Wheelabrator North Broward Inc.
A Waste Management Company
2600 Wiles Road
Pompano Beach, FL 33073
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June 28, 2010

CERTIFIED MAIL #70080500000147115632

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

Re: Wheelabrator North Broward
F.A.C. 62-296.416 Quarterly Mercury Stack Testing
Second Quarter of 2010, Report Submittal

Dear Mr. Anderson:

As required by F.A.C. 62-296.416, please find enclosed the 2010 second quarter report on mercury stack testing which was conducted on Unit #2.

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

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

Sincerely,

Scott McIlvaine
Plant Manager

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section CERTIFIED MAIL #70080500000147115649
FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, CERTIFIED MAIL #70080500000147115656
Broward County Department of Planning and Environmental Protection, Air Quality Division CERTIFIED MAIL #70080500000147115663
Chuck Faller (with)
Tim Porter (without)
Rob French – MPI - (with)
Ram Tewari – BCWRS (without)

WM WASTE MANAGEMENT

REPORT ON MERCURY TESTING

WHEELABRATOR NORTH BROWARD, INC.
UNIT 2 FF OUTLET
POMPANO BEACH, FL

CLEANAIR PROJECT NO: 10955-5
REVISION 0: JUNE 21, 2010

CleanAir.

CleanAir Engineering
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Wheelabrator North Broward, Inc.
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Pompano Beach, FL 33073

REPORT ON MERCURY TESTING

Performed for:
WHEELABRATOR NORTH BROWARD, INC.
UNIT 2 FF OUTLET
POMPANO BEACH, FL

Client Reference No: Service Agreement
CleanAir Project No: 10955-5
Revision 0: June 21, 2010

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

Submitted by,

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

Reviewed by,

Kevin O'Halloren, PE
Project Manager
kohalloren@cleanair.com
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REVISION HISTORY

REPORT ON MERCURY TESTING

DRAFT REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
D0a	06/15/10	All	Draft version of original document.

FINAL REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
0	06/21/10	All	Final version of original document.

CONTENTS

PROJECT OVERVIEW

Wheelabrator North Broward, Inc. operates a refuse to energy facility, located in Pompano Beach, Florida. The facility's emission levels are regulated by the Florida Department of Environmental Protection (FDEP). Wheelabrator North Broward, Inc. contracted Clean Air Engineering (CleanAir) to perform a compliance test program at its municipal waste combustor (MWC) facility in Pompano Beach, Florida. Testing was conducted in accordance with 40 CFR 60 Subpart Cb and applicable sections of PSD–FL-112(B) and PA86-22. The sampling was conducted at the Unit 2 Fabric Filter (FF) Outlet on May 25, 2010.

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.
C. Slimp	- CleanAir
P. Bihun	- CleanAir

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

All equipment utilized for testing was manufactured by Clean Air Engineering.

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

Table 1-1:
Schedule of Activities

Run Number	Location	Method	Analyte	Date	Start Time	End Time
1	Unit 2 FF Outlet	USEPA Method 29	Mercury	05/25/10	07:39	09:50
2	Unit 2 FF Outlet	USEPA Method 29	Mercury	05/25/10	10:18	12:29
3	Unit 2 FF Outlet	USEPA Method 29	Mercury	05/25/10	12:50	15:00

PROJECT OVERVIEW

Table 1-2:
Summary of Test Results

Source Constituent	Sampling Method	Average Emission	Permit Limit[1]
Unit 2 FF Outlet			
Mercury (µg/dscm @7% O_2)	EPA M29	15	50

[1] Limit obtained from the facility's Title V Permit No. 0570127-005-AV and Subpart Cb as of April 28, 2009

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

End of Section 1 – Project Overview

RESULTS

Table 2-1:
Unit 2 FF Outlet – Mercury

Run No.		1	2	3	Average
Date (2010)		May 25	May 25	May 25	
Start Time (approx.)		07:39	10:18	12:50	
Stop Time (approx.)		09:50	12:29	15:00	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	185	184	184	**184**
P_1	SDA Outlet Temperature (°F)	319	320	320	**320**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.0	9.0	9.0	**9.0**
CO_2	Carbon dioxide (dry volume %)	9.6	9.8	9.8	**9.7**
T_s	Sample temperature (°F)	309	309	309	**309**
B_w	Actual water vapor in gas (% by volume)	23.9	23.5	23.9	**23.7**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	183,571	174,827	179,796	**179,398**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	93,659	89,469	91,496	**91,542**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	77.82	72.71	74.05	**74.86**
%I	Isokinetic sampling (%)	104.7	102.4	102.0	**103.0**
Laboratory Data					
m_{n-1b}	Fraction 1B (µg)	0.1204	<0.1000	<0.1000	
m_{n-2b}	Fraction 2B (µg)	42.0524	20.5021	19.5846	
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)	0.8843	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	43.0571	20.5021	19.5846	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	1.2E-09	6.2E-10	5.8E-10	**8.1E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.4E-09	7.3E-10	6.8E-10	**9.5E-10**
C_{sd}	Concentration (µg/dscm)	20	10	9	**13**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	23	12	11	**15**
$E_{lb/hr}$	Rate (lb/hr)	0.0069	0.0033	0.0032	**0.0045**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.1E-05	1.0E-05	9.8E-06	**1.4E-05**

RESULTS

Table 2-2:
Quality Assurance and Quality Control

RPD RESULTS

Run Number		Front Half	H_2O_2/HNO_4	Empty Impinger	$KMnO_4$	HCl
U2 FF Outlet R1		0.034	0.006	NA	NA	0.011
U2 FF Outlet R2		NA	0.00099678	NA	NA	NA
U2 FF Outlet R3		NA	0.006	NA	NA	NA
Field Blank		NA	NA	NA	NA	NA
Reagent Blank		NA	NA	NA	NA	NA
			Sample Spike and Recovery			
U2 FF Outlet R3	#1	98%	102%	82%	92%	115%
	#2	108%	105%	83%	91%	113%
			Blanks			
Field Blank	#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	< 0.2	< 0.2	< 0.5	< 0.4
	#2	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4
Meter Post Cal		-0.6%				

End of Section 2 – Results

DESCRIPTION OF INSTALLATION

PROCESS DESCRIPTION

The North Broward Resource Recovery Facility operates three (3) 750 tons per day municipal refuse-fired, water-wall boiler trains. The trains were manufactured by Babcock & Wilcox to produce electricity for sale to a local utility company. Each boiler is equipped with a spray dryer absorber (SDA) for acid gas removal, followed by a fabric filter (FF) baghouse for the control of particulate emissions. Wheelabrator Air Pollution Control, Inc. supplies the control equipment. Each FF baghouse is followed by an induced draft fan that directs the flue gas to a dedicated flue in a common stack.

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

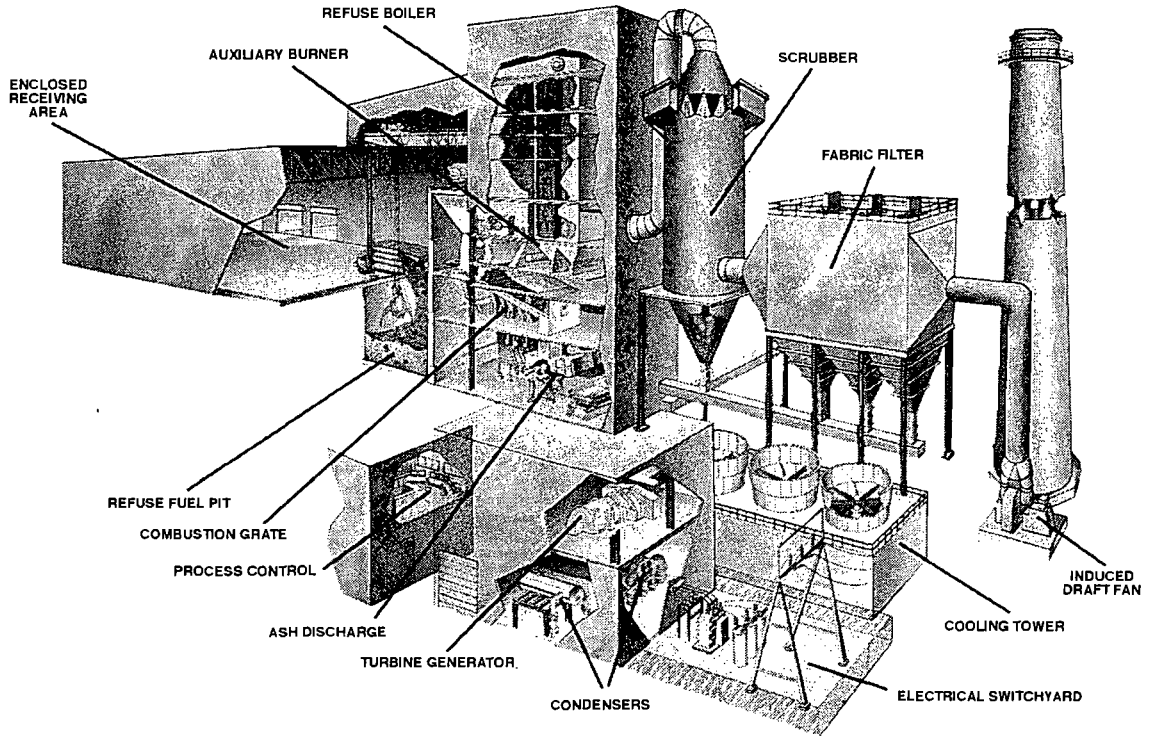


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

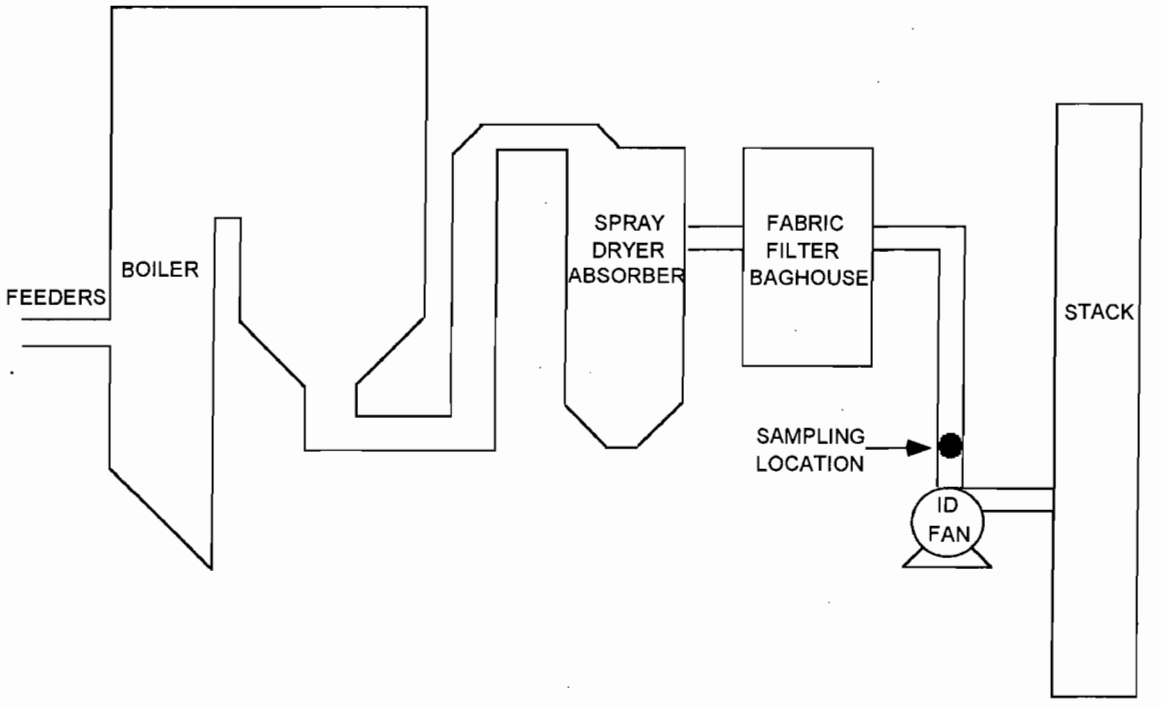


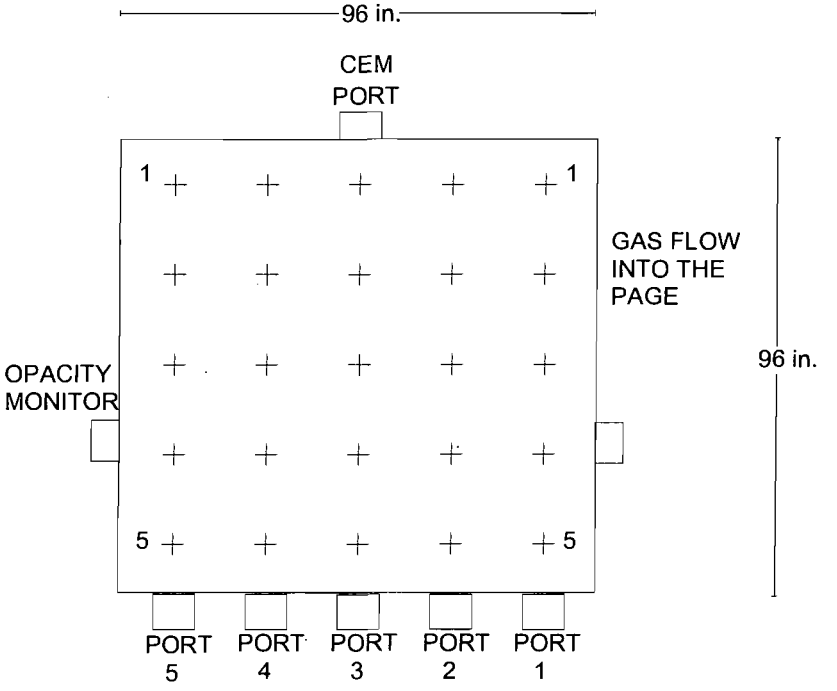
Figure 3-2: Process Schematic

DESCRIPTION OF SAMPLING LOCATION(S)

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

Table 3-1:
Sampling Points

Location	Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
Unit 2 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 2 FF Outlet Sampling Point Determination (EPA Method 1)

End of Section 3 – Description of Installation

METHODOLOGY

Clean Air Engineering followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1, 2, 3, 3B, 4 and 29. The following table summarizes the methods and their respective sources.

