2.5005E-10**
C_{sd}	Concentration (µg/dscm)	7.5687E+00	7.8300E+00	7.0464E+00	**7.4817E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	9.3101E+00	9.9850E+00	8.6677E+00	**9.3209E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	9.6621E+00	1.0440E+01	8.9954E+00	**9.6992E+00**
C_{sd}	Concentration (mg/dscm)	7.5687E-03	7.8300E-03	7.0464E-03	**7.4817E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	9.3101E-03	9.9850E-03	8.6677E-03	**9.3209E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	9.6621E-03	1.0440E-02	8.9954E-03	**9.6992E-03**
C_a	Concentration (µg/m^3 (actual,wet))	4.0401E+00	4.2247E+00	3.7478E+00	**4.0042E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	8.1225E+00	8.4029E+00	7.5620E+00	**8.0291E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	9.9913E+00	1.0716E+01	9.3019E+00	**1.0003E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.0369E+01	1.1204E+01	9.6536E+00	**1.0409E+01**
$E_{lb/hr}$	Rate (lb/hr)	2.8208E-03	3.0378E-03	2.6761E-03	**2.8449E-03**
$E_{g/s}$	Rate (g/s)	3.5536E-04	3.8270E-04	3.3713E-04	**3.5839E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	8.5232E-06	9.1410E-06	7.9351E-06	**8.5331E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	9.1511E-06	9.8878E-06	8.5196E-06	**9.1862E-06**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 18	Sep 18	Sep 18	
Start Time (approx.)		07:55	10:27	13:01	
Stop Time (approx.)		10:11	12:41	15:15	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.8724E-12	<5.7881E-12	<5.8063E-12	**<5.8223E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.2236E-12	<7.3812E-12	<7.1422E-12	**<7.2490E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.4967E-12	<7.7175E-12	<7.4122E-12	**<7.5421E-12**
C_a	Concentration (lb/acf)	<3.1346E-12	<3.1230E-12	<3.0882E-12	**<3.1153E-12**
C_{sd}	Concentration (µg/dscm)	<9.4038E-02	<9.2689E-02	<9.2979E-02	**<9.3235E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1568E-01	<1.1820E-01	<1.1437E-01	**<1.1608E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.2005E-01	<1.2358E-01	<1.1870E-01	**<1.2078E-01**
C_{sd}	Concentration (mg/dscm)	<9.4038E-05	<9.2689E-05	<9.2979E-05	**<9.3235E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1568E-04	<1.1820E-04	<1.1437E-04	**<1.1608E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.2005E-04	<1.2358E-04	<1.1870E-04	**<1.2078E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<5.0197E-02	<5.0011E-02	<4.9453E-02	**<4.9887E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.0092E-01	<9.9471E-02	<9.9783E-02	**<1.0006E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.2414E-01	<1.2685E-01	<1.2274E-01	**<1.2458E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.2883E-01	<1.3263E-01	<1.2738E-01	**<1.2961E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.5048E-05	<3.5961E-05	<3.5313E-05	**<3.5440E-05**
$E_{g/s}$	Rate (g/s)	<4.4152E-06	<4.5302E-06	<4.4485E-06	**<4.4647E-06**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0590E-07	<1.0821E-07	<1.0471E-07	**<1.0627E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1370E-07	<1.1705E-07	<1.1242E-07	**<1.1439E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 18	Sep 18	Sep 18	
Start Time (approx.)		07:55	10:27	13:01	
Stop Time (approx.)		10:11	12:41	15:15	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.4681E-11	<1.4470E-11	<1.4516E-11	**<1.4556E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.8059E-11	<1.8453E-11	<1.7856E-11	**<1.8122E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.8742E-11	<1.9294E-11	<1.8531E-11	**<1.8855E-11**
C_a	Concentration (lb/acf)	<7.8366E-12	<7.8075E-12	<7.7205E-12	**<7.7882E-12**
C_{sd}	Concentration (µg/dscm)	<2.3510E-01	<2.3172E-01	<2.3245E-01	**<2.3309E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.8919E-01	<2.9550E-01	<2.8593E-01	**<2.9021E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<3.0012E-01	<3.0896E-01	<2.9674E-01	**<3.0194E-01**
C_{sd}	Concentration (mg/dscm)	<2.3510E-04	<2.3172E-04	<2.3245E-04	**<2.3309E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.8919E-04	<2.9550E-04	<2.8593E-04	**<2.9021E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<3.0012E-04	<3.0896E-04	<2.9674E-04	**<3.0194E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.2549E-01	<1.2503E-01	<1.2363E-01	**<1.2472E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.5230E-01	<2.4868E-01	<2.4946E-01	**<2.5014E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.1035E-01	<3.1712E-01	<3.0685E-01	**<3.1144E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.2208E-01	<3.3157E-01	<3.1845E-01	**<3.2404E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.7620E-05	<8.9902E-05	<8.8281E-05	**<8.8601E-05**
$E_{g/s}$	Rate (g/s)	<1.1038E-05	<1.1326E-05	<1.1121E-05	**<1.1162E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.6475E-07	<2.7052E-07	<2.6176E-07	**<2.6568E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.8425E-07	<2.9262E-07	<2.8105E-07	**<2.8597E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	<1.1745E-11	<1.1576E-11	<1.1613E-11	**<1.1645E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.4447E-11	<1.4762E-11	<1.4284E-11	**<1.4498E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.4993E-11	<1.5435E-11	<1.4824E-11	**<1.5084E-11**
C_a	Concentration (lb/acf)	<6.2693E-12	<6.2460E-12	<6.1764E-12	**<6.2305E-12**
C_{sd}	Concentration (µg/dscm)	<1.8808E-01	<1.8538E-01	<1.8596E-01	**<1.8647E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.3135E-01	<2.3640E-01	<2.2875E-01	**<2.3216E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.4010E-01	<2.4717E-01	<2.3739E-01	**<2.4155E-01**
C_{sd}	Concentration (mg/dscm)	<1.8808E-04	<1.8538E-04	<1.8596E-04	**<1.8647E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.3135E-04	<2.3640E-04	<2.2875E-04	**<2.3216E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.4010E-04	<2.4717E-04	<2.3739E-04	**<2.4155E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.0039E-01	<1.0002E-01	<9.8906E-02	**<9.9774E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.0184E-01	<1.9894E-01	<1.9957E-01	**<2.0011E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.4828E-01	<2.5370E-01	<2.4548E-01	**<2.4915E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.5767E-01	<2.6525E-01	<2.5476E-01	**<2.5923E-01**
$E_{lb/hr}$	Rate (lb/hr)	<7.0096E-05	<7.1922E-05	<7.0625E-05	**<7.0881E-05**
$E_{g/s}$	Rate (g/s)	<8.8304E-06	<9.0604E-06	<8.8971E-06	**<8.9293E-06**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.1180E-07	<2.1642E-07	<2.0941E-07	**<2.1254E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.2740E-07	<2.3410E-07	<2.2484E-07	**<2.2878E-07**

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L O J @_O

QA/QC _____
Date _____

QA/QC DATA

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Nozzle Calibration Sheet

Client	WHEELABRATOR	Project Number	10455
Calibrated by	BOB FREKSTA	Unit	2
Date	9/16/08	Runs	1-6

NORTH + South

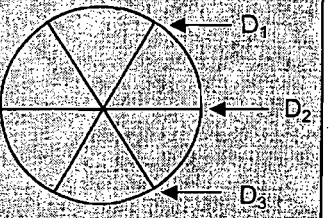
Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
265-1	0.265	0.265	0.265	0.000	0.265

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_____

Date_____

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-13

Date of Calibration: 7/21/2008

Meter Box Y_d: 0.9860

Calibration Conducted by: OLEG

Meter Box ΔH@: 1.8221

Barometric Pressure: 29.10

				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@
0.935	3.00	-1.70	1.0000	0.000	10.000	10.000	984.142	994.387	10.245	75.5	75.5	75.50	89.0	82.0	85.50	10.25	0.9826	1.8280
0.938	3.00	-1.70	1.0000	0.000	10.000	10.000	994.387	1004.643	10.256	75.5	75.5	75.50	90.0	82.0	86.00	10.22	0.9824	1.8174
0.375	0.50	-1.00	1.0000	0.000	5.000	5.000	8.225	13.324	5.099	75.5	75.5	75.50	83.0	81.0	82.00	12.79	0.9887	1.9010
0.376	0.50	-1.00	1.0000	0.000	5.000	5.000	13.324	18.428	5.104	75.5	75.5	75.50	83.0	81.0	82.00	12.74	0.9878	1.8862
0.676	1.50	-1.20	1.0000	0.000	10.000	10.000	20.923	31.145	10.222	75.5	75.5	75.50	87.0	81.0	84.00	14.17	0.9871	1.7500
0.676	1.50	-1.20	1.0000	0.000	10.000	10.000	31.145	41.365	10.220	75.5	75.5	75.50	87.0	81.0	84.00	14.17	0.9872	1.7500
																Averages	0.98597	1.82212

Nomenclature

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft^3)
- V_{ds} Standard Meter Volume - Dry (ft^3)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \leq Y_{avg} \pm 0.02$
- Y_{ds} Standard Meter Correction Factor (unitless)
- ΔH@ Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H_2O) $\Delta H@_i \leq \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P/13.6}{P_b + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.5	5.0
10.4	10.0
15.4	15.0
20.2	20.0
24.8	25.0

CleanAir ENGINEERIN

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 66-13 Office: _____

Calibrated by: OLEG Client: _____

Date: 7/21/08 Job No: _____

Temperature Scale Used: Fahrenheit Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	50	50	50				
100	99	100	99				
150	150	151	150				
200	201	201	200				
250	251	251	250				
300	301	301	300				
350	351	351	350				
400	400	401	400				
450	449	451	450				
500	499	501	500				
550	550	551	550				
600	601	601	600				

Tolerance = ±2°F difference from reference setting.

Calibration Reference Information

Reference Used: Omega CL23A Serial No: T-225950

Calibrated By: JH Metrology Date Calibrated: 10/7/2007

Calibration Report No: R044701

CleanAir. ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No. 10455 Meter No. 66-13 Orifice C-3

Location warehouse Meter Yd 0.9860 Orifice K' 0.4413

Test Date 10/07/08 Meter ΔH@ 1.8221 Orifice Cal. Date 03/11/08

Operator r. vicere Full Test Cal. Date 07/21/08

Barom. Press. (P_b) 29.43 in. Hg

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.

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	431.10	68	68								
1	5.0	434.04	69	68	77	1.10	20	5.0	2.94	68.3	0.9672	-0.4%
2	10.0	436.96	70	68	77	1.10	20	5.0	2.92	68.8	0.9748	0.4%
3	15.0	439.89	71	68	78	1.10	20	5.0	2.93	69.3	0.9714	0.0%
										Average Y_i	0.9711	
										Cal. Error	-1.5%	

Calculations and Specifications

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

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

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

CleanAir ENGINEERING

SAMPLE PROBE CALIBRATION DATA

Probe Type: S-Type M-5 **I.D. number:** 67-8-20

Thermocouple Calibration

Reference Type: _____ Reference I.D. No: _____ Pyrometer I.D. No: _____ Degrees: F / C

Point No.	Target Temp.	Reference Temp	Indicated Temp	Temp Difference	% Difference	Specification
1	ice-32°F					
2	ambient-70°F					%Difference ≤ 1.5
3	hot oil-150°F					
4	boiling H_2O-212°F					
5	hot oil-320°F					

Does assembly meet specifications? [ ] → **If "NO" thermocouple must be replaced.**

Geometric Pitot Calibration — *diagrams on reverse*

Is pitot assembly in good repair? (YES) NO If "NO" explain: _____

If repairs are required, pitot does not meet specification.

[X] **"S" Pitot**

Measurement				Specification
a1 =	1	a2 =	1	<10 °
b1 =	3	b2 =	3	<5°
γ =	2	θ =	1	
Pa =	0.332	Pb =	0.332	Pa + Pb = A
A =	0.664	Dt =	0.25	

Calculations

z = A sin γ = 0.02314 <0.125"

w = A sin θ = 0.01158 <0.03125"

Does assembly meet specifications? (YES / NO)

[ ] **Standard Pitot**

Measurement		Specification
Tube O.D.	_____	(D)
Static Hole I.D.	_____	0.1 x D =
Length,		
Tip to Static	_____	> 6xD =
Static to Bend	_____	>8xD =

Does assembly meet specifications? YES / NO

If "YES" "S" pitot Cp=0.84; Std pitot Cp=0.99

If "NO" wind tunnel calibration is required.

