REPORT ON MERCURY TESTING

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

CLIENT REFERENCE NO: 14600459
CLEANAIR PROJECT NO: 9963-5
REVISION 0: DECEMBER 20, 2006

CleanAir.

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Performed for:
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UNIT 1 FF OUTLET
POMPANO BEACH, FL

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Revision 0: December 20, 2006

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

Submitted by,

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Reviewed by,

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REVISION HISTORY

REPORT ON MERCURY TESTING

Revision History

Revision No:	Date	Pages	Comments
0	12/20/06	All	Original version of document.

CONTENTS

PROJECT OVERVIEW

Wheelabrator North Broward, Inc. operates a Refuse to Energy Facility located in Pompano Beach, Florida. The facility's emission levels are regulated by the Florida Department of Environmental Protection. Wheelabrator North Broward, Inc. contracted Clean Air Engineering (CleanAir) to perform a compliance test program at their municipal waste combustor (MWC) facility in Pompano Beach, Florida. Testing was conducted in accordance with 40 CFR 60 Subpart Cb and applicable sections of PSD–FL-112(B) and PA86-22. The sampling was conducted at the Unit 1 Fabric Filter (FF) Outlet on November 14, 2006.

The testing included the determination of the following constituents:

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

Coordinating and observing the field portion of the program were:

C. Faller	- Wheelabrator North Broward, Inc.
D. Dreska	- CleanAir

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

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 1 FF Outlet	USEPA Method 29	Mercury	11/14/06	7:59	10:10
2	Unit 1 FF Outlet	USEPA Method 29	Mercury	11/14/06	10:25	12:36
3	Unit 1 FF Outlet	USEPA Method 29	Mercury	11/14/06	12:49	15:00

Table 1-2:
Summary of Test Results

Source Constituent	Sampling Method	Average Emission	Permit Limit[1]
Unit 1 FF Outlet			
Mercury (µg/dscm @7% O_2)	EPA M29	5.5	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 and the Quality Control and Quality Assurance Results are shown in Table 2-2 on page 2-2.

Results

WHEELABRATOR NORTH BROWARD, INC.
POMPANO BEACH, FL

Client Reference No: 14600459
CleanAir Project No: 9963-5

RESULTS

Table 2-1:
Unit 1 FF Outlet – Mercury

Run No.		1	2	3	Average
Date (2006)		Nov 14	Nov 14	Nov 14	
Start Time (approx.)		07:59	10:25	12:49	
Stop Time (approx.)		10:10	12:36	15:00	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184	184	184	**184**
P_1	SDA Outlet Temperature (°F)	320	320	320	**320**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.6	9.4	9.4	**9.5**
CO_2	Carbon dioxide (dry volume %)	9.8	9.8	10.0	**9.9**
T_s	Sample temperature (°F)	308	310	307	**308**
B_w	Actual water vapor in gas (% by volume)	21.3	21.8	24.5	**22.5**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	191,140	197,378	194,357	**194,292**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	100,929	103,330	98,665	**100,975**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	84.99	84.25	81.91	**83.72**
%I	Isokinetic sampling (%)	104.6	101.3	103.1	**103.0**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B (µg)	0.1801	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	7.9197	13.3804	10.6038	
$m_{n\text{-}3a}$	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)	<0.1000	<0.1000	<0.1000	
m_n	Total matter corrected for allowable blanks (µg)	8.0998	13.3804	10.6038	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	2.1E-10	3.5E-10	2.9E-10	**2.8E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.6E-10	4.2E-10	3.5E-10	**3.4E-10**
C_{sd}	Concentration (µg/dscm)	3.4	5.6	4.6	**4.5**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.1	6.8	5.5	**5.5**
$E_{lb/hr}$	Rate (lb/hr)	1.3E-03	2.2E-03	1.7E-03	**1.7E-03**

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						
Unit 1 FF Outlet R1		5.1%	0.8%	NA	NA	NA
Unit 1 FF Outlet R2		NA	0.1%	NA	NA	NA
Unit 1 FF Outlet R3		NA	1.1%	NA	NA	NA
Unit 1 FF Outlet FB		NA	NA	NA	NA	NA
Reagent Blank		NA	NA	NA	NA	NA
Sample Spike and Recovery						
Unit 1 FF Outlet R3	#1	112%	105%	102%	97%	103%
	#2	112%	105%	101%	97%	103%
Blanks						
Unit 1 FF Outlet FB	#1	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
	#2	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
Reagent Blank	#1	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
	#2	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4

DESCRIPTION OF INSTALLATION

PROCESS DESCRIPTION

The North 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 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, which directs the flue gas to a dedicated flue in a common stack.

Figure 3-1 shows a general schematic for the facility. The testing occurred at the Unit 1 FF Outlet as shown in Figure 3-2.

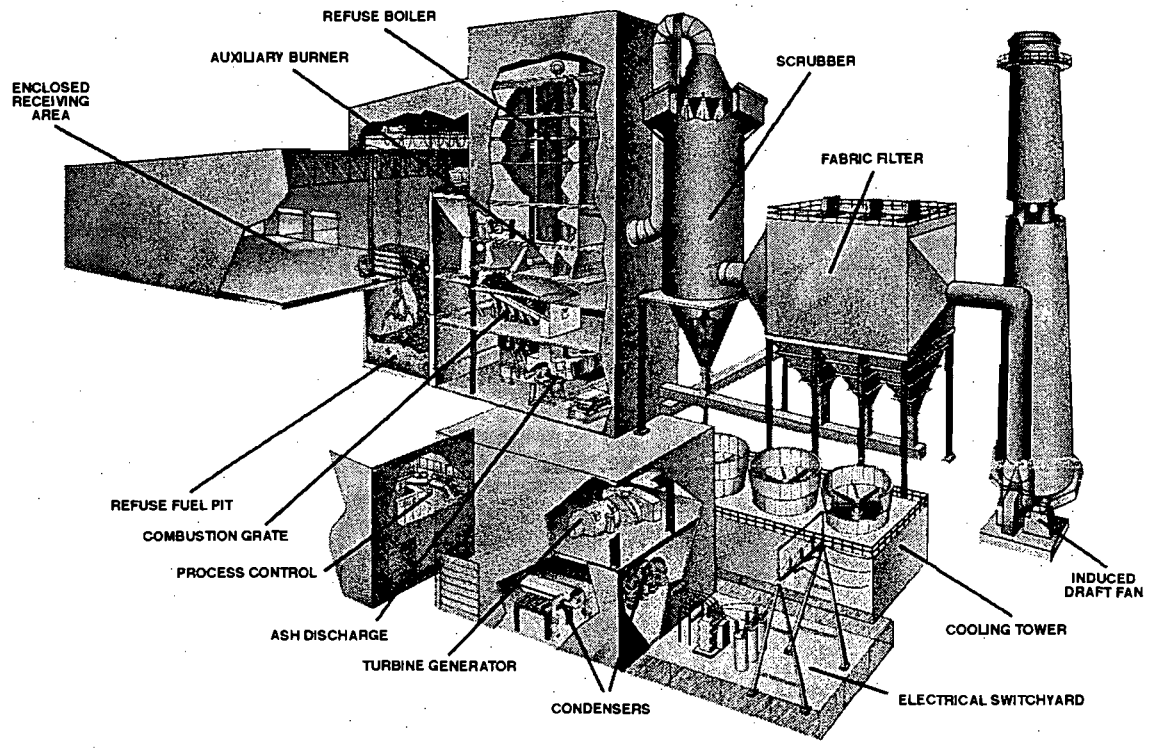


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

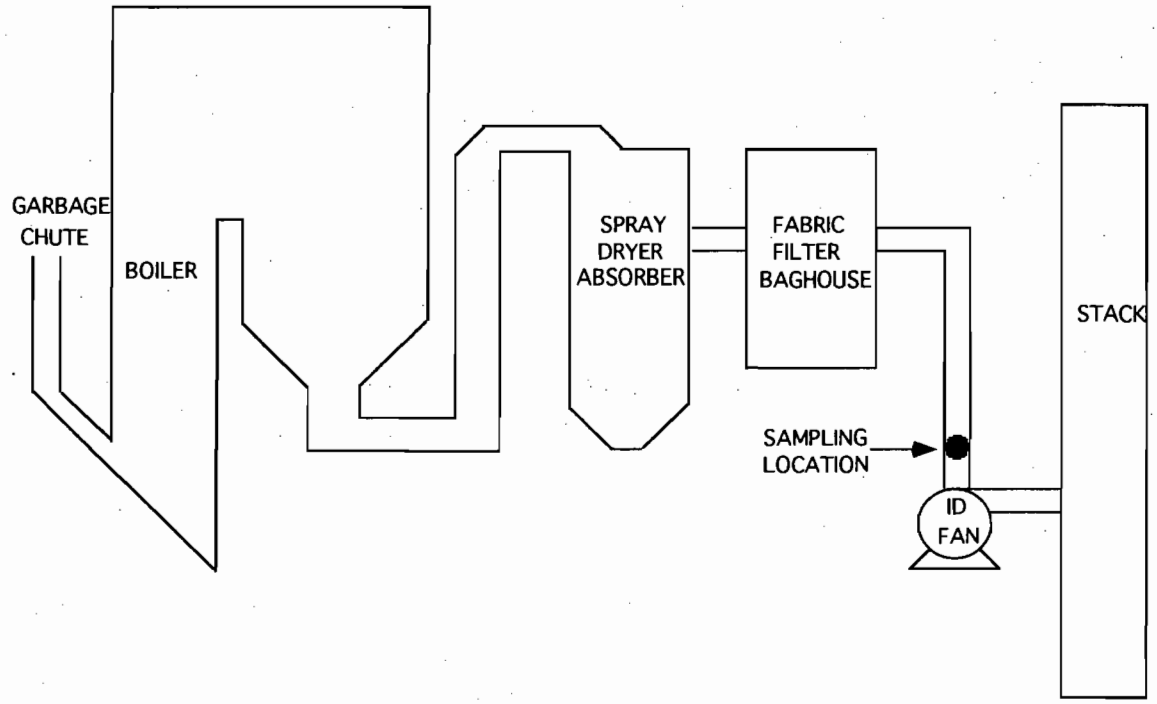


Figure 3-2: Process Schematic

DESCRIPTION OF INSTALLATION

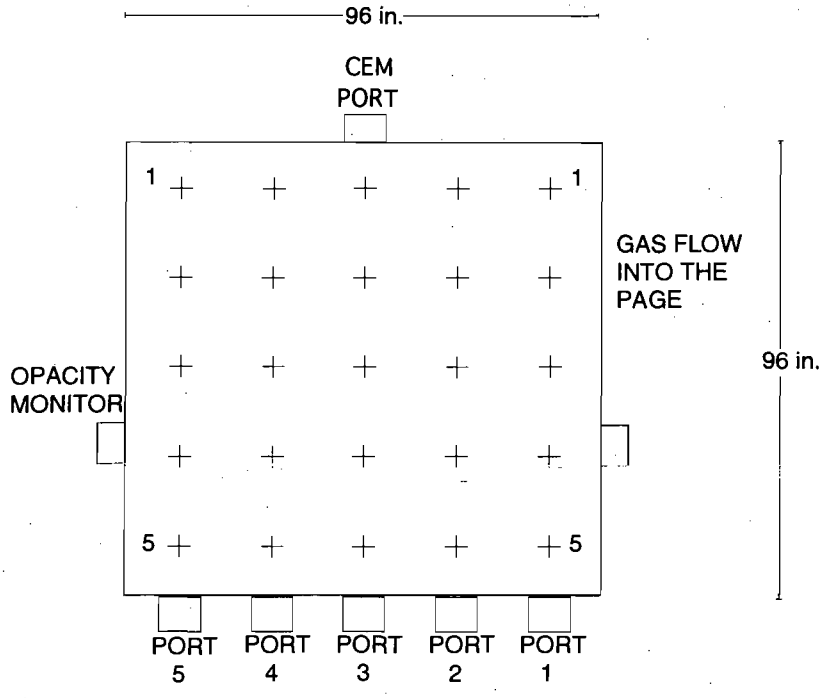
DESCRIPTION OF SAMPLING LOCATION(S)

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 the source tested in the program.

Table 3-1:
Sampling Points

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



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

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

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

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 Clean Air's internal Quality Manual were also followed. Results of all QA/QC activities performed by Clean Air Engineering are summarized in Appendix D.

APPENDIX

TEST METHOD SPECIFICATIONS

A

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Specification Sheet for EPA Method 29