Table 4-1:
Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A	
Method 1	"Sample and Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"
Method 3	"Gas Analysis for the Determination of Dry Molecular Weight"
Method 3B	"Gas Analysis for the Determination of Emission Rate Correction Factor or Excess Air"
Method 4	"Determination of Moisture Content in Stack Gases"
Method 29	"Determination of Metals Emissions from Stationary Sources"

These methods appear in detail in Title 40 of the Code of Federal Regulations (CFR) and on the World Wide Web at http://www.cleanair.com.

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

CleanAir followed specific quality assurance and quality control (QA/QC) procedures as outlined in the individual methods and in EPA "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source-Specific Methods", EPA/600/R-94/038C. Additional QA/QC methods, as prescribed in CleanAir's internal Quality Manual, were also followed. Results of all QA/QC activities performed by CleanAir are summarized in Appendix D.

End of Section 4 –Methodology

APPENDIX

TEST METHOD SPECIFICATIONS

A

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Specification Sheet for EPA Method 29

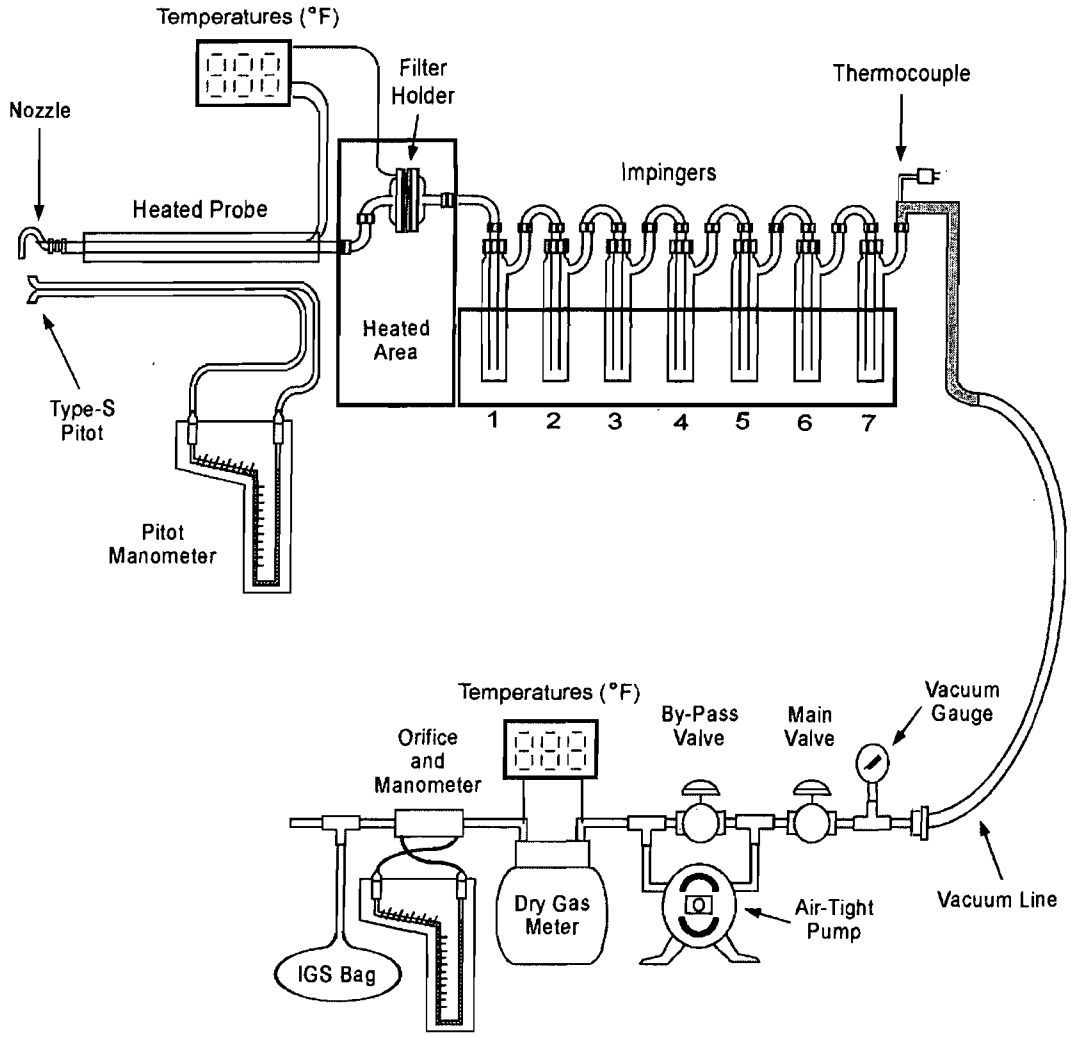
Source Location Name(s)	Unit 2 FF Outlet
Pollutant(s) to be Determined	Mercury
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	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	0.82
Pitot Tube Calibration by	Geometric or Wind Tunnel	Wind-Tunnel
Pitot Tube Attachment	Attached to Probe	Attached to Probe
Metering System Console		
Meter Type	Dry Gas Meter	Dry Gas Meter
Meter Accuracy	±2%	±1%
Meter Resolution	N/A	0.01 cubic feet
Meter Size	N/A	0.1 dcf/revolution
Meter Calibrated Against	Wet Test Meter or Standard DGM	Wet Test Meter
Pump Type	N/A	Rotary Vane
Temperature Measurements	N/A	Type K Thermocouple/Pyrometer
Temperature Resolution	5.4°F	1.0°F
ΔP Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
ΔH Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
Barometer	Mercury or Aneroid	Digital Barometer calibrated w/Mercury Aneroid
Filter Description		
Filter Location	After Probe	Exit of Probe
Filter Holder Material	Borosilicate Glass	Borosilicate Glass
Filter Support Material	Teflon (or other non-metallic)	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	248°F±25°F	248°F±25°F
Filter Material	Quartz or Glass Fiber	Quartz Fiber
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

Specification Sheet for EPA Method 29

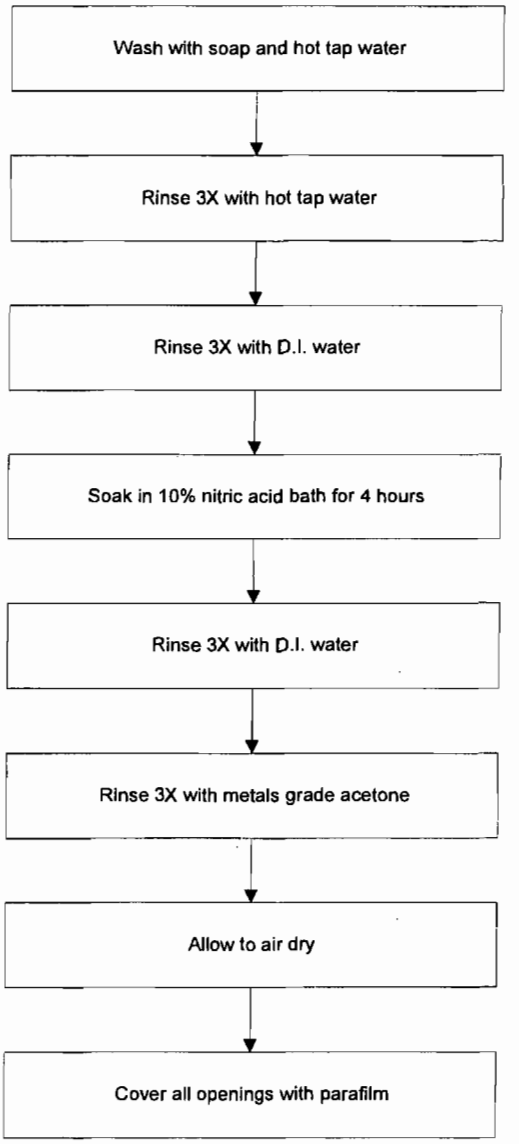
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types	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

EPA Method 29
Sampling Train Configuration



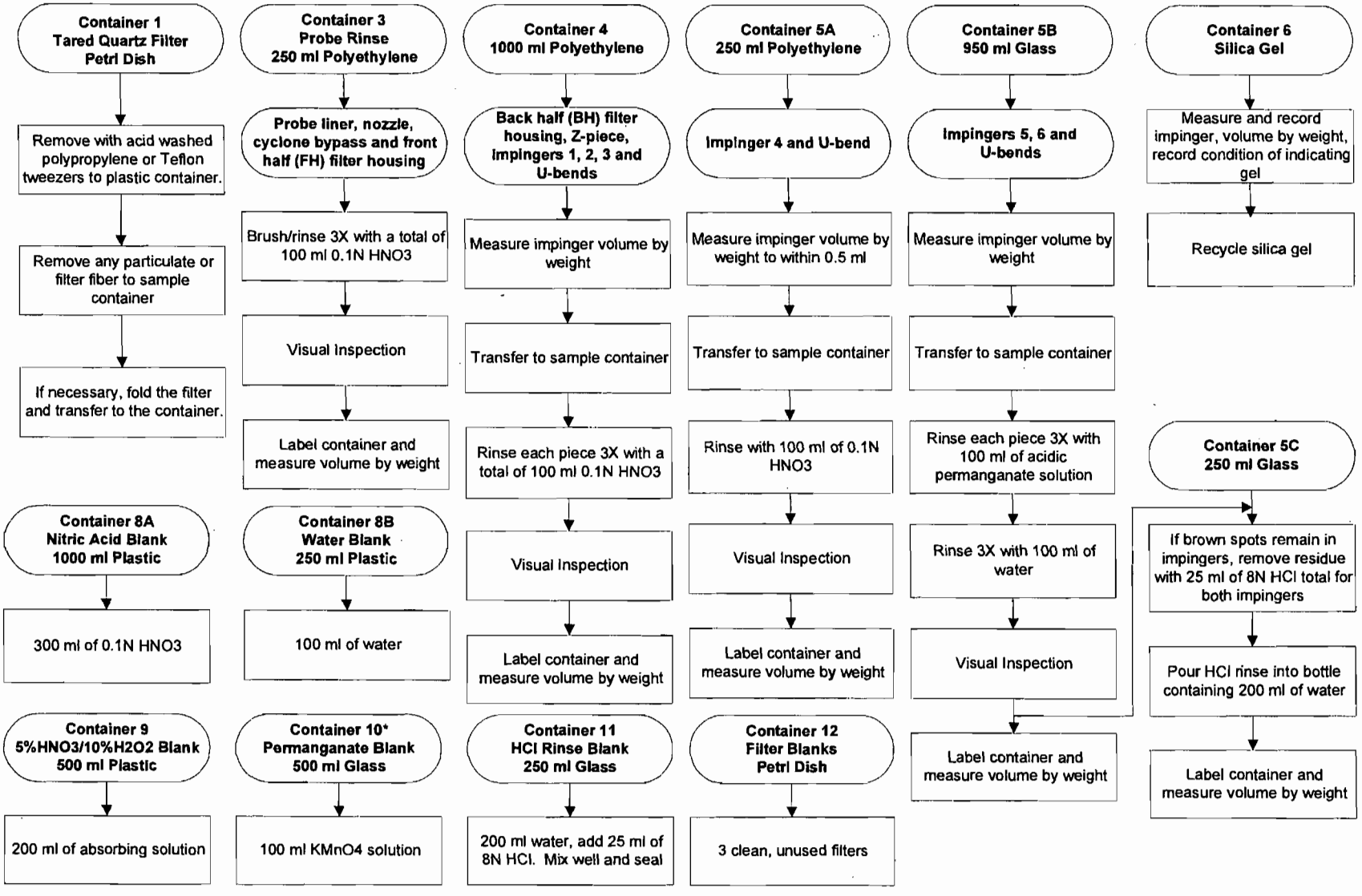
	Impinger Contents
Impinger 1	Empty
Impinger 2	100 ml 5% HNO_3/10% H_2O_2
Impinger 3	100 ml 5% HNO_3/10% H_2O_2
Impinger 4	Empty
Impinger 5	100 ml 4% $KMnO_4$/10% H_2SO_4
Impinger 6	100 ml 4% $KMnO_4$/10% H_2SO_4
Impinger 7	Silica Gel

EPA Method 29
Glassware Preparation Procedures

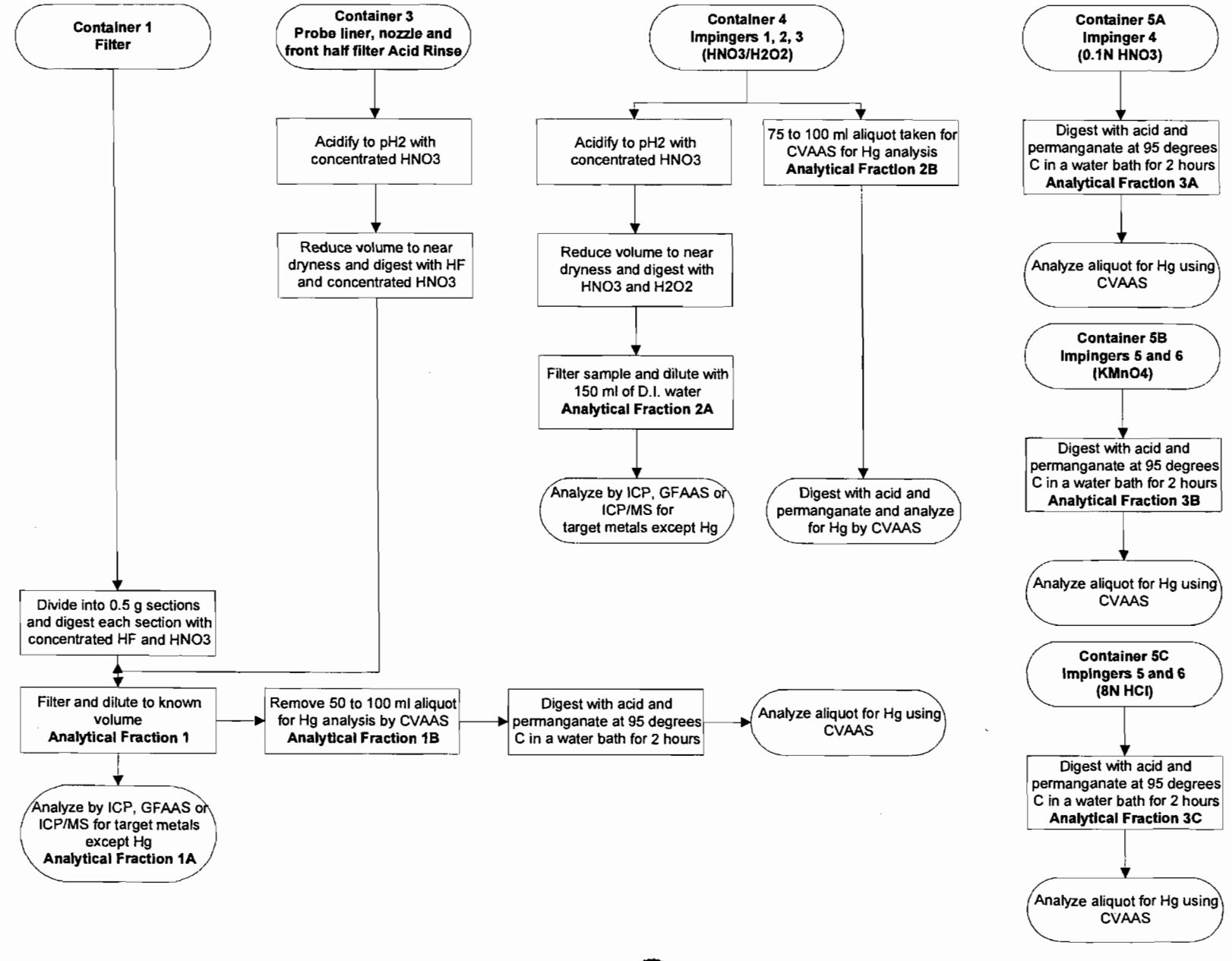


EPA Method 29
Sample Recovery Flowchart
(Includes Mercury)

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



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.