Wind Tunnel Pitot Calibration

All specifications are from EPA 600/8-76-005, section 3.1

PROBE Cp = 0.84 **Calibrated by:** Jeff Thomas **Date:** 12/26/07

CleanAir ENGINEERING

Wheelabrator South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

USEPA Method 29 (Mercury)
QA/QC Results

	Run No.	1	2	3	
	Date (2008)	Sep 18	Sep 18	Sep 18	
	Start Time (approx.)	07:55	10:27	13:01	
	Stop Time (approx.)	10:11	12:41	15:15	
	Total Duration of Test Run (min.)	136	134	134	
	Net Sampling Time (min.)	125	125	125	
	Sampling System Calibration Summary				
	Nozzle ID No:	67-265-1	67-265-1	67-265-1	
D_n	Nozzle Diameter (in):	0.265	0.265	0.265	
	Probe ID No:	67-8-20	67-8-20	67-8-20	
C_p	Pitot Coefficient:	0.840	0.840	0.840	
	Meter Box ID. No:	66-13	66-13	66-13	
Y_d	Meter Box Yd - Field Sheet	0.9860	0.9860	0.9860	
	Meter Box Yd - Database	0.9860	0.9860	0.9860	
	Meter Box ΔH@ - Field Sheet	1.8221	1.8221	1.8221	
	Meter Box ΔH@ - Database	1.8221	1.8221	1.8221	
	QA/QC				
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0254	0.0261	0.0259	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0030	0.0030	0.0020	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
V_{mstd}	Actual Sample Volume (dscf)	75.097	76.191	75.952	
	Alternative Method 5 Post-Test Calibration (EPA ALT-009)				
$\sqrt{\Delta H_{avg}}$	Average of Square Root of ΔH (in. W.C.)	1.1180	1.1527	1.1409	
Y_{qa}	Alternative Meter Calibration Factor	0.9835	0.9937	0.9879	**Average**
	Variation from full-test Y_d (average ≤ ±5%)	-0.3%	0.8%	0.2%	**0.2%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	Actual Variation (%)	100.98	98.42	100.22	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	1	
	Number of points >110%	0	0	1	
	Number of points <80%	0	0	1	
	Number of points >120%	0	0	0	

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LOJ@

QA/QC _____
Date _____

FIELD DATA

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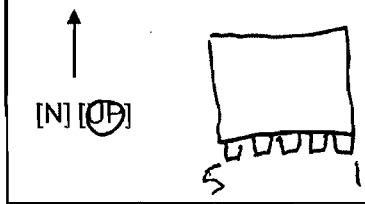
TEST LOCATION: Outlet **TESTING** Mercury **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 3 **RUN:** 1

FIELD DATA SHEET

Client	Wheelabrator
Project No.	10455
Plant	S. Broward
Date	9-18-08
Meter Operator	K. Kirchner
Probe Operator	" "

Cross-Section of Test Location



Amb. Temp. (°F)	80
Bar. Press.	29.95 (in. Hg) [mbar]
Probe I.D. No.	67-8-20
Liner Material	Glass

Meter Box	66-13	Sample Box No.	66-M1
Meter Y_d	0.9860	Meter $\Delta H_@$	1.8221
K Factor	2.6	Pitot C_p	.84
Leak Rate Before	.003 (cfm) [Lpm]	@	13 (in. Hg)
Leak Rate After	.003 (cfm) [Lpm]	@	8 (in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑	Bad ☐	

Filter No.	IN9		
Thimble No.	N5		
Nozzle Diameter	.265	Nozzle I.D.	67-265-1

Duct Dimensions (in.)	96x96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.7	10	[In]	

Start Time:	07:55	Stop Time:	10:11

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] 945.880	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)~~ 0	Notes
5-1	5	.44	1.1	948.92	300	250	254	62	83	81	4	9.2	
2	10	.45	1.2	951.97	299	250	255	47	87	81	4	9.6	
3	15	.43	1.1	954.94	305	248	253	48	91	82	4	9.3	
4	20	.51	1.3	958.15	311	250	254	49	~~98~~	83	4.5	9.5	
5	25	.43	1.1	961.15	310	249	254	49	94	83	4	9.5	Stop Test 08:20 Change Port
4-1	30	.46	1.2	964.34	301	251	249	55	92	84	4.5	9.7	New V=961.26 Δ=.11 Restart 08:23
2	35	.53	1.4	967.67	300	251	254	53	94	86	4.5	9.5	
3	40	.49	1.3	970.90	298	251	252	53	96	86	4.5	9.7	
4	45	.45	1.2	974.02	298	249	250	55	96	86	4.5	9.3	
5	50	.43	1.1	976.98	297	249	253	57	96	87	4	9.6	Stop Test 08:48 Change Port
3-1	55	.34	.88	979.67	296	251	252	54	92	87	3.5	9.7	New V=977.08 Δ=.10 Restart 08:50
2	60	.50	1.3	982.81	295	251	248	46	95	87	4.5	9.5	
3	65	.52	1.4	986.170	295	250	261	47	97	88	4.5	9.7	
	Total	*8.8639	15.5800	79.330	3905					2306			
	Average	.6939	1.2552		297.4000				91.9800				

*Sum of square roots.

Circle correct bracketed units on data sheet.

Subtract .43 From Total V.

QA/QC KaK
Date 9-18-08

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 1

FIELD DATA SHEET

Client Wheelabrator	Project No. 10455
Plant S. Broward	Date 9-18-08
Meter Operator K.K.	
Probe Operator K.K.	

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] 986.170	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)~~ O2	Notes
3-4	70	.49	1.3	989.42	295	248	252	50	98	~~88~~	~~4.5~~	~~9.5~~	Stop Test @ 9:15 Change Port
5	75	.48	1.2	992.65	295	251	247	51	98	89	~~4.5~~ 4.7	~~9.7~~ 9.5	New V=992.78 ΔV=3.13 Restart 9:18
2-1	80	.57	1.5	996.20	294	251	248	59	95	~~88~~	5 ~~4.6~~	9.6 KK	
2	85	.58	1.5	999.67	295	248	253	56	98	90	5 ~~4.8~~ KK	9.8	
3	90	.54	1.4	1003.15	294	251	253	57	99	90	5	8.9	
4	95	.55	1.4	1006.62	295	251	246	59	100	91	5	9.6	
5	100	.45	1.1	1009.50	294	251	253	61	100	91	4.5	9.6	Stop Test @ 9:43 Change Port
1-1	105	.50	1.3	1012.80	293	250	254	64	98	92	4.5	9.8	New V=1009.91 ΔV=.09 Restart 9:46
2	110	.40	1.0	1015.67	292	251	254	50	100	92	4.	9.8	
3	115	.56	1.5	1019.13	292	250	247	52	102	93	5	9.0	
4	120	.46	1.2	1022.26	293	250	246	52	104	94	4.5	9.3	
5	125	.52	1.4	1025.640	298	249	249	53	106	96	5	9.0	
	Total	*8.5439	15.8000		3530					2293			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KK

Date 9-[illegible]-08

CleanAir ENGINEERING

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

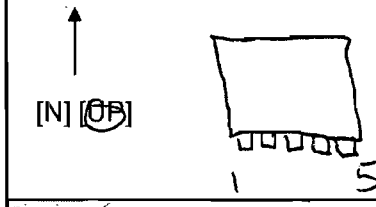
Mercury

UNIT: 3 **RUN:** 2

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: S. Broward	Date: 9-18-08
Meter Operator: K. Kirchner	
Probe Operator: " "	

Cross-Section of Test Location



Amb. Temp. (°F): 87	Bar. Press.: 29.95	[in. Hg] [mbar]
Probe I.D. No.:	67-8-20	
Liner Material:	Glass	

Meter Box: 66-13	Sample Box No.: 6-M	
Meter Y_d: 0.9860	Meter $\Delta H_@$: 1.8221	
K Factor: 2.6	Pitot C_p: .84	
Leak Rate Before: .003 [cfm] [Lpm] @ 14 (in. Hg)		
Leak Rate After: .003 [cfm] [Lpm] @ 8 (in. Hg)		
Pitot Leak Check Before: ☑ After: Good ☑ Bad ☐		

Filter No.:	N9	
Thimble No.:	N9	
Nozzle Diameter: .265	Nozzle I.D.:	67-265-1

Duct Dimensions (in.)			
Static Pres ($in. H_2O$)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.8	10		

Start Time: 10:27	Stop Time: 12:41

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] 27.300	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. Tx (°F)~~ O²	Notes
5-1	5	.47	1.2	30.35	295	248	251	66	100	97	3.5	9.2	
2	10	.42	1.1	33.40	296	251	249	53	101	97	3.5	9.6	
3	15	.45	1.2	36.47	294	249	255	48	103	98	3.5	9.9	
4	20	.51	1.3	39.67	295	251	252	49	104	98	4	10.0	
5	29	.38	.99	42.50	295	252	254	50	104	97	3.5	9.7	Stop Test 10:52 Change Port New Vm 42.59 ΔV=.09 Restart 10:54
4-1	30	.57	1.5	46.06	295	250	257	56	102	97	4.5	9.9	
2	35	.47	1.2	49.22	294	251	258	53	104	97	4	10.2	
3	40	.55	1.4	52.55	295	252	248	56	105	98	4.5	10.3	
4	45	.55	1.4	55.87	296	249	253	56	104	97	4.5	10.1	
5	50	.46	1.2	58.98	296	251	254	57	104	97	4	10.1	Stop Test 11:19 Change Port
3-1	55	.38	.99	61.83	296	248	248	51	100	96	3.5	10.3	New Vm 59.14 ΔV=.06 Restart 11:21
2	60	.59	1.5	65.28	296	250	250	50	102	96	4.5	10.4	
3	65	.60	1.6	68.820	294	249	252	50	103	96	4.5	10.2	
	Total	*9.0962	16.5800	~~81.660~~ SB	3837					2597			
	Average	.7161	1.3352	81.56	295.1200				99.4600				

*Sum of square roots. Subtract .38 From Total V. Circle correct bracketed units on data sheet.

QA/QC KAK
Date 9-18-08

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 2

FIELD DATA SHEET

Client Wheelabrator	Project No. 10455
Plant S. Broward	Date 9-18-08
Meter Operator K.K	
Probe Operator K.K	

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 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L] 68.820	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_r (°F)	Notes
3-4	70	.54	1.4	72.18	296	249	248	52	104	96	4.5	10.4	
5	75	.53	1.4	75.55	291	248	251	54	104	97	4.5	11.3	Stop Test 11:46 Change Port
2-1	80	.63	1.6	79.28	297	251	255	61	100	96	4.5	11.6	New Vi: 75.69 ΔV=.14 Restart 11:48
2	85	.60	1.6	82.84	295	252	251	56	102	96	4.5	9.6	
3	90	.54	1.4	86.19	299	252	252	57	103	96	4.5	9.5	
4	95	.55	1.4	89.50	294	249	253	57	103	96	4.5	9.6	
5	100	.48	1.2	92.60	295	250	255	56	102	96	4	9.7	Stop Test 12:14 Change Port
1-1	105	.59	1.5	96.19	294	252	252	61	99	95	4.5	9.7	New Vi: 92.69 ΔV=.09 Restart 12:16
2	110	.60	1.6	99.77	295	251	253	60	102	95	5	10.5	
3	115	.49	1.3	103.03	295	248	250	60	103	95	4.5	10.0	
4	120	.49	1.3	106.29	295	251	246	62	103	96	4.5	9.9	
5	125	.44	1.1	109.340	295	252	245	64	102	95	4	10.3	
	Total	*8.8665	16.8000		3541					2376			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KJK

Date 9-18-08

CleanAir ENGINEERING

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

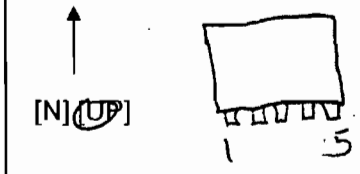
UNIT: 3 **RUN:** 3

FIELD DATA SHEET

Mercury

Client	Wheelabrator
Plant	S. Broward
Meter Operator	K. Kirchner
Probe Operator	" "
Project No.	10445
Date	9-18-08