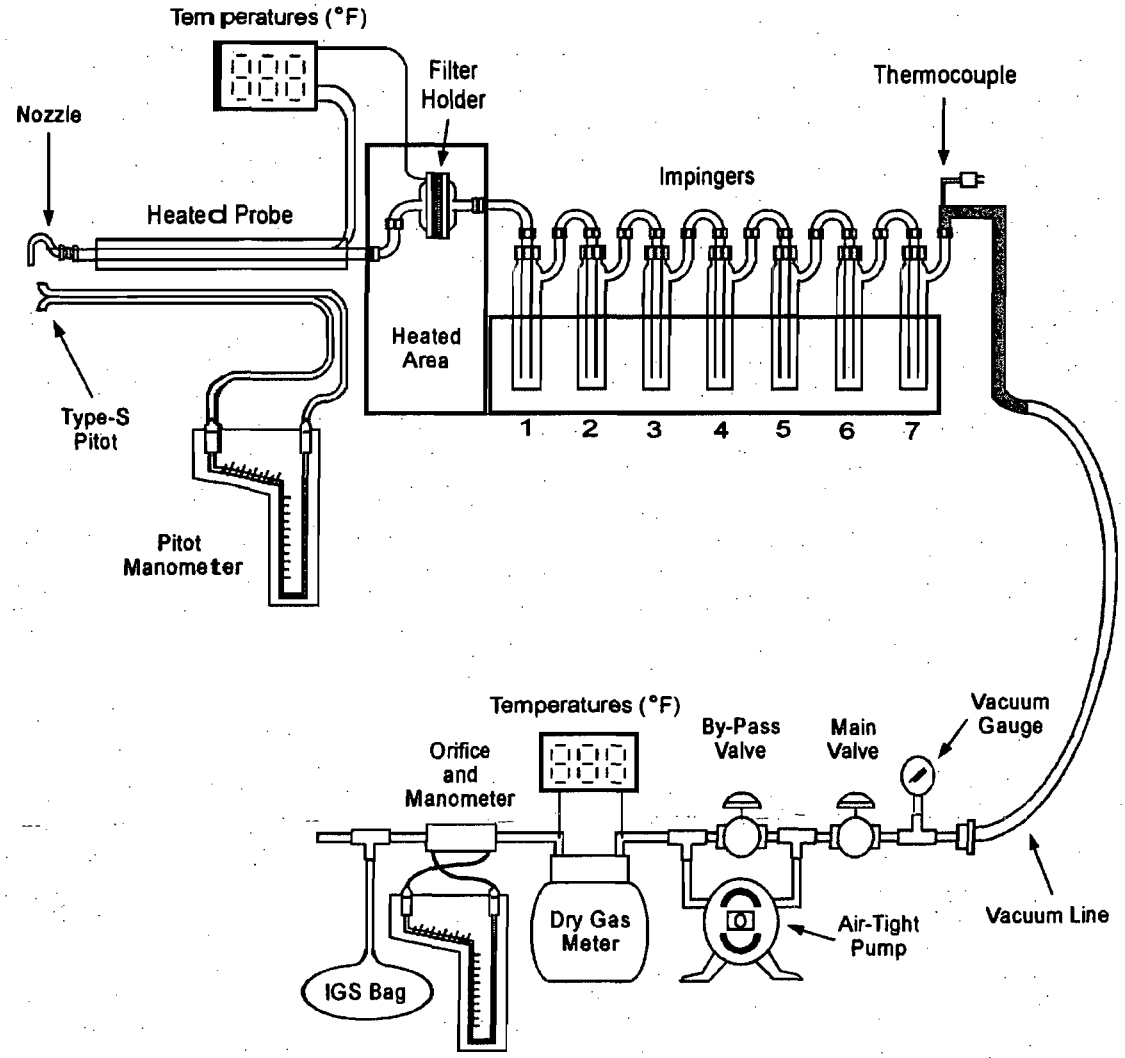
Source Location Name(s)	Unit 1 FF Outlet
Pollutant(s) to be Determined	Mercury
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	125 minutes
No. of Sample Traverse Points	N/A	25
Sample Time per Point	N/A	5 minutes
Sampling Rate	Isokinetic (90-110%)	Isokinetic (90-110%)
Sampling Probe		
Nozzle Material	Borosilicate or Quartz Glass	Borosilicate Glass
Nozzle Design	Button-Hook or Elbow	Button-Hook
Probe Liner Material	Borosilicate or Quartz Glass	Borosilicate Glass
Effective Probe Length	N/A	8 feet
Probe Temperature Set-Point	248°F±25°F	248°F±25°F
Velocity Measuring Equipment		
Pitot Tube Design	Type S	Type S
Pitot Tube Coefficient	N/A	0.84
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

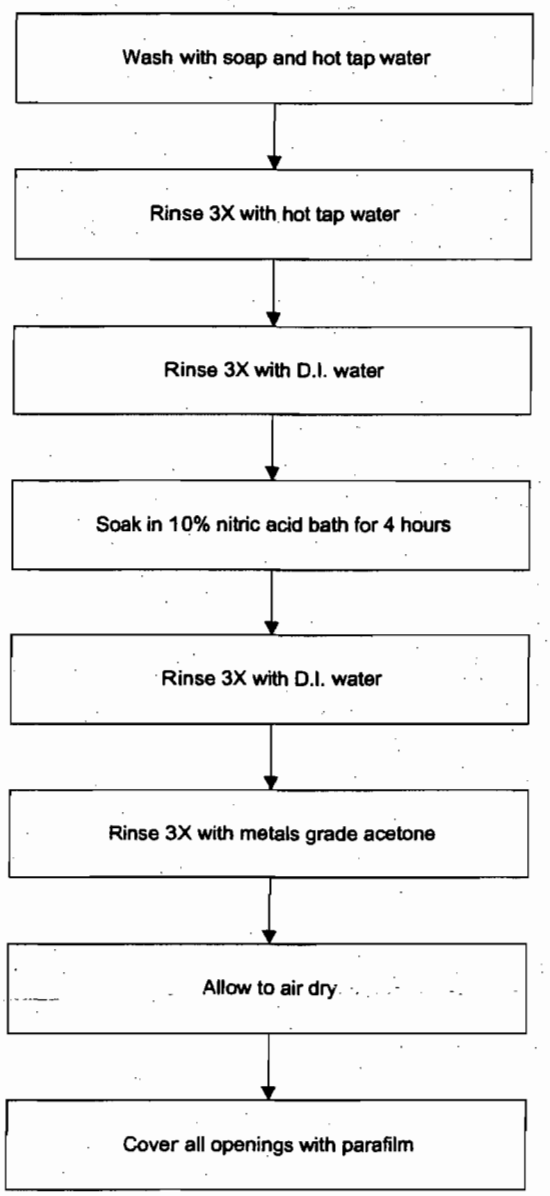
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types		
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	Glass
Impinger Contents Recovered?	Yes	Yes
Impinger Rinse Reagent	See Method 29 Recovery Flow Chart	See Recovery Flow Chart
Impinger Wash Bottle	Glass or Teflon	Teflon
Impinger Storage Container	See Recovery Flow Chart	See Recovery Flow Chart
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric and Volumetric
Filter Preparation Conditions	See Method 29 Analytical Flow Chart	For Metals Analysis
Front-Half Rinse Preparation	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Back-Half Analysis	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Additional Analysis	None	None

EPA Method 29
Sampling Train Configuration



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

EPA Method 29
Glassware Preparation Procedures



EPA Method 29
Sample Recovery Flowchart
(includes Mercury)

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

Container 1
Tared Quartz Filter Petri Dish
- Remove with acid washed polypropylene or Teflon tweezers to plastic container.
- Remove any particulate or filter fiber to sample container
- If necessary, fold the filter and transfer to the container.

Container 3
Probe Rinse
250 ml Polyethylene
- Probe liner, nozzle, cyclone bypass and front half (FH) filter housing
- Brush/rinse 3X with a total of 100 ml 0.1N HNO3
- Visual Inspection
- Label container and measure volume by weight

Container 4
1000 ml Polyethylene
- Back half (BH) filter housing, Z-piece, impingers 1, 2, 3 and U-bends
- Measure impinger volume by weight
- Transfer to sample container
- Rinse each piece 3X with a total of 100 ml 0.1N HNO3
- Visual Inspection
- Label container and measure volume by weight

Container 5A
250 ml Polyethylene
- Impinger 4 and U-bend
- Measure impinger volume by weight to within 0.5 ml
- Transfer to sample container
- Rinse with 100 ml of 0.1N HNO3
- Visual Inspection
- Label container and measure volume by weight

Container 5B
950 ml Glass
- Impingers 5, 6 and U-bends
- Measure impinger volume by weight
- Transfer to sample container
- Rinse each piece 3X with 100 ml of acidic permanganate solution
- Rinse 3X with 100 ml of water
- Visual Inspection
- Label container and measure volume by weight

Container 6
Silica Gel
- Measure and record impinger, volume by weight, record condition of indicating gel
- Recycle silica gel

Container 8A
Nitric Acid Blank
1000 ml Plastic
- 300 ml of 0.1N HNO3

Container 8B
Water Blank
250 ml Plastic
- 100 ml of water

Container 9
5%HNO3/10%H2O2 Blank
500 ml Plastic
- 200 ml of absorbing solution

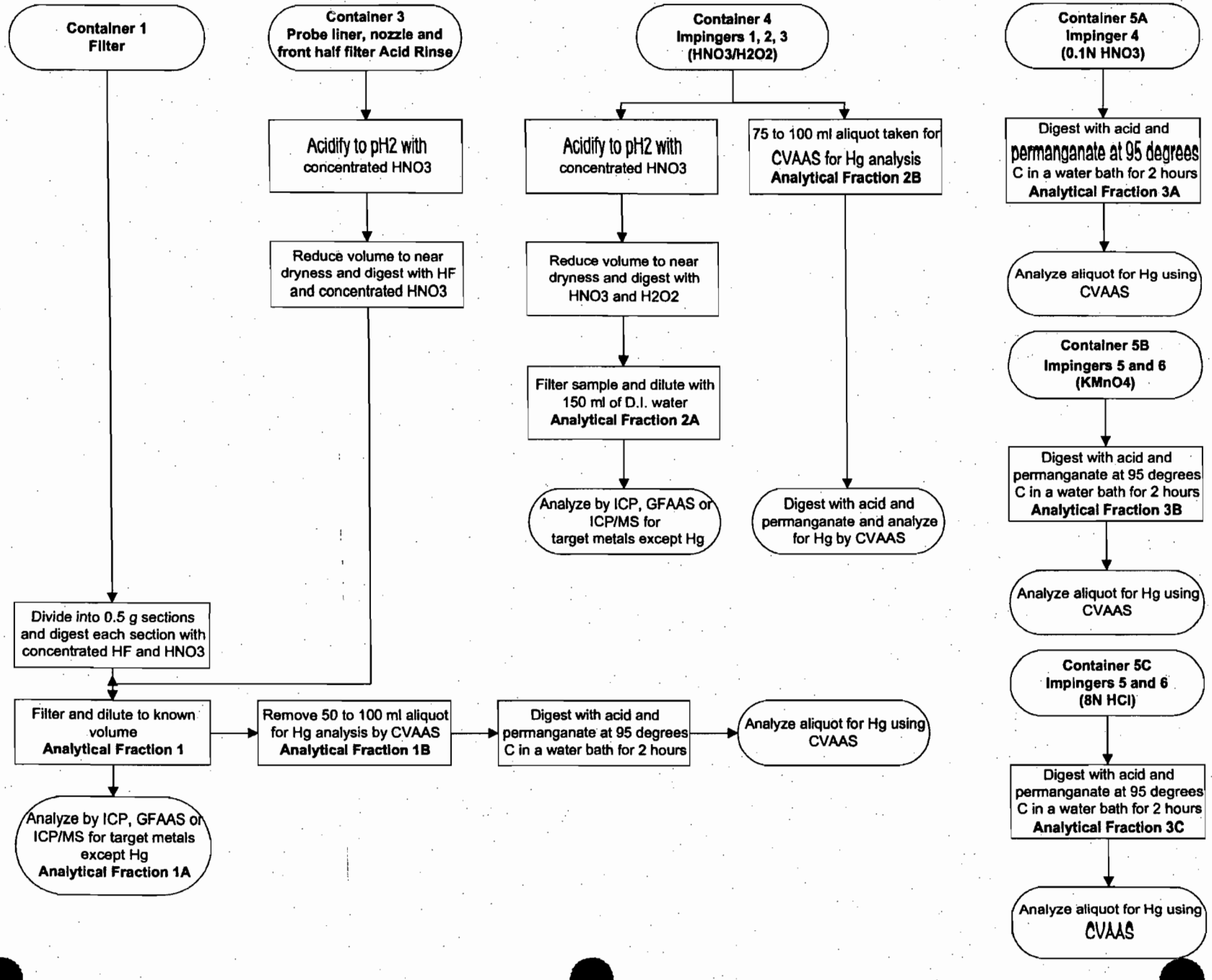
Container 10*
Permanganate Blank
500 ml Glass
- 100 ml KMnO4 solution

Container 11
HCl Rinse Blank
250 ml Glass
- 200 ml water, add 25 ml of 8N HCl. Mix well and seal

Container 12
Filter Blanks
Petri Dish
- 3 clean, unused filters

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

EPA Method 29
Analytical Flowchart
(includes Mercury)



SAMPLE CALCULATIONS

B

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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.

120506 100250
o

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)	=	488.6	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)	=	23.00	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)	=	29.90	in. Hg
T_m	= average dry gas meter temperature (°F)	=	81.18	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	85.99	dcf
Y_d	= gas meter correction factor (dimensionless)	=	1.0106	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.46	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)	=	84.994	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)	=	29.90	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-9.50	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.20	in. Hg

QA/QC
Date 12-5-12

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)	=	308.08	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	29.20	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)	=	29.20	In. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.20	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)	=	84.994	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	23.00	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2130	
		=	21.30	%

QA/QC C
Date 12-5-04

7. Saturated moisture content (% by volume)

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

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.20	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.20	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	=	0.2130	
B_w	= actual water vapor in gas	=	0.2130	
		=	21.30	%

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 (%)	=	9.8	%
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 (%)	=	80.60	%

QA/QC
Date 12-5-08

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 (%)	=	9.8	%
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 (%)	=	80.6	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.95	%

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	=	0.2130	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.95	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.41	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

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)	=	27.41	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.20	in. Hg
T_s	= average sample gas temperature (°F)	=	308.08	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.708	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	49.78	ft/sec

QA/QC
Date 12-5-06

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)	=	49.78	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	191,140	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)	=	191,140	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.20	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	308.1	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	128,240	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	=	0.2130	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	128,240	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	100,929	dscfm

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

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

Where:

Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	100,929	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)	=	82,051	dscfm

QA/QC
Date 12-5-08

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)	=	100,929	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	6,055,764	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)	=	100,929	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)	=	171,503	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)	=	171,503	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)	=	159,809	dry Nm^3/hr

QA/QC C
Date 12-5-05

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)	=	0.275	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2130	
P_s	= absolute sample gas pressure (in. Hg)	=	29.20	in. Hg
T_s	= average sample gas temperature (°F)	=	308.1	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	84.994	dscf
V_s	= sample gas velocity (ft/sec)	=	49.78	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 (%)	=	104.59	%

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)	=	85.99	dcf
T_m	= average dry gas meter temperature (°F)	=	81.18	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.7880	
P_{bar}	= barometric pressure (in. Hg)	=	29.90	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.462	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb-mole)	=	29.95	lb/lb-mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.204	√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	=	0.9766	

QA/QC _____
Date 11-5-08

EPA Method 29 Sample Calculations - Mercury Analytical Result

Sample data taken from Run 1

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 throughtout. The final table is formatted to an appropriate number of significant figures.

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

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1. Total blank amount (µg)

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

Where:

m_{1b-B}	= mercury amount in blank for Fraction 1b	=	<0.1000	µg
m_{2b-B}	= mercury amount in blank for Fraction 2b	=	<0.3000	µg
m_{3a-B}	= mercury amount in blank for Fraction 3a	=	<0.2000	µg
m_{3b-B}	= mercury amount in blank for Fraction 3b	=	<0.5000	µg
m_{3c-B}	= mercury amount in blank for Fraction 3c	=	<0.1000	µg
$m_{total-B}$	= total amount of mercury in blank	=	<1.2000	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	=	0.1801	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	7.9197	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 Frection 3c	=	<0.1000	µg
$m_{total-S}$	= total amount of mercury in sample	=	8.0998	µg

3. Allowable blank correction (µg)

$$m_{T-B-allow} = m_{total-B} \text{ if } m_{total-B} \leq 0.6$$

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

Where:

$m_{total-B}$	= total amount of mercury in blank	=	<1.2000	µg
$m_{total-S}$	= total amount of mercury in sample	=	8.0998	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	0.4050	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.