061410 111812
P

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

V_{lc}	= total volume of liquid collected in impingers and silica gel (ml)	=	518.3	ml
0.04706	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	24.39	ft^3

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.88	in. Hg
T_m	= average dry gas meter temperature (°F)	=	89.30	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	81.36	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9936	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.28	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)	=	77.819	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)	=	29.88	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-9.10	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)	=	29.21	in. Hg

QA/QC_____
Date_____

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

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

Where:

T_s	= average sample gas temperature (°F)	=	309.24	°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)	=	29.21	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)	=	29.21	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.21	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)	=	77.819	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	24.39	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2386	
		=	23.86	%

7. Saturated moisture content (% by volume)

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

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.21	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.21	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

QA/QC _____
Date _____

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	=	0.2386	
B_w	= actual water vapor in gas	=	0.2386	
		=	23.86	%

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 (%)	=	9.6	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.0	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.40	%

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

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

Where:

M_{CO2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.6	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.0	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.4	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.89	lb/lb·mole

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

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

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2386	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.89	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.05	lb/lb·mole

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12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.82	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.05	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.21	in. Hg
T_s	= average sample gas temperature (°F)	=	309.24	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.691	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	47.81	ft/sec

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

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

Where:

A_s	= cross sectional area of sampling location (ft^2)	=	64.00	ft^2
V_s	= sample gas velocity (ft/sec)	=	47.81	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	183,571	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)	=	183,571	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.21	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	309.2	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	123,016	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	=	0.2386	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	123,016	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	93,659	dscfm

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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)	=	93,659	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.0	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
7	= oxygen content of corrected gas (%)	=	7.0	%
Q_{std7}	= volumetric flow rate at STP and 7%O_2, dry basis (dscfm)	=	79,959	dscfm

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	93,659	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,619,567	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)	=	93,659	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)	=	159,149	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)	=	159,149	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)	=	148,298	dry Nm^3/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.273	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2386	
P_s	= absolute sample gas pressure (in. Hg)	=	29.21	in. Hg
T_s	= average sample gas temperature (°F)	=	309.2	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	77.819	dscf
V_s	= sample gas velocity (ft/sec)	=	47.81	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 (%)	=	104.71	%

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)	=	81.36	dcf
T_m	= average dry gas meter temperature (°F)	=	89.30	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.7678	
P_{bar}	= barometric pressure (in. Hg)	=	29.88	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.280	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.89	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.128	√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	=	0.9805	

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LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

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

	CASE 1 All 5 fractions are D.	CASE 2 1 to 4 fractions are ND	CASE 3 All 5 fractions are ND
Rule			
ND = 0	$m_{Total\text{-}B}$ = Sum D, 1-5	$m_{Total\text{-}B}$ = Sum D	$m_{Total\text{-}B}$ = < Sum ND
ND=1x	$m_{Total\text{-}B}$ = Sum D, 1-5	$m_{Total\text{-}B}$ = Sum D	$m_{Total\text{-}B}$ = < Sum ND
ND=0.5x	$m_{Total\text{-}B}$ = Sum D, 1-5	$m_{Total\text{-}B}$ = Sum D	$m_{Total\text{-}B}$ = < 0.5 Sum ND

2. Logic for Determining Total Sample ($m_{Total\text{-}S}$) from 5 Fractions

	CASE 1 All 5 fractions are D.	CASE 2 1 to 4 fractions are ND	CASE 3 All 5 fractions are ND
Rule			
ND = 0	$m_{Total\text{-}S}$ = Sum D, 1-5	$m_{Total\text{-}S}$ = Sum D	$m_{Total\text{-}S}$ = < Sum ND
ND=1x	$m_{Total\text{-}S}$ = Sum D, 1-5	$m_{Total\text{-}S}$ = < [Sum D + Sum ND]	$m_{Total\text{-}S}$ = < Sum ND
ND=0.5x	$m_{Total\text{-}S}$ = Sum D, 1-5	$m_{Total\text{-}S}$ = < [SumD+0.5 SumND]	$m_{Total\text{-}S}$ = < 0.5 Sum ND

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

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

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

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

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

Definitions and Notes

The term "Rule" refers to the rule being implemented for handling non-detectable quantities in summations.
MDL = minimum detection limit.
D = Detectable quantity reported as D.
ND = Non-Detectable quantity reported at a value of ND.
MIN[MDL] = lowest quantity of all detection limits for 5 fractions.

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USEPA Method 29
Mercury Analyte Calculations

Sample data taken from Run 1

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

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

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K

1. Total blank amount (µg)

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

Where:

m_{1b-B}	= mercury amount in blank for Fraction 1b	=	<0.1000	µg
m_{2b-B}	= mercury amount in blank for Fraction 2b	=	<0.2000	µg
m_{3a-B}	= mercury amount in blank for Fraction 3a	=	<0.2000	µg
m_{3b-B}	= mercury amount in blank for Fraction 3b	=	<0.5000	µg
m_{3c-B}	= mercury amount in blank for Fraction 3c	=	<0.4000	µg
$m_{total-B}$	= total amount of mercury in blank	=	<1.4000	µg

2. Total sample amount (µg)

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

Where:

m_{1b-S}	= mercury amount in sample for Fraction 1b	=	0.1204	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	42.0524	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	=	0.8843	µg
$m_{total-S}$	= total amount of mercury in sample	=	43.0571	µg

3. Allowable blank correction (µg)

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

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

Where:

$m_{total-B}$	= total amount of mercury in blank	=	<1.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	43.0571	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	2.1529	µg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg

NOTE: In this case, the second criteria applies.

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

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

Where:

$m_{total-S}$	= total amount of mercury in sample	=	43.0571	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	43.0571	µg

5. Sample corrected for allowable blank - Prorated for each fraction (µg)

$$m_{n-i} = \left(\frac{m_{i-S}}{m_{total-S}}\right)\left(m_n\right)$$

Where:

m_n	= total mercury in sample corrected for allowable blank	=	43.0571	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	0.1204	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	42.0524	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	=	0.8843	µg
$m_{total-S}$	= total amount of mercury in sample	=	43.0571	µg
m_{n-1b}	= mercury corrected for blank - prorated for Fraction 1b	=	0.1204	µg
m_{n-2b}	= mercury corrected for blank - prorated for Fraction 2b	=	42.0524	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	=	0.8843	µg

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USEPA Method 29
Mercury Sample Calculations

Sample data taken from Run 1

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P_K

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)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= mercury concentration (lb/dscf)	=	1.2200E-09	lb/dscf

2. Mercury concentration (µg/dscm)

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

Where:

m_n	= mercury collected in sample (total µg)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= mercury concentration (µg/dscm)	=	1.9537E+01	µg/dscm

3. Mercury concentration (mg/dscm)

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

Where:

m_n	= mercury collected in sample (total µg)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	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)	=	1.9537E-02	mg/dscm

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4. Mercury concentration (µg/Nm3 dry)

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

Where:

m_n	= mercury collected in sample (total µg)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	
C_{sd}	= mercury concentration (µg/Nm3 dry)	=	2.0967E+01	µg/Nm^3 dry

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

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

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	1.2200E-09	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.0	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= mercury concentration corrected to x% oxygen (lb/dscf)	=	1.4291E-09	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	1.2200E-09	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.6	%
C_{sdy}	= mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	1.5303E-09	lb/dscf @ y%CO_2

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

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

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	1.2200E-09	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	93,659	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	183,571	acfm
C_a	= mercury concentration at actual gas conditions (lb/acf)	=	6.2246E-10	lb/acf

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8. Mercury emission rate (lb/hr)

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

Where:

m_n	= mercury collected in sample (total µg)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	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)	=	93,659	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= mercury emission rate (lb/hr)	=	6.8560E-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)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	93,659	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)	=	8.6369E-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)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	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)	=	93,659	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{T/yr}$	= mercury emission rate (Ton/yr)	=	3.0029E-02	Ton/yr

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

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

Where:

m_n	= mercury collected in sample (total µg)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	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 (%)	=	9.0	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= mercury emission rate - Fd-based (lb/MMBtu)	=	2.0564E-05	lb/MMBtu

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

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

Where:

m_n	= mercury collected in sample (total µg)	=	43.0571	µg
V_{mstd}	= volume metered, standard (dscf)	=	77.8189	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 (%)	=	9.6	%
100	= conversion factor	=	100	
E_{Fc}	= mercury emission rate - Fc-based (lb/MMBtu)	=	2.3210E-05	lb/MMBtu

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10955
Unit 2 FF Outlet

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

Run No.		1	2	3	Average
Date (2010)		May 25	May 25	May 25	
Start Time (approx.)		07:39	10:18	12:50	
Stop Time (approx.)		09:50	12:29	15:00	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9936	0.9936	0.9936	
C_p	Pitot tube coefficient	0.8200	0.8200	0.8200	
P_g	Static pressure (in. H_2O)	-9.1000	-10.2000	-10.1000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.88	29.88	29.88	**29.8800**
D_n	Nozzle diameter (in.)	0.2730	0.2730	0.2730	
O_2	Oxygen (dry volume %)	9.0333	9.0000	9.0000	**9.0111**
CO_2	Carbon dioxide (dry volume %)	9.5667	9.8000	9.7667	**9.7111**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.4000	81.2000	81.2333	**81.2778**
V_{lc}	Total Liquid collected (ml)	518.30	473.70	494.60	
V_m	Volume metered, meter conditions (ft^3)	81.3650	76.9400	78.9750	
T_m	Dry gas meter temperature (°F)	89.3000	95.7000	100.1800	
T_s	Sample temperature (°F)	309.2400	308.8000	308.7600	**308.9333**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2804	1.1340	1.1792	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	24.3912	22.2923	23.2759	**23.3198**
V_{mstd}	Volume metered, standard (dscf)	77.8189	72.7131	74.0476	**74.8599**
P_a	Sample gas pressure, absolute (in. Hg)	29.2109	29.1300	29.1374	**29.1594**
P_v	Vapor pressure, actual (in. Hg)	29.2109	29.1300	29.1374	**29.1594**
B_{wo}	Moisture measured in sample (% by volume)	23.8638	23.4643	23.9160	**23.7480**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	23.8638	23.4643	23.9160	**23.7480**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.6912	0.6585	0.6766	**0.6754**
M_d	MW of sample gas, dry (lb/lb-mole)	29.8920	29.9280	29.9227	**29.9142**
M_s	MW of sample gas, wet (lb/lb-mole)	27.0541	27.1292	27.0712	**27.0848**
V_s	Velocity of sample (ft/sec)	47.8051	45.5279	46.8218	**46.7183**
%I	Isokinetic sampling (%)	104.7143	102.4266	101.9952	**103.0453**
Q_a	Volumetric flow rate, actual (acfm)	183,571	174,827	179,796	**179,398**
Q_s	Volumetric flow rate, standard (scfm)	123,016	116,898	120,257	**120,057**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	93,659	89,469	91,496	**91,542**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	79,959	76,596	78,332	**78,295**
Q_a	Volumetric flow rate, actual (acf/hr)	11,014,288	10,489,634	10,787,741	**10,763,888**
Q_s	Volumetric flow rate, standard (scf/hr)	7,380,938	7,013,904	7,215,429	**7,203,424**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,619,567	5,368,143	5,489,788	**5,492,500**
Q_a	Volumetric flow rate, actual (m^3/hr)	311,931	297,073	305,515	**304,840**
Q_s	Volumetric flow rate, standard (m^3/hr)	209,033	198,638	204,345	**204,005**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	159,149	152,029	155,474	**155,551**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	135,869	130,154	133,104	**133,042**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	194,780	185,094	190,413	**190,096**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	148,298	141,663	144,874	**144,945**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	126,605	121,280	124,028	**123,971**

Comments:
Average includes 3 runs.