Cross-Section of Test Location



Amb. Temp. (°F)	90
Bar. Press.	29.95 (in. Hg) [mbar]
Probe I.D. No.	67-8-20
Liner Material	Glass

Meter Box	66-13	Sample Box No.	66M1
Meter Y_d	0.98600	Meter $\Delta H_@$	1.8221
K Factor	2.6	Pitot C_p	.84
Leak Rate Before	.002 (cfm) [Lpm]	@	11 (in. Hg)
Leak Rate After	.002 (cfm) [Lpm]	@	9 (in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑	Bad ☐	

Filter No.	NA	
Thimble No.	NA	
Nozzle Diameter	.265	Nozzle I.D. 67-265-1

Duct Dimensions (in.) 96x96

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow (In) [Out] of page	First point all the way (In) [Out]
-9.8	10		

Start Time:	13:01	Stop Time:	15:15

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] 111.200	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) 0²	Notes
5-1	5	.48	1.2	114.30	295	250	257	65	94	93	3.5	10.0	
2	10	.40	1.0	116.58	294	248	258	57	96	93	3	9.2	
3	15	.40	1.0	119.85	294	250	256	59	97	93	3	9.8	
4	20	.47	1.2	123.05	295	251	249	51	98	93	3.5	9.6	
5	25	.42	1.1	126.02	296	248	250	48	98	92	3	9.7	Stop Test 13:26 Change Port
4-1	30	.46	1.2	129.24	295	249	253	54	96	92	3.5	9.5	New V=126.14 ΔV=.12 Restart 13:28
2	35	.50	1.3	132.47	296	250	256	53	98	92	3.5	9.5	
3	40	.51	1.3	135.68	295	249	249	54	100	92	3.5	9.7	
4	45	.54	1.4	139.06	295	251	252	55	100	93	4	9.6	
5	50	.43	1.1	142.05	295	249	248	59	100	92	3.5	9.6	Stop Test 13:53 Change Port
3-1	55	.46	1.2	145.22	295	249	250	64	97	92	3.5	9.5	New V=142.17 ΔV=.12 Restart 13:55
2	60	.51	1.3	148.50	295	249	255	52	99	93	4	9.4	
3	65	.46	1.2	151.610	295	252	249	47	101	93	3.5	9.0	
	Total	*8.8521	15.5000	80.950	3835					2477			
	Average	.7098	1.3080		295.3600					96.9800			

*Sum of square roots.

Subtract .51 From Total V.

Circle correct bracketed units on data sheet.

QA/QC KGK

Date 9-18-08

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 3

FIELD DATA SHEET

Client Wheelabrator	Project No. 10445
Plant S. Broward	Date 9-18-08
Meter Operator	K.K.
Probe Operator	K.K.

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)~~ O_2	Notes
	5			151.610		250	250						
3-4	70	.49	1.3	154.83	295	251	249	47	101	93	4	9.8	
5	75	.42	1.1	157.91	296	250	248	50	102	94	3.5	9.2	Stop Test 14:20 Change Port
2-1	80	.64	1.7	161.81	298	252	250	58	99	94	4.5	9.5	New V=158.02 ΔV=.11 Restart 14:27
2	85	.61	1.6	165.38	296	252	249	56	103	94	4.5	9.5	
3	90	.58	1.5	168.87	296	251	255	57	104	95	4.5	8.9	
4	95	.57	1.5	172.33	296	248	251	53	104	95	4.5	9.8	
5	100	.55	1.4	175.68	295	251	243	47	104	96	4	9.7	Stop Test 14:47 Change Port
1-1	105	.59	1.5	179.27	295	252	252	53	101	95	4.5	9.7	New V=175.84 ΔV=.16 Restart 14:50
2	110	.57	1.5	182.68	294	254	256	52	103	96	4.5	9.5	
3	115	.54	1.4	186.02	296	250	249	53	104	96	4.5	9.7	
4	120	.48	1.2	189.15	296	249	254	55	104	96	4	10.0	
5	125	.57	1.5	192.660	296	251	249	56	103	96	4.5	10.2	
	Total	*8.8930	17.2000		3549					2372			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KAK

Date 9/18/08

CleanAir ENGINEERING

Impinger Weight Sheet

Client	WHEELABRATOR			Unit Name / Location	3
Plant	SOUTH BROWARD	Job No.	13455	Method	29

Run No.	1	Filter Type	QUARTZ	—	Sample Box No.	M1
Date	9/18	Lot No.	55287	—	pH	—
Analyst	TR	Filter No.	—	—	Rinse	—

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	768.1	444.7	322.4	
Impinger 2	5% HNO_3 10% H_2O_2	621.0	541.3	79.7	QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	561.8	549.6	12.2	Date
Impinger 4	EMPTY	529.6	526.3	3.3	
Impinger 5	4% $KMNO_4$ 10% H_2SO_4	571.3	567.0	4.3	Total Weight (gm)
Impinger 6	4% $KMNO_4$ 10% H_2SO_4	533.2	531.9	1.3	423.2
Impinger 7	SILICA GEL	734.1	716.7	17.4	440.6

Run No.	2	Filter Type	QUARTZ	—	Sample Box No.	M9
Date	9/18	Lot No.	55287	—	pH	
Analyst	TR	Filter No.	—	—	Rinse	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	768.1	439.8		
Impinger 2	5% HNO_3 10% H_2O_2	615.1	542.8		QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	560.3	550.3		Date
Impinger 4	EMPTY	440.9	439.2		
Impinger 5	4% $KMNO_4$ 10% H_2SO_4	527.6	525.0		Total Weight (gm)
Impinger 6	4% $KMNO_4$ 10% H_2SO_4	542.6	543.2		
Impinger 7	SILICA GEL	709.5	693.2		

Run No.	3	Filter Type	QUARTZ	—	Sample Box No.	
Date	9/18	Lot No.	55287	—	pH	—
Analyst	TR	Filter No.	—	—	Rinse	—

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	796.5	444.8		
Impinger 2	5% HNO_3 10% H_2O_2	626.3	545.7		QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	559.2	552.9		Date
Impinger 4	EMPTY	527.3	525.7		
Impinger 5	4% $KMNO_4$ 10% H_2SO_4	568.0	566.0		Total Weight (gm)
Impinger 6	4% $KMNO_4$ 10% H_2SO_4	532.4	532.0		
Impinger 7	SILICA GEL	733.0	717.5		

CleanAir. ENGINEERING

QA/QC SR
Date 10/14

ORSAT READINGS

TEST LOCATION: OUTLET **PAGE** 1 **OF** 1

Client	WHEELABRATOR	Project Number	10455	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	SOUTH BROWARD	Unit	3	
Orsat ID	12	Fuel Type	MSW	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	9.4	19.0	9.6	1.20	TR	9/18	1130
		2	9.4	19.0	9.6				
		3	9.4	19.0	9.6				
		Avg.							
2	29	1	9.0	19.0	10.0	1.21	TR	9/18	1400
		2	9.0	19.0	10.0				
		3	9.0	19.0	10.0				
		Avg.							
3	29	1	9.4	19.0	9.6	1.20	TR	9/18	1600
		2	9.4	19.0	9.6				
		3	9.4	19.0	9.6				
		Avg.							
		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 F_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_____
Date_____

CleanAir. ENGINEERING

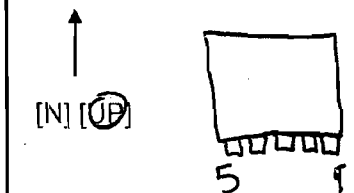
TEST LOCATION: Outlet **Mercury TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 3 **RUN:** 4

FIELD DATA SHEET

Client	Wheelabrator
Project No.	10455
Plant	S. Broward
Date	9-19-08
Meter Operator	K. Kirchner
Probe Operator	" "

Cross-Section of Test Location



Amb. Temp. (°F)	75
Bar. Press.	29.95 [in. Hg] [mbar]
Probe I.D. No.	67-8-20
Liner Material	Glass

Meter Box	66-13
Sample Box No.	66-M1
Meter Y_d	0.9860
Meter $\Delta H_@$	1.8221
K Factor	2.6
Pitot C_p	.84
Leak Rate Before	.003 [cfm] [Lpm] @ 12 (in. Hg)
Leak Rate After	.002 [cfm] [Lpm] @ 8 (in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐

Duct Dimensions (in.)	96x96		
Static Pres ($in. H_2O$)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.6	10		

Filter No.	NA		
Thimble No.	NA		
Nozzle Diameter ~~.267-1~~ .265		Nozzle I.D.	67-265-1

Start Time:	05:30	Stop Time:	07:43

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. 193.270 [ft³] [L]	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. Tt (°F)~~ 02	Notes
5-1	5	.48	1.2	196.37	297	250	254	65	80	79	3	10.0	
2	10	.41	1.1	199.30	296	252	252	51	81	78	3	9.9	
3	15	.46	1.2	202.38	296	250	252	47	84	79	3.5	10.0	
4	20	.47	1.2	205.44	297	251	252	46	86	79	3.5	9.5	
5	25	.43	1.1	208.41	295	250	252	49	88	80	3	9.8	Stop Test 05:55 Change Port
4-1	30	.49	1.3	211.73	295	251	254	56	87	81	3.5	9.9	New V=208.54 ΔV=.13 Restart 05:57
2	35	.50	1.3	214.90	297	251	253	56	90	81	3.5	9.5	
3	40	.43	1.1	217.89	295	248	248	55	90	81	3.5	9.9	
4	45	.46	1.2	220.94	296	250	250	56	91	82	3.5	9.7	
5	50	.37	.96	223.67	296	249	251	57	91	82	3	9.1	Stop Test 06:22 Change Port
3-1	55	.34	.88	226.45	296	249	256	63	89	83	3	9.8	New V=223.80 ΔV=.13 Restart 06:24
2	60	.55	1.4	229.81	296	250	256	60	91	83	4	10.0	
3	65	.44	1.1	232.770	296	250	253	47	93	84	3.5	9.0	
	Total	*8.6901	15.0400	~~80~~ 75.040	3848					2193			
	Average	.6659	1.1444		295.8800					86.5800			

* Sum of square roots.

Subtract .49 From Total V.

Circle correct bracketed units on data sheet.

QA/QC KJK

Date 9-18-08

%I = 100.1

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 4

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: S. Broward	Date: 9-18-08
Meter Operator: K.K.	
Probe Operator: K.K.	

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 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L] 232.770	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
3-4	70	.41	1.1	235.68	295	249	245	45	92	84	3.5	8.8	
5	75	.40	1.0	238.51	296	251	258	44	93	85	3	9.7	Stop Test 06:14 Change Port
4-1	80	.42	1.1	241.54	296	251	246	54	90	85	3.5	9.0	New V=238.62 ΔV=.11 Restart 18:31
2	85	.48	1.2	244.58	296	250	249	51	92	85	3.5	9.1	
3	90	.48	1.2	247.67	296	249	255	53	93	85	3.5	9.3	
4	95	.46	1.2	250.76	296	251	247	53	93	86	3.5	9.3	
5	100	.35	.91	253.44	296	251	252	55	94	86	3	8.8	Stop Test 07:16 Change Port
1-1	105	.51	1.3	256.79	296	250	251	62	91	86	4	9.8	New V=253.56 ΔV=.12 Restart 07:18
2	110	.51	1.3	260.04	296	249	258	61	93	86	4	8.9	
3	115	.33	.86	262.64	294	250	251	63	93	86	3	9.1	
4	120	.47	1.2	265.71	296	248	255	65	93	87	3.5	8.7	
5	125	.48	1.2	268.800	296	248	250	59	93	86	3.5	8.9	
	Total	*2.9575	1.3700		3549					2136			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KaK

Date 9-18-08

CleanAir ENGINEERING

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

Mercury

UNIT: 3 **RUN:** 5

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: S. Broward	Date: 9-18-08
Meter Operator:	K. Kirchner
Probe Operator:	" "

Meter Box: 66-13	Sample Box No.: 66-M9
Meter Y_d: 0.9860	Meter $\Delta H_@$: 1.8221
K Factor: 2.6	Pitot C_p: .84
Leak Rate Before: .003 (cfm) [Lpm] @ 12 (in. Hg)	
Leak Rate After: .003 (cfm) [Lpm] @ 8 (in. Hg)	
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐