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	=	8.0998	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	8.0998	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	=	8.0998	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	0.1801	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	7.9197	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	=	<0.1000	µg
$m_{total-S}$	= total amount of mercury in sample	=	8.0998	µg
m_{n-1b}	= mercury corrected for blank - prorated for Fraction 1b	=	0.1801	µg
m_{n-2b}	= mercury corrected for blank - prorated for Fraction 2b	=	7.9197	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	=	<0.1000	µg

EPA Method 29 Sample Calculations - Mercury Emissions Results

Sample data taken from Run 1

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 throughtout. The final table is formatted to an appropriate number of significant figures.

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1. Mercury concentration (lb/dscf)

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

Where:

m_n	= Mercury collected in sample (total µg)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= Mercury concentration (lb/dscf)	=	2.1013E-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)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= Mercury concentration (µg/dscm)	=	3.3650E+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)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	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)	=	3.3650E-03	mg/dscm

12-5-06

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)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	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)	=	3.6112E+00	µg/Nm³ dry

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	2.1013E-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)	=	2.5848E-10	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	2.1013E-10	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.8	%
C_{sdy}	= Mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	2.5731E-10	lb/dscf @ y%CO_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	2.1013E-10	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	100,929	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	191,140	acfm
C_a	= Mercury concentration at actual gas conditions (lb/acf)	=	1.1096E-10	lb/acf

12-5-06

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)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	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)	=	100,929	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= Mercury emission rate (lb/hr)	=	1.2725E-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)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	100,929	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)	=	1.6031E-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)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	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)	=	100,929	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)	=	5.5736E-03	Ton/yr

12-5-06

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

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

Where:

m_n	= Mercury collected in sample (total µg)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.6	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= Mercury emission rate - Fd-based (lb/MMBtu)	=	3.7194E-06	lb/MMBtu

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

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

Where:

m_n	= Mercury collected in sample (total µg)	=	8.0998	µg
V_{mstd}	= volume metered, standard (dscf)	=	84.9942	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 (%)	=	9.8	%
100	= conversion factor	=	100	
E_{Fc}	= Mercury emission rate - Fc-based (lb/MMBtu)	=	3.9025E-06	lb/MMBtu

12-5-06

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PARAMETERS

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Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2006)		Nov 14	Nov 14	Nov 14	
Start Time (approx.)		07:59	10:25	12:49	
Stop Time (approx.)		10:10	12:36	15:00	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0106	1.0106	1.0106	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-9.5000	-9.5000	-9.4000	
A_n	Sample location area (ft²)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.90	29.90	29.90	**29.9000**
D_n	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O_2	Oxygen (dry volume %)	9.6000	9.4000	9.4000	**9.4667**
CO_2	Carbon dioxide (dry volume %)	9.8000	9.8000	10.0000	**9.8667**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.6000	80.8000	80.8000	**80.6667**
V_{lc}	Total Liquid collected (ml)	488.60	498.40	563.60	
V_m	Volume metered, meter conditions (ft³)	85.9850	87.1450	85.2550	
T_m	Dry gas meter temperature (°F)	81.1800	93.3200	96.7400	
T_s	Sample temperature (°F)	308.0800	309.9600	306.9600	**308.3333**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.4624	1.4784	1.4136	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft³)	22.9984	23.4597	26.5287	**24.3289**
V_{mstd}	Volume metered, standard (dscf)	84.9942	84.2541	81.9075	**83.7186**
P_s	Sample gas pressure, absolute (in. Hg)	29.2015	29.2015	29.2088	**29.2039**
P_v	Vapor pressure, actual (in. Hg)	29.2015	29.2015	29.2088	**29.2039**
B_{wo}	Moisture measured in sample (% by volume)	21.2963	21.7796	24.4648	**22.5136**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.2963	21.7796	24.4648	**22.5136**
$\sqrt{\Delta P}$	Velocity head (√in. H_2O)	0.7075	0.7289	0.7153	**0.7172**
M_d	MW of sample gas, dry (lb/lb-mole)	29.9520	29.9440	29.9760	**29.9573**
M_s	MW of sample gas, wet (lb/lb-mole)	27.4067	27.3426	27.0461	**27.2651**
V_s	Velocity of sample (ft/sec)	49.7761	51.4006	50.6137	**50.5968**
%I	Isokinetic sampling (%)	104.5933	101.2735	103.1083	**102.9917**
Q_a	Volumetric flow rate, actual (acfm)	191,140	197,378	194,357	**194,292**
Q_s	Volumetric flow rate, standard (scfm)	128,240	132,102	130,621	**130,321**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	100,929	103,330	98,665	**100,975**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	82,051	85,489	81,629	**83,056**
Q_a	Volumetric flow rate, actual (acf/hr)	11,468,407	11,842,693	11,661,398	**11,657,499**
Q_s	Volumetric flow rate, standard (scf/hr)	7,694,381	7,926,096	7,837,261	**7,819,246**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	6,055,764	6,199,821	5,919,893	**6,058,493**
Q_a	Volumetric flow rate, actual (m³/hr)	324,792	335,392	330,258	**330,147**
Q_s	Volumetric flow rate, standard (m³/hr)	217,909	224,472	221,956	**221,446**
Q_{std}	Volumetric flow rate, dry standard (dry m³/hr)	171,503	175,583	167,655	**171,580**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m³/hr)	139,423	145,266	138,707	**141,132**
Q_s	Volumetric flow rate, normal (Nm³/hr)	203,052	209,167	206,822	**206,347**
Q_{std}	Volumetric flow rate, dry normal (Nm³/hr)	159,809	163,611	156,224	**159,881**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm³/hr)	129,917	135,362	129,250	**131,510**

Comments:

Average includes 3 runs.

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Date 12-5-06

Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2006)		Nov 14	Nov 14	Nov 14	
Start Time (approx.)		07:59	10:25	12:49	
Stop Time (approx.)		10:10	12:36	15:00	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.2	184.2	184.0	**184.1**
P_1	SDA Outlet Temperature (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.6000	9.4000	9.4000	**9.4667**
CO_2	Carbon dioxide (dry volume %)	9.8000	9.8000	10.0000	**9.8667**
T_s	Sample temperature (°F)	308.0800	309.9600	306.9600	**308.3333**
B_w	Actual water vapor in gas (% by volume)	21.2963	21.7796	24.4648	**22.5136**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	191,140	197,378	194,357	**194,292**
Q_s	Volumetric flow rate, standard (scfm)	128,240	132,102	130,621	**130,321**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	100,929	103,330	98,665	**100,975**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	82,051	85,489	81,629	**83,056**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B (µg)	0.1801	<0.1000	<0.1000	**<0.1267**
$m_{n\text{-}2b}$	Fraction 2B (µg)	7.9197	13.3804	10.6038	**10.6346**
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	**<0.2000**
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	**<0.5000**
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.1000	<0.1000	<0.1000	**<0.1000**
m_n	Total matter corrected for allowable blanks (µg)	8.0998	13.3804	10.6038	**10.6947**
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	2.1013E-10	3.5018E-10	2.8546E-10	**2.8192E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.5848E-10	4.2326E-10	3.4504E-10	**3.4226E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.5731E-10	4.2879E-10	3.4255E-10	**3.4288E-10**
C_a	Concentration (lb/acf)	1.1096E-10	1.8332E-10	1.4491E-10	**1.4640E-10**
C_{sd}	Concentration (µg/dscm)	3.3650E+00	5.6076E+00	4.5713E+00	**4.5146E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.1392E+00	6.7778E+00	5.5253E+00	**5.4808E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.1204E+00	6.8664E+00	5.4855E+00	**5.4908E+00**
C_{sd}	Concentration (mg/dscm)	3.3650E-03	5.6076E-03	4.5713E-03	**4.5146E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.1392E-03	6.7778E-03	5.5253E-03	**5.4808E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.1204E-03	6.8664E-03	5.4855E-03	**5.4908E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.7768E+00	2.9356E+00	2.3206E+00	**2.3444E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.6112E+00	6.0179E+00	4.9058E+00	**4.8449E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.4421E+00	7.2738E+00	5.9296E+00	**5.8818E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.4219E+00	7.3688E+00	5.8869E+00	**5.8925E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.2725E-03	2.1710E-03	1.6899E-03	**1.7111E-03**
$E_{g/s}$	Rate (g/s)	1.6031E-04	2.7350E-04	2.1289E-04	**2.1556E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.5736E-03	9.5091E-03	7.4018E-03	**7.4948E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.7194E-06	6.0904E-06	4.9649E-06	**4.9249E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.9025E-06	6.5033E-06	5.1954E-06	**5.2004E-06**

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Date 12-5-06

Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2006)		Nov 14	Nov 14	Nov 14	
Start Time (approx.)		07:59	10:25	12:49	
Stop Time (approx.)		10:10	12:36	15:00	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	4.6720E-12	<2.6171E-12	<2.6921E-12	**<3.3270E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	5.7469E-12	<3.1633E-12	<3.2539E-12	**<4.0547E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	5.7208E-12	<3.2046E-12	<3.2305E-12	**<4.0520E-12**
C_a	Concentration (lb/acf)	2.4670E-12	<1.3701E-12	<1.3666E-12	**<1.7346E-12**
C_{sd}	Concentration (µg/dscm)	7.4815E-02	<4.1909E-02	<4.3110E-02	**<5.3278E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	9.2029E-02	<5.0655E-02	<5.2106E-02	**<6.4930E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	9.1610E-02	<5.1317E-02	<5.1732E-02	**<6.4886E-02**
C_{sd}	Concentration (mg/dscm)	7.4815E-05	<4.1909E-05	<4.3110E-05	**<5.3278E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	9.2029E-05	<5.0655E-05	<5.2106E-05	**<6.4930E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	9.1610E-05	<5.1317E-05	<5.1732E-05	**<6.4886E-05**
C_a	Concentration (µg/m^3 (actual,wet))	3.9505E-02	<2.1940E-02	<2.1885E-02	**<2.7777E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	8.0289E-02	<4.4975E-02	<4.6264E-02	**<5.7176E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	9.8763E-02	<5.4362E-02	<5.5919E-02	**<6.9681E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	9.8314E-02	<5.5072E-02	<5.5517E-02	**<6.9634E-02**
$E_{lb/hr}$	Rate (lb/hr)	2.8292E-05	<1.6225E-05	<1.5937E-05	**<2.0152E-05**
$E_{g/s}$	Rate (g/s)	3.5642E-06	<2.0440E-06	<2.0076E-06	**<2.5386E-06**
$E_{T/yr}$	Rate (Ton/yr)	1.2392E-04	<7.1067E-05	<6.9803E-05	**<8.8264E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	8.2695E-08	<4.5517E-08	<4.6822E-08	**<5.8345E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	8.6765E-08	<4.8603E-08	<4.8996E-08	**<6.1455E-08**

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Date 12-5-06

Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2006)		Nov 14	Nov 14	Nov 14	
Start Time (approx.)		07:59	10:25	12:49	
Stop Time (approx.)		10:10	12:36	15:00	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	2.0546E-10	3.5018E-10	2.8546E-10	**2.8037E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.5274E-10	4.2326E-10	3.4504E-10	**3.4034E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.5159E-10	4.2879E-10	3.4255E-10	**3.4098E-10**
C_a	Concentration (lb/acf)	1.0849E-10	1.8332E-10	1.4491E-10	**1.4558E-10**
C_{sd}	Concentration (µg/dscm)	3.2902E+00	5.6076E+00	4.5713E+00	**4.4897E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.0472E+00	6.7778E+00	5.5253E+00	**5.4501E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.0288E+00	6.8664E+00	5.4855E+00	**5.4602E+00**
C_{sd}	Concentration (mg/dscm)	3.2902E-03	5.6076E-03	4.5713E-03	**4.4897E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.0472E-03	6.7778E-03	5.5253E-03	**5.4501E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.0288E-03	6.8664E-03	5.4855E-03	**5.4602E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.7373E+00	2.9356E+00	2.3206E+00	**2.3312E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.5309E+00	6.0179E+00	4.9058E+00	**4.8182E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.3433E+00	7.2738E+00	5.9296E+00	**5.8489E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.3236E+00	7.3688E+00	5.8869E+00	**5.8598E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.2442E-03	2.1710E-03	1.6899E-03	**1.7017E-03**
$E_{g/s}$	Rate (g/s)	1.5674E-04	2.7350E-04	2.1289E-04	**2.1438E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.4497E-03	9.5091E-03	7.4018E-03	**7.4535E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.6367E-06	6.0904E-06	4.9649E-06	**4.8973E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.8157E-06	6.5033E-06	5.1954E-06	**5.1715E-06**

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Date 12-5-06

Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2006)		Nov 14	Nov 14	Nov 14	
Start Time (approx.)		07:59	10:25	12:49	
Stop Time (approx.)		10:10	12:36	15:00	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.1886E-12	<5.2342E-12	<5.3841E-12	**<5.2690E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.3824E-12	<6.3265E-12	<6.5078E-12	**<6.4056E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<6.3534E-12	<6.4092E-12	<6.4609E-12	**<6.4078E-12**
C_a	Concentration (lb/acf)	<2.7398E-12	<2.7402E-12	<2.7332E-12	**<2.7377E-12**
C_{sd}	Concentration (µg/dscm)	<8.3088E-02	<8.3818E-02	<8.6219E-02	**<8.4375E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.0221E-01	<1.0131E-01	<1.0421E-01	**<1.0258E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.0174E-01	<1.0263E-01	<1.0346E-01	**<1.0261E-01**
C_{sd}	Concentration (mg/dscm)	<8.3088E-05	<8.3818E-05	<8.6219E-05	**<8.4375E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.0221E-04	<1.0131E-04	<1.0421E-04	**<1.0258E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.0174E-04	<1.0263E-04	<1.0346E-04	**<1.0261E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<4.3874E-02	<4.3880E-02	<4.3769E-02	**<4.3841E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<8.9168E-02	<8.9951E-02	<9.2528E-02	**<9.0549E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.0968E-01	<1.0872E-01	<1.1184E-01	**<1.1008E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.0918E-01	<1.1014E-01	<1.1103E-01	**<1.1012E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.1421E-05	<3.2451E-05	<3.1873E-05	**<3.1915E-05**
$E_{g/s}$	Rate (g/s)	<3.9583E-06	<4.0880E-06	<4.0153E-06	**<4.0205E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.3762E-04	<1.4213E-04	<1.3961E-04	**<1.3979E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<9.1839E-08	<9.1035E-08	<9.3643E-08	**<9.2172E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<9.6360E-08	<9.7206E-08	<9.7991E-08	**<9.7186E-08**