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10955
Unit 2 FF Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2010)		May 25	May 25	May 25	
Start Time (approx.)		07:39	10:18	12:50	
Stop Time (approx.)		09:50	12:29	15:00	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	185	184	184	**184**
P_1	SDA Outlet Temperature - (°F)	319	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 %)	9.0333	9.0000	9.0000	**9.0111**
CO_2	Carbon dioxide (dry volume %)	9.5667	9.8000	9.7667	**9.7111**
T_s	Sample temperature (°F)	309.2400	308.8000	308.7600	**308.9333**
B_w	Actual water vapor in gas (% by volume)	23.8638	23.4643	23.9160	**23.7480**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	183,571	174,827	179,796	**179,398**
Q_s	Volumetric flow rate, standard (scfm)	123,016	116,898	120,257	**120,057**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	93,659	89,469	91,496	**91,542**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	79,959	76,596	78,332	**78,295**
Q_a	Volumetric flow rate, actual (acf/hr)	11,014,288	10,489,634	10,787,741	**10,763,888**
Q_s	Volumetric flow rate, standard (scf/hr)	7,380,938	7,013,904	7,215,429	**7,203,424**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,619,567	5,368,143	5,489,788	**5,492,500**
Q_a	Volumetric flow rate, actual (m^3/hr)	311,931	297,073	305,515	**304,840**
Q_s	Volumetric flow rate, standard (m^3/hr)	209,033	198,638	204,345	**204,005**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	159,149	152,029	155,474	**155,551**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	135,869	130,154	133,104	**133,042**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	194,780	185,094	190,413	**190,096**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	148,298	141,663	144,874	**144,945**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	126,605	121,280	124,028	**123,971**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	77.8189	72.7131	74.0476	**74.8599**
%I	Isokinetic sampling (%)	104.7143	102.4266	101.9952	**103.0453**
Laboratory Data					
m_{n-1b}	Fraction 1B (µg)	0.1204	<0.1000	<0.1000	
m_{n-2b}	Fraction 2B (µg)	42.0524	20.5021	19.5846	
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)	0.8843	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	43.0571	20.5021	19.5846	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	1.2200E-09	6.2172E-10	5.8319E-10	**8.0831E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.4291E-09	7.2621E-10	6.8121E-10	**9.4550E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.5303E-09	7.6129E-10	7.1655E-10	**1.0027E-09**
C_a	Concentration (lb/acf)	6.2246E-10	3.1817E-10	2.9678E-10	**4.1247E-10**
C_{sd}	Concentration (µg/dscm)	1.9537E+01	9.9559E+00	9.3390E+00	**1.2944E+01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.2885E+01	1.1629E+01	1.0909E+01	**1.5141E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.4506E+01	1.2191E+01	1.1475E+01	**1.6057E+01**
C_{sd}	Concentration (mg/dscm)	1.9537E-02	9.9559E-03	9.3390E-03	**1.2944E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.2885E-02	1.1629E-02	1.0909E-02	**1.5141E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.4506E-02	1.2191E-02	1.1475E-02	**1.6057E-02**
C_a	Concentration (µg/m^3 (actual,wet))	9.9679E+00	5.0950E+00	4.7526E+00	**6.6052E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	2.0967E+01	1.0684E+01	1.0022E+01	**1.3891E+01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	2.4559E+01	1.2480E+01	1.1707E+01	**1.6249E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	2.6299E+01	1.3083E+01	1.2314E+01	**1.7232E+01**
$E_{lb/hr}$	Rate (lb/hr)	6.8560E-03	3.3375E-03	3.2016E-03	**4.4650E-03**
$E_{g/s}$	Rate (g/s)	8.6369E-04	4.2044E-04	4.0333E-04	**5.6249E-04**
$E_{T/yr}$	Rate (Ton/yr)	3.0029E-02	1.4618E-02	1.4023E-02	**1.9557E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.0564E-05	1.0450E-05	9.8022E-06	**1.3605E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.3210E-05	1.1546E-05	1.0868E-05	**1.5208E-05**

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10955
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
QA/QC Results

	Run No.	1	2	3	
	Date (2010)	May 25	May 25	May 25	
	Start Time (approx.)	07:39	10:18	12:50	
	Stop Time (approx.)	09:50	12:29	15:00	
	Total Duration of Test Run (min.)	131	131	130	
	Net Sampling Time (min.)	125	125	125	
	Sampling System Calibration Summary				
	Nozzle ID No:	273-1	273-1	273-1	
D_n	Nozzle Diameter (in):	0.273	0.273	0.273	
	Probe ID No:	67-8-18	67-8-18	67-8-18	
C_p	Pitot Coefficient:	0.8200	0.8200	0.8200	
	Meter Box ID. No:	61-5	61-5	61-5	
Y_d	Meter Box Yd - Field Sheet	0.9936	0.9936	0.9936	
	Meter Box Yd - Database	0.9936	0.9936	0.9936	
	Meter Box ΔH@ - Field Sheet	1.7678	1.7678	1.7678	
	Meter Box ΔH@ - Database	1.7678	1.7678	1.7678	
	QA/QC				
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0260	0.0246	0.0253	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0150	0.0030	0.0020	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
V_{mstd}	Actual Sample Volume (dscf)	77.819	72.713	74.048	
	Alternative Method 5 Post-Test Calibration (EPA ALT-009)				
$\sqrt{\Delta H_{avg}}$	Average of Square Root of ΔH (in. W.C.)	1.1275	1.0618	1.0836	
Y_{qa}	Alternative Meter Calibration Factor	0.9805	0.9817	0.9799	**Average**
	Variation from full-test Y_d (average ≤ ±5%)	-1.3%	-1.2%	-1.4%	**-1.3%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	Actual Variation (%)	104.71	102.43	102.00	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	0	
	Number of points >110%	0	0	0	
	Number of points <80%	0	0	0	
	Number of points >120%	0	0	0	

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Nozzle Calibration Sheet

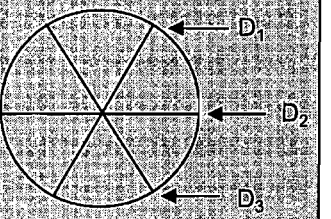
Client	Wheelabrator	Project Number	10955
Calibrated by	C. Slimp	Unit	2
Date	5-24-10	Runs	1-3

Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
273-1	0.273	0.273	0.274	0.001	0.273

D_1, D_2, D_3 = three nozzle diameter measurements

ΔD = maximum difference between any two diameters
ΔD = 0.004 inches*

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



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

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Date 5/24/10

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Meter Box Full Test Calibration

Meter Box No: 61-5

Date of Calibration: 5/3/2010

Meter Box Y_d: 0.9936

Calibration Conducted by: OLEG LAVROV

Meter Box ΔH@: 1.7676

Barometric Pressure: 29.00

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{ls} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
0.973	3.00	-1.80	1.0000	0.000	10.000	10.000	625.637	635.732	10.095	70.0	70.0	70.00	81.0	76.0	78.50	9.92	0.9943	1.7019
0.962	3.00	-1.80	1.0000	0.000	10.000	10.000	635.732	645.882	10.150	70.0	70.0	70.00	84.0	77.0	80.50	10.03	0.9926	1.7366
0.381	0.50	-1.10	1.0000	0.000	5.000	5.000	649.227	654.315	5.088	70.5	70.5	70.50	82.0	78.0	80.00	12.64	0.9962	1.8387
0.380	0.50	-1.10	1.0000	0.000	5.000	5.000	654.315	659.418	5.103	70.5	70.5	70.50	83.0	79.0	81.00	12.69	0.9952	1.8498
0.678	1.50	-1.40	1.0000	0.000	10.000	10.000	661.640	671.889	10.249	71.0	71.0	71.00	88.0	80.0	84.00	14.21	0.9923	1.7397
0.677	1.50	-1.40	1.0000	0.000	10.000	10.000	671.889	682.172	10.283	71.0	71.0	71.00	89.0	81.0	85.00	14.22	0.9908	1.7389
																Averages	0.99357	1.76758

Nomenclature

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

Equations

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

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

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

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
4.7	5.0
9.9	10.0
14.9	15.0
20.2	20.0
24.5	25.0

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Meter Box - Pyrometer Calibration Sheet

Meter Box No: 61-5 Office:

Calibrated by: OLEG LAVROV Client:

Date: 5/3/10 Job No:

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

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	50	50	50				
100	100	99	100				
150	150	150	150				
200	200	200	200				
250	250	250	250				
300	300	300	300				
350	350	350	350				
400	400	400	400				
450	450	450	450				
500	500	499	500				
550	550	550	550				
600	600	600	600				

Tolerance = ±2°F difference from reference setting.

Calibration Reference Information

Reference Used: Omega CL23A Serial No: T-225950

Calibrated By: JH Metrology Exp. Date : 10/7/2010

Calibration Report No: RO44791

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Meter Box Critical Orifice Post-Test Calibration Data

Project No. 10955 | Meter No. 61-5 | Orifice C-3

Location warehouse | Meter Yd 0.9936 | Orifice K' 0.4423

Test Date 06/03/10 | Meter ΔH@ 1.7676 | Orifice Cal. Date 02/03/10

Operator r. vicere | Full Test Cal. Date 05/03/10

Barom. Press. (P_b) 29.03 in. Hg

Leak Checks

Negative Pressure — *No movement of manometer in one-minute* ☑ Pass

Positive Pressure — *No movement of manometer in one-minute* ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (in. W.G.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	0.0	151.00	76	74								
1	5.0	153.92	76	74	76	1.00	21	5.0	2.92	75.0	0.9896	0.2%
2	10.0	156.85	76	74	78	1.00	21	5.0	2.93	75.0	0.9844	-0.3%
3	15.0	159.76	77	74	81	1.00	21	5.0	2.91	75.3	0.9889	0.1%
										Average Y_i	0.9877	
										Cal. Error	-0.6%	

Calculations and Specifications

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

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

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

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Sample Probe Calibration

Probe Type: M5 with S-Type Pitot **I.D. Number:** 67-8-18

Project Number:

Thermocouple Calibration

Reference Type: Thermocouple Reference I.D. No: 15-078-39 Pyrometer I.D. No: 80512890 Units: °F

Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Specification
1	Ambient	70	70	0	0.00%	
2	200°F-250°F	218	217	1	0.15%	%Difference ≤ 1.5

* Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? ⟶ **YES**

Pitot Tube Calibration (Wind Tunnel Method @ 49 ft/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(A)}$**
1	0.549	0.812	0.814	0.003
2	0.561	0.816	0.820	0.003
3	0.556	0.815	0.818	0.000
		Side 'A' Average Probe $C_{p(A)}$=	0.8175	0.0021

Specification: Avg. C_p Deviations ≤ 0.01

Pitot Side 'B' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(B)}$**
1	0.564	0.802	0.823	0.000
2	0.555	0.803	0.823	0.000
3	0.556	0.805	0.823	0.000
		Side 'B' Average Probe $C_{p(B)}$=	0.8228	0.0000

Specification: Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.817	—	0.823	=	-0.006	|Difference| ≤ 0.01

Does assembly meet specifications? **YES** ⟶ **If "Yes", C_p= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.**

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

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

Probe Cp= 0.820 Calibrated by: R ARNOLD Date: 03/04/2010

CleanAir ENGINEERING

FIELD DATA

E

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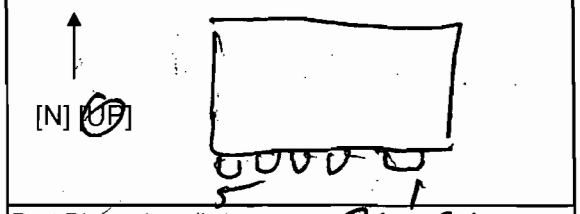
TEST LOCATION: Ft. Outlet Mercury TESTING METHOD: 29 PAGE 1 OF 2

UNIT: 2 RUN: 1

FIELD DATA SHEET

Client	Wheelabrator	Project No.	10911
Plant	N. Broward	Date	5/25/10
Meter Operator	P. Bihari		
Probe Operator	P. Bihari		

Cross-Section of Test Location



Amb. Temp. (°F)	80	Bar. Press.	29.88 [in. Hg] [mbar]
Probe I.D. No.			07-5-18
Liner Material			Glass

Meter Box	6-5	Sample Box No.	MB
Meter Y_d	0.9936	Meter $\Delta H_@$	1.7676
K Factor	2.62	Pitot C_p	0.82
Leak Rate Before	0.002 [cfm] [Lpm]	@	13 (in. Hg)
Leak Rate After	0.015 [cfm] [Lpm]	@	10 (in. Hg)
Pitot Leak Check Before:	☒	After: Good ☒ Bad ☐	

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.273	Nozzle I.D.	273-1

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.1	10.0		

Duct Dimensions (in.) 96 x 96

Start Time:	7:39	Stop Time:	9:50

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. [ft^3] [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_x (°F)	Notes
				909.450		250	250						O2
5-1	5	0.58	1.5	913.02	312	248	250	65	79	80	4.0	N/A	10.2
2	10	0.52	1.4	916.37	312	246	253	61	81	80	5.5		9.6 KC2=1.68
3	15	0.45	1.2	919.49	310	252	253	62	84	80	5.5		10.1
4	20	0.44	1.2	922.67	311	251	247	63	87	81	5.5		8.8
5	25	0.42	1.1	925.650	309	250	248	64	89	81	5.0		9.8 925 169.5
4-1	30	0.53	1.4	929.10	308	249	249	59	89	83	5.5		10.7 -0.045
2	35	0.45	1.2	932.26	310	248	246	57	92	83	5.0		10.2
3	40	0.45	1.2	935.41	310	253	251	56	93	84	5.0		10.1
4	45	0.42	1.1	938.42	310	251	248	55	95	85	5.0		10.2
5	50	0.38	1.0	941.280	310	250	249	53	95	85	4.5		10.2 941 331
3-1	55	0.45	1.2	944.52	308	249	246	60	94	86	5.0		10.6 -0.055
2	60	0.52	1.4	947.95	311	250	254	61	95	86	5.5		10.1
	Total	*		81.365									
	Average	0.4812	1.2804		309.240				89.3000				

Sum of square roots. 14.9

Circle correct bracketed units on data sheet. 3721 2061

QA/QC PB Date 5/25/10

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 1

FIELD DATA SHEET

Client	Wheelabrator
Plant	N. Broward
Meter Operator	C. Gibson
Probe Operator	C. Gibson
Project No.	10 555
Date	5/25/10

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
						280	250						O_2
3	5 65	0.52	1.4	951.36	310	291	252	62	96	86	5.5	N/A	11.1
4	70	0.50	1.3	954.65	310	281	248	62	96	86	5.5		10.5
5	75	0.42	1.1	957.6600	308	280	249	62	96	87	5.0		9.8
2-1	80	0.61	1.6	961.39	308	249	246	63	96	88	6.5		10.2 257 72
2	85	0.63	1.7	965.16	310	280	254	63	97	88	7.0		10.4 -0.06
3	90	0.44	1.2	968.39	308	252	251	62	97	88	5.5		10.4
4	95	0.52	1.4	971.85	309	251	249	63	96	88	6.0		9.4
5	100	0.57	1.5	975.415	309	280	248	60	97	88	6.0		9.9 975 425
1-1	105	0.33	0.88	978.15	305	249	248	60	95	88	4.5		10.2 -0.06
2	110	0.31	0.83	980.75	307	250	253	59	96	88	4.5		9.4
3	115	0.47	1.3	984.05	308	280	251	58	96	89	5.5		10.3
4	120	0.50	1.3	987.37	309	280	247	57	99	89	5.1		10.3
5	125	0.60	1.6	991.035	309	251	249	57	99	89	6.5		9.0
	Total	*											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC RB

Date 5/25/10

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 2

FIELD DATA SHEET

Client	Wheelabrator	Project No.	10255
Plant	N. Broward	Date	5/25/10
Meter Operator	P. Bibur		
Probe Operator	P. Bibur		