Cross-Section of Test Location

Duct Dimensions (in.)	96x96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow (In) [Out] of page	First point all the way (In) [Out]
-9.9	10		

Amb. Temp. (°F): 81	Bar. Press.: 29.95 [in. Hg] [mbar]
Probe I.D. No.:	67-8-20
Liner Material:	Glass

Filter No.: N9		
Thimble No.: N9		
Nozzle Diameter: .265	Nozzle I.D.:	67-265-1

Start Time: 08:00	Stop Time: 10:13

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] 269.560	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_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in.Hg)	~~XAD Trap Temp. Tt (°F)~~ O_2	Notes
5-1	5	.47	1.2	272.69	297	249	251	66	86	85	4	9.4	
2	10	.46	1.2	275.77	296	251	263	49	89	85	4	9.4	
3	15	.39	1.0	278.58	295	251	255	43	91	85	4	8.6	
4	20	.39	1.0	281.43	296	250	251	42	92	85	4	9.3	
5	25	.41	1.1	284.41	296	252	249	42	92	85	4	9.6	Stop Test 08:25 Change Port
4-1	30	.45	1.2	287.63	296	250	251	47	90	86	4	9.1	New V=284.55 ΔV=.14 Restart 08:27
2	35	.44	1.1	290.57	296	248	249	44	92	86	4	8.9	
3	40	.45	1.2	293.69	296	250	251	46	93	86	4.5	9.1	
4	45	.43	1.1	296.66	297	249	254	48	94	86	4	8.9	
5	50	.40	1.0	299.49	296	248	249	50	94	87	4	9.1	Stop Test 08:52 Change Port
3-1	55	.39	1.0	302.40	296	249	248	60	91	86	4	9.4	New V=299.60 ΔV=.11 Restart 08:54
2	60	.44	1.1	305.30	296	249	252	59	94	87	4	9.5	
3	65	.46	1.2	308.410	297	250	249	60	94	87	4.5	8.8	
	Total	*8.5123	14.4000	77.870	3850					2308			
	Average	.6814	1.2120		296.0400				91.3200				

*Sum of square roots.

Subtract .47 From Total V.

Circle correct bracketed units on data sheet.

QA/QC KgK
Date 9-18-08

0.1=10%

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 5

FIELD DATA SHEET

Client Wheelabrator	Project No. 10455
Plant S. Broward	Date 9-18-08
Meter Operator K.K.	
Probe Operator K.K.	

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] 308.410	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)~~ 0°C	Notes
						250	250						
3-4	70	.41	1.1	311.41	296	248	251	52	94	87	4.5	9.2	
5	75	.40	1.0	314.23	295	251	251	44	95	88	4	9.5	Stop Test 09:19 Change Port
2-1	80	.60	1.6	317.92	297	248	254	49	93	88	5.5	9.4	New V=314.34 ΔV=.11 Restart 09:21
2	85	.57	1.5	321.40	296	249	250	46	96	88	5.5	9.9	
3	90	.54	1.4	324.77	296	252	247	47	97	88	5.5	9.9	
4	95	.54	1.4	328.13	298	251	252	48	97	89	5.5	9.6	
5	100	.49	1.3	331.34	296	248	249	50	99	90	5	9.6	Stop Test 09:46 Change Port
1-1	105	.57	1.5	334.89	295	251	251	54	98	91	5.5	9.9	New V=331.44 ΔV=.10 Restart 09:48
2	110	.51	1.3	338.18	296	252	252	49	100	91	5	10.0	
3	115	.56	1.5	341.66	295	250	252	50	102	93	5.5	10.0	
4	120	.43	1.1	344.74	296	251	249	51	103	94	5	9.4	
5	125	.46	1.2	347.900	295	250	251	53	103	94	5	9.0	
	Total	*8.5235	15.9000		3551					2258			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KAK

Date 9-18-08

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 6

FIELD DATA SHEET

Client	Wheelabrator
Plant	S. Broward
Meter Operator	K. Kirchner
Probe Operator	" "
Project No.	10455
Date	9-18-08

Meter Box	66-13
Meter Y_d	0.9860
K Factor	2.6
Leak Rate Before	.003 (cfm) [Lpm] @ 11 (in. Hg)
Leak Rate After	.002 (cfm) [Lpm] @ 8 (in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐
Sample Box No.	66-M1
Meter $\Delta H_@$	1.8221
Pitot C_p	.84

Cross-Section of Test Location

Duct Dimensions (in.)	96x96		
Static Pres ($in. H_2O$)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.9	10		

Amb. Temp. (°F)	87
Bar. Press.	29.95 [in. Hg] [mbar]
Probe I.D. No.	67-8-20
Liner Material	Glass

Filter No.	NA	
Thimble No.	NA	
Nozzle Diameter	.265	Nozzle I.D. 67-265-1

Start Time:	10:28
Stop Time:	12:40

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] 348.650	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)~~ O_2	Notes
5-1	5	.56	1.5	352.15	297	250	251	66	96	95	4	9.3	
2	10	.56	1.5	355.58	297	248	252	50	99	94	4	9.2	~~Stop Test Change Port New V= Restart~~
3	15	.46	1.2	358.76	296	252	251	47	102	95	4	9.3	
4	20	.51	1.3	362.02	296	249	250	48	102	96	4	9.5	
5	25	.45	1.2	365.13	295	249	248	50	103	96	4	9.3	Stop Test 10:53 Change Port New V=365.22 ΔV=.09 Restart 10:55
4-1	30	.62	1.6	368.80	297	250	250	57	100	95	4.5	9.6	
2	35	.52	1.4	372.19	296	252	251	54	102	96	4.5	9.5	
3	40	.49	1.3	375.48	297	250	249	56	103	96	4	8.9	
4	45	.46	1.2	378.60	296	248	251	57	102	96	4	9.4	
5	50	.42	1.1	381.59	296	250	249	59	102	96	4	10.3	
3-1	55	.40	1.0	384.55	296	249	250	66	100	95	3.5	10.0	Stop Test 11:20 Change Port
2	60	.52	1.4	387.91	298	250	249	56	101	95	4.5	8.8	New V=381.68 ΔV=.09 Restart 11:21
3	65	.44	1.1	390.900	297	249	252	46	103	96	4	8.9	
	Total	9.1116	16.8000	(80.860)	3854					2556			
	Average	(.7047)	1.2960		(296.4800)				(99.1200)				

*Sum of square roots. Subtract .41 From Total V. Circle correct bracketed units on data sheet.

QA/QC KAK
Date 9-18-08

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 6

FIELD DATA SHEET

Client Wheelabrator	Project No. 10455
Plant S. Broward	Date 9-18-08
Meter Operator	K.K
Probe Operator	K.K

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. 390.900 [L]	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)~~ °C	Notes
3-4	70	.45	1.2	393.96	297	251	250	48	103	96	4	8.6	
5	75	.43	1.1	396.92	297	249	249	51	104	96	4	9.5	Stop Test 11:46 Change Port
2-1	80	.51	1.3	400.27	297	248	250	59	101	96	4	9.8	New V=397.05 ΔV=.13 Restart 11:48
2	85	.55	1.4	403.61	296	249	250	57	104	97	4.5	9.1	
3	90	.49	1.3	406.89	297	252	250	59	104	96	4.5	8.8	
4	95	.53	1.4	410.22	298	249	251	58	103	96	4.5	9.0	
5	100	.48	1.2	413.35	296	251	248	51	104	97	4	8.9	Stop Test 12:17 Change Port
1-1	105	.59	1.5	416.98	297	251	248	54	102	97	4.5	9.5	New V=413.45 ΔV=.10 Restart 12:19
2	110	.49	1.3	420.24	295	251	250	53	104	97	4.5	9.0	
3	115	.47	1.2	423.31	295	252	250	55	104	97	4	9.1	
4	120	.51	1.3	426.54	296	251	250	57	104	97	4.5	9.3	
5	125	.54	1.4	429.920	297	249	250	59	104	97	4.5	9.2	
	Total	*8.5058	15.6000		3558					2400			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC IGK

Date 9-[illegible]-08

CleanAir ENGINEERING

Impinger Weight Sheet

Client	WHEELABRATOR			Unit Name/ Location	UNIT 2 3 (SB)
Plant	BROWARD SOUTH	Job No	10455	Method	29

Run No	4	Filter Type	QUARTZ	—		Sample Box No	M1
Date	9/19	Lot No	55287	—		pH	—
Analyst	TR	Filter No	—	—		Rinse	—

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	664.8	444.5	220.3	
Impinger 2	5% HNO_3 10% H_2O_2	693.6	554.2	139.4	QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	588.2	551.4	36.8	Date
Impinger 4	EMPTY	532.4	525.7	6.7	
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	570.0	566.7	3.3	Total Weight (gm)
Impinger 6	4% $KMnO_4$ 10% H_2O_2	535.8	533.4	3.4	409.9
Impinger 7	SILICA GEL	757.0	741.3	15.7	425.6

Run No	5	Filter Type	QUARTZ	—		Sample Box No	M9
Date	9/19	Lot No	55287	—		pH	—
Analyst	TR	Filter No	—	—		Rinse	—

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	786.5	444.2	342.3	
Impinger 2	5% HNO_3 10% H_2O_2	625.5	542.2	83.3	QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	549.7	542.6	7.1	Date
Impinger 4	EMPTY	440.0	438.8	1.2	
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	526.4	526.2	0.2	Total Weight (gm)
Impinger 6	4% $KMnO_4$ 10% H_2SO_4	542.8	542.0	0.8	434.9
Impinger 7	SILICA GEL	589.6	574.8	14.8	449.7

Run No	6	Filter Type	QUARTZ	—		Sample Box No	M1
Date	9/19	Lot No	55287	—		pH	—
Analyst		Filter No	—	—		Rinse	—

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	778.9	445.6	333.3	
Impinger 2	5% HNO_3 10% H_2O_2	618.4	548.0	70.4	QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	561.2	554.2	7.0	Date
Impinger 4	EMPTY	526.8	526.1	0.7	
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	572.5	569.8	2.7	Total Weight (gm)
Impinger 6	4% $KMnO_4$ 10% H_2SO_4	538.5	537.4	1.1	415.2
Impinger 7	SILICA GEL	763.2	748.8	14.4	429.6

CleanAir. ENGINEERING

QA/QC SB
Date 10/14

ORSAT READINGS

TEST LOCATION: OUTLET **PAGE** 1 **OF** 1

Client	WHEELABRATOR	Project Number	10456	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	BROWARD SOUTH	Unit	3	
Orsat ID	12	Fuel Type	MSW	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
4	29	1	9.6	19.0	9.4	1.20	TR	9/19	9:05
		2	9.6	19.0	9.4				
		3	9.6	19.0	9.4				
		Avg.							
5	29	1	9.4	19.0	9.6	1.20	TR	9/19	11:00
		2	9.4	19.0	9.6				
		3	9.4	19.0	9.6				
		Avg.							
6	29	1	9.6	19.0	9.4	1.20	TR	9/19	1345
		2	9.6	19.0	9.4				
		3	9.6	19.0	9.4				
		Avg.							
		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 F_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

FDS003-Orsat.xls July 2008

QA/QC_____
Date_____

CleanAir ENGINEERING

FIELD DATA PRINTOUTS

F

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Field Data Printout

Test Method: **USEPA Method 29**
Analyte: **Mercury**

Location: Unit 3 Outlet
Test Run: 1
Client: Wheelabrator South Broward, Inc.
Project No: 10455
Source Area (ft^2): 64.00000
Meter Operator: K. Kirchner 384
Probe Operator: K. Kirchner 384
Test Date: 9/18/08
Start Time: 07:55
Stop Time: 10:11
Leak Rate Before: 0.003 cfm @ 13 "Hg
Leak Rate After: 0.003 cfm @ 8 "Hg

Bar. Press. (in. Hg): 29.95
Static P: -9.7
O_2 (dry volume %): 9.60
CO_2 (dry volume %): 9.40
N_2+CO (dry volume %): 81.00
H_2O (condensate, ml or gm): 423.2
H_2O (silica, g): 17.4
Actual Moisture (%): 21.64

Nozzle ID No: 67-265-1
Nozzle Diameter (D_n): 0.265
Probe ID No: 67-8-20
Pitot C_p: 0.84
Pitot Leak Check: ☑Pass ☐Fail
Meter Box ID. No: 66-13
Meter ΔH@: 1.82210
Meter Y_d: 0.98600