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Date 12-5-06

Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2006)		Nov 14	Nov 14	Nov 14	
Start Time (approx.)		07:59	10:25	12:49	
Stop Time (approx.)		10:10	12:36	15:00	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.2971E-11	<1.3085E-11	<1.3460E-11	**<1.3172E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.5956E-11	<1.5816E-11	<1.6269E-11	**<1.6014E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.5883E-11	<1.6023E-11	<1.6152E-11	**<1.6020E-11**
C_a	Concentration (lb/acf)	<6.8494E-12	<6.8504E-12	<6.8331E-12	**<6.8443E-12**
C_{sd}	Concentration (µg/dscm)	<2.0772E-01	<2.0954E-01	<2.1555E-01	**<2.1094E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.5551E-01	<2.5328E-01	<2.6053E-01	**<2.5644E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.5435E-01	<2.5659E-01	<2.5866E-01	**<2.5653E-01**
C_{sd}	Concentration (mg/dscm)	<2.0772E-04	<2.0954E-04	<2.1555E-04	**<2.1094E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.5551E-04	<2.5328E-04	<2.6053E-04	**<2.5644E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.5435E-04	<2.5659E-04	<2.5866E-04	**<2.5653E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.0968E-01	<1.0970E-01	<1.0942E-01	**<1.0960E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.2292E-01	<2.2488E-01	<2.3132E-01	**<2.2637E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.7421E-01	<2.7181E-01	<2.7960E-01	**<2.7520E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.7296E-01	<2.7536E-01	<2.7758E-01	**<2.7530E-01**
$E_{lb/hr}$	Rate (lb/hr)	<7.8552E-05	<8.1127E-05	<7.9684E-05	**<7.9788E-05**
$E_{g/s}$	Rate (g/s)	<9.8957E-06	<1.0220E-05	<1.0038E-05	**<1.0051E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.4406E-04	<3.5534E-04	<3.4901E-04	**<3.4947E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.2960E-07	<2.2759E-07	<2.3411E-07	**<2.3043E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.4090E-07	<2.4301E-07	<2.4498E-07	**<2.4296E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	<2.5943E-12	<2.6171E-12	<2.6921E-12	**<2.6345E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.1912E-12	<3.1633E-12	<3.2539E-12	**<3.2028E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.1767E-12	<3.2046E-12	<3.2305E-12	**<3.2039E-12**
C_a	Concentration (lb/acf)	<1.3699E-12	<1.3701E-12	<1.3666E-12	**<1.3689E-12**
C_{sd}	Concentration (µg/dscm)	<4.1544E-02	<4.1909E-02	<4.3110E-02	**<4.2188E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<5.1103E-02	<5.0655E-02	<5.2106E-02	**<5.1288E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<5.0870E-02	<5.1317E-02	<5.1732E-02	**<5.1306E-02**
C_{sd}	Concentration (mg/dscm)	<4.1544E-05	<4.1909E-05	<4.3110E-05	**<4.2188E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<5.1103E-05	<5.0655E-05	<5.2106E-05	**<5.1288E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.0870E-05	<5.1317E-05	<5.1732E-05	**<5.1306E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.1937E-02	<2.1940E-02	<2.1885E-02	**<2.1920E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<4.4584E-02	<4.4975E-02	<4.6264E-02	**<4.5274E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<5.4842E-02	<5.4362E-02	<5.5919E-02	**<5.5041E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<5.4592E-02	<5.5072E-02	<5.5517E-02	**<5.5060E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.5710E-05	<1.6225E-05	<1.5937E-05	**<1.5958E-05**
$E_{g/s}$	Rate (g/s)	<1.9791E-06	<2.0440E-06	<2.0076E-06	**<2.0103E-06**
$E_{T/yr}$	Rate (Ton/yr)	<6.8812E-05	<7.1067E-05	<6.9803E-05	**<6.9894E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<4.5920E-08	<4.5517E-08	<4.6822E-08	**<4.6086E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<4.8180E-08	<4.8603E-08	<4.8996E-08	**<4.8593E-08**

120506 110009
OLF@_0
QA/QC _____
Date 12-5-06

QA/QC DATA

D

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Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

USEPA Method 29 (Mercury)
QA/QC Results

	Run No.	1	2	3	
	Date (2006)	Nov 14	Nov 14	Nov 14	
	Start Time (approx.)	07:59	10:25	12:49	
	Stop Time (approx.)	10:10	12:36	15:00	
	Total Duration of Test Run (min.)	131	131	131	
	Net Sampling Time (min.)	125	125	125	
	Sampling System Calibration Summary				
	Nozzle ID No:	.275-1	.275-1	.275-1	
D_n	Nozzle Diameter (in):	0.275	0.275	0.275	
	Probe ID No:	67-8-7	67-8-7	67-8-7	
C_p	Pitot Coefficient:	0.84	0.84	0.84	
	Meter Box ID. No:	61-7	61-7	61-7	
Y_d	Meter Box Yd - Field Sheet	1.0106	1.0106	1.0106	
	Meter Box Yd - Database	1.0106	1.0106	1.0106	
	Meter Box $\Delta H@$ - Field Sheet	1.7880	1.7880	1.7880	
	Meter Box $\Delta H@$ - Database	1.7880	1.7880	1.7880	
	QA/QC				
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0275	0.0279	0.0273	
	(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	0.0050	0.0030	
	Sample Volume				
	Minimum Volume Required (dscf)	60.00	60.00	60.00	
V_{mstd}	Actual Sample Volume (dscf)	84.99	84.25	81.91	
	Alternative Method 5 Post-Test Calibration (EPA ALT-009)				
$\sqrt{\Delta H_{avg}}$	Average of Square Root of ΔH (in. W.C.)	1.204	1.212	1.184	
Y_{qa}	Alternative Meter Calibration Factor	0.9766	0.9810	0.9817	**Average**
	Variation from full-test Y_d (average ≤ ±5%)	3.4%	2.9%	2.9%	**3.1%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	Actual Variation (%)	104.59	101.27	103.11	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	0	
	Number of points >110%	0	0	0	
	Number of points <80%	0	0	0	
	Number of points >120%	0	0	0	

120506 100250
OLF@

QA/QC
Date 12-5-06

Nozzle Calibration Sheet

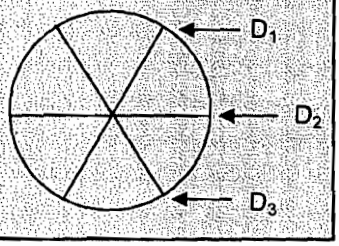
Client	WHEELABRATOR	Project Number	9963
Calibrated by	DR	Unit	1
Date	11/14/06	Runs	

Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
.275-1	.275	.276	.275	0.001	.275

D_1, D_2, D_3 = three nozzle diameter measurements

ΔD = maximum difference between any two diameters
$\Delta D = 0.004$ inches*

D_{ave} = average of D_1, D_2, D_3



* (40 CFR 60, Appendix A, Method 5, Section 5.1)

QA/QC ✓
Date 12-5-06

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 61-7

Date of Calibration: 1/16/2006

Meter Box Y_d: 1.0106

Calibration conducted by: Ryan Redel

Meter Box ΔH@: 1.7880

Signature

Barometric Pressure: 28.83

				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	In	Out	T_{ds} Avg.	In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
0.942	3.00	-1.80	1.0000	0.000	10.000	10.000	864.005	874.101	10.096	62.0	62.0	62.00	82.0	73.0	77.50	10.34	1.0075	1.8144
0.940	3.00	-1.80	1.0000	0.000	10.000	10.000	874.101	884.227	10.126	62.0	62.0	62.00	83.0	75.0	79.00	10.36	1.0073	1.8146
0.388	0.50	-1.20	1.0000	0.000	5.000	5.000	900.761	905.795	5.034	62.0	62.0	62.00	78.0	76.0	77.00	12.54	1.0174	1.7691
0.388	0.50	-1.20	1.0000	0.000	5.000	5.000	905.795	910.840	5.045	62.0	62.0	62.00	78.0	76.0	77.00	12.56	1.0151	1.7747
0.671	1.50	-1.40	1.0000	0.000	10.000	10.000	919.604	929.772	10.168	62.0	62.0	62.00	82.0	76.0	79.00	14.52	1.0080	1.7789
0.671	1.50	-1.40	1.0000	0.000	10.000	10.000	929.772	939.940	10.168	62.0	62.0	62.00	82.0	76.0	79.00	14.51	1.0080	1.7764

Averages 1.01057 1.78801

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_{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)
Θ	Duration of Run (minutes)

Equations

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

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

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

Vacuum Gauge		DGM Thermocouples		
Standard (in.Hg)	Gauge (in.Hg)	Standard (°F)	Inlet (°F)	Outlet (°F)
5.0	5.8			
10.0	10.5			
15.0	15.2			
20.0	20.0			
25.0	24.8			

D - 5

CleanAir ENGINEERING

Pyrometer Calibration Test Report

Pyrometer No.:	61-7	Office:	Palatine, Il
Calibrated By:	R.R.	Client:	
Date:	1/16/2006	Job Number:	

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
50 °F	48 °F
100 °F	98 °F
150 °F	148 °F
200 °F	198 °F
250 °F	248 °F
300 °F	298 °F
350 °F	348 °F
400 °F	398 °F
450 °F	448 °F
500 °F	498 °F
550 °F	548 °F
600 °F	598 °F

Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	Omega Engineering, Inc.	Exp. Date:	9/26/2006
Report No:	R 044791		

CleanAir ENGINEERING

BEST AVAILABLE COPY

Meter Box Critical Orifice Post-Test Calibration Data

Project No. 9963 Meter No. 61-7 Orifice B-2

Location Palatine, IL Meter Yd 1.0106 Orifice K' 0.3710

Test Date 11/29/06 Meter ΔH@ 1.7880 Orifice Cal. Date 10/19/06

Operator B. Crane Full Test Cal. Date 01/16/06

Barom. Press. (P_b) 29.20 in. Hg

Leak Checks

Negative Pressure ☑ Pass

No movement of manometer in one-minute

Positive Pressure ☑ Pass

No movement of manometer in one-minute

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	867.80	70	67								
1	6.0	870.75	70	68	72	0.70	21	6.0	2.95	68.8	0.9789	-0.4%
2	11.0	873.19	72	68	73	0.70	21	5.0	2.44	69.5	0.9867	0.4%
3	16.0	875.64	73	69	74	0.70	21	5.0	2.45	70.5	0.9836	0.1%
										Average Y_i	0.9831	
										Cal. Error	-2.7%	

Calculations and Specifications

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

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

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

CleanAir ENGINEERING

SAMPLE PROBE CALIBRATION DATA

Probe Type: M5 **I.D. number:** 67-8-7

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, pilot does not meet specification.

[X] **"S" Pitot**

Measurement				Specification
a1 =	1	a2 =	1	<10 °
b1 =	0	b2 =	2	<5°
γ =	0	θ =	3	
Pa =	0.364	Pb =	0.360	Pa + Pb = A
A =	0.724	Dt =	0.250	

Calculations

z = A sin γ = 0.0000 <0.125"

w = A sin θ = 0.0252 <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

Reference Pitot I.D. No: _____ Reference Pitot Cp: _____

Pitot Side 'A':

Trial No.	Reference ΔP	Probe ΔP	Probe Cp*	Deviation from Average Cp*	Specification
1					Cp Deviations ≤ 0.01
2					
3					

Side 'A' Average Probe Cp= _____

Pitot Side 'B':

Trial No.	Reference ΔP	Probe ΔP	Probe Cp*	Deviation from Average Cp*	
1					Cp Deviations ≤ 0.01
2					
3					

Side 'B' Average Probe Cp= _____

* *Probe Cp=(Reference Cp)√(Reference ΔP / Probe ΔP); Cp Deviation=Trial Probe Cp - Average Probe Cp*

Side 'A' Average Cp		Side 'B' Average Cp		Difference	
	-		=		Abs. Diff. ≤ 0.01

Does assembly meet specifications? YES / NO → ***If "YES" Cp=Average of Side 'A' and 'B' Cp values.***
If "NO" PITOT MUST BE REPLACED.

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

PROBE Cp = 0.84 **Calibrated by:** _____ **Date:** 3/9/06

CleanAir. ENGINEERING

FIELD DATA

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TEST LOCATION: FF Outlet Mercury **TESTING METHOD:** 4 **PAGE** 1 **OF** 2

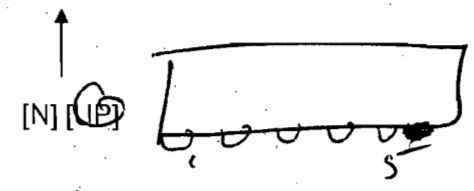
UNIT: 1 **RUN:** 1

FIELD DATA SHEET

Daniel J. Bursey FDEP

Client	Lafarge Laboratory	Project No.	9963
Plant	N. Broward	Date	11/14/06
Meter Operator		PB	
Probe Operator		PB	

Cross-Section of Test Location



Amb. Temp. (°F)	70	Bar. Press.	29.90 [in. Hg] [mbar]
Probe I.D. No.		67-7	
Liner Material		Glass	

Meter Box	101-7	Sample Box No.	67-7
Meter Y_d	1.0106	Meter $\Delta H_@$	1.7880
K Factor	2.90	Pitot C_p	0.84
Leak Rate Before	0.004 [cfm] [Lpm]	@	15 (in. Hg)
Leak Rate After	0.003 [cfm] [Lpm]	@	8 (in. Hg)
Pitot Leak Check Before: ☒	After: Good ☒	Bad ☐	

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.275	Nozzle I.D.	2751

Duct Dimensions (in.)			
96 x 96			
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.5	10.0	[In]	[In]

Start Time:	7:59	Stop Time:	10:10

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] 133.290	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
1-1	5	.47	1.4	136.71	307	250	250	60	71	71	2.5	N/A	
2	10	.46	1.3	139.97	306	250	249	49	72	70	2.5		
3	15	.52	1.5	143.45	307	250	249	50	75	71	2.5		
4	20	.63	1.8	147.25	307	250	250	49	77	72	3.0		
5	25	.56	1.6	150.880	308	250	250	51	79	73	2.5		150.920 -0.04
2-1	30	.48	1.4	154.29	307	250	251	55	79	74	2.5		
2	35	.45	1.3	157.50	308	250	250	56	82	75	2.5		
3	40	.50	1.5	161.00	308	251	250	58	83	75	2.5		
4	45	.64	1.9	164.92	308	250	250	60	84	76	3.0		
5	50	.55	1.6	168.570	308	251	250	62	85	76	3.0		168.545 -0.035
3-1	55	.42	1.2	171.71	308	249	250	64	84	77	2.5		
2	60	.46	1.3	175.01	308	250	250	62	85	77	2.5		
		8.50563											
	Total			85.985									
	Average	0.7075	1.4604		308.0800				84.1800				