Meter Box	61-15	Sample Box No.	4 KP
Meter Y_d	0.9934	Meter $\Delta H_@$	1.7676
K Factor	2.68	Pitot C_p	0.82
Leak Rate Before	0.003 [cfm] [Lpm] @ 12 (in. Hg)		
Leak Rate After	0.003 [cfm] [Lpm] @ 11 (in. Hg)		
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐		

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)	96x96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-10.2	10.0	In	In

Amb. Temp. (°F)	84	Bar. Press.	29.88 [in. Hg] [mbar]
Probe I.D. No.	67-8-18		
Liner Material	Glass		

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.273	Nozzle I.D.	273-1
Start Time:	10:18	Stop Time:	12:29

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] 991.495	Stack Temp. Ts (°F)	Probe T_p (°F) Set Point 200	Filter T_f (°F) Set Point 200	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\ in}$ (°F)	DGM Outlet $T_{m\ out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes O_2
5-1	5	0.33	0.88	994.17	308	282	285	66	91	89	4.0	NA	8.7
2	10	0.36	0.97	996.98	309	281	286	66	93	89	4.8		9.0
3	15	0.38	1.0	999.85	308	282	280	63	95	88	4.5		9.4
4	20	0.37	0.99	1002.71	309	281	281	61	98	89	4.5		8.0
5	25	0.35	0.94	1005.485	309	280	280	61	98	90	4.5		9.0	1005.525 (-0.04)
4-1	30	0.41	1.1	1008.48	308	248	251	63	97	90	5.0		9.8
2	35	0.45	1.2	1011.69	311	249	281	64	98	90	5.5		9.4
3	40	0.44	1.2	1014.91	310	282	281	64	100	91	5.5		9.8
4	45	0.50	1.3	1018.27	310	252	250	64	100	91	6.0		9.9	1022.57
5	50	0.47	~~1.3~~ 1.2 PB	1021.425	310	280	280	64	101	91	5.5 ~~6.0~~ PB		8.9	1021.520 (-0.095)
3-1	55	0.46	1.2	1024.72	310	249	254	62	99	93	5.5		9.8
2	60	0.40	1.0	1027.61	309	249	280	58	100	93	5.0	↓	9.7
	Total	*		76.940									
	Average	0.4585	1.1340		308.800				95.7000				

Sum of square roots 12.98

3711 2255

Circle correct bracketed units on data sheet.

QA/QC PB

Date 5/25/10

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 2

FIELD DATA SHEET

Client	Wheelabrator	Project No.	10955
Plant	N. Broward	Date	7/25/10
Meter Operator	P. Bihun		
Probe Operator	P. Bihun		

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. (ft) [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
						280	250						O_2
3	65	0.40	1.0	1030.45	310	281	280	57	99	92	5.0	N/A	8.2
4	70	0.45	1.2	1033.74	309	281	280	58	100	92	5.5		9.0
5	75	0.50	1.3	1037.045	310	280	280	58	101	92	6.0		9.6
2-1	80	0.49	1.3	1040.44	308	248	280	62	99	93	6.0		10.1
2	85	0.43	1.1	1043.42	309	249	281	62	101	93	5.5		9.1
3	90	0.48	1.2	1046.60	309	251	280	62	101	93	5.5		9.0
4	95	0.45	1.2	1049.76	308	281	280	63	102	94	5.5		8.0
5	100	0.55	1.4	1053.250	308	280	249	64	102	94	6.5		9.3
1-1	105	0.30	0.77	1055.79	307	249	284	64	99	95	4.5		9.2
2	110	0.35	0.90	1058.52	307	280	280	61	100	95	5.0		9.6
3	115	0.47	1.2	1061.74	308	280	249	58	102	95	6.0		9.0
4	120	0.56	1.4	1065.21	308	280	280	58	103	95	6.5		8.3
5	125	0.56	1.4	1068.670	308	281	280	58	103	95	6.5	↓	8.4
	Total	*											
	Average												

105 1.30 -0.08

105 1.095 -0.08

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC PB

Date 7/26/10

CleanAir ENGINEERING

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

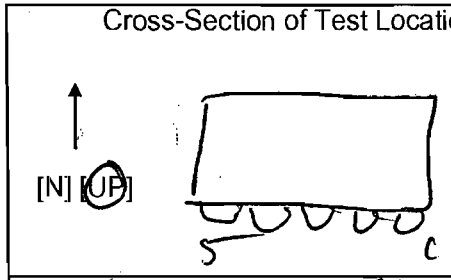
UNIT: 2 **RUN:** 3

FIELD DATA SHEET

Client	Duke Energy	Project No.	10955
Plant	Ft. Brown	Date	5/28/10
Meter Operator	T. Bynum		
Probe Operator	T. Bynum		

Meter Box	4-F	Sample Box No.	M10
Meter Y_d	0.9936	Meter $\Delta H_@$	1.7674
K Factor	2.57	Pitot C_p	0.82
Leak Rate Before	0.003 [cfm] [Lpm]	@	12 (in. Hg)
Leak Rate After	0.002 [cfm] [Lpm]	@	10 (in. Hg)
Pitot Leak Check Before:	☒	After: Good ☒	Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.)	96x96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-10.1	10.0		

Amb. Temp. (°F)	85	Bar. Press.	29.88 [in. Hg] [mbar]
Probe I.D. No.		27-S-18	
Liner Material		Glass	

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.273	Nozzle I.D.	273-1

Start Time:	12:50	Stop Time:	15:00

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. 68.995 [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 O_2
5-1	5	0.38	0.98	71.92	308	255	256	65	94	94	4.5	N/A	9.1
2	10	0.35	0.90	74.63	310	251	255	54	97	94	4.0		9.5
3	15	0.46	1.2	77.87	309	252	251	50	97	93	5.0		9.8
4	20	0.47	1.2	81.06	309	252	250	48	100	94	5.0		9.1
5	25	0.40	1.0	84.000	309	250	250	47	102	94	4.5		8.9
4-1	30	0.58	1.5	87.58	310	251	248	49	102	95	6.0		8.0
2	35	0.48	1.2	90.88	309	248	252	48	103	95	5.5		9.3
3	40	0.48	1.2	94.05	310	251	249	50	104	96	5.5		9.3
4	45	0.41	1.2	97.25	310	251	250	52	105	96	5.5		7.5
5	50	0.43	1.1	100.285	309	250	250	54	105	97	5.0		8.8
3-1	55	0.43	1.1	103.29	309	250	248	57	103	97	5.0		7.9
2	60	0.43	1.1	106.26	308	249	250	55	104	98	5.0		8.2
	Total	*		78.975									
	Average	0.4766	1.1792		308.760				100.1800				

Sum of square roots. 13.68

Circle correct bracketed units on data sheet. 3110

QA/QC PB Date 5/28/10

12.2359

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

ORSAT READINGS

TEST LOCATION: EF Outlet **PAGE** 1 **OF** 1

Client	Wheelabrator	Project Number	10955	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	N. Broward	Unit	2	
Orsat ID	6	Fuel Type	waste	Leak Check Passed ☑

Run Number	Method Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	F_O	Analyst	Analysis Date	Analysis Time
1	29	1	9.5	18.6	9.1	1.24	C. Slimp	~~4/05~~/12/10	10:39
		2	9.6	18.5	8.9				
		3	9.6	18.6	9.0				
		Avg.	9.57		9.0				
2	29	1	9.8	18.8	9.0	1.21	C. Slimp	5/12/10	13:14
		2	9.8	18.8	9.0				
		3	9.8	18.8	9.0				
		Avg.	9.4		9.0				
3	29	1	9.8	18.8	9.0		C Slimp	5/12/10	15:35
		2	9.7	18.7	9.0				
		3	9.8	18.8	9.0				
		Avg.	9.77		9.0				
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							

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

Acceptable ranges for F_O:

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

FDS903-Orsat.xls, July 2005

QA/QC_____
Date_____

CleanAir ENGINEERING

Impinger Weight Sheet

Client Wheelabrator		Unit Name / Location 2 Stack FF Outlet	
Plant N. Broward	Job No. 10955	Method 29	

Run No. 1	Filter Type Quartz		Sample Box No. M10
Date 5-25-10	Lot No.		pH —
Analyst C. Slimp	Filter No. —		Rinse ~~H2O~~ CS —

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	762.5	445.9	316.6	
Impinger 2	100 ml 5%HNO3/10%H2O2	652.3	529.2	123.1	QA/QC CS
Impinger 3	100 ml 5%HNO3/10%H2O2	607.1	563.1	44.0	Date 5-25-10
Impinger 4	Empty	447.5	435.6	11.9	
Impinger 5	100 ml 4%KMnO4/10%H2SO4	530.5	527.7	2.8	Total Weight (gm)
Impinger 6	100 ml 4%KMnO4/10%H2SO4	538.0	537.7	0.3	498.7
Impinger 7	Silica Gel	754.4	734.8	19.6	518.7

Run No. 2	Filter Type Quartz		Sample Box No. 68 KP
Date 5-25-10	Lot No.		pH —
Analyst C. Slimp	Filter No. —		Rinse —

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	752.4	437.4	315.0	
Impinger 2	100 ml 5%HNO3/10%H2O2	671.8	552.4	119.4	QA/QC CS
Impinger 3	100 ml 5%HNO3/10%H2O2	550.4	530.6	19.8	Date 5-25-10
Impinger 4	Empty	440.6	437.8	2.8	
Impinger 5	100 ml 4%KMnO4/10%H2SO4	534.7	533.1	1.6	Total Weight (gm)
Impinger 6	100 ml 4%KMnO4/10%H2SO4	542.3	542.3	0	458.6
Impinger 7	Silica Gel	765.3	750.2	15.1	473.7

Run No. 3	Filter Type		Sample Box No.
Date	Lot No.		pH
Analyst	Filter No.		Rinse

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	822.1	446.3	373.8	
Impinger 2	100 ml 5%HNO3/10%H2O2	624.0	534.5	89.5	QA/QC
Impinger 3	100 ml 5%HNO3/10%H2O2	571.4	559.9	11.5	Date
Impinger 4	Empty	442.2	440.4	1.8	
Impinger 5	100 ml 4%KMnO4/10%H2SO4	528.7	526.8	1.9	Total Weight (gm)
Impinger 6	100 ml 4%KMnO4/10%H2SO4	543.5	543.6	-0.1	478.4
Impinger 7	Silica Gel	718.9	702.7	16.2	494.6

QA/QC_____
Date_____

CleanAir ENGINEERING

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FIELD DATA PRINTOUTS

F

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Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 FF Outlet
Test Run: 1
Client: Wheelabrator North Broward, Inc.
Project No: 10955
Source Area (ft²): 64.00000
Meter Operator: P. Bihun 505
Probe Operator: P. Bihun 505
Test Date: 5/25/10
Start Time: 07:39
Stop Time: 09:50
Leak Rate Before: 0.002 cfm @ 13 "Hg
Leak Rate After: 0.015 cfm @ 10 "Hg

Bar. Press. (in. Hg): 29.88
Static P: -9.1
O_2 (dry volume %): 9.03
CO_2 (dry volume %): 9.57
N_2+CO (dry volume %): 81.40
H_2O (condensate, ml or gm): 498.7
H_2O (silica, g): 19.6
Actual Moisture (%): 23.86

Nozzle ID No: 273-1
Nozzle Diameter (D_n): 0.273
Probe ID No: 67-8-18
Pitot C_p: 0.8200
Pitot Leak Check: ☑Pass ☐Fail
Meter Box ID. No: 61-5
Meter ΔH@: 1.76776
Meter Y_d: 0.99360

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			909.450						
5-01	5.0	0.58	1.50	913.020	312	79	80	0.76	3.57	106.4
5-02	10.0	0.52	1.40	916.370	312	81	80	0.72	3.35	105.2
5-03	15.0	0.45	1.20	919.490	310	84	80	0.67	3.12	104.9
5-04	20.0	0.44	1.20	922.670	311	87	81	0.66	3.18	107.8
5-05	25.0	0.42	1.10	925.650	309	89	81	0.65	2.98	103.0
LEAK CHECK	25.0			925.695						
4-01	30.0	0.53	1.40	929.100	308	89	83	0.73	3.40	104.6
4-02	35.0	0.45	1.20	932.260	310	92	83	0.67	3.16	105.1
4-03	40.0	0.45	1.20	935.410	310	93	84	0.67	3.15	104.6
4-04	45.0	0.42	1.10	938.420	310	95	85	0.65	3.01	103.2
4-05	50.0	0.38	1.00	941.280	310	95	85	0.62	2.86	103.0
LEAK CHECK	50.0			941.335						
3-01	55.0	0.45	1.20	944.520	308	94	86	0.67	3.18	105.3
3-02	60.0	0.52	1.40	947.950	311	95	86	0.72	3.43	105.7
3-03	65.0	0.52	1.40	951.360	310	96	86	0.72	3.41	104.9
3-04	70.0	0.50	1.30	954.650	310	96	86	0.71	3.29	103.2
3-05	75.0	0.42	1.10	957.660	308	96	87	0.65	3.01	102.7
LEAK CHECK	75.0			957.720						
2-01	80.0	0.61	1.60	961.390	308	96	88	0.78	3.67	104.0
2-02	85.0	0.63	1.70	965.160	310	97	88	0.79	3.77	105.2
2-03	90.0	0.44	1.20	968.390	308	97	88	0.66	3.23	107.6
2-04	95.0	0.52	1.40	971.850	309	96	88	0.72	3.46	106.2
2-05	100.0	0.57	1.50	975.415	309	97	88	0.75	3.56	104.4
LEAK CHECK	100.0			975.475						
2-01	105.0	0.33	0.88	978.150	305	95	88	0.57	2.67	102.8
2-02	110.0	0.31	0.83	980.750	307	96	88	0.56	2.60	103.1
2-03	115.0	0.47	1.30	984.050	308	96	89	0.69	3.30	106.3
2-04	120.0	0.50	1.30	987.370	309	99	89	0.71	3.32	103.5
2-05	125.0	0.60	1.60	991.035	309	99	89	0.77	3.66	104.4
Final	125.0		1.28040	81.36500	309.24000	89.30000		0.69120	81.36500	
25 points sampled		Sq.Rt.ΔP								
QC Check: Field Averages		0.6912	1.2804	81.3650	309.2400	89.3000				
		☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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Field Data Printout

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

Location: Unit 2 FF Outlet
Test Run: 2
Client: Wheelabrator North Broward, Inc.
Project No: 10955
Source Area (ft²): 64.00000
Meter Operator: P. Bihun 505
Probe Operator: P. Bihun 505
Test Date: 5/25/10
Start Time: 10:18
Stop Time: 12:29
Leak Rate Before: 0.003 cfm @ 12 "Hg
Leak Rate After: 0.003 cfm @ 11 "Hg