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			945.880						
5-01	5.0	0.44	1.10	948.920	300	83	81	0.66	3.04	103.2
5-02	10.0	0.45	1.20	951.970	299	87	81	0.67	3.05	102.0
5-03	15.0	0.43	1.10	954.940	305	91	82	0.66	2.97	101.5
5-04	20.0	0.51	1.30	958.150	311	92	83	0.71	3.21	101.0
5-05	25.0	0.43	1.10	961.150	310	94	83	0.66	3.00	102.5
LEAK CHECK	25.0			961.260						
4-01	30.0	0.46	1.20	964.340	301	92	84	0.68	3.08	101.2
4-02	35.0	0.53	1.40	967.670	300	94	86	0.73	3.33	101.6
4-03	40.0	0.49	1.30	970.900	298	96	86	0.70	3.23	102.1
4-04	45.0	0.45	1.20	974.020	298	96	86	0.67	3.12	102.9
4-05	50.0	0.43	1.10	976.980	297	96	87	0.66	2.96	99.7
LEAK CHECK	50.0			977.080						
3-01	55.0	0.34	0.88	979.670	296	92	87	0.58	2.59	98.3
3-02	60.0	0.50	1.30	982.810	295	95	87	0.71	3.14	98.1
3-03	65.0	0.52	1.40	986.170	295	97	88	0.72	3.36	102.7
3-04	70.0	0.49	1.30	989.420	295	98	88	0.70	3.25	102.2
3-05	75.0	0.48	1.20	992.650	295	98	89	0.69	3.23	102.5
LEAK CHECK	75.0			992.780						
2-01	80.0	0.57	1.50	996.200	294	95	89	0.75	3.42	99.9
2-02	85.0	0.58	1.50	999.670	295	98	90	0.76	3.47	100.1
2-03	90.0	0.54	1.40	1003.150	294	99	90	0.73	3.48	103.9
2-04	95.0	0.55	1.40	1006.620	295	100	91	0.74	3.47	102.5
2-05	100.0	0.45	1.10	1009.500	294	100	91	0.67	2.88	94.0
LEAK CHECK	100.0			1009.590						
1-01	105.0	0.50	1.30	1012.800	293	98	92	0.71	3.21	99.4
1-02	110.0	0.40	1.00	1015.670	292	100	92	0.63	2.87	99.1
1-03	115.0	0.56	1.50	1019.130	292	102	93	0.75	3.46	100.8
1-04	120.0	0.46	1.20	1022.260	293	104	94	0.68	3.13	100.3
1-05	125.0	0.52	1.40	1025.640	298	106	96	0.72	3.38	101.9
Final	125.0		1.25520	79.33000	297.40000	91.98000		0.69391	79.33000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6939	1.2552	79.3300	297.4000	91.9800				
		☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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Field Data Printout

Test Method: **USEPA Method 29**
Analyte: **Mercury**

Location: Unit 3 Outlet
Test Run: 2
Client: Wheelabrator South Broward, Inc.
Project No: 10455
Source Area (ft^2): 64.00000

Meter Operator:	K. Kirchner	384
Probe Operator:	K. Kirchner	384

Test Date: 9/18/08
Start Time: 10:27
Stop Time: 12:41

Leak Rate Before:	0.003	cfm	@ 14 "Hg
Leak Rate After:	0.003	cfm	@ 8 "Hg

Bar. Press. (in. Hg): 29.95
Static P: -9.8
O_2 (dry volume %): 10.00
CO_2 (dry volume %): 9.00
N_2+CO (dry volume %): 81.00

H_2O (condensate, ml or gm): 414.3
H_2O (silica, g): 16.3
Actual Moisture (%): 21.01

Nozzle ID No: 67-265-1
Nozzle Diameter (D_n): 0.265
Probe ID No: 67-8-20
Pitot C_p: 0.84
Pitot Leak Check: ☑Pass ☐Fail

Meter Box ID. No: 66-13
Meter ΔH@: 1.82210
Meter Y_d: 0.98600

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			27.300						
5-01	5.0	0.47	1.20	30.350	295	100	97	0.69	3.05	96.2
5-02	10.0	0.42	1.10	33.400	296	101	97	0.65	3.05	101.8
5-03	15.0	0.45	1.20	36.470	294	103	98	0.67	3.07	98.6
5-04	20.0	0.51	1.30	39.670	295	104	98	0.71	3.20	96.5
5-05	25.0	0.38	0.99	42.500	295	104	97	0.62	2.83	98.9
LEAK CHECK	25.0			42.590						
4-01	30.0	0.57	1.50	46.060	295	102	97	0.75	3.47	99.3
4-02	35.0	0.47	1.20	49.220	294	104	97	0.69	3.16	99.3
4-03	40.0	0.55	1.40	52.550	295	105	98	0.74	3.33	96.7
4-04	45.0	0.55	1.40	55.870	296	104	97	0.74	3.32	96.6
4-05	50.0	0.46	1.20	58.980	296	104	97	0.68	3.11	98.9
LEAK CHECK	50.0			59.140						
3-01	55.0	0.38	0.99	61.830	296	100	96	0.62	2.69	94.5
3-02	60.0	0.59	1.50	65.280	296	102	96	0.77	3.45	97.2
3-03	65.0	0.60	1.60	68.820	294	103	96	0.77	3.54	98.7
3-04	70.0	0.54	1.40	72.180	296	104	96	0.73	3.36	98.8
3-05	75.0	0.53	1.40	75.550	291	104	97	0.73	3.37	99.6
LEAK CHECK	75.0			75.690						
2-01	80.0	0.63	1.60	79.280	297	100	96	0.79	3.59	98.1
2-02	85.0	0.60	1.60	82.840	295	102	96	0.77	3.56	99.4
2-03	90.0	0.54	1.40	86.190	299	103	96	0.73	3.35	98.7
2-04	95.0	0.55	1.40	89.500	294	103	96	0.74	3.31	96.4
2-05	100.0	0.48	1.20	92.600	295	102	96	0.69	3.10	96.7
LEAK CHECK	100.0			92.690						
1-01	105.0	0.59	1.50	96.190	294	99	95	0.77	3.50	98.8
1-02	110.0	0.60	1.60	99.770	295	102	95	0.77	3.58	100.1
1-03	115.0	0.49	1.30	103.030	295	103	95	0.70	3.26	100.7
1-04	120.0	0.49	1.30	106.290	295	103	96	0.70	3.26	100.6
1-05	125.0	0.44	1.10	109.340	295	102	95	0.66	3.05	99.4
Final	125.0		1.33520	81.56000	295.12000	99.46000		0.71611	81.56000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7161	1.3352	81.5600	295.1200	99.4600				
		☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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Field Data Printout

Test Method: **USEPA Method 29**
Analyte: **Mercury**

Location: Unit 3 Outlet
Test Run: 3
Client: Wheelabrator South Broward, Inc.
Project No: 10455
Source Area (ft^2): 64.00000

Meter Operator:	K. Kirchner	384
Probe Operator:	K. Kirchner	384

Test Date: 9/18/08
Start Time: 13:01
Stop Time: 15:15
Leak Rate Before: 0.002 cfm @ 11 "Hg
Leak Rate After: 0.002 cfm @ 9 "Hg

Bar. Press. (in. Hg): 29.95
Static P: -9.8
O_2 (dry volume %): 9.60
CO_2 (dry volume %): 9.40
N_2+CO (dry volume %): 81.00

H_2O (condensate, ml or gm): 442.6
H_2O (silica, g): 15.5
Actual Moisture (%): 22.11

Nozzle ID No: 67-265-1
Nozzle Diameter (D_n): 0.265
Probe ID No: 67-8-20
Pitot C_p: 0.84
Pitot Leak Check: ☑Pass ☐Fail

Meter Box ID. No: 66-13
Meter ΔH@: 1.82210
Meter Y_d: 0.98600

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			111.200						
5-01	5.0	0.48	1.20	114.300	295	94	93	0.69	3.10	98.9
5-02	10.0	0.40	1.00	116.580	294	96	93	0.63	2.28	79.4*
5-03	15.0	0.40	1.00	119.850	294	97	93	0.63	3.27	113.8*
5-04	20.0	0.47	1.20	123.050	295	98	93	0.69	3.20	102.8
5-05	25.0	0.42	1.10	126.020	296	98	92	0.65	2.97	101.0
LEAK CHECK	25.0			126.140						
4-01	30.0	0.46	1.20	129.240	295	96	92	0.68	3.10	100.9
4-02	35.0	0.50	1.30	132.470	296	98	92	0.71	3.23	100.8
4-03	40.0	0.51	1.30	135.680	295	100	92	0.71	3.21	98.9
4-04	45.0	0.54	1.40	139.060	295	100	93	0.73	3.38	101.1
4-05	50.0	0.43	1.10	142.050	295	100	92	0.66	2.99	100.3
LEAK CHECK	50.0			142.170						
3-01	55.0	0.46	1.20	145.220	295	97	92	0.68	3.05	99.2
3-02	60.0	0.51	1.30	148.500	295	99	93	0.71	3.28	101.1
3-03	65.0	0.46	1.20	151.610	295	101	93	0.68	3.11	100.7
3-04	70.0	0.49	1.30	154.830	295	101	93	0.70	3.22	101.0
3-05	75.0	0.42	1.10	157.910	296	102	94	0.65	3.08	104.2
LEAK CHECK	75.0			158.020						
2-01	80.0	0.64	1.70	161.810	298	99	94	0.80	3.79	104.5
2-02	85.0	0.61	1.60	165.380	296	103	94	0.78	3.57	100.3
2-03	90.0	0.58	1.50	168.870	296	104	95	0.76	3.49	100.3
2-04	95.0	0.57	1.50	172.330	296	104	95	0.75	3.46	100.3
2-05	100.0	0.55	1.40	175.680	295	104	96	0.74	3.35	98.7
LEAK CHECK	100.0			175.840						
1-01	105.0	0.59	1.50	179.270	295	101	95	0.77	3.43	97.9
1-02	110.0	0.57	1.50	182.680	294	103	96	0.75	3.41	98.7
1-03	115.0	0.54	1.40	186.020	296	104	96	0.73	3.34	99.4
1-04	120.0	0.48	1.20	189.150	296	104	96	0.69	3.13	98.7
1-05	125.0	0.57	1.50	192.660	296	103	96	0.75	3.51	101.8
Final	125.0		1.30800	80.95000	295.36000	96.98000		0.70980	80.95000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7098	1.3080	80.9500	295.3600	96.9800				
		☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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USEPA Method 4 Laboratory Data

Location: Unit 3 Outlet
Client: Wheelabrator South Broward, Inc.
Project No: 10455

Test Method: USEPA Method 29
Analyte: Mercury
Analyst: T. Richards
Analyst Emp No: 714

Test Run: 1

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	767.1	444.7	322.4
Impinger 2	5%HNO3/10%H2O2	621.0	541.3	79.7
Impinger 3	5%HNO3/10%H2O2	561.8	549.6	12.2
Impinger 4	Empty	529.6	526.3	3.3
Impinger 5	4%KMnO4/10%H2SO4	571.3	567.0	4.3
Impinger 6	4%KMnO4/10%H2SO4	533.2	531.9	1.3
Impinger 7	Silica Gel	734.1	716.7	17.4
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
423.2	Liquid (gm)		
0.0	less rinse (gm)		
423.2	Net Liquid (gm)	423.2	☑ QA/QC OK
+ 17.4	Silica Gel (gm)	17.4	☑ QA/QC OK
440.6	Total Vlc (gm)	440.6	☑ QA/QC OK

Test Run: 2

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	768.1	439.8	328.3
Impinger 2	5%HNO3/10%H2O2	615.1	542.8	72.3
Impinger 3	5%HNO3/10%H2O2	560.3	550.3	10.0
Impinger 4	Empty	440.9	439.2	1.7
Impinger 5	4%KMnO4/10%H2SO4	527.6	525.0	2.6
Impinger 6	4%KMnO4/10%H2SO4	542.6	543.2	-0.6
Impinger 7	Silica Gel	709.5	693.2	16.3
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
414.3	Liquid (gm)		
0.0	less rinse (gm)		
414.3	Net Liquid (gm)	414.3	☑ QA/QC OK
+ 16.3	Silica Gel (gm)	16.3	☑ QA/QC OK
430.6	Total Vlc (gm)	430.6	☑ QA/QC OK