Sum of square roots 17.8

Circle correct bracketed units on data sheet. 3040 1813

QA/QC PB

Date 11/14/06

CleanAir ENGINEERING

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

UNIT: 1 RUN: 1

FIELD DATA SHEET

Daniel Bay

Client	Wheelabrator	Project No.	9963
Plant	N. Broward	Date	11/14/06
Meter Operator	RB		
Probe Operator	RB		

Cross-Section of Test Location

[N] [UP]

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

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP ($in. H_2O$)	Orifice Setting ΔH ($in. H_2O$)	Gas Sample Volume V_m Init. Vol. [ft³] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	Filter T_f (°F) Set Points	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
						270	250						
3	65	.51	1.5	178.52	308	280	249	57	86	78	3.0	N/A	
4	70	.58	1.7	182.30	309	280	250	55	89	80	3.0		
5	75	.58	1.7	186.045	310	281	250	55	90	81	3.0		186.100
4-1	80	.58	1.7	189.81	309	279	252	58	88	81	3.0		-0.055
2	85	.38	1.1	192.79	308	279	250	59	88	82	2.5		
3	90	.33	.96	195.57	308	281	250	60	87	81	2.5		
4	95	.51	1.5	199.08	310	280	250	62	87	82	3.0		
5	100	.60	1.7	202.800	310	280	249	62	89	82	3.0		202.895
5-1	105	.39	1.1	205.83	308	280	250	63	89	83	2.5		-0.095
2	110	.49	1.2	209.25	308	280	249	63	89	83	3.0		
3	115	.39	1.1	212.21	308	281	250	63	90	83	2.5		
4	120	.45	1.3	215.50	308	280	250	64	90	84	3.0		
5	125	.68	2.0	219.500	308	280	250	64	90	84	3.5		
	Total	*9.12295											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC DA

Date 11/14/06

CleanAir ENGINEERING

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

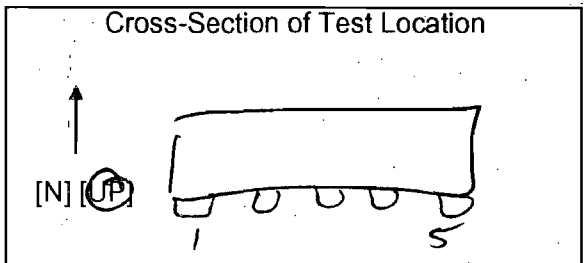
Mercury

UNIT: 1 **RUN:** 2

FIELD DATA SHEET

Client	Wheelabrator	Project No.	9463
Plant	N Braunfels	Date	11/14/06
Meter Operator	PB		
Probe Operator	PB		

Cross-Section of Test Location



Amb. Temp. (°F)	75	Bar. Press.	29.90 (in. Hg) [mbar]
Probe I.D. No.		67-8-7	
Liner Material		Glass	

Meter Box	64-7	Sample Box No.	67-36
Meter Y_d	1.0106	Meter $\Delta H_@$	1.7880
K Factor	2.90	Pitot C_p	0.84
Leak Rate Before	0.005 [cfm] [Lpm]	@	14 (in. Hg)
Leak Rate After	0.005 [cfm] [Lpm]	@	13 (in. Hg)
Pitot Leak Check Before: ☒	After: Good ☒	Bad ☐	

Duct Dimensions (in.)	96 x 96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.50	10.0		

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.271	Nozzle I.D.	225-1

Start Time:	10:25	Stop Time:	12:36

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. 219.730 [m^3] [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)	Notes
5-1	5	.47	1.4	223.17	308	248	246	65	90	87	3.0	N/A	
2	10	.51	1.5	226.67	309	250	251	64	96	87	3.0		
3	15	.42	1.2	229.87	307	250	251	64	91	86	2.5		
4	20	.52	1.4 1.5	233.30	306	250	252	63	91	86	3.0		K: 2.75
5	25	.606	1.8	237.140	309	252	250	61	93	87	3.5		237.140 -0.04
4-6	30	.57	1.6	240.79	308	250	250	61	93	88	3.0		
2	35	.46	1.3	244.04	310	250	249	61	93	87	2.5		
3	40	.43	1.2	247.22	308	250	251	62	93	88	2.5		
4	45	.56	1.5	250.75	310	250	250	62	94	88	3.5		
5	50	.61	1.7	254.465	311	250	251	63	94	88	3.5		254.510 -0.045
3-1	55	.35	.96	257.33	321	249	251	63	94	89	2.5		
2	60	.46	1.3	260.64	314	250	249	64	96	89	3.0	↓	
	Total	*		87.145									
	Average	0.7289	1.4784		309.960				93.320				

Sum of square roots: 16.86

Circle correct bracketed units on data sheet.

QA/QC PB

Date 11/14/06

2162

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

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

UNIT: 1 RUN: 2

FIELD DATA SHEET

Client	Wheelabrator	Project No.	9963
Plant	N. Brunswick	Date	11/14/06
Meter Operator	PB		
Probe Operator	PB		

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 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 200	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	60	.49	1.3	263.93	314	251	251	62	97	89	3.0	N/A	
4	70	.61	1.7	267.67	305	250	250	56	98	91	3.5		
5	75	.65	1.8	271.545	309	250	250	59	100	91	4.0		271.550
2-1	80	.51	1.4	274.97	307	249	251	62	99	92	3.0		-0.045
2	85	.47	1.3	278.25	310	250	249	61	100	93	3.0		
3	90	.54	1.5	281.78	311	250	250	53	100	94	3.5		
4	95	.64	1.8	285.59	311	250	249	53	101	94	4.0		
5	100	.59	1.6	289.235	311	249	250	54	101	94	3.5		289.280
1-1	105	.49	1.3	292.55	310	250	251	55	100	94	3.5		-0.045
2	110	.52	1.4	295.95	310	249	248	53	100	94	3.5		
3	115	.56	1.5	299.47	310	251	248	53	100	94	3.5		
4	120	.616	1.8	303.33	310	250	249	54	100	94	4.0		
5	125	.61	1.7	307.050	310	250	250	54	100	94	4.0		
	Total	*											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC PB

Date 11/14/06

CleanAir ENGINEERING

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

UNIT: 1 **RUN:** 3

FIELD DATA SHEET

Client	Wheelabrator	Project No.	9963
Plant	Mt. Brydges	Date	11/14/06
Meter Operator	PB		
Probe Operator	PB		

Cross-Section of Test Location

Amb. Temp. (°F)	80	Bar. Press.	29.90 (in. Hg) [mbar]
Probe I.D. No.			67-8-7
Liner Material			Glass

Meter Box	61-7	Sample Box No.	67-2
Meter Y_d	1.0106	Meter $\Delta H_@$	1.7880
K Factor	2.75	Pitot C_p	0.84
Leak Rate Before	0.005 (cfm) [Lpm]	@	13 (in. Hg)
Leak Rate After	0.003 (cfm) [Lpm]	@	8 (in. Hg)
Pitot Leak Check Before	☒	After: Good ☒ Bad ☐	

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.275	Nozzle I.D.	275-1

Duct Dimensions (in.)	96 x 96			
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]	
-9.4	10.0			

Start Time: 12:49 Stop Time: 15:00

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	Filter T_f (°F) Set Points	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
				307.275		250	250						
1-1	5	.51	1.4	310.608	307	250	248	64	93	93	2.5	N/A	
2	10	.51	1.4	314.06	307	250	249	64	96	92	2.5		
3	15	.59	1.6	317.71	307	250	250	60	97	92	3.0		
4	20	.62	1.7	321.51	307	250	249	59	99	93	3.0		
5	25	.55	1.5	325.025	308	250	249	61	100	93	2.5		
2-1	30	.47	1.3	328.32	307	249	250	64	98	93	2.5		325.050 -0.025
2	35	.47	1.3	331.58	308	250	250	64	99	93	2.5		
3	40	.49	1.3	334.83	308	250	251	59	99	94	2.5		
4	45	.63	1.7	338.59	308	250	251	60	100	94	3.0		
5	50	.54	1.5	342.150	308	250	251	61	100	95	3.0		342.175
3-1	55	.42	1.2	345.32	307	250	250	64	98	94	2.5		-0.025
2	60	.47	1.3	348.60	307	249	250	62	99	94	3.0		
	Total	*		85.255									
	Average	0.7153	1.4136		306.960				98.7400				

Sum of square roots 17.2

Circle correct bracketed units on data sheet.

QA/QC PB

Date 11/14/06

CleanAir ENGINEERING

E - 7

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

UNIT: 1 **RUN:** 3

FIELD DATA SHEET

Client Wheelabrator	Project No. 1463
Plant N. Broward	Date 11/14/06
Meter Operator	PB
Probe Operator	PB

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt Elapsed Time (5)	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 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	65	.47	1.3	351.84	307	251	250	58	99	94	3.0	N/A	
4	70	.66	1.8	355.70	308	250	250	58	101	95	3.5		
5	75	.67	1.8	359.545	308	250	248	59	103	96	3.5		359.575
4-1	80	.51	1.4	362.98	307	250	250	62	101	96	3.0		-0.03
2	85	.42	1.2	366.14	306	250	249	61	101	95	3.0		
3	90	.43	1.2	369.31	306	250	247	63	100	95	3.0		
4	95	.56	1.5	372.87	307	250	250	64	100	96	3.5		
5	100	.67	1.8	376.770	308	250	248	59	101	96	3.5		376.845
5-1	105	.36	.99	379.71	307	250	251	62	99	95	2.5		-0.045
2	110	.40	1.1	382.70	308	250	248	60	99	95	3.0		
3	115	.31	.85	385.37	300	247	251	61	99	95	2.5		
4	120	.52	1.4	388.79	306	249	250	63	99	95	3.5		
5	125	.66	1.8	392.655	307	250	250	64	99	95	3.5		
	Total	*											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC PA

Date 11/14/06

CleanAir ENGINEERING

Impinger Weight Sheet

Client	WHEELABRATOR	Unit Name / Location	UNIT 1 FF OUTLET
Plant	NORTH	Job No. 9963	Method M29

Run No.	1	Filter Type	QUARTZ	Sample Box No.	67-~~36~~ 2
Date	11/14/06	Lot No.		pH	NA
Analyst	D²	Filter No.	NA	Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	773.9	454.0	319.9	
Impinger 2	5%/10%	662.6	542.2	120.4	QA/QC D²
Impinger 3	5%/10%	539.5	516.0	23.5	Date 11/14
Impinger 4	EMPTY	463.3	459.5	3.8	
Impinger 5	KMNO4	553.6	552.5	1.1	Total Weight (gm)
Impinger 6	KMNO4	506.0	505.0	1.0	469.7
Impinger 7	GEL	773.6	754.7	18.9	488.6

Run No.	2	Filter Type	QUARTZ	Sample Box No.	67-36
Date	11/14/06	Lot No.		pH	NA
Analyst	D²	Filter No.	NA	Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	779.3	441.4	337.9	
Impinger 2	5%/10%	639.7	530.5	109.2	QA/QC D²
Impinger 3	5%/10%	557.6	531.9	25.7	Date 11/14
Impinger 4	EMPTY	442.7	438.5	4.2	
Impinger 5	KMNO4	556.3	555.0	1.3	Total Weight (gm)
Impinger 6	KMNO4	552.2	551.5	0.7	479
Impinger 7	GEL	779.6	760.2	19.4	498.4

Run No.	3	Filter Type	QUARTZ	Sample Box No.	67-2
Date	11/14/06	Lot No.		pH	NA
Analyst	D²	Filter No.	NA	Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	815.2	455.4	359.8	
Impinger 2	5%/10%	635.1	456.9	178.2	QA/QC D²
Impinger 3	5%/10%	525.2	517.9	7.3	Date 11/14
Impinger 4	EMPTY	462.7	461.0	1.7	
Impinger 5	KMNO4	524.5	522.5	2.0	Total Weight (gm)
Impinger 6	KMNO4	554.8	553.3	1.5	550.5
Impinger 7	GEL	786.3	773.2	13.1	563.6

CleanAir. ENGINEERING

QA/QC D²
Date 11/14/06

ORSAT READINGS

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

Client	WHEELABRATOR	Project Number	9963	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	NORTH	Unit	1	
Orsat ID	#2	Fuel Type	MW	Leak Check Passed ☐

Run Number	Method Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Fo	Analyst	Analysis Date	Analysis Time
1	m29	1	9.8	19.4	9.6	1.15306	D²	11/14/06	1124
		2	9.8	19.4	9.6				
		3	9.8	19.4	9.6				
		Avg	9.8		9.6				
2	m29	1	9.8	19.2	9.4	1.17347	D²	11/14/06	1338
		2	9.8	19.2	9.4				
		3	9.8	19.2	9.4				
		Avg	9.8		9.4				
3	m29	1	10.0	19.4	9.4	1.15009	D²	11/14/06	1538
		2	10.0	19.4	9.4				
		3	10.0	19.4	9.4				
		Avg	10.0		9.4				
		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 Fo to verify result

Acceptable ranges for Fo:

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

QA/QC D² Date 11/14/06

CleanAir. ENGINEERING

FIELD DATA PRINTOUTS

F

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Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 1 FF Outlet
Test Run: 1
Client: Wheelabrator North Broward, Inc
Project No: 9963
Source Area (ft²): 64.00000

Test Date: 11/14/06
Start Time: 07:59
Stop Time: 10:10
Leak Rate Before: 0.004 cfm @ 15 "Hg
Leak Rate After: 0.003 cfm @ 8 "Hg

Bar. Press. (in. Hg): 29.90
Static P: -9.5
O_2 (dry volume %): 9.60
CO_2 (dry volume %): 9.80
N_2+CO (dry volume %): 80.60

H_2O (condensate, ml or gm): 469.7
H_2O (silica, g): 18.9
Actual Moisture (%): 21.30

Nozzle ID No: .275-1
Nozzle Diameter (D_n): 0.275
Probe ID No: 67-8-7
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 61-7
Meter ΔH@: 1.78800
Meter Y_d: 1.01060