Bar. Press. (in. Hg): 29.88
Static P: -10.2
O_2 (dry volume %): 9.00
CO_2 (dry volume %): 9.80
N_2+CO (dry volume %): 81.20
H_2O (condensate, ml or gm): 458.6
H_2O (silica, g): 15.1
Actual Moisture (%): 23.46

Nozzle ID No: 273-1
Nozzle Diameter (D_n): 0.273
Probe ID No: 67-8-18
Pitot C_p: 0.8200
Pitot Leak Check: ☑Pass ☐Fail
Meter Box ID. No: 61-5
Meter ΔH@: 1.76776
Meter Y_d: 0.99360

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			991.495						
5-01	5.0	0.33	0.88	994.170	308	91	89	0.57	2.67	103.0
5-02	10.0	0.36	0.97	996.980	309	93	89	0.60	2.81	103.5
5-03	15.0	0.38	1.00	999.850	308	95	89	0.62	2.87	102.6
5-04	20.0	0.37	0.99	1002.710	309	98	89	0.61	2.86	103.4
5-05	25.0	0.35	0.94	1005.485	309	98	90	0.59	2.77	103.1
LEAK CHECK	25.0			1005.525						
4-01	30.0	0.41	1.10	1008.480	308	97	90	0.64	2.96	101.5
4-02	35.0	0.45	1.20	1011.690	311	98	90	0.67	3.21	105.4
4-03	40.0	0.44	1.20	1014.910	310	100	91	0.66	3.22	106.5
4-04	45.0	0.50	1.30	1018.270	310	100	91	0.71	3.36	104.3
4-05	50.0	0.47	1.20	1021.425	310	101	91	0.69	3.15	100.9
LEAK CHECK	50.0			1021.520						
3-01	55.0	0.46	1.20	1024.720	310	99	93	0.68	3.20	103.4
3-02	60.0	0.40	1.00	1027.610	309	100	93	0.63	2.89	100.0
3-03	65.0	0.40	1.00	1030.480	310	99	92	0.63	2.87	99.5
3-04	70.0	0.45	1.20	1033.710	309	100	92	0.67	3.23	105.5
3-05	75.0	0.50	1.30	1037.045	310	101	92	0.71	3.34	103.3
LEAK CHECK	75.0			1037.095						
2-01	80.0	0.49	1.30	1040.440	308	99	93	0.70	3.35	104.7
2-02	85.0	0.43	1.10	1043.420	309	101	93	0.66	2.98	99.4
2-03	90.0	0.48	1.20	1046.600	309	101	93	0.69	3.18	100.4
2-04	95.0	0.45	1.20	1049.760	308	102	94	0.67	3.16	102.8
2-05	100.0	0.55	1.40	1053.250	308	102	94	0.74	3.49	102.7
LEAK CHECK	100.0			1053.300						
1-01	105.0	0.30	0.77	1055.790	307	99	95	0.55	2.49	99.2
1-02	110.0	0.35	0.90	1058.520	307	100	95	0.59	2.73	100.6
1-03	115.0	0.47	1.20	1061.740	308	102	95	0.69	3.22	102.4
1-04	120.0	0.56	1.40	1065.210	308	103	95	0.75	3.47	101.0
1-05	125.0	0.56	1.40	1068.670	308	103	95	0.75	3.46	100.7
Final	125.0		1.13400	76.94000	308.80000	95.70000		0.65846	76.94000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6585	1.1340	76.9400	308.8000	95.7000				
		☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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Field Data Printout

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

Location: Unit 2 FF Outlet
Test Run: 3
Client: Wheelabrator North Broward, Inc.
Project No: 10955
Source Area (ft²): 64.00000
Meter Operator: P. Bihun 505
Probe Operator: P. Bihun 505
Test Date: 5/25/10
Start Time: 12:50
Stop Time: 15:00
Leak Rate Before: 0.003 cfm @ 12 "Hg
Leak Rate After: 0.002 cfm @ 10 "Hg

Bar. Press. (in. Hg): 29.88
Static P: -10.1
O_2 (dry volume %): 9.00
CO_2 (dry volume %): 9.77
N_2+CO (dry volume %): 81.23
H_2O (condensate, ml or gm): 478.4
H_2O (silica, g): 16.2
Actual Moisture (%): 23.92

Nozzle ID No: 273-1
Nozzle Diameter (D_n): 0.273
Probe ID No: 67-8-18
Pitot C_p: 0.8200
Pitot Leak Check: ☑Pass ☐Fail
Meter Box ID. No: 61-5
Meter ΔH@: 1.76776
Meter Y_d: 0.99360

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			68.995						
5-01	5.0	0.38	0.98	71.920	308	94	94	0.62	2.93	104.7
5-02	10.0	0.35	0.90	74.630	310	97	94	0.59	2.71	100.9
5-03	15.0	0.46	1.20	77.870	309	97	93	0.68	3.24	105.3
5-04	20.0	0.47	1.20	81.060	309	100	94	0.69	3.19	102.2
5-05	25.0	0.40	1.00	84.000	309	102	94	0.63	2.94	101.9
LEAK CHECK	25.0			84.040						
4-01	30.0	0.58	1.50	87.580	310	102	95	0.76	3.54	102.0
4-02	35.0	0.48	1.20	90.880	309	103	95	0.69	3.30	104.3
4-03	40.0	0.48	1.20	94.050	310	104	96	0.69	3.17	100.1
4-04	45.0	0.45	1.20	97.250	310	105	96	0.67	3.20	104.2
4-05	50.0	0.43	1.10	100.255	309	105	97	0.66	3.01	100.0
LEAK CHECK	50.0			100.295						
3-01	55.0	0.43	1.10	103.290	309	103	97	0.66	3.00	99.8
3-02	60.0	0.43	1.10	106.260	308	104	98	0.66	2.97	98.7
3-03	65.0	0.40	1.00	109.140	308	103	98	0.63	2.88	99.3
3-04	70.0	0.45	1.20	112.400	308	103	98	0.67	3.26	106.0
3-05	75.0	0.45	1.20	115.650	308	105	98	0.67	3.25	105.5
LEAK CHECK	75.0			115.695						
2-01	80.0	0.52	1.30	119.020	309	103	97	0.72	3.33	100.8
2-02	85.0	0.50	1.30	122.340	309	104	97	0.71	3.32	102.5
2-03	90.0	0.50	1.30	125.640	309	105	98	0.71	3.30	101.8
2-04	95.0	0.54	1.40	129.130	308	106	98	0.73	3.49	103.4
2-05	100.0	0.54	1.40	132.625	309	107	98	0.73	3.50	103.5
LEAK CHECK	100.0			132.670						
1-01	105.0	0.40	1.00	135.510	307	105	98	0.63	2.84	97.7
1-02	110.0	0.35	0.90	138.230	307	105	99	0.59	2.72	99.9
1-03	115.0	0.48	1.20	141.490	308	106	99	0.69	3.26	102.3
1-04	120.0	0.51	1.30	144.840	310	109	101	0.71	3.35	101.7
1-05	125.0	0.51	1.30	148.140	309	109	101	0.71	3.30	100.1
Final	125.0		1.17920	78.97500	308.76000	100.18000		0.67655	78.97500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6766	1.1792	78.9750	308.7600	100.1800				
		☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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Date _____

USEPA Method 3 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 FF Outlet
Client: Wheelabrator North Broward, Inc.
Project No: 10955
Method: EPA Method 3
Fuel Type: Municipal Waste
F_o for Fuel: 1.03 to 1.3

Analyst: B. Wiltse
Analyst Emp No: 561

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
1	1	9.5	18.6	9.1	81.4	29.88		
	2	9.6	18.5	8.9	81.5	29.89		
	3	9.6	18.6	9.1	81.3	29.90		
	Avg.	9.56667		9.03333	81.40000	29.89	1.24042	***All measurements in spec.***
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
2	1	9.8	18.8	9.0	81.2	29.93		
	2	9.8	18.8	9.0	81.2	29.93		
	3	9.8	18.8	9.0	81.2	29.93		
	Avg.	9.80000		9.00000	81.20000	29.93	1.21429	***All measurements in spec.***
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
3	1	9.8	18.8	9.0	81.2	29.93		
	2	9.7	18.7	9.0	81.3	29.91		
	3	9.8	18.8	9.0	81.2	29.93		
	Avg.	9.76667		9.00000	81.23333	29.92	1.21843	***All measurements in spec.***
CEM or Other Avg:								☑ Fo value within expected range.

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

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USEPA Method 4 Laboratory Data

Location: Unit 2 FF Outlet
Client: Wheelabrator North Broward, Inc.
Project No: 10955

Test Method: USEPA Method 29
Analyte: Mercury
Analyst: B. Wiltse
Analyst Emp No: 561

Test Run: 1

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	762.5	445.9	316.6
Impinger 2	5%HNO3/10%H2O2	652.3	529.2	123.1
Impinger 3	5%HNO3/10%H2O2	607.1	563.1	44.0
Impinger 4	Empty	447.5	435.6	11.9
Impinger 5	4%KMnO4/10%H2SO4	530.5	527.7	2.8
Impinger 6	4%KMnO4/10%H2SO4	538.0	537.7	0.3
Impinger 7	Silica Gel	754.4	734.8	19.6
Impinger 8				

Rinse: (ml or gm)

498.7	Liquid (gm)	*Field Data Check*	
0.0	less rinse (gm)		
498.7	Net Liquid (gm)	498.7	☑QA/QC OK
+ 19.6	Silica Gel (gm)	19.6	☑QA/QC OK
518.3	Total Vlc (gm)	518.3	☑QA/QC OK

Test Run: 2

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	752.4	437.4	315.0
Impinger 2	5%HNO3/10%H2O2	671.8	552.4	119.4
Impinger 3	5%HNO3/10%H2O2	550.4	530.6	19.8
Impinger 4	Empty	440.6	437.8	2.8
Impinger 5	4%KMnO4/10%H2SO4	534.7	533.1	1.6
Impinger 6	4%KMnO4/10%H2SO4	542.3	542.3	0.0
Impinger 7	Silica Gel	765.3	750.2	15.1
Impinger 8				

Rinse: (ml or gm)

458.6	Liquid (gm)	*Field Data Check*	
0.0	less rinse (gm)		
458.6	Net Liquid (gm)	458.6	☑QA/QC OK
+ 15.1	Silica Gel (gm)	15.1	☑QA/QC OK
473.7	Total Vlc (gm)	473.7	☑QA/QC OK

Test Run: 3

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	822.1	448.3	373.8
Impinger 2	5%HNO3/10%H2O2	624.0	534.5	89.5
Impinger 3	5%HNO3/10%H2O2	571.4	559.9	11.5
Impinger 4	Empty	442.2	440.4	1.8
Impinger 5	4%KMnO4/10%H2SO4	528.7	526.8	1.9
Impinger 6	4%KMnO4/10%H2SO4	543.5	543.6	-0.1
Impinger 7	Silica Gel	718.9	702.7	16.2
Impinger 8				

Rinse: (ml or gm)

478.4	Liquid (gm)	*Field Data Check*	
0.0	less rinse (gm)		
478.4	Net Liquid (gm)	478.4	☑QA/QC OK
+ 16.2	Silica Gel (gm)	16.2	☑QA/QC OK
494.6	Total Vlc (gm)	494.6	☑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)

	Liquid (gm)	*Field Data Check*	
	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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LABORATORY DATA

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10955
Unit 2 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)	<0.2000		
m_{3a-B}	Fraction 3A Blank (µg)	<0.2000		
m_{3b-B}	Fraction 3B Blank (µg)	<0.5000		
m_{3c-B}	Fraction 3C Blank (µg)	<0.4000		
$m_{total-B}$	Total Blank Amount (µg)	<1.4000		
Run No.		**1**	**2**	**3**
Date (2010)		May 25	May 25	May 25
Start Time (approx.)		07:39	10:18	12:50
Stop Time (approx.)		09:50	12:29	15:00
Sample Analysis				
m_{1b-S}	Fraction 1B Sample (µg)	0.1204	<0.1000	<0.1000
m_{2b-S}	Fraction 2B Sample (µg)	42.0524	20.5021	19.5846
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)	0.8843	<0.4000	<0.4000
$m_{total-S}$	Total Sample Amount (µg)	43.0571	20.5021	19.5846
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)	43.0571	20.5021	19.5846
Sample Corrected for Blank				
m_{n-1b}	Fraction 1B (µg)	0.1204	<0.1000	<0.1000
m_{n-2b}	Fraction 2B (µg)	42.0524	20.5021	19.5846
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)	0.8843	<0.4000	<0.4000

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Date _____

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Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 10955

Mercury

EPA Method 29 Analysis

Analytical Report
14553

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

The following data for Analytical Report 14553
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

Ana White
June 8, 2010

Report Reviewed and Finalized By:

Ken Smith, Laboratory Director
June 8, 2010

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
U2 FF Outlet R1	#1	43.1	0.122	42.2	< 0.2	< 0.5	0.889
	#2		0.118	41.9	< 0.2	< 0.5	0.880
U2 FF Outlet R2	#1	20.5	< 0.1	20.5	< 0.2	< 0.5	< 0.4
	#2		< 0.1	20.5	< 0.2	< 0.5	< 0.4
U2 FF Outlet R3	#1	19.6	< 0.1	19.5	< 0.2	< 0.5	< 0.4
	#2		< 0.1	19.6	< 0.2	< 0.5	< 0.4
Field Blank	#1	< 0.5	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
Reagent Blank	#1	< 0.5	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.2	< 0.2	< 0.5	< 0.4

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ANALYTICAL NARRATIVE

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Element One Analytical Narrative

Client:	Clean Air, IL	Element One #:	14553
Client ID:	Wheelabrator North Broward	Analyst:	ESS
Method:	Method 29	Dates Received:	05/26/2010
Analytes:	Hg	Dates Analyzed:	06/02-04/2010

Summary of Analysis
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), spike sample recovery, and second source calibration verification 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 or spike recovery values.