Test Run: 3

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	796.5	444.8	351.7
Impinger 2	5%HNO3/10%H2O2	626.3	545.7	80.6
Impinger 3	5%HNO3/10%H2O2	559.2	552.9	6.3
Impinger 4	Empty	527.3	525.7	1.6
Impinger 5	4%KMnO4/10%H2SO4	568.0	566.0	2.0
Impinger 6	4%KMnO4/10%H2SO4	532.4	532.0	0.4
Impinger 7	Silica Gel	733.0	717.5	15.5
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
442.6	Liquid (gm)		
0.0	less rinse (gm)		
442.6	Net Liquid (gm)	442.6	☑ QA/QC OK
+ 15.5	Silica Gel (gm)	15.5	☑ QA/QC OK
458.1	Total Vlc (gm)	458.1	☑ 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 3 Outlet
Client: Wheelabrator South Broward, Inc.
Project No: 10455
Method: EPA Method 3
Fuel Type: Municipal Waste
F_o for Fuel: 1.03 to 1.3

Test Method: **USEPA Method 29**
Analyte: **Mercury**

Analyst: T. Richards
Analyst Emp No: 714

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	9.4	19.0	9.6	81.0	29.89		
	2	9.4	19.0	9.6	81.0	29.89		
	3	9.4	19.0	9.6	81.0	29.89		
	Avg.	9.40000		9.60000	81.00000	29.89	1.20213	*All measurements in spec.*
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	9.0	19.0	10.0	81.0	29.84		
	2	9.0	19.0	10.0	81.0	29.84		
	3	9.0	19.0	10.0	81.0	29.84		
	Avg.	9.00000		10.00000	81.00000	29.84	1.21111	*All measurements in spec.*
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	9.4	19.0	9.6	81.0	29.89		
	2	9.4	19.0	9.6	81.0	29.89		
	3	9.4	19.0	9.6	81.0	29.89		
	Avg.	9.40000		9.60000	81.00000	29.89	1.20213	*All measurements in spec.*
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 South Broward, Inc.
Clean Air Project No: 10455
Unit 3 Outlet

USEPA Method 29
Mercury (Hg) Laboratory Parameters

Detection Limits				
$m_{1b\text{-}DL}$	Fraction 1B Detection Limit (µg)	0.0000		
$m_{2b\text{-}DL}$	Fraction 2B Detection Limit (µg)	0.0000		
$m_{3a\text{-}DL}$	Fraction 3A Detection Limit (µg)	0.0000		
$m_{3b\text{-}DL}$	Fraction 3B Detection Limit (µg)	0.0000		
$m_{3c\text{-}DL}$	Fraction 3C Detection Limit (µg)	0.0000		
Blank Analysis				
$m_{1b\text{-}B}$	Fraction 1B Blank (µg)	<0.1000		
$m_{2b\text{-}B}$	Fraction 2B Blank (µg)	<0.2000		
$m_{3a\text{-}B}$	Fraction 3A Blank (µg)	<0.2000		
$m_{3b\text{-}B}$	Fraction 3B Blank (µg)	<0.5000		
$m_{3c\text{-}B}$	Fraction 3C Blank (µg)	<0.4000		
$m_{total\text{-}B}$	Total Blank Amount (µg)	<1.4000		
Run No.		**1**	**2**	**3**
Date (2008)		Sep 18	Sep 18	Sep 18
Start Time (approx.)		07:55	10:27	13:01
Stop Time (approx.)		10:11	12:41	15:15
Sample Analysis				
$m_{1b\text{-}S}$	Fraction 1B Sample (µg)	<0.1000	<0.1000	<0.1000
$m_{2b\text{-}S}$	Fraction 2B Sample (µg)	16.0970	16.8952	15.1569
$m_{3a\text{-}S}$	Fraction 3A Sample (µg)	<0.2000	<0.2000	<0.2000
$m_{3b\text{-}S}$	Fraction 3B Sample (µg)	<0.5000	<0.5000	<0.5000
$m_{3c\text{-}S}$	Fraction 3C Sample (µg)	<0.4000	<0.4000	<0.4000
$m_{total\text{-}S}$	Total Sample Amount (µg)	16.0970	16.8952	15.1569
Allowable Blank				
$m_{T\text{-}B\text{-}allow}$	Total Allowable Blank (µg)	0.0000	0.0000	0.0000
Sample Corrected for Blank				
m_n	Total Sample Amount (µg)	16.0970	16.8952	15.1569
Sample Corrected for Blank - Prorated Fractions				
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000
$m_{n\text{-}2b}$	Fraction 2B (µg)	16.0970	16.8952	15.1569
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000

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Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 10455 South Broward

Mercury

EPA Method 29 Analysis

Analytical Report
11419

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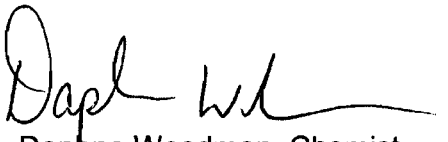
Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX: 910-792-6853 e1lab@e1lab.com

The following data for Analytical Report 11419
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:



Daphne Woodman, Chemist
September 25, 2008

Report Reviewed and Finalized By:

Ken Smith, Laboratory Director
September 25, 2008

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
U3 FF O-S R1	#1	16.1	< 0.1	16.1	< 0.2	< 0.5	< 0.4
	#2		< 0.1	16.1	< 0.2	< 0.5	< 0.4
U3 FF O-S R2	#1	16.9	< 0.1	16.8	< 0.2	< 0.5	< 0.4
	#2		< 0.1	17.0	< 0.2	< 0.5	< 0.4
U3 FF O-S R3	#1	15.2	< 0.1	15.2	< 0.2	< 0.5	< 0.4
	#2		< 0.1	15.1	< 0.2	< 0.5	< 0.4
South Field Blank	#1	< 0.5	< 0.1	< 0.3	< 0.2	< 0.5	----
	#2		< 0.1	< 0.3	< 0.2	< 0.5	----
South Reagent Blank	#1	< 0.5	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.2	< 0.2	< 0.5	< 0.4

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ANALYTICAL NARRATIVE

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Element One Analytical Narrative

Client:	Clean Air Engineering	Element One #:	11419
Client ID:	South Broward	Analyst:	ESS
Method:	M29	Dates Received:	09/22/08
Analytes:	Hg	Dates Analyzed:	09/24-25/08

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
U3 FF O-S R1	NA	0.4%	NA	NA	NA
U3 FF O-S R2	NA	1.1%	NA	NA	NA
U3 FF O-S R3	NA	0.4%	NA	NA	NA
South Field Blank	NA	NA	NA	NA	------
South 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
U3 FF O-S R3	#1	98%	94%	104%	94%	95%
	#2	98%	93%	102%	94%	96%

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SAMPLE CUSTODY

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11419

CHAIN OF CUSTODY FORM

CLIENT Wheelabrator
PLANT South Broward
PROJECT MANAGER Scott Brown
PROJECT NO. 10455
DEPT. 66

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	1	Unit 3 FF Outlet		Filter		1	x				
	1			Front-Half 0.1N HNO3 Rinse	198.2	1	x				
	1			Imp. 1,2,3 + 0.1N HNO3 Rinse	288.9	1	x				
	1			Imp. 4 + 0.1N HNO3 Rinse	289.9	1	x				
	1			Imp. 5,6 KMnO4+H2O Rinse	241.9	1	x				
	1			Imp. 5,6 HCl Rinse	385.5	1	x				
	2			Filter		1	x				
	2			Front-Half 0.1N HNO3 Rinse	190.6	1	x				
	2			Imp. 1,2,3 + 0.1N HNO3 Rinse	249.1	1	x				
	2			Imp. 4 + 0.1N HNO3 Rinse	125.2	1	x				
	2			Imp. 5,6 KMnO4+H2O Rinse	335.1	1	x				
	2	V		Imp. 5,6 HCl Rinse	396.3	1	x				

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R Preksta	9/19	Lisa Bratton	9/22/08 0918		
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Bob Preksta

Signature R Preksta Date 9/19

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Palatine, IL 60067
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(847) 991-3385 fax
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CHAIN OF CUSTODY FORM

CLIENT Wheelabrator
PLANT South Broward
PROJECT MANAGER Scott Brown

PROJECT NO. 10455
DEPT. 66

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	ADDITIONAL INFORMATION
	3	Unit 3 FF Outlet		Filter		1	x	
	3	"		Front-Half 0.1N HNO3 Rinse	147.5	1	x	
	3	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	832.0	1	x	
	3	"		Imp. 4 + 0.1N HNO3 Rinse	121.8	1	x	
	3	"		Imp. 5,6 KMnO4+H2O Rinse	475	1	x	
	3	"		Imp. 5,6 HCl Rinse	106.8	1	x	
		"						
		"						
	FB	"		Filter		1	x	
	FB	"		Front-Half 0.1N HNO3 Rinse	134.2	1	x	
	FB	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	880.0	1	x	
	FB	"		Imp. 4 + 0.1N HNO3 Rinse	89.7	1	x	
	FB	"		Imp. 5,6 KMnO4+H2O Rinse	883.4	1	x	
	FB	V		Imp. 5,6 HCl Rinse	1/4	1/4	x	

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CHAIN OF CUSTODY FORM

CLIENT Wheelabrator
PLANT South Broward
PROJECT MANAGER Scott Brown
PROJECT NO. 10455
DEPT. 66

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Archive (Hg)				ADDITIONAL INFORMATION
	4	Unit 3 FF Outlet		Filter	1		x				
	4	"		Front-Half 0.1N HNO3 Rinse	1	199.1	x				
	4	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1	733.5	x				
	4	"		Imp. 4 + 0.1N HNO3 Rinse	1	126.9	x				
	4	"		Imp. 5,6 KMnO4+H2O Rinse	1	883.1	x				
	4	"		Imp. 5,6 HCl Rinse	1	110.3	x				
		"									
		"									
	5	"		Filter	1		x				
	5	"		Front-Half 0.1N HNO3 Rinse	1	168.1	x				
	5	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1	801.5	x				
	5	"		Imp. 4 + 0.1N HNO3 Rinse	1	129.3	x				
	5	"		Imp. 5,6 KMnO4+H2O Rinse	1	899.1	x				
	5	V		Imp. 5,6 HCl Rinse	1	314.6	x				

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R. Preksta	9/19	Lisa Bratton	9/22/08 0918		
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CLIENT Wheelabrator
PLANT South Broward
PROJECT MANAGER Scott Brown
PROJECT NO. 10455
DEPT. 66

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Archive (Hg)				ADDITIONAL INFORMATION
	6	Unit 3 FF Outlet		Filter	1		x				
	6	"		Front-Half 0.1N HNO3 Rinse	1		x				
	6	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1		x				
	6	"		Imp. 4 + 0.1N HNO3 Rinse	1		x				
	6	"		Imp. 5,6 KMnO4+H2O Rinse	1		x				
	6	V		Imp. 5,6 HCl Rinse	1		x				
				Filter							
				Front-Half 0.1N HNO3 Rinse	186.2						
				Imp. 1,2,3 + 0.1N HNO3 Rinse	81.2						
				Imp. 4 + 0.1N HNO3 Rinse	145.9						
				Imp. 5,6 KMnO4+H2O Rinse	933.8						
				Imp. 5,6 HCl Rinse	406.2						

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PLANT South Broward
PROJECT MANAGER Scott Brown

PROJECT NO. 10455
DEPT. 66

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	ADDITIONAL INFORMATION
	NA	Reagent Blank		3 Quartz Filters	1	NA	x	
	NA	Reagent Blank		0.1N HNO3	1	200 300	x	
	NA	Reagent Blank		DI H_2O	1	100	x	
	NA	Reagent Blank		5% HNO_3 / 10% H_2O_2	1	200	x	
	NA	Reagent Blank		4% $KMnO_4$ / 10% H_2SO_4	1	100	x	
	NA	Reagent Blank		8 N HCl / DI H_2O	1	225	x	

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ANALYTICAL DATA

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Analytical Calculations

Metals-

Element Results (µg) =ICP Results (µg/L)*Dilution*Final Volume (L)