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			133.290						
1-01	5.0	0.47	1.40	136.710	307	71	71	0.69	3.42	109.3
1-02	10.0	0.46	1.30	139.970	306	72	70	0.68	3.26	105.2
1-03	15.0	0.52	1.50	143.450	307	75	71	0.72	3.48	105.4
1-04	20.0	0.63	1.80	147.250	307	77	72	0.79	3.80	104.3
1-05	25.0	0.56	1.60	150.880	308	79	73	0.75	3.63	105.4
Leak-Check	25.0			150.920						
2-01	30.0	0.48	1.40	154.290	307	79	74	0.69	3.37	105.5
2-02	35.0	0.45	1.30	157.500	308	82	75	0.67	3.21	103.4
2-03	40.0	0.50	1.50	161.000	308	83	75	0.71	3.50	106.9
2-04	45.0	0.64	1.90	164.920	308	84	76	0.80	3.92	105.8
2-05	50.0	0.55	1.60	168.510	308	85	78	0.74	3.59	104.3
Leak-Check	50.0			168.545						
3-01	55.0	0.42	1.20	171.710	308	84	77	0.65	3.17	105.1
3-02	60.0	0.48	1.30	175.010	308	85	77	0.68	3.30	104.7
3-03	65.0	0.51	1.50	178.520	308	86	78	0.71	3.51	105.6
3-04	70.0	0.58	1.70	182.300	309	89	60	0.76	3.78	106.3
3-05	75.0	0.58	1.70	186.045	310	90	81	0.76	3.74	105.2
Leak-Check	75.0			186.100						
4-01	80.0	0.58	1.70	189.810	309	88	81	0.76	3.71	104.3
4-02	85.0	0.38	1.10	192.790	308	88	82	0.62	2.98	103.2
4-03	90.0	0.33	0.96	195.570	308	87	81	0.57	2.78	103.5
4-04	95.0	0.51	1.50	199.080	310	87	82	0.71	3.51	105.3
4-05	100.0	0.60	1.70	202.800	310	89	82	0.77	3.72	102.7
Leak-Check	100.0			202.895						
5-01	105.0	0.39	1.10	205.830	308	89	63	0.62	2.94	100.1
5-02	110.0	0.49	1.40	209.250	308	89	83	0.70	3.42	104.2
5-03	115.0	0.39	1.10	212.210	308	90	83	0.62	2.96	100.9
5-04	120.0	0.45	1.30	215.500	308	90	84	0.67	3.29	104.4
5-05	125.0	0.68	2.00	219.500	308	90	84	0.82	4.00	103.4
Final	125.0		1.46240	85.98500	308.08000	81.18000		0.70754	85.98500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7075	1.4624	85.9850	308.0800	81.1800				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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SS ISOKINETIC Version 12-2004a

QA/QC
Date 12-5-06

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 1 FF Outlet
Test Run: 2
Client: Wheelabrator North Broward, Inc
Project No: 9963
Source Area (ft²): 64.00000

Test Date: 11/14/06
Start Time: 10:25
Stop Time: 12:36
Leak Rate Before: 0.005 cfm @ 14 "Hg
Leak Rate After: 0.005 cfm @ 13 "Hg

Bar. Press. (in. Hg): 29.90
Static P: -9.5
O_2 (dry volume %): 9.40
CO_2 (dry volume %): 9.80
N_2+CO (dry volume %): 80.80

H_2O (condensate, ml or gm): 479.0
H_2O (silica, g): 19.4
Actual Moisture (%): 21.78

Nozzle ID No: .275-1
Nozzle Diameter (D_n): 0.275
Probe ID No: 67-8-7
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 61-7
Meter ΔH@: 1.78800
Meter Y_d: 1.01060

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			219.730						
5-01	5.0	0.47	1.40	223.170	308	90	87	0.69	3.44	107.0
5-02	10.0	0.51	1.50	226.670	309	90	87	0.71	3.50	104.6
5-03	15.0	0.42	1.20	229.870	307	91	86	0.65	3.20	105.2
5-04	20.0	0.52	1.40	233.300	306	91	86	0.72	3.43	101.3
5-05	25.0	0.66	1.80	237.140	309	93	87	0.81	3.84	100.7
Leak-Check	25.0			237.180						
4-01	30.0	0.57	1.60	240.790	308	93	88	0.75	3.61	101.7
4-02	35.0	0.46	1.30	244.040	310	93	87	0.68	3.25	102.0
4-03	40.0	0.43	1.20	247.220	308	93	88	0.66	3.18	103.0
4-04	45.0	0.56	1.50	250.750	310	94	88	0.75	3.53	100.3
4-05	50.0	0.61	1.70	254.465	311	94	88	0.78	3.72	101.3
Leak-Check	50.0			254.510						
3-01	55.0	0.35	0.96	257.330	321	94	89	0.59	2.82	101.9
3-02	60.0	0.46	1.30	260.640	314	96	89	0.68	3.31	103.7
3-03	65.0	0.49	1.30	263.930	314	97	89	0.70	3.29	99.8
3-04	70.0	0.61	1.70	267.670	305	98	91	0.78	3.74	100.9
3-05	75.0	0.65	1.80	271.545	309	100	91	0.81	3.88	101.4
Leak-Check	75.0			271.590						
2-01	80.0	0.51	1.40	274.970	307	99	92	0.71	3.38	99.6
2-02	85.0	0.47	1.30	278.250	310	100	93	0.69	3.28	100.7
2-03	90.0	0.54	1.50	281.780	311	100	94	0.73	3.53	101.1
2-04	95.0	0.64	1.80	285.590	311	101	94	0.80	3.81	100.2
2-05	100.0	0.59	1.60	289.235	311	101	94	0.77	3.65	99.8
Leak-Check	100.0			289.280						
1-01	105.0	0.49	1.30	292.550	310	100	94	0.70	3.27	98.2
1-02	110.0	0.52	1.40	295.950	310	100	94	0.72	3.40	99.2
1-03	115.0	0.56	1.50	299.470	310	100	94	0.75	3.52	99.0
1-04	120.0	0.66	1.80	303.330	310	100	94	0.81	3.86	100.0
1-05	125.0	0.61	1.70	307.050	310	100	94	0.78	3.72	100.3
Final	125.0		1.47840	87.14500	309.96000	93.32000		0.72689	87.14500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7269	1.4784	87.1450	309.9600	93.3200				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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QA/QC
Date 11-15-06

Field Data Printout

Test Method: USEPA Method 29

Analyte: Mercury

Location: Unit 1 FF Outlet
Test Run: 3
Client: Wheelabrator North Broward, Inc
Project No: 9963
Source Area (ft²): 64.00000

Bar. Press. (in. Hg): 29.90
Static P: -9.4
O_2 (dry volume %): 9.40
CO_2 (dry volume %): 10.00
N_2+CO (dry volume %): 80.60

Nozzle ID No: .275-1
Nozzle Diameter (D_n): 0.275
Probe ID No: 67-8-7
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 11/14/06
Start Time: 12:49
Stop Time: 15:00
Leak Rate Before: 0.005 cfm @ 13 "Hg
Leak Rate After: 0.003 cfm @ 8 "Hg

H_2O (condensate, ml or gm): 550.5
H_2O (silica, g): 13.1
Actual Moisture (%): 24.46

Meter Box ID. No: 61-7
Meter ΔH@: 1.78800
Meter Y_d: 1.01060

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			307.275						
1-01	5.0	0.51	1.40	310.680	307	93	93	0.71	3.41	103.8
1-02	10.0	0.51	1.40	314.060	307	96	92	0.71	3.38	102.9
1-03	15.0	0.59	1.60	317.710	307	97	92	0.77	3.65	103.2
1-04	20.0	0.62	1.70	321.510	307	99	93	0.79	3.80	104.6
1-05	25.0	0.55	1.50	325.025	308	100	93	0.74	3.51	102.6
Leak-Check	25.0			325.050						
2-01	30.0	0.47	1.30	328.320	307	98	93	0.69	3.27	103.4
2-02	35.0	0.47	1.30	331.580	308	99	93	0.69	3.25	103.0
2-03	40.0	0.49	1.30	334.830	308	99	94	0.70	3.25	100.5
2-04	45.0	0.63	1.70	338.590	308	100	94	0.79	3.76	102.5
2-05	50.0	0.54	1.50	342.150	308	100	95	0.73	3.56	104.7
Leak-Check	50.0			342.175						
3-01	55.0	0.42	1.20	345.320	307	98	94	0.65	3.14	105.0
3-02	60.0	0.47	1.30	348.600	307	99	94	0.69	3.28	103.5
3-03	65.0	0.47	1.30	351.840	307	99	94	0.69	3.24	102.2
3-04	70.0	0.66	1.80	355.700	308	101	95	0.81	3.86	102.7
3-05	75.0	0.67	1.80	359.545	308	103	96	0.82	3.85	101.3
Leak-Check	75.0			359.575						
4-01	80.0	0.51	1.40	362.980	307	101	96	0.71	3.41	102.8
4-02	85.0	0.42	1.20	366.140	306	101	95	0.65	3.16	105.1
4-03	90.0	0.43	1.20	369.310	306	100	95	0.66	3.17	104.3
4-04	95.0	0.56	1.50	372.870	307	100	96	0.75	3.56	102.7
4-05	100.0	0.67	1.80	376.770	308	101	96	0.82	3.90	102.9
Leak-Check	100.0			376.815						
5-01	105.0	0.36	0.99	379.710	307	99	95	0.60	2.89	104.2
5-02	110.0	0.40	1.10	382.700	308	99	95	0.63	2.99	102.2
5-03	115.0	0.31	0.85	385.370	300	99	95	0.56	2.67	103.1
5-04	120.0	0.52	1.40	388.790	306	99	95	0.72	3.42	102.5
5-05	125.0	0.66	1.80	392.655	307	99	95	0.81	3.86	102.9
Final	125.0		1.41360	85.25500	306.96000	96.74000		0.71531	85.25500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7153	1.4136	85.2550	306.9600	96.7400				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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SS ISOKINETIC Version 12-2004a

QA/QC
Date 12-5-06

USEPA Method 3 Laboratory Data

Location: Unit 1 FF Outlet
Client: Wheelabrator North Broward, Inc
Project No: 9963
Method: EPA Method 3
Fuel Type: Municipal Waste
F_o for Fuel: 1.03 to 1.3

Test Method: USEPA Method 29
Analyte: Mercury

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	9.8	19.4	9.6	80.6	29.95		
	2	9.8	19.4	9.6	80.6	29.95		
	3	9.8	19.4	9.6	80.6	29.95		
	Avg.	9.80000		9.60000	80.60000	29.95	1.15306	*All measurements in spec.*
CEM or Other Avg:		9.80000		9.60000	80.60000	29.95200		☑ 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	9.8	19.2	9.4	80.8	29.94		
	2	9.8	19.2	9.4	80.8	29.94		
	3	9.8	19.2	9.4	80.8	29.94		
	Avg.	9.80000		9.40000	80.80000	29.94	1.17347	*All measurements in spec.*
CEM or Other Avg:		9.80000		9.40000	80.80000	29.94400		☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
3	1	10.0	19.4	9.4	80.6	29.98		
	2	10.0	19.4	9.4	80.6	29.98		
	3	10.0	19.4	9.4	80.6	29.98		
	Avg.	10.00000		9.40000	80.60000	29.98	1.15000	*All measurements in spec.*
CEM or Other Avg:		10.00000		9.40000	80.60000	29.97600		☑ 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
	1							
	2							
	3							
	Avg.							
CEM or Other Avg:								☐ Fo value within expected range.

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SS ISOKINETIC Version 12-2004a

QA/QC
Date 12-5-06

USEPA Method 4 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 1 FF Outlet
Client: Wheelabrator North Broward, Inc
Project No: 9963

Test Run: 1

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	773.9	454.0	319.9
Impinger 2	5%HNO3/10%H2O2	662.6	542.2	120.4
Impinger 3	5%HNO3/10%H2O2	539.5	516.0	23.5
Impinger 4	Empty	463.3	459.5	3.8
Impinger 5	4%KMnO4/10%H2SO4	553.6	552.5	1.1
Impinger 6	4%KMnO4/10%H2SO4	506.0	505.0	1.0
Impinger 7	Silica Gel	773.6	754.7	18.9
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
469.7	Liquid (gm)		
0.0	less rinse (gm)		
469.7	Net Liquid (gm)	469.7	☑ QA/QC OK
+ 18.9	Silica Gel (gm)	18.9	☑ QA/QC OK
488.6	Total Vlc (gm)	488.6	☑ QA/QC OK

Test Run: 2

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	779.3	441.4	337.9
Impinger 2	5%HNO3/10%H2O2	639.7	530.5	109.2
Impinger 3	5%HNO3/10%H2O2	557.6	531.9	25.7
Impinger 4	Empty	442.7	438.5	4.2
Impinger 5	4%KMnO4/10%H2SO4	556.3	555.0	1.3
Impinger 6	4%KMnO4/10%H2SO4	552.2	551.5	0.7
Impinger 7	Silica Gel	779.6	760.2	19.4
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
479.0	Liquid (gm)		
0.0	less rinse (gm)		
479.0	Net Liquid (gm)	479.0	☑ QA/QC OK
+ 19.4	Silica Gel (gm)	19.4	☑ QA/QC OK
498.4	Total Vlc (gm)	498.4	☑ QA/QC OK

Test Run: 3

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	815.2	455.4	359.8
Impinger 2	5%HNO3/10%H2O2	635.1	456.9	178.2
Impinger 3	5%HNO3/10%H2O2	525.2	517.9	7.3
Impinger 4	Empty	462.7	461.0	1.7
Impinger 5	4%KMnO4/10%H2SO4	524.5	522.5	2.0
Impinger 6	4%KMnO4/10%H2SO4	554.8	553.3	1.5
Impinger 7	Silica Gel	786.3	773.2	13.1
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
550.5	Liquid (gm)		
0.0	less rinse (gm)		
550.5	Net Liquid (gm)	550.5	☑ QA/QC OK
+ 13.1	Silica Gel (gm)	13.1	☑ QA/QC OK
563.8	Total Vlc (gm)	563.6	☑ 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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QA/QC C
Date 12-5-12

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LABORATORY DATA

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Wheelabrator North Broward, Inc
Clean Air Project No: 9963
Unit 1 FF Outlet

USEPA Method 29
Mercury (Hg) Laboratory Parameters

Blank Analysis				
m_{1b-B}	Fraction 1B Blank (µg)	<0.1000		
m_{2b-B}	Fraction 2B Blank (µg)	<0.3000		
m_{3a-B}	Fraction 3A Blank (µg)	<0.2000		
m_{3b-B}	Fraction 3B Blank (µg)	<0.5000		
m_{3c-B}	Fraction 3C Blank (µg)	<0.1000		
$m_{total-B}$	Total Blank Amount (µg)	<1.2000		
Run No.		1	2	3
Date (2006)		Nov 14	Nov 14	Nov 14
Start Time (approx.)		07:59	10:25	12:49
Stop Time (approx.)		10:10	12:36	15:00
Sample Analysis				
m_{1b-S}	Fraction 1B Sample (µg)	0.1801	<0.1000	<0.1000
m_{2b-S}	Fraction 2B Sample (µg)	7.9197	13.3804	10.6038
m_{3a-S}	Fraction 3A Sample (µg)	<0.2000	<0.2000	<0.2000
m_{3b-S}	Fraction 3B Sample (µg)	<0.5000	<0.5000	<0.5000
m_{3c-S}	Fraction 3C Sample (µg)	<0.1000	<0.1000	<0.1000
$m_{total-S}$	Total Sample Amount (µg)	8.0998	13.3804	10.6038
Allowable Blank				
$m_{T-B-allow}$	Total Allowable Blank (µg)	0.0000	0.0000	0.0000
Sample Corrected for Blank				
m_n	Total Sample Amount (µg)	8.0998	13.3804	10.6038
Sample Corrected for Blank				
m_{n-1b}	Fraction 1B (µg)	0.1801	<0.1000	<0.1000
m_{n-2b}	Fraction 2B (µg)	7.9197	13.3804	10.6038
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)	<0.1000	<0.1000	<0.1000