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QUALITY CONTROL SUMMARY

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Summary of Quality Control Data

Mercury Duplicate Analysis RPD

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

Run Number	Front half	H_2O_2/HNO_3	Empty Imp	$KMnO_4$	HCl
U2 FF Outlet R1	3.4%	0.6%	NA	NA	1.1%
U2 FF Outlet R2	NA	0.1%	NA	NA	NA
U2 FF Outlet R3	NA	0.6%	NA	NA	NA
Field Blank	NA	NA	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA

Mercury Spike Recoveries

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

Run Number		Front half	H2O2/HNO4	Empty Imp	KMnO4	HCl
U2 FF Outlet R3	#1	98%	102%	82%	92%	115%
	#2	108%	105%	83%	91%	113%

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SAMPLE CUSTODY

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CHAIN OF CUSTODY FORM

14553 20136:4

CLIENT Wheelabrator | PROJECT NO. 10955 | PAGE 1 OF 3
PLANT North Broward | DEPT. 66 | REVISION NO. 1
PROJECT MANAGER Scott Brown | RECOVERY PERSON:
JOB LEADER Carl Slimp | Carl Slimp

CAE LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	*5 Metals Hg	ANALYSIS REQUESTED	ADDITIONAL INFORMATION
	—	Lab	5-25-10	5% HNO_3/10% H_2O_2 Reagent Blank	1	200	✓		* Method 29
	1	Unit 2 FF Outlet	"	Imp 1-3 catch & Rinse	1	770	✓		
	2	"	"	"	1	744	✓		
	3	"	"	"	1	774	✓		
	Field Blank	"	"	"	1	300	✓		
	Reagent Blank	Lab	5-25-10	DI H_2O Blank	1	100	✓		

Relinquished by:(Signature)	Date/Time	Received by:(Signature)	Date/Time	Relinquished by:(Signature)	Date/Time
Carl Slimp	5/25/10				
Courier:	Date/Time	Relinquished by:(Signature)	Date/Time	Rec'd for Analysis by:	Date/Time
				Lisa Bruton	5/26/10 0945

Special Handling Instructions: Attn: Ken Smith
Forwarding Lab: Element One, 5022-C Wrightsville Ave, Wilmington, NC 28405
PO Number:

This form was completed by: Carl Slimp
Signature: Carl Slimp Date: 5/25/10

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

DS COC Palatine EXCL_R0-6/7/06

Samples received in good condition in Fisherbrand containers. No empty container received

CHAIN OF CUSTODY FORM

14553 201485

CLIENT Wheelabrator
PLANT North Broward
PROJECT MANAGER Scott Brown
JOB LEADER Carl Slimp

PROJECT NO. 10955
DEPT. 66
RECOVERY PERSON: Carl Slimp

PAGE 2 OF 3
REVISION NO. 1

CAE LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	Metals *	ANALYSIS REQUESTED			ADDITIONAL INFORMATION
	—	Lab	5/25/10	Reagent Blank 4% KMnO4/10% H2SO4	1	100	✓				* Hg Method 29
	1	Unit 2 FF Outlet	5/25/10	Imp 5&6 catch/rinse	1	432	✓				
	2	"	5/25/10	"	1	407	✓				
	3	"	5/25/10	"	1	446	✓				
	Field Blank	"	5/25/10	"	1	400	✓				
				0.1 N Nitric acid Reagent Blank							
	—	Lab	5/25/10	~~Imp 4 Catch + Rinse~~	1	300	✓				
	1	~~Lab~~ Unit 2 FF Outlet	5/25/10	Imp 4 Catch + Rinse	1	106	✓				
	2	Unit 2 FF Outlet	"	"	1	100	✓				
	3	"	"	"	1	105	✓				
	FB 4	"	"	"	1	100	✓				
	+CS										
	2CS										
	3CS										

Relinquished by:(Signature)	Date/Time	Received by:(Signature)	Date/Time	Relinquished by:(Signature)	Date/Time
Carl Slimp	5/25/10				
Courier:	**Date/Time**	**Relinquished by:(Signature)**	**Date/Time**	**Req'd for Analysis by:**	**Date/Time**
				Lisa Bruton	5/26/10 0945

Special Handling Instructions
Attn: Ken Smith
Forwarding Lab: Element One
5022-C Wrightsville Ave
Wilmington, NC 28405
PO Number: 10955

This form was completed by:
Carl Slimp
Signature: Carl Slimp
Date: 5-25-10

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

DS COC Palatine
EXCL_R0-6/7/06

CHAIN OF CUSTODY FORM

14553 201388

CLIENT: Wheelabrator | PROJECT NO.: 10955 | PAGE 3 OF 3
PLANT: North Broward | DEPT.: 66 | REVISION NO.: 1
PROJECT MANAGER: Scott Brown | RECOVERY PERSON: Carl Slimp
JOB LEADER: Carl Slimp

CAE LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	Hg	ANALYSIS REQUESTED			ADDITIONAL INFORMATION
	Reagent Blank	Lab	5-25-10	Imp Sds 8NHCl Rinse	1	225	✓				Method 29
	1	Unit 2 FF Outlet	"	"	1	225	✓				
	2	"	"	"	1	225	✓				
	3	"	"	"	1	225	✓				
	Field Blank	"	"	"	1	225	✓				
	Reagent Blank	Lab	"	3 Quartz Filters	1	—	✓				
	1	Unit 2 FF Outlet	"	1 Quartz Filter	1	—	✓				
	2	"	"	"	1	—	✓				
	3	"	"	"	1	—	✓				
	Field Blank	"	"	"	1	—	✓				
	~~Reagent Blank~~	~~Lab~~	~~"~~	~~0.1 N~~							
	1	Unit 2 FF Outlet	"	F/B Rinse 0.1 Nitric	1	100	✓				
	2	"	"	"	1	100	✓				
	3	"	"	"	1	100	✓				
	Field Blank	"	"	"	1	100	✓				

Relinquished by:(Signature)	Date/Time	Received by:(Signature)	Date/Time	Relinquished by:(Signature)	Date/Time
Carl Slimp	5-25-10				
Courier:	**Date/Time**	**Relinquished by:(Signature)**	**Date/Time**	**Rec'd for Analysis by:**	**Date/Time**
				Lea Bratton	5/26/10 0945

Special Handling Instructions: Attn: Ken Smith
Forwarding Lab: Element One, 5022-C Wrightsville Ave, Wilmington, NC 28405
PO Number: 10955

This form was completed by:
Signature Date

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

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

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ANALYTICAL DATA

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Analytical Calculations

Mercury-

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

Where-

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

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

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

Analytical Calculations

Spike Recovery-

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

Where-

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

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

Spike Amount--*ICP-MS Spike Table*

Duplicate Analysis RPD-

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

Where-

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

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

elementOne **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID 14553**

Analysis Due Date 06.03.10
QA/QC/Report Due Date 06.07.10

Client	Clean Air IL
Project No	10955

Date Rec	05.26.10
Time Rec	0945

HNO_3 Lot 084234	HF Lot: 51089702	HCl Lot: 4109030	**Ref. Method: 29**
Volume Marked Y/N	Volume Loss Y/N?		

Sample Identification

1	U2 FF Outlet R1	4	Field Blank		
2	U2 FF Outlet R2	5	Reagent Blank		
	U2 FF Outlet R2 Duplicate				
3	U2 FF Outlet R3				
	U2 FF Outlet R3 Spike				

Analyses Requested Samples 1-5 Hg

Runs / FB	Fil / Ace (FH) pH <2.0 Y / N		HNO_3 (FH) pH <2.0 Y/N		5% HNO_3/10% H_2O_2 (BH) pH <2.0 Y/N			HNO_3 (A) pH <2.0 Y/N		$KMnO_4$ (B) pH <2.0 Y/N		HCl (C) pH <2.0 Y/N	
Lab ID	Fil ID	BV ml	BV ml	FV ml	BV ml	Used	FV ml	BV ml	FV ml	BV ml	FV ml	BV ml	FV ml
1			105	100	770			110	200	370	500	210	400
2.D			108		750			108		380		200	
3.S			100		770			110		380		230	
4			110		290			110		380		240	

M-29 Reagent Blank

Lab ID	Fraction			BV, ml	FV, ml	Comments
5	C-7	FH	Acetone Blank			
	C-8A	FH	0.1N HNO_3	810		used 100 mls
	C-8A	A	0.1N HNO_3			
	C-8B	B	DI H_2O	110		used 33 mls
	C-9	BH	5% HNO_3/10% H_2O_2	200	—	
	C-10	B	4% $KMnO_4$/10%H_2SO_4	100		
	C-11	C	8N HCl DI H_2O	225	400	
	C-12	FH	Filter			

Lab Communications

SS Page1 of 1
5/27/2010 8:38:06 AM
SS by AKB
Labeled By/Date 5-27-10 ESS

FH Prep By/Date 6-2-10 ESS
BH Prep By/Date 6-1-10 ESS
BH/FH Prep By/Date ———
PM Prep By / Date ———

A Prep By/Date 6-1-10 ESS
B Prep By/Date 6-1-10 ESS
C Prep By/Date 6-3-10 ESS
ID Verification By/Date 5 28-10

14553-CAE 3

elementOne **Method 29 Microwave Worksheet** **Lab ID # e**

Client:

Date Digested: ~~6/01/10~~ 6/01/10 Initials: DV Worksheet Prepared by: DV

Auto Sample Loc.	Sample Lab ID	Sample Weight (g)	# of filters digested	Spike	Prep Volume (ml)	Weight In Micro / Weight Out Micro	Units
1	LRB 14553				100		
2	14553-1		1				
3	-2		1				
4	-3		1				
5	-4		1				
6	-5		1				
7	LRB 14567						
8	14567-1		1				
9	-2		1				
10	-3		1				
11	-4		1				
12	LRB 14572						
13	14572-1		1				
14	-2		1				
15	-3		1				
16	-4		1				
HNO_3	lot # 1109090	6 ml					
HF	lot # 5108120	2 ml					