Where-

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

Dilution= Diluted Volume--*ICP-MS Run Sheet*
Aliquot

Final Volume=FH=Final Volume (FV)--*Sample Submission*
BH=Received Volume (BV).*Final Volume (FV)--*Sample Submission*
Aliquot (Used)
Combined Results=FH+BH

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*

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element One **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID 11419**

Analysis Due Date 09.30.08
QA/QC/Report Due Date 10.02.08

Client	Clean Air IL
Project No	10455—North & South Broward

Date Rec	09.22.08
Time Rec	0918

HNO_3 Lot:	HF Lot:	HCl Lot:	**Ref. Method:**
Volume Marked Y / N	Volume Loss Y / N / ?		**29**

Sample Identification

9	U3 FF Outlet-South R1	12	South Field Blank	14	U3 FF Outlet South R4
10	U3 FF Outlet South R2	13	South Reagent Blank	15	U3 FF Outlet South R5
	U3 FF Outlet South R2 Duplicate				U3 FF Outlet South R5 Duplicate
11	U3 FF Outlet South R3			16	U3 FF Outlet South R6
	U3 FF Outlet South R3 Spike				U3 FF Outlet South R6 Spike

Analyses Requested Samples 9-13 Hg
Samples 14-16 **ARCHIVE**

Runs / FB	Acetone (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	BV ml	FV ml	BV ml	FV ml	BV ml	Used	FV ml	BV ml	FV ml	BV ml	FV ml	BV ml	FV ml
9			170		700			86	200	340	500	180	400
10.D			162		690			98	↓	380	↓	200	↓
11.S			152		740			96	↓	420	↓	200	↓
12			110		300			98	↓	430	↓		
14													
15.D													
16.S													

Reagent Blank

Lab ID			Fraction	SV, ml	BV, ml	Used	FV, ml	pH	Prep By / Date
13	C-7	FH	Acetone Blank						
	C-8	FH	0.1N HNO_3			100			
	C-8	FH/A	0.1N HNO_3	196					
	C-8	B	DI H_2O	130		33			
	C-9	BH	5% HNO_3/10% H_2O_2	190					
	C-10	B	4% $KmnO_4$/10%H_2SO_4	100		100			
	C-11	C	8N HCl & DI	180			400		
	C-12	FH	Filter						

Lab Communications

SS Page2 of 2
SS by LLB
9/22/2008 11:35:24 AM

FH Prep By/Date 9.24.08 ES
A Prep By/Date 9.23.08 ES
BH Prep By/Date 9.23.08 ES
B Prep By/Date 9.23.08 ES
BH/FH Prep By/Date NA
C Prep By/Date 9.24.08 ES
Labeled By/Date 9.23.08 ES
ID Verification By/Date RLC 9/23/08

17

One

Method 29 Microwave Worksheet

Lab ID # e 11419 / 11411

Client: Clean Air Integr

Date Digested: 9/24/08 Initials: ESS Worksheet Prepared by: ESS

Auto Sample Loc.	Sample Lab ID	Sample Weight (g)	# of filters digested	Spike	Prep Volume (ml)	Weight In Micro / Weight Out Micro	Units
1	11419-1		1		100		
2	-2						
3	-3						
4	-4						
5	-5						
6	-9						
7	-10						
8	-11						
9	-12						
10	-13						
11	11411-1						
12	-2						
13	-3						
14	-4						
15	-5						
16	-6						

Element One, Inc. Form 104 - Revision 1.0

6mls HNO_3 074993

Ames HF 5107113

8

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	9/24/2008	8:31:04	0.00055351			µg			0.00055351					
STD1=.004ug	9/24/2008	8:32:18	0.00109113			µg			0.00109113					
STD2=.04ug	9/24/2008	8:33:33	0.01397292			µg			0.01397292					
STD3=.08ug	9/24/2008	8:34:49	0.02660077			µg			0.02660077					
STD4=.16ug	9/24/2008	8:36:05	0.05220641			µg			0.05220641					
STD5=.2ug	9/24/2008	8:37:23	0.06635198			µg			0.06635198					
0.004ug = DL	9/24/2008	8:40:22	0.00132077	0.00399822	0.00399822	µg			0.00132077	0.00399822	0.00399822			
0.080ug = STD.2	9/24/2008	8:41:38	0.02526573	0.07648412	0.07648412	µg			0.02526573	0.07648412	0.07648412			
0.080ug = QC STD 3	9/24/2008	8:42:57	0.02485844	0.07525119	0.07525119	µg			0.02485844	0.07525119	0.07525119			
11419-9BH	9/24/2008	8:58:28	0.03038549	0.09198259	16.0969549	µg	4	700	0.03032789	0.09180825	16.066444	0.03044308	0.09215694	16.1274657
11419-10BH	9/24/2008	9:00:14	0.03307979	0.10013876	17.2739368	µg	4	690	0.03295376	0.09975724	17.2081251	0.03320582	0.10052028	17.3397486
11419-10BH DUP	9/24/2008	9:01:58	0.03235459	0.09794342	16.8952416	µg	4	690	0.03217024	0.09738539	16.7989799	0.03253893	0.09850146	16.9915032
0.004ug = DL	9/24/2008	9:03:11	0.00124051	0.00375527	0.00375527	µg	4	690	0.00124051	0.00375527	0.00375527			
0.080ug = STD.2	9/24/2008	9:04:27	0.0265941	0.08050536	0.08050536	µg	4	690	0.0265941	0.08050536	0.08050536			
REAGENT BLANK	9/24/2008	9:05:43	0.00007641	0.00023131	0.00023131	µg	4	690	0.00007641	0.00023131	0.00023131			
11419-11BH	9/24/2008	9:07:27	0.02706449	0.08192931	15.1569238	µg	4	740	0.02711868	0.08209335	15.1872708	0.0270103	0.08176528	15.1265769
11419-11BH SPK	9/24/2008	9:09:11	0.05177391	0.15672936	28.994933	µg	4	740	0.05191244	0.15714872	29.0725142	0.05163538	0.15631	28.9173517
11419-12BH	9/24/2008	9:10:55	0.00013586	0.00041129	0.03084693	µg	4	300	0.00014935	0.00045211	0.03390887	0.00012237	0.00037046	0.027785
11419-13BH	9/24/2008	9:12:40	-0.0002514	-0.000761	-0.0361498	µg	4	190	-0.0002802	-0.0008485	-0.0403044	-0.0002225	-0.0006735	-0.0319952
0.004ug = DL	9/24/2008	9:24:35	0.00121892	0.00368991	0.00368991	µg	4	500	0.00121892	0.00368991	0.00368991			
0.080ug = STD.2	9/24/2008	9:25:51	0.02572314	0.07786879	0.07786879	µg	4	500	0.02572314	0.07786879	0.07786879			
REAGENT BLANK	9/24/2008	9:27:07	0.00009965	0.00030166	0.00030166	µg	4	500	0.00009965	0.00030166	0.00030166			
11419-9B	9/24/2008	9:30:43	-0.0001	-0.0003029	-0.037868	µg	4	500	-0.0001294	-0.0003917	-0.0489731	-0.0000707	-0.0002141	-0.0267629
11419-10B	9/24/2008	9:32:34	-0.0000235	-0.0000712	-0.0089101	µg	4	500	-0.0000704	-0.0002132	-0.0266502	0.00002333	0.00007063	0.00882994
11419-10B DUP	9/24/2008	9:34:23	-0.0001143	-0.000346	-0.0432603	µg	4	500	-0.0000741	-0.0002244	-0.0280512	-0.0001545	-0.0004677	-0.0584695
11419-11B	9/24/2008	9:36:05	-0.0001442	-0.0004365	-0.0545664	µg	4	500	-0.0001713	-0.0005186	-0.0648251	-0.000117	-0.0003544	-0.0443076
11419-11B SPK	9/24/2008	9:37:48	0.02479736	0.07506627	9.38328417	µg	4	500	0.02475287	0.0749316	9.3664509	0.02484184	0.07520093	9.40011744
11419-12B	9/24/2008	9:39:32	-0.0003782	-0.0011449	-0.1431135	µg	4	500	-0.000344	-0.0010416	-0.1302049	-0.0004123	-0.0012481	-0.156022
11419-13B	9/24/2008	9:41:16	-0.0004371	-0.0013233	-0.1654148	µg	4	500	-0.0004634	-0.001403	-0.1753793	-0.0004108	-0.0012436	-0.1554504
0.004ug = DL	9/24/2008	9:45:58	0.00132039	0.00399709	0.00399709	µg	4	200	0.00132039	0.00399709	0.00399709			
0.080ug = STD.2	9/24/2008	9:47:14	0.02499462	0.07566343	0.07566343	µg	4	200	0.02499462	0.07566343	0.07566343			
REAGENT BLANK	9/24/2008	9:48:30	0.00014588	0.00044162	0.00044162	µg	4	200	0.00014588	0.00044162	0.00044162			
Calib Blank	9/24/2008	11:22:34	0.00051398			µg	4	200	0.00051398					
STD1=.004ug	9/24/2008	11:23:48	0.0013245			µg	4	200	0.0013245					
STD2=.04ug	9/24/2008	11:25:03	0.01369345			µg	4	200	0.01369345					
STD3=.08ug	9/24/2008	11:26:19	0.02586791			µg	4	200	0.02586791					
STD4=.16ug	9/24/2008	11:27:38	0.04965321			µg	4	200	0.04965321					
STD5=.2ug	9/24/2008	11:29:00	0.06101433			µg	4	200	0.06101433					
Reagent Blank	9/24/2008	11:30:46	0.00000437	0.00001413	0.00001413	µg	4	200	0.00002576	0.00008324	0.00008324	-0.000017	-0.0000549	-0.0000549
0.004ug = DL	9/24/2008	11:31:59	0.00133743	0.00432166	0.00432166	µg	4	200	0.00133743	0.00432166	0.00432166			
0.080ug = STD.2	9/24/2008	11:33:15	0.02530208	0.08175919	0.08175919	µg	4	200	0.02530208	0.08175919	0.08175919			
REAGENT BLANK	9/24/2008	11:34:31	0.00002747	0.00008878	0.00008878	µg	4	200	0.00002747	0.00008878	0.00008878			
0.080ug = STD.2	9/24/2008	11:35:47	0.02523164	0.08153158	0.08153158	µg	4	200	0.02523164	0.08153158	0.08153158			
0.080ug = QC STD 3	9/24/2008	11:37:06	0.02504438	0.08092648	0.08092648	µg	4	200	0.02504438	0.08092648	0.08092648			
REAGENT BLANK	9/24/2008	11:38:22	-0.0000022	-0.0000071	-0.0000071	µg	4	200	-0.0000022	-0.0000071	-0.0000071			
11419-9A	9/24/2008	11:49:02	0.00013322	0.0004305	0.02152527	µg	4	200	0.00014806	0.00047844	0.02392218	0.00011839	0.00038256	0.01912836
11419-10A	9/24/2008	11:50:50	-0.0000982	-0.0003175	-0.0158788	µg	4	200	-0.0000976	-0.0003156	-0.0157837	-0.0000988	-0.0003194	-0.0159739
11419-10A DUP	9/24/2008	11:52:39	-0.0000774	-0.0002501	-0.0125084	µg	4	200	-0.0000785	-0.0002539	-0.0126969	-0.0000762	-0.0002464	-0.01232
11419-11A	9/24/2008	11:54:30	-0.0000699	-0.0002259	-0.0112989	µg	4	200	-0.0000556	-0.0001799	-0.0089967	-0.0000841	-0.000272	-0.0136011
11419-11A SPK	9/24/2008	11:56:15	0.02543387	0.08218503	4.10925152	µg	4	200	0.02563196	0.08282515	4.14125758	0.02523577	0.0815449	4.07724546
0.004ug = DL	9/24/2008	11:57:27	0.00133276	0.00430659	0.00430659	µg	4	200	0.00133276	0.00430659	0.00430659			
0.080ug = STD.2	9/24/2008	11:58:43	0.02511147	0.08114326	0.08114326	µg	4	200	0.02511147	0.08114326	0.08114326			
REAGENT BLANK	9/24/2008	11:59:59	-0.0001009	-0.0003261	-0.0003261	µg	4	200	-0.0001009	-0.0003261	-0.0003261			
11419-12A	9/24/2008	12:01:42	-0.0002206	-0.0007129	-0.0356497	µg	4	200	-0.0002244	-0.0007251	-0.036259	-0.0002168	-0.0007008	-0.0350404
11419-13A	9/24/2008	12:03:24	-0.0002143	-0.0006926	-0.0346333	µg	4	200	-0.0002107	-0.0006808	-0.0340423	-0.000218	-0.0007044	-0.0352243
0.004ug = DL	9/24/2008	12:04:36	0.00125285	0.00404837	0.00404837	µg	4	200	0.00125285	0.00404837	0.00404837			
0.080ug = QC STD 3	9/24/2008	12:05:52	0.02486256	0.08033895	0.08033895	µg	4	200	0.02486256	0.08033895	0.08033895			
REAGENT BLANK	9/24/2008	12:07:09	-0.0000932	-0.0003014	-0.0003014	µg	4	200	-0.0000932	-0.0003014	-0.0003014			
Calib Blank	9/25/2008	8:46:58	0.00022763			µg			0.00022763					
STD1=.004ug	9/25/2008	8:48:12	0.00136324			µg			0.00136324					
STD2=.04ug	9/25/2008	8:49:26	0.01320324			µg			0.01320324					
STD3=.08ug	9/25/2008	8:50:43	0.02690959			µg			0.02690959					
STD4=.16ug	9/25/2008	8:51:59	0.05197953			µg			0.05197953					
STD5=.2ug	9/25/2008	8:53:17	0.06409655			µg			0.06409655					
0.004ug = DL	9/25/2008	9:00:18	0.00140789	0.00434979	0.00434979	µg			0.00140789	0.00434979	0.00434979			
0.080ug = STD.2	9/25/2008	9:01:33	0.02837434	0.08766487	0.08766487	µg			0.02837434	0.08766487	0.08766487			
0.080ug = QC STD 3	9/25/2008	9:02:52	0.02585156	0.07987055	0.07987055	µg			0.02585156	0.07987055	0.07987055			
11419-9C	9/25/2008	9:16:32	0.00030194	0.00093287	0.09328732	µg	4	400	0.00030746	0.00094993	0.0949935	0.00029641	0.00091581	0.09158114
11419-10C	9/25/2008	9:18:22	0.00041314	0.00127645	0.1276451	µg	4	400	0.00040435	0.00124929	0.12492963	0.00042193	0.0013036	0.13036056
11419-10C DUP	9/25/2008	9:20:07	0.00046368	0.00143258	0.14325844	µg	4	400	0.0004648	0.00143604	0.14360438	0.00046256	0.00142912	0.14291251
11419-11C	9/25/2008	9:21:51	0.00048818	0.00150828	0.15082853	µg	4	400	0.00049234	0.00152114	0.15211418	0.00048402	0.00149542	0.14954288
0.004ug = DL	9/25/2008	9:23:04	0.0014303	0.00441904	0.00441904	µg	4	400	0.0014303	0.00441904	0.00441904			
0.004ug = DL	9/25/2008	9:24:16	0.00131685	0.00406852	0.00406852	µg	4	400	0.00131685	0.00406852	0.00406852			
0.080ug = STD.2	9/25/2008	9:25:33	0.02782888	0.08597964	0.08597964	µg	4	400	0.02782888	0.08597964	0.08597964			
REAGENT BLANK	9/25/2008	9:26:49	0.00001215	0.00003756	0.00003756	µg	4	400	0.00001215	0.00003756	0.00003756			
11419-11C SPK	9/25/2008	9:28:32	0.02477881	0.07655618	7.65561867	µg	4	400	0.02458096	0.07594492	7.59449208	0.02497665	0.07716745	7.71674525