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QA/QC C
Date 12-5-06

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Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 9963

Mercury

EPA Method 29 Analysis

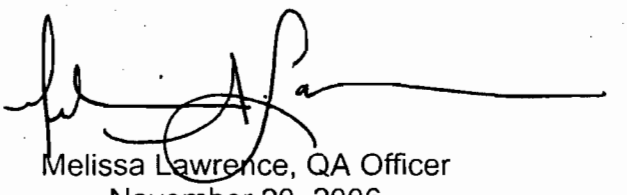
Analytical Report
8294

el1

Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-791-0128 FAX: 910-792-6853 e1lab@e1lab.com

The following data for Analytical Report 8294
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:



Melissa Lawrence, QA Officer
November 20, 2006

Report Reviewed and Finalized By:

Ken Smith, Laboratory Director
November 20, 2006

elementOne

8294-Client SDG: M29 Report Packet
Page 1 of 1b

SUMMARY OF RESULTS

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Summary of Analysis

Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front half µg	H_2O_2/ HNO_3 µg	Empty Impinger µg	$KMnO_4$ µg	HCl µg
U1-FF Outlet-R1	#1	8.10	0.18	7.89	< 0.2	< 0.5	< 0.4
	#2		0.18	7.95	< 0.2	< 0.5	< 0.4
U1-FF Outlet-R2	#1	13.4	< 0.1	13.4	< 0.2	< 0.5	< 0.4
	#2		< 0.1	13.4	< 0.2	< 0.5	< 0.4
U1-FF Outlet-R3	#1	10.6	< 0.1	10.7	< 0.2	< 0.5	< 0.4
	#2		< 0.1	10.5	< 0.2	< 0.5	< 0.4
U1-FF Outlet-FB	#1	< 0.5	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
Reagent Blank	#1	< 0.5	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.5	< 0.4

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ANALYTICAL NARRATIVE

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Element One Analytical Narrative

Client:	Clean Air Engineering, IL	Element One #:	8294
Client ID:	North Broward	Analyst:	RWJ, CMS
Method:	M29	Dates Received:	11/16/06
Analytes:	Hg	Dates Analyzed:	11/16-20/06

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. Nothing unusual was noticed with any of the samples or analyses.

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QUALITY CONTROL SUMMARY

Summary of Quality Control Data

Mercury Duplicate Analysis RPD

(Method 29 QC limits: ±10 for RPD)

Run Number	Front half	H2O2/HNO4	Empty Impinger	KMnO4	HCl
U1-FF Outlet-R1	5.1%	0.8%	NA	NA	NA
U1-FF Outlet-R2	NA	0.1%	NA	NA	NA
U1-FF Outlet-R3	NA	1.1%	NA	NA	NA
U1-FF Outlet-FB	NA	NA	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA

Mercury Spike Recoveries

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

Run Number		Front half	H2O2/HNO4	Empty Impinger	KMnO4	HCl
U1-FF Outlet-R3	#1	112%	105%	102%	97%	103%
	#2	112%	105%	101%	97%	103%

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SAMPLE CUSTODY

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CHAIN OF CUSTODY FORM

CLIENT: Wheelabrator
PROJECT NO.: 9963
PLANT: North Broward
DEPT.: 66
PROJECT MANAGER: Scott Brown

EPA METHOD 29

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	1	Unit 1 FF Outlet	11/14	Filter	1		x				
	1	"		Front-Half 0.1N HNO3 Rinse	1		x				
	1	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1		x				
	1	"		Imp. 4 + 0.1N HNO3 Rinse	1		x				
	1	"		Imp. 5,6 KMnO4+H2O Rinse	1		x				
	1	"	↓	Imp. 5,6 HCl Rinse	1		x				
		"									
		"									
	2	"	11/14	Filter	1		x				
	2	"		Front-Half 0.1N HNO3 Rinse	1		x				
	2	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1		x				
	2	"		Imp. 4 + 0.1N HNO3 Rinse	1		x				
	2	"		Imp. 5,6 KMnO4+H2O Rinse	1		x				
	2	V	↓	Imp. 5,6 HCl Rinse	1		x				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Dick Dreska	11/15/04 12:00				
Courier: FED EX	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by: Jack Wade	Date / Time 11/16/04 11:15

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC

PO Number:

This form was completed by:

Dick Dreska

Signature: Dick Dreska Date: 11/16/04

CleanAir ENGINEERING

LDS001A_1-COC Palatine_M29, August 2004

500 West Wood Street
Palatine, IL 60067

(800) 627-0033 ph
(847) 991-3385 fax
www.cleanair.com

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8294

CHAIN OF CUSTODY FORM

CLIENT Wheelabrator | PROJECT NO. 9963
PLANT North Broward | DEPT. 66
PROJECT MANAGER Scott Brown

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	3	Unit 1 FF Outlet	11/14	Filter	1		x				
	3	"	"	Front-Half 0.1N HNO3 Rinse	1		x				
	3	"	"	Imp. 1,2,3 + 0.1N HNO3 Rinse	1		x				
	3	"	"	Imp. 4 + 0.1N HNO3 Rinse	1		x				
	3	"	"	Imp. 5,6 KMnO4+H2O Rinse	1		x				
	3	"	"	Imp. 5,6 HCl Rinse	1		x				
		"									
		"									
	FB	"	11/14	Filter	1		x				
	FB	"	"	Front-Half 0.1N HNO3 Rinse	1		x				
	FB	"	"	Imp. 1,2,3 + 0.1N HNO3 Rinse	1		x				
	FB	"	"	Imp. 4 + 0.1N HNO3 Rinse	1		x				
	FB	"	"	Imp. 5,6 KMnO4+H2O Rinse	1		x				
	FB	V	"	Imp. 5,6 HCl Rinse	1		x				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Dick Dreska	11/15/06 1200				
Courier: FED EX	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by: Steph Wash	Date / Time 11/16/06 11:15

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC

PO Number:

This form was completed by: Dick Dreska

Signature: Dick Dreska Date: 11/15/06

CleanAir ENGINEERING

LDS001A_1-COC Palatine_M29, August 2004

500 West Wood Street
Palatine, IL 60067

(800) 627-0033 ph
(847) 991-3385 fax
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CHAIN OF CUSTODY FORM

CLIENT: Wheelabrator
PLANT: North Broward
PROJECT MANAGER: Scott Brown
PROJECT NO.: 9963
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	11/14	3 Quartz Filters	1	NA	x				
	NA	Reagent Blank		0.1N HNO3	1	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				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
	11/15/06 12:??				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
					11/16/06 11:15

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC

PO Number:

This form was completed by:
Dick Dreska

Signature: Dick Dreska Date: 11/15/06

CleanAir ENGINEERING
500 West Wood Street
Palatine, IL 60067
(800) 627-0033 ph
(847) 991-3385 fax
www.cleanair.com

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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*

One **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID** **8294**

RUSH-24 HOUR TAT

Analysis Due Date 11.17.06

QA/QC/Report Due Date 11.17.06

Client:	Clean Air IL
Project No.:	9963 N. Broward

Date Rec:	11.16.06
Time Rec:	1115

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

	Sample Identification		**Sample Identification**
1	Unit 1 FF Outlet R1	4	Unit 1 FF Outlet FB
2	Unit 1 FF Outlet R2	5	Reagent Blank
3	Unit 1 FF Outlet R3		
	Unit 1 FF Outlet R3 Spike		

Analyses Requested: Samples 1-5 Hg

Run / FB	Front Half		Back Half			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	
Lab ID	BV, ml	FV, ml	BV, ml	Used	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml
1	140	100	800	400	50	114	500	385	500	265	400
2	140	↓	810	405	↓	110	↓	345	↓	240	↓
3	140	↓	790	395	↓	110	↓	375	↓	245	↓
4	98	↓	300	150	↓	108	↓	290	↓	230	↓

Reagent Blank M-29

Lab ID	Fraction			SV, ml	BV, ml	Used	FV, ml	Comments
5								
	C-8	FH	0.1N HNO_3	290	290	100	100	
	C-8	A	0.1N HNO_3					
	C-8	B	DI H_2O	197	—	—	—	used 33mls for B
	C-9	BH	5% HNO_3/10% H_2O_2	300	300	200+100	90	
	C-10	B	4% $KMnO_4$/10%H_2SO_4	260	133	100	400	100mls KMnO4 + 33mls
	C-11	C	8N HCl & DI H_2O	225			400	
	C-12	FH	Filter					

Lab Notes / Communications

SS Page 1 of 1
SS Form by _____
11/16/2006 11:25:35 AM

FH Prep By/Date 11.16.06 A Prep By/Date 11.16.06
BH Prep By/Date 11.16.06 B Prep By/Date _____
FH/BH Prep By/Date _____ C Prep By/Date _____
ID Verification By/Date 11.16.06

015

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
[redacted]ib Blank	11/16/2006	16:00:26	0.00097616			µg	40	1	0.00097616					
[redacted]D1=.004ug	11/16/2006	16:01:40	0.00128085			µg	40	1	0.00128085					
STD2=.04ug	11/16/2006	16:02:55	0.0108659			µg	40	1	0.0108659					
STD3=.08ug	11/16/2006	16:04:13	0.02231477			µg	40	1	0.02231477					
STD4=.16ug	11/16/2006	16:05:30	0.04526736			µg	40	1	0.04526736					
STD5=.2ug	11/16/2006	16:06:49	0.0550702			µg	40	1	0.0550702					
0.004ug = DL	11/16/2006	16:09:48	0.00131666	0.0043915	0.0043915	µg	40	1	0.00131666	0.0043915	0.0043915			
0.080ug = STD.2	11/16/2006	16:11:05	0.02113799	0.07300033	0.07300033	µg	40	1	0.02113799	0.07300033	0.07300033			
0.080ug = QC STD 3	11/16/2006	16:12:24	0.02233979	0.0773169	0.0773169	µg	40	1	0.02233979	0.0773169	0.0773169			
REAGENT BLANK	11/16/2006	16:13:40	0.0000602	0.00020037	0.00020037	µg	40	1	0.0000602	0.00020037	0.00020037			
8294-1 BH	11/16/2006	16:15:24	0.01166049	0.03959869	7.91973868	µg	4	800	0.01161567	0.03944335	7.88867097	0.01170531	0.03975403	7.95080639
8294-2 BH	11/16/2006	16:17:08	0.01919926	0.06607588	13.3803664	µg	4	810	0.01920677	0.06610261	13.3857787	0.01919176	0.06604915	13.374954
8294-3 BH	11/16/2006	16:18:53	0.01569778	0.05369031	10.6038373	µg	4	790	0.01577839	0.05397369	10.6598051	0.01561717	0.05340693	10.5478695
8294-3 BHSPK	11/16/2006	16:20:40	0.03858948	0.13756137	27.1683707	µg	4	790	0.03861096	0.1376434	27.1845718	0.03856799	0.13747933	27.1521696
8294-4 BH	11/16/2006	16:22:27	-0.0003862	-0.0012843	-0.0963255	µg	4	300	-0.000384	-0.001277	-0.0957779	-0.0003884	-0.0012916	-0.0968731
8294-5 BH	11/16/2006	16:24:15	-0.0003631	-0.0012076	-0.0905764	µg	4	300	-0.0003572	-0.0011879	-0.0890963	-0.000369	-0.0012274	-0.0920565
8294-1 A	11/16/2006	16:26:06	-0.0003161	-0.0010515	-0.0525764	µg	4	200	-0.0003161	-0.0010515	-0.0525757	-0.0003161	-0.0010515	-0.0525771
8294-2 A	11/16/2006	16:27:56	-0.0002941	-0.0009781	-0.0489098	µg	4	200	-0.0003077	-0.0010234	-0.0511744	-0.0002804	-0.0009329	-0.0466451
8294-3 A	11/16/2006	16:29:43	-0.0004522	-0.0015039	-0.0751965	µg	4	200	-0.0004413	-0.0014676	-0.0733825	-0.0004632	-0.0015402	-0.0770105
8294-3 ASPK	11/16/2006	16:31:26	0.02344091	0.08128818	4.06440934	µg	4	200	0.0234713	0.081398	4.06990039	0.02341052	0.08117836	4.05891828
0.004ug = DL	11/16/2006	16:32:39	0.00130006	0.004336	0.004336	µg	4	200	0.00130006	0.004336	0.004336			
0.080ug = STD.2	11/16/2006	16:33:55	0.02127825	0.07350316	0.07350316	µg	4	200	0.02127825	0.07350316	0.07350316			
REAGENT BLANK	11/16/2006	16:35:10	0.00013576	0.00045188	0.00045188	µg	4	200	0.00013576	0.00045188	0.00045188			
8294-4 A	11/16/2006	16:36:54	-0.0004191	-0.0013938	-0.069694	µg	4	200	-0.0003985	-0.0013254	-0.066272	-0.0004397	-0.0014623	-0.073116
8294-5 A	11/16/2006	16:38:38	-0.0004303	-0.0014311	-0.071557	µg	4	200	-0.0004279	-0.001423	-0.0711528	-0.0004328	-0.0014392	-0.0719612
8294-1 B	11/16/2006	16:40:32	-0.0002531	-0.0008419	-0.105247	µg	4	500	-0.0002499	-0.0008314	-0.1039258	-0.0002563	-0.0008525	-0.1065682
8294-2 B	11/16/2006	16:42:18	-0.0001362	-0.0004534	-0.0566763	µg	4	500	-0.0001018	-0.0003387	-0.0423438	-0.0001707	-0.000568	-0.0710088
8294-3 B	11/16/2006	16:44:34	-0.0003844	-0.0012784	-0.1598109	µg	4	500	-0.0003853	-0.0012813	-0.1601743	-0.0003835	-0.0012755	-0.1594474
8294-3 BSPK	11/16/2006	16:46:20	0.0223773	0.07745193	9.68149215	µg	4	500	0.02233529	0.07730067	9.66258486	0.02241932	0.07760319	9.70039945
8294-4 B	11/16/2006	16:48:07	-0.0004556	-0.0015152	-0.1894033	µg	4	500	-0.0004176	-0.0013889	-0.1736231	-0.0004936	-0.0016414	-0.2051835
8294-5 B	11/16/2006	16:49:55	-0.0003047	-0.0010134	-0.1266834	µg	4	500	-0.0003157	-0.00105	-0.1312557	-0.0002937	-0.0009768	-0.122111
0.004ug = DL	11/16/2006	16:51:11	0.0012488	0.00416468	0.00416468	µg	4	500	0.0012488	0.00416468	0.00416468			
0.080ug = QC STD 3	11/16/2006	16:52:27	0.02224127	0.07696234	0.07696234	µg	4	500	0.02224127	0.07696234	0.07696234			
REAGENT BLANK	11/16/2006	16:53:42	0.00009778	0.00032545	0.00032545	µg	4	500	0.00009778	0.00032545	0.00032545			
Calib Blank	11/17/2006	10:20:37	0.00034436			µg			0.00034436					
[redacted]TD1=.004ug	11/17/2006	10:21:51	0.00059437			µg			0.00059437					
[redacted]D2=.04ug	11/17/2006	10:23:07	0.0052227			µg			0.0052227					
[redacted]TD3=.08ug	11/17/2006	10:24:23	0.00988282			µg			0.00988282					
STD4=.16ug	11/17/2006	10:25:40	0.01935283			µg			0.01935283					
STD5=.2ug	11/17/2006	10:27:00	0.02392032			µg			0.02392032					
0.004ug = DL	11/17/2006	10:29:59	0.00059185	0.00399691	0.00399691	µg			0.00059185	0.00399691	0.00399691			
0.080ug = STD.2	11/17/2006	10:31:15	0.0095906	0.07682084	0.07682084	µg			0.0095906	0.07682084	0.07682084			
0.080ug = QC STD 3	11/17/2006	10:32:34	0.00987368	0.0792229	0.0792229	µg			0.00987368	0.0792229	0.0792229			
REAGENT BLANK	11/17/2006	10:33:50	-0.0000068	-0.0000441	-0.0000441	µg			-0.0000068	-0.0000441	-0.0000441			
8294-fh lrb	11/17/2006	10:35:34	0.00007987	0.0005215	0.01303753	µg	4	100	0.00009953	0.00065052	0.016263	0.00006022	0.00039247	0.00981175
8294-lrb spk	11/17/2006	10:37:18	0.00954117	0.07640165	4.7751034	µg	1.6	100	0.00958665	0.07678737	4.79921063	0.00949568	0.07601593	4.75099563
8294-1 fh	11/17/2006	10:39:04	0.00104144	0.00720346	0.18008664	µg	4	100	0.00106656	0.00738596	0.184649	0.00101631	0.00702096	0.175524
8294-2 fh	11/17/2006	10:40:50	0.00027661	0.00183112	0.04577823	µg	4	100	0.00028863	0.00191217	0.04780425	0.0002646	0.00175008	0.043752
8294-4 fh	11/17/2006	10:46:14	0.0002339	0.00154391	0.03859788	µg	4	100	0.00025433	0.00168095	0.04202375	0.00021347	0.00140687	0.03517175
8294-5 fh	11/17/2006	10:48:04	0.0001898	0.00124877	0.03121941	µg	4	100	0.00018873	0.00124166	0.0310415	0.00019086	0.00125588	0.031397
0.004ug = DL	11/17/2006	10:52:48	0.00058286	0.00393415	0.00393415	µg	0.1	100	0.00058286	0.00393415	0.00393415			
0.080ug = STD.2	11/17/2006	10:54:04	0.00920527	0.07355508	0.07355508	µg	0.1	100	0.00920527	0.07355508	0.07355508			
REAGENT BLANK	11/17/2006	10:55:20	0.00004568	0.00029736	0.00029736	µg	0.1	100	0.00004568	0.00029736	0.00029736			
Calib Blank	11/17/2006	11:42:40	0.00032217			µg	4	100	0.00032217					
Calib Blank	11/17/2006	11:44:52	0.00037738			µg	4	100	0.00037738					
STD1=.004ug	11/17/2006	11:46:06	0.00073072			µg	4	100	0.00073072					
STD2=.04ug	11/17/2006	11:47:21	0.00526817			µg	4	100	0.00526817					
STD3=.08ug	11/17/2006	11:48:38	0.00974054			µg	4	100	0.00974054					
STD4=.16ug	11/17/2006	11:49:54	0.01929464			µg	4	100	0.01929464					
STD5=.2ug	11/17/2006	11:51:12	0.02373356			µg	4	100	0.02373356					
0.004ug = DL	11/17/2006	11:54:11	0.00065404	0.00367307	0.00367307	µg	4	100	0.00065404	0.00367307	0.00367307			
0.080ug = STD.2	11/17/2006	11:55:27	0.01011157	0.08123938	0.08123938	µg	4	100	0.01011157	0.08123938	0.08123938			
0.080ug = QC STD 3	11/17/2006	11:56:47	0.00999991	0.08027423	0.08027423	µg	4	100	0.00999991	0.08027423	0.08027423			
REAGENT BLANK	11/17/2006	11:58:03	0.00005863	0.00028185	0.00028185	µg	4	100	0.00005863	0.00028185	0.00028185			
8294-1 C	11/17/2006	11:59:47	0.0003287	0.00171579	0.00171579	µg	4	400	0.00032892	0.00171702	0.171702	0.00032849	0.00171457	0.171457
8294-2 C	11/17/2006	12:01:29	0.00040285	0.0021426	0.0021426	µg	4	400	0.00039982	0.00212493	0.212493	0.00040587	0.00216026	0.216026
8294-4 C	11/17/2006	12:12:42	-0.000081	-0.0003673	-0.0003673	µg	4	400	-0.0000524	-0.0002415	-0.02415	-0.0001096	-0.000493	-0.0493
8294-5 C	11/17/2006	12:14:26	-0.0000606	-0.0002786	-0.0002786	µg	4	400	-0.0000668	-0.0003062	-0.03062	-0.0000545	-0.000251	-0.0251
0.004ug = DL	11/17/2006	12:22:45	0.00068873	0.00389341	0.00389341	µg	4	100	0.00068873	0.00389341	0.00389341			
0.080ug = STD.2	11/17/2006	12:24:02	0.01070289	0.08635525	0.08635525	µg	4	100	0.01070289	0.08635525	0.08635525			
REAGENT BLANK	11/17/2006	12:26:20	0.00006058	0.00029145	0.00029145	µg	4	100	0.00006058	0.00029145	0.00029145			
[redacted]23-11 bh	11/17/2006	12:33:25	0.01718559	0.14274988	46.3937115	µg	2	650	0.0172321	0.14315574	46.5256155	0.01713909	0.14234401	46.2618033
[redacted]004ug = DL	11/17/2006	12:34:42	0.00069846	0.00395558	0.00395558	µg	2	650	0.00069846	0.00395558	0.00395558			
0.080ug = QC STD 3	11/17/2006	12:35:58	0.01038935	0.08364177	0.08364177	µg	2	650	0.01038935	0.08364177	0.08364177			
REAGENT BLANK	11/17/2006	12:37:15	0.00008153	0.00039511	0.00039511	µg	2	650	0.00008153	0.00039511	0.00039511			
Calib Blank	11/20/2006	16:45:03	0.00059897			µg	4	100	0.00059897					

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
STD1=.004ug	11/20/2006	16:46:17	0.00087721			µg	4	100	0.00087721					
STD2=.04ug	11/20/2006	16:47:33	0.00785964			µg	4	100	0.00785964					
STD3=.08ug	11/20/2006	16:48:49	0.01612394			µg	4	100	0.01612394					
STD4=.16ug	11/20/2006	16:50:06	0.03160096			µg	4	100	0.03160096					
STD5=.2ug	11/20/2006	16:51:25	0.03959726			µg	4	100	0.03959726					
0.004ug = DL	11/20/2006	16:54:25	0.00085378	0.00406562	0.00406562	µg	4	100	0.00085378	0.00406562	0.00406562			
REAGENT BLANK	11/20/2006	16:55:38	-0.0000033	-0.0000157	-0.0000157	µg	4	100	-0.0000033	-0.0000157	-0.0000157			
8294-3 FH	11/20/2006	17:08:04	0.00015901	0.00075622	0.01890564	µg	4	100	0.00016586	0.00078879	0.0197198	0.00015216	0.00072365	0.01809147
8294-3 FH SPK	11/20/2006	17:10:00	0.01823202	0.0897417	2.24354256	µg	4	100	0.01822821	0.08972227	2.24305692	0.01823583	0.08976112	2.24402821
8294-3 C	11/20/2006	17:11:50	0.00062608	0.00298004	0.29800414	µg	4	400	0.00064249	0.00305827	0.30582722	0.00060966	0.00290181	0.29018107
8294-3 C SPK	11/20/2006	17:13:38	0.016755	0.08223618	8.22361855	µg	4	400	0.01677535	0.08233928	8.23392826	0.01673466	0.08213308	8.21330884
0.004ug = DL	11/20/2006	17:14:52	0.00081663	0.00388843	0.00388843	µg	4	400	0.00081663	0.00388843	0.00388843			
0.080ug = STD.2	11/20/2006	17:16:08	0.01661747	0.08153946	0.08153946	µg	4	400	0.01661747	0.08153946	0.08153946			
REAGENT BLANK	11/20/2006	17:17:24	0.0000009	0.00000431	0.00000431	µg	4	400	0.0000009	0.00000431	0.00000431			

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 11/14/2006
Start Time: 10:25
End Time: 12:36

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	507.23	320.11	34.76	29.39	5.37	21.17	305.12	5.76	-9.45
Unit 2	526.78	325.30	41.25	36.18	5.08	17.71	308.81	6.44	-11.50
Unit 3	521.01	324.88	41.78	35.86	5.92	17.30	313.32	6.46	-8.37

H - 5 1

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	193.98	887.86	829.93	85.75	-0.09	271.23	1053.56	3.55	184.21
Unit 2	188.11	892.91	829.09	84.25	-0.09	271.80	1120.97	6.00	184.26
Unit 3	190.72	888.06	829.83	86.71	-0.10	278.49	1168.09	3.74	184.20

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 11/14/2006
Start Time: 12:49
End Time: 15:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	504.30	320.00	33.63	29.32	4.31	21.24	302.10	5.83	-9.48
Unit 2	525.92	324.87	41.88	37.89	3.99	17.02	308.94	6.49	-11.67
Unit 3	523.05	325.27	42.35	37.41	4.94	16.88	314.25	6.49	-8.38

H - 9

1

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	194.31	888.00	830.53	84.30	-0.10	270.82	1054.00	3.07	184.01
Unit 2	188.48	891.63	831.64	85.05	-0.09	271.27	1114.83	4.78	183.89
Unit 3	189.61	887.05	826.33	86.93	-0.09	278.03	1168.58	3.04	183.36

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

UNIT #1

Date	Test	Method #	Run #	Steam Flow	Tons of Trash Processed
	Particulate/HCl	5/26A	1		
	Particulate/HCl	5/26A	2		
	Particulate/HCl	5/26A	3		
11/14/2006	Metals (Hg only)	29	1	184.2 klb/hr	73.8
11/14/2006	Metals (Hg only)	29	2	184.2 klb/hr	73.8
11/14/2006	Metals (Hg only)	29	3	184.0 klb/hr	73.7
	Metals (Hg only)	29	4		
	Metals (Hg only)	29	5		
	Metals (Hg only)	29	6		
	Fluorides	13B	1		
	Fluorides	13B	2		
	Fluorides	13B	3		
	Dioxins/Furans	23	1		
	Dioxins/Furans	23	2		
	Dioxins/Furans	23	3		

UNIT #2

Date	Test	Method #	Run #	Steam Flow	Tons of Trash Processed
	Particulate/HCl	5/26A	1		
	Particulate/HCl	5/26A	2		
	Particulate/HCl	5/26A	3		
	Metals (Cd, Hg, Be, Pb)	29	1		
	Metals (Cd, Hg, Be, Pb)	29	2		
	Metals (Cd, Hg, Be, Pb)	29	3		
	Metals (Hg only)	29	4		
	Metals (Hg only)	29	5		
	Metals (Hg only)	29	6		
	Fluorides	13B	1		
	Fluorides	13B	2		
	Fluorides	13B	3		
	Dioxins/Furans	23	1		
	Dioxins/Furans	23	2		
	Dioxins/Furans	23	3		

UNIT #3

Date	Test	Method #	Run #	Steam Flow	Tons of Trash Processed
	Particulate/HCl	5/26A	1		
	Particulate/HCl	5/26A	2		
	Particulate/HCl	5/26A	3		
	Metals (Cd, Hg, Be, Pb)	29	1		
	Metals (Cd, Hg, Be, Pb)	29	2		
	Metals (Cd, Hg, Be, Pb)	29	3		
	Metals (Hg only)	29	4		
	Metals (Hg only)	29	5		
	Metals (Hg only)	29	6		
	Fluorides	13B	1		
	Fluorides	13B	2		
	Fluorides	13B	3		
	Dioxins/Furans	23	1		
	Dioxins/Furans	23	2		
	Dioxins/Furans	23	3		

Cd (cadmium) Hg (mercury) Be (beryllium) Pb (lead)

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 11/14/2006
Start Time: 07:59
End Time: 10:10

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	506.73	319.97	35.13	31.14	3.99	19.56	305.43	5.83	-9.63
Unit 2	528.05	324.85	42.09	38.14	3.95	16.31	308.22	6.49	-11.70
Unit 3	530.70	324.78	46.98	41.57	5.41	14.62	313.39	6.52	-8.32

1

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	193.64	887.68	830.13	87.16	-0.09	270.35	1042.21	2.90	184.19
Unit 2	187.99	893.97	830.16	86.83	-0.10	271.11	1127.75	4.72	184.34
Unit 3	190.22	888.45	830.40	88.31	-0.11	277.61	1172.39	5.39	183.79

PLANT DATA

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Wheelabrator North Broward Inc.
A Waste Management Company

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

December 22, 2006

#70051160000234571125

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

Re: Wheelabrator North Broward
F.A.C. 62-296.416 Quarterly Mercury Stack Testing
Fourth Quarter of 2006, Report Submittal

Dear Mr. Graziani:

As required by F.A.C. 62-296.416, please find enclosed the 2006 fourth quarter report on mercury stack testing which was conducted on Unit #1.

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

If there are any questions, please contact this office at (954) 971-8701.

Sincerely,

Gary Agunaga
Plant Manager

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section #70051160000234571132
FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, #70051160000234571149
Broward County Department of Planning and Environmental Protection, Air Quality Division #70051160000234571156
Chuck Faller (with)
Tim Porter (without)
Sandy Gutner – MPI - (with)
Ram Tewari – BCWRS (without)
File: 3.7.2 (without)
5.1.3.2 (without)

s;admin/receptionist12/22/06

WM WASTE MANAGEMENT