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
11419-13C	9/25/2008	9:30:17	-0.0000994	-0.0003073	-0.0307334	µg	4	400	-0.0001056	-0.0003263	-0.0326355	-0.0000933	-0.0002883	-0.0288312
11419-LRB	9/25/2008	9:32:01	-0.0000409	-0.0001266	-0.003166	µg	4	100	-0.0000391	-0.0001209	-0.0030249	-0.0000428	-0.0001322	-0.0033071
11419-LRB SPK	9/25/2008	9:33:46	0.02483455	0.0767284	1.91821004	µg	4	100	0.02487738	0.07686074	1.92151862	0.02479171	0.07659605	1.91490147
0.004ug = DL	9/25/2008	9:45:45	0.00133668	0.0041298	0.0041298	µg	4	100	0.00133668	0.0041298	0.0041298			
0.080ug = STD.2	9/25/2008	9:47:00	0.02786541	0.0860925	0.0860925	µg	4	100	0.02786541	0.0860925	0.0860925			
REAGENT BLANK	9/25/2008	9:48:16	0.00002727	0.00008427	0.00008427	µg	4	100	0.00002727	0.00008427	0.00008427			
11419-9FH	9/25/2008	9:51:53	0.00082359	0.00254456	0.06361403	µg	4	100	0.00082676	0.00255437	0.06385927	0.00082041	0.00253475	0.06336878
11419-10FH	9/25/2008	9:53:43	0.00100873	0.00311655	0.07791393	µg	4	100	0.00098767	0.0030515	0.07628763	0.00102978	0.0031816	0.07954023
11419-10FH DUP	9/25/2008	9:55:29	0.0009988	0.00308587	0.07714688	µg	4	100	0.0009852	0.00304387	0.0760969	0.00101239	0.00312787	0.07819686
11419-11FH	9/25/2008	9:57:11	0.00065215	0.0020149	0.05037252	µg	4	100	0.00066496	0.00205446	0.05136163	0.00063935	0.00197533	0.04938342
11419-11FH SPK	9/25/2008	9:58:54	0.02542406	0.07854974	1.96374365	µg	4	100	0.02540903	0.07850331	1.96258298	0.02543908	0.07859617	1.96490432
11419-12FH	9/25/2008	10:00:38	0.00039007	0.00120518	0.03012953	µg	4	100	0.0003793	0.00117188	0.02929708	0.00040085	0.00123847	0.03096199
11419-13FH	9/25/2008	10:02:21	0.00014582	0.00045055	0.0112638	µg	4	100	0.00014515	0.00044847	0.01121189	0.0001465	0.00045262	0.01131571
0.004ug = DL	9/25/2008	10:07:04	0.0012894	0.00398372	0.00398372	µg	20	1	0.0012894	0.00398372	0.00398372			
0.080ug = STD.2	9/25/2008	10:08:20	0.02568317	0.07935028	0.07935028	µg	20	1	0.02568317	0.07935028	0.07935028			
REAGENT BLANK	9/25/2008	10:09:36	0.00002412	0.00007454	0.00007454	µg	20	1	0.00002412	0.00007454	0.00007454			
0.004ug = DL	9/25/2008	10:25:46	0.0012986	0.00401214	0.00401214	µg	40	1	0.0012986	0.00401214	0.00401214			
0.080ug = STD.2	9/25/2008	10:27:01	0.02518438	0.07780923	0.07780923	µg	40	1	0.02518438	0.07780923	0.07780923			
0.080ug = QC STD 3	9/25/2008	10:28:19	0.02460633	0.07602332	0.07602332	µg	40	1	0.02460633	0.07602332	0.07602332			
REAGENT BLANK	9/25/2008	10:29:36	-0.0000094	-0.0000293	-0.0000293	µg	40	1	-0.0000094	-0.0000293	-0.0000293			
0.004ug = DL	9/25/2008	10:44:26	0.00126979	0.00392314	0.00392314	µg	40	1	0.00126979	0.00392314	0.00392314			
0.080ug = QC STD 3	9/25/2008	10:45:42	0.02439739	0.07537777	0.07537777	µg	40	1	0.02439739	0.07537777	0.07537777			
REAGENT BLANK	9/25/2008	10:46:58	0.00002139	0.0000661	0.0000661	µg	40	1	0.00002139	0.0000661	0.0000661			

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PLANT DATA

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

UNIT #3

Date	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (tons)
9/18/2008	Mercury	29	1	184.5	2.27	78.1
9/18/2008	Mercury	29	2	184.4	2.25	77.4
9/18/2008	Mercury	29	3	184.3	2.23	76.7

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 9/18/2008
Start Time: 7:55:00
End Time: 10:11:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	518.54	315.04	41.54	30.85	10.77	292.81	6.37	-12.22	183.35
Unit 2	83.58	83.26	0.01	0.01	90.00	85.91	0.03	0.10	0.00
Unit 3 29 run 1	502.72	318.44	36.17	32.36	12.51	300.66	7.09	-10.79	184.50

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	187.43	898.33	823.01	86.97	-0.10	432.55	1106.91	20.04	6.57	9.49
Unit 2	0.00	-4.08	497.11	0.07	0.01	84.13	65.56	0.00	-6.26	21.38
Unit 3	187.11	897.96	823.91	76.05	-0.11	392.69	1204.39	5.18	6.58	9.47

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 9/18/2008
Start Time: 10:27:00
End Time: 12:42:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	520.45	315.26	41.81	33.95	10.81	291.55	6.34	-12.30	174.30
Unit 2	84.15	84.19	0.02	0.00	90.00	85.27	0.03	0.25	0.00
Unit 3 29 run 2	508.47	315.06	38.95	32.62	11.45	298.93	7.11	-11.01	184.35

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	179.96	896.35	823.43	87.41	-0.10	435.76	1095.20	16.44	7.57	10.22
Unit 2	0.00	-4.31	497.11	0.07	0.01	84.15	65.13	0.00	-6.26	21.38
Unit 3	186.40	896.96	820.88	78.10	-0.11	396.33	1188.18	5.24	6.96	9.69

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 9/18/2008
Start Time: 13:01:00
End Time: 15:15:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	517.55	320.29	39.28	28.02	11.50	296.22	7.39	-13.34	177.36
Unit 2	84.06	84.30	0.02	0.00	90.00	85.36	0.05	0.21	0.00
Unit 3 29 run 3	510.34	315.02	40.17	29.48	11.27	298.28	7.15	-11.00	184.34

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	182.01	896.90	825.06	84.25	-0.09	433.16	1110.41	15.43	6.96	9.31
Unit 2	0.00	-4.20	497.11		0.01	83.95	65.10	0.00	-6.26	21.38
Unit 3	186.71	897.11	820.07	79.26	-0.10	397.17	1186.01	4.84	6.73	9.50

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 9/19/2008
Start Time: 5:38:00
End Time: 7:51:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	522.63	314.89	43.45	35.51	10.08	294.90	6.72	-12.96	184.05
Unit 2	82.85	80.73	0.00	0.02	90.00	83.86	0.04	-0.04	0.00
Unit 3 29 run 4	498.66	314.92	36.28	32.10	11.40	299.72	7.09	-10.57	184.55

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	188.27	897.85	825.49	89.81	-0.09	438.18	1116.78	18.40	6.47	9.18
Unit 2	0.00	-3.35	497.11	0.07	0.01	82.87	63.11	0.00	-6.26	21.38
Unit 3	186.63	897.14	818.00	76.11	-0.11	394.77	1189.64	4.35	6.85	9.17

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Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 9/19/2008
Start Time: 8:08:00
End Time: 10:21:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	515.75	315.03	39.39	33.79	10.67	288.27	6.16	-11.82	183.73
Unit 2	81.94	81.37	0.00	0.01	90.00	83.31	0.03	0.06	0.00
Unit 3 29 run 5	501.91	315.05	37.71	31.46	11.18	298.94	7.27	-10.87	184.47

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	187.44	898.28	823.16	84.34	-0.11	431.29	1143.28	23.05	6.23	8.84
Unit 2	0.00	-3.69	497.11	0.07	0.01	82.80	65.55	0.00	-6.26	21.38
Unit 3	186.60	897.76	821.38	78.99	-0.10	393.86	1165.39	5.31	6.71	9.25

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 9/19/2008
Start Time: 10:36:00
End Time: 12:48:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	513.96	314.99	37.57	32.99	11.49	294.06	6.14	-11.59	184.45
Unit 2	82.64	82.35	0.02	0.00	90.00	84.23	0.05	0.19	0.00
Unit 3 29 run 6	507.59	314.84	39.20	34.30	11.07	300.66	7.34	-11.20	184.12

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	188.76	898.82	825.90	80.45	-0.11	427.60	1144.35	18.97	5.73	8.25
Unit 2	0.00	-3.90	497.11	0.07	0.01	82.75	66.14	0.00	-6.26	21.38
Unit 3	184.35	896.86	806.10	81.00	-0.10	398.73	1172.86	3.94	7.50	9.83

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