Element One, Inc. Form 104 - Revision 1.0

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
Calib Blank	6/2/2010	11:16:44	0.0002273			µg			0.0002273					
STD1=.004ug	6/2/2010	11:17:59	0.0013241			µg			0.0013241					
STD2=.04ug	6/2/2010	11:19:14	0.0123811			µg			0.0123811					
STD3=.08ug	6/2/2010	11:20:30	0.0255055			µg			0.0255055					
STD4=.16ug	6/2/2010	11:21:49	0.0486654			µg			0.0486654					
STD5=.2ug	6/2/2010	11:23:09	0.062729			µg			0.062729					
Reagent Blank	6/2/2010	11:24:56	0.0001649	0.0005306	0.0005306	µg			0.0001905	0.0006129	0.0006129	0.0001393	0.0004483	0.0004483
0.004ug = DL	6/2/2010	11:26:10	0.0013334	0.0042904	0.0042904	µg			0.0013334	0.0042904	0.0042904			
0.080ug = STD.2	6/2/2010	11:28:02	0.0266223	0.0856594	0.0856594	µg			0.0266223	0.0856594	0.0856594			
0.080ug = QC STD 3	6/2/2010	11:29:23	0.0253129	0.0814463	0.0814463	µg			0.0253129	0.0814463	0.0814463			
REAGENT BLANK	6/2/2010	11:30:40	0.0001304	0.0004197	0.0004197	µg			0.0001304	0.0004197	0.0004197			
0.004ug = DL	6/2/2010	12:38:38	0.0013526	0.0043519	0.0043519	µg	4	245	0.0013526	0.0043519	0.0043519			
0.080ug = STD.2	6/2/2010	12:39:54	0.0270315	0.086976	0.086976	µg	4	245	0.0270315	0.086976	0.086976			
REAGENT BLANK	6/2/2010	12:41:12	5.882E-05	0.0001893	0.0001893	µg	4	245	5.882E-05	0.0001893	0.0001893			
14553-2bh	6/2/2010	12:46:35	0.0358997	0.1155104	21.658191	µg	4	750	0.0365548	0.1176182	22.05341	0.0352446	0.1134025	21.262972
14553-2bh dup	6/2/2010	12:48:24	0.0339833	0.1093443	20.502058	µg	4	750	0.0340003	0.1093988	20.512277	0.0339664	0.1092898	20.49184
14553-3bh	6/2/2010	12:50:14	0.0316195	0.1017384	19.584649	µg	4	770	0.0315321	0.1014573	19.530533	0.0317069	0.1020196	19.638766
14553-3bh spk	6/2/2010	12:52:04	0.0573502	0.1845291	35.521845	µg	4	770	0.0570457	0.1835494	35.333259	0.0576547	0.1855087	35.710431
14553-4bh	6/2/2010	12:53:54	3.554E-05	0.0001144	0.0082912	µg	4	290	4.609E-05	0.0001483	0.0107525	2.499E-05	8.041E-05	0.0058299
14553-5bh	6/2/2010	12:55:45	0.0006076	0.0019551	0.0977538	µg	4	200	0.0006119	0.0019687	0.0984366	0.0006034	0.0019414	0.097071
0.004ug = DL	6/2/2010	13:00:36	0.001335	0.0042955	0.0042955	µg	4	540	0.001335	0.0042955	0.0042955			
0.080ug = STD.2	6/2/2010	13:01:53	0.0269307	0.0866518	0.0866518	µg	4	540	0.0269307	0.0866518	0.0866518			
REAGENT BLANK	6/2/2010	13:03:10	7.098E-05	0.0002284	0.0002284	µg	4	540	7.098E-05	0.0002284	0.0002284			
Calib Blank	6/2/2010	13:49:54	0.000316			µg	4	460	0.000316					
STD1=.004ug	6/2/2010	13:51:09	0.0013175			µg	4	460	0.0013175					
STD2=.04ug	6/2/2010	13:52:25	0.0129762			µg	4	460	0.0129762					
STD3=.08ug	6/2/2010	13:53:42	0.0256179			µg	4	460	0.0256179					
STD4=.16ug	6/2/2010	13:55:00	0.0469022			µg	4	460	0.0469022					
STD5=.2ug	6/2/2010	13:56:18	0.0598384			µg	4	460	0.0598384					
Reagent Blank	6/2/2010	13:58:07	4.445E-05	0.0001483	0.0001483	µg	4	460	5.793E-05	0.0001933	0.0001933	3.097E-05	0.0001034	0.0001034
0.004ug = DL	6/2/2010	13:59:21	0.001301	0.004341	0.004341	µg	4	460	0.001301	0.004341	0.004341			
0.080ug = STD.2	6/2/2010	14:00:38	0.0251842	0.0840349	0.0840349	µg	4	460	0.0251842	0.0840349	0.0840349			
REAGENT BLANK	6/2/2010	14:01:55	-0.000003	-0.0000101	-0.0000101	µg	4	460	-0.000003	-0.0000101	-0.0000101			
0.080ug = QC STD 3	6/2/2010	14:03:12	0.0254909	0.0850583	0.0850583	µg	4	460	0.0254909	0.0850583	0.0850583			
REAGENT BLANK	6/2/2010	14:04:29	-0.0000358	-0.0001196	-0.0001196	µg	4	460	-0.0000358	-0.0001196	-0.0001196			
0.004ug = DL	6/2/2010	14:46:20	0.0011737	0.0039163	0.0039163	µg	4	200	0.0011737	0.0039163	0.0039163			
0.080ug = STD.2	6/2/2010	14:47:37	0.0252917	0.0843937	0.0843937	µg	4	200	0.0252917	0.0843937	0.0843937			
REAGENT BLANK	6/2/2010	14:48:54	3.312E-05	0.0001105	0.0001105	µg	4	200	3.312E-05	0.0001105	0.0001105			
14553-1a	6/2/2010	15:06:54	0.0005986	0.0019974	0.0998712	µg	4	200	0.0005869	0.0019582	0.0979108	0.0006104	0.0020366	0.1018315
0.004ug = DL	6/2/2010	15:08:07	0.0011923	0.0039785	0.0039785	µg	4	200	0.0011923	0.0039785	0.0039785			
0.080ug = STD.2	6/2/2010	15:09:24	0.0238709	0.0796527	0.0796527	µg	4	200	0.0238709	0.0796527	0.0796527			
REAGENT BLANK	6/2/2010	15:10:41	-0.0000307	-0.0001024	-0.0001024	µg	4	200	-0.0000307	-0.0001024	-0.0001024			
14553-2a	6/2/2010	15:12:26	0.0001168	0.0003897	0.0194836	µg	4	200	0.0001068	0.0003565	0.0178243	0.0001267	0.0004229	0.0211428
14553-2a dup	6/2/2010	15:14:10	8.403E-05	0.0002804	0.0140196	µg	4	200	7.501E-05	0.0002503	0.0125162	9.304E-05	0.0003105	0.0155231
14553-3a	6/2/2010	15:15:55	0.0001782	0.0005945	0.0297255	µg	4	200	0.0001487	0.0004963	0.0248141	0.0002076	0.0006927	0.034637
14553-3a spk	6/2/2010	15:17:41	0.0197168	0.0657913	3.2895648	µg	4	200	0.0195507	0.0652369	3.2618446	0.019883	0.0663457	3.317285
14553-4a	6/2/2010	15:19:27	-0.0000558	-0.0001864	-0.0093248	µg	4	200	-0.0000393	-0.0001313	-0.0065663	-0.0000724	-0.0002416	-0.0120834
14553-5a	6/2/2010	15:21:13	-0.0000511	-0.0001705	-0.0085262	µg	4	200	-0.0000564	-0.0001883	-0.0094153	-0.0000457	-0.0001527	-0.0076371
0.004ug = DL	6/2/2010	15:29:38	0.0011039	0.0036836	0.0036836	µg	4	100	0.0011039	0.0036836	0.0036836			
0.080ug = STD.2	6/2/2010	15:30:55	0.0229953	0.076731	0.076731	µg	4	100	0.0229953	0.076731	0.076731			
REAGENT BLANK	6/2/2010	15:32:12	-0.0000291	-0.0000972	-0.0000972	µg	4	100	-0.0000291	-0.0000972	-0.0000972			
Calib Blank	6/2/2010	12:04:00	0.0003244			µg			0.0003244					
STD1=.004ug	6/2/2010	12:05:15	0.0010493			µg			0.0010493					
STD2=.04ug	6/2/2010	12:06:30	0.0114752			µg			0.0114752					
STD3=.08ug	6/2/2010	12:07:46	0.019871			µg			0.019871					
STD4=.16ug	6/2/2010	12:09:02	0.0451999			µg			0.0451999					
STD5=.2ug	6/2/2010	12:10:20	0.0538749			µg			0.0538749					
Reagent Blank	6/2/2010	12:12:05	4.13E-06	1.514E-05	1.514E-05	µg			-0.0000225	-0.0000826	-0.0000826	0.0000308	0.0001129	0.0001129
0.004ug = DL	6/2/2010	12:13:18	0.0010512	0.0038527	0.0038527	µg			0.0010512	0.0038527	0.0038527			
0.080ug = STD.2	6/2/2010	12:14:35	0.0215097	0.0788356	0.0788356	µg			0.0215097	0.0788356	0.0788356			
0.080ug = QC STD 3	6/2/2010	12:15:53	0.0214302	0.0785444	0.0785444	µg			0.0214302	0.0785444	0.0785444			
REAGENT BLANK	6/2/2010	12:17:10	-0.0000082	-0.0000301	-0.0000301	µg			-0.0000082	-0.0000301	-0.0000301			
0.004ug = DL	6/2/2010	14:23:45	0.0011029	0.0040424	0.0040424	µg	4	700	0.0011029	0.0040424	0.0040424			
0.080ug = STD.2	6/2/2010	14:25:02	0.0215955	0.07915	0.07915	µg	4	700	0.0215955	0.07915	0.07915			
REAGENT BLANK	6/2/2010	14:26:18	-0.0000341	-0.0001251	-0.0001251	µg	4	700	-0.0000341	-0.0001251	-0.0001251			
14553-1b	6/2/2010	14:44:00	0.0007574	0.0027761	0.3470089	µg	4	500	0.0007574	0.0027761	0.3470143	0.0007574	0.002776	0.3470034
0.004ug = DL	6/2/2010	14:45:12	0.0011372	0.0041679	0.0041679	µg	4	500	0.0011372	0.0041679	0.0041679			
0.080ug = STD.2	6/2/2010	14:46:28	0.022485	0.0824103	0.0824103	µg	4	500	0.022485	0.0824103	0.0824103			
REAGENT BLANK	6/2/2010	14:47:44	-0.0000325	-0.0001191	-0.0001191	µg	4	500	-0.0000325	-0.0001191	-0.0001191			
14553-2b	6/2/2010	14:49:27	0.0001569	0.000575	0.0718713	µg	4	500	0.0001505	0.0005515	0.0689422	0.0001633	0.0005984	0.0748004
14553-2b dup	6/2/2010	14:51:09	-0.0000292	-0.0001071	-0.0133894	µg	4	500	-0.0000393	-0.0001443	-0.0180379	-0.000019	-0.0000699	-0.008741
14553-3b	6/2/2010	14:52:51	-0.0000563	-0.0002065	-0.025816	µg	4	500	-0.0000444	-0.0001628	-0.0203532	-0.0000682	-0.0002502	-0.0312788
14553-3b spk	6/2/2010	14:54:33	0.019929	0.0730421	9.1302571	µg	4	500	0.0200039	0.0733169	9.1646105	0.019854	0.0727672	9.0959037
14553-4b	6/2/2010	14:56:17	-0.0000103	-0.000038	-0.004757	µg	4	500	1.083E-05	3.971E-05	0.0049642	-0.0000316	-0.0001158	-0.0144783
14553-5b	6/2/2010	14:58:01	-0.000101	-0.0003701	-0.046273	µg	4	500	-0.0000725	-0.0002659	-0.0332385	-0.0001294	-0.0004744	-0.0593075
0.004ug = DL	6/2/2010	15:09:06	0.0011778	0.0043167	0.0043167	µg	4	500	0.0011778	0.0043167	0.0043167			
0.080ug = STD.2	6/2/2010	15:10:22	0.0225533	0.0826607	0.0826607	µg	4	500	0.0225533	0.0826607	0.0826607			
REAGENT BLANK	6/2/2010	15:11:39	-0.0000099	-0.0000364	-0.0000364	µg	4	500	-0.0000099	-0.0000364	-0.0000364			

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
Calib Blank	6/3/2010	12:27:57	0.0003165			µg	40	1	0.0003165					
STD1=.004ug	6/3/2010	12:29:12	0.0010093			µg	40	1	0.0010093					
STD2=.04ug	6/3/2010	12:30:28	0.0106417			µg	40	1	0.0106417					
STD3=.08ug	6/3/2010	12:31:46	0.0258407			µg	40	1	0.0258407					
STD4=.16ug	6/3/2010	12:33:04	0.0476237			µg	40	1	0.0476237					
STD5=.2ug	6/3/2010	12:34:23	0.0567293			µg	40	1	0.0567293					
Reagent Blank	6/3/2010	12:36:11	6.156E-05	0.0002108	0.0002108	µg	40	1	0.0001238	0.0004238	0.0004238	-0.0000006	-0.0000021	-0.0000021
0.004ug = DL	6/3/2010	12:37:25	0.0011279	0.0038619	0.0038619	µg	40	1	0.0011279	0.0038619	0.0038619			
0.080ug = STD.2	6/3/2010	12:38:42	0.0240062	0.082198	0.082198	µg	40	1	0.0240062	0.082198	0.082198			
0.080ug = QC STD 3	6/3/2010	12:40:02	0.0246354	0.0843524	0.0843524	µg	40	1	0.0246354	0.0843524	0.0843524			
REAGENT BLANK	6/3/2010	12:41:19	0.000087	0.0002979	0.0002979	µg	40	1	0.000087	0.0002979	0.0002979			
0.004ug = DL	6/3/2010	13:45:23	0.0010489	0.0035915	0.0035915	µg	1	640	0.0010489	0.0035915	0.0035915			
0.080ug = STD.2	6/3/2010	13:46:40	0.0237285	0.0812469	0.0812469	µg	1	640	0.0237285	0.0812469	0.0812469			
REAGENT BLANK	6/3/2010	13:47:57	1.39E-06	4.78E-06	4.78E-06	µg	1	640	1.39E-06	4.78E-06	4.78E-06			
14553-1bh	6/3/2010	13:51:32	0.0127601	0.0436908	42.052412	µg	0.8	770	0.0127974	0.0438186	42.175395	0.0127227	0.043563	41.929428
0.004ug = DL	6/3/2010	14:08:48	0.0011625	0.0039805	0.0039805	µg	0.1	100	0.0011625	0.0039805	0.0039805			
0.080ug = STD.2	6/3/2010	14:10:05	0.0240042	0.082191	0.082191	µg	0.1	100	0.0240042	0.082191	0.082191			
REAGENT BLANK	6/3/2010	14:11:22	-0.0000021	-0.0000074	-0.0000074	µg	0.1	100	-0.0000021	-0.0000074	-0.0000074			
0.004ug = DL	6/3/2010	14:54:31	0.0012711	0.0043524	0.0043524	µg	0.1	100	0.0012711	0.0043524	0.0043524			
0.080ug = STD.2	6/3/2010	14:55:48	0.024692	0.084546	0.084546	µg	0.1	100	0.024692	0.084546	0.084546			
REAGENT BLANK	6/3/2010	14:57:05	2.048E-05	7.013E-05	7.013E-05	µg	0.1	100	2.048E-05	7.013E-05	7.013E-05			
14553-1fh	6/3/2010	15:00:39	0.0014066	0.0048162	0.1204042	µg	4	100	0.0014308	0.004899	0.1224741	0.0013824	0.0047334	0.1183343
14553-2fh	6/3/2010	15:02:27	0.001042	0.0035679	0.089197	µg	4	100	0.0010607	0.0036318	0.090794	0.0010234	0.003504	0.0876
14553-2fh dup	6/3/2010	15:04:15	0.0010216	0.0034979	0.0874483	µg	4	100	0.0010162	0.0034794	0.0869854	0.001027	0.0035164	0.0879111
14553-3fh	6/3/2010	15:06:03	0.0009289	0.0031806	0.0795155	µg	4	100	0.0009414	0.0032235	0.0805864	0.0009164	0.0031378	0.0784447
14553-3fh spk	6/3/2010	15:07:52	0.0241368	0.0826449	2.0661233	µg	4	100	0.022982	0.0786909	1.9672727	0.0252915	0.086599	2.1649738
14553-4fh	6/3/2010	15:09:41	-0.000135	-0.0004625	-0.0115641	µg	4	100	-0.0001193	-0.0004086	-0.010216	-0.0001508	-0.0005164	-0.0129121
14553-5fh	6/3/2010	15:11:31	-0.0000923	-0.0003162	-0.0079051	µg	4	100	-0.0000973	-0.0003331	-0.0083293	-0.0000873	-0.0002992	-0.0074808
0.004ug = DL	6/3/2010	15:17:35	0.0012434	0.0042574	0.0042574	µg	4	100	0.0012434	0.0042574	0.0042574			
0.080ug = STD.2	6/3/2010	15:18:52	0.0248084	0.0849447	0.0849447	µg	4	100	0.0248084	0.0849447	0.0849447			
REAGENT BLANK	6/3/2010	15:20:09	8.66E-06	2.967E-05	2.967E-05	µg	4	100	8.66E-06	2.967E-05	2.967E-05			
Calib Blank	6/4/2010	15:21:30	0.0002752			µg	4	400	0.0002752					
STD1=.004ug	6/4/2010	15:22:46	0.0011429			µg	4	400	0.0011429					
STD2=.04ug	6/4/2010	15:24:02	0.0129503			µg	4	400	0.0129503					
STD3=.08ug	6/4/2010	15:25:19	0.0250546			µg	4	400	0.0250546					
STD4=.16ug	6/4/2010	15:26:36	0.0488489			µg	4	400	0.0488489					
STD5=.2ug	6/4/2010	15:27:55	0.0551523			µg	4	400	0.0551523					
Reagent Blank	6/4/2010	15:29:44	0.0000635	0.000218	0.000218	µg	4	400	0.0000309	0.0001061	0.0001061	9.609E-05	0.00033	0.00033
0.004ug = DL	6/4/2010	15:30:57	0.0012291	0.0042201	0.0042201	µg	4	400	0.0012291	0.0042201	0.0042201			
0.080ug = STD.2	6/4/2010	15:32:14	0.02478	0.0850845	0.0850845	µg	4	400	0.02478	0.0850845	0.0850845			
0.080ug = QC STD 3	6/4/2010	15:36:19	0.0251713	0.0864282	0.0864282	µg	4	400	0.0251713	0.0864282	0.0864282			
REAGENT BLANK	6/4/2010	15:37:36	7.53E-06	2.587E-05	2.587E-05	µg	4	400	7.53E-06	2.587E-05	2.587E-05			
0.004ug = DL	6/4/2010	15:56:52	0.0012435	0.0042698	0.0042698	µg	4	400	0.0012435	0.0042698	0.0042698			
0.080ug = STD.2	6/4/2010	15:58:10	0.024999	0.0858364	0.0858364	µg	4	400	0.024999	0.0858364	0.0858364			
REAGENT BLANK	6/4/2010	15:59:27	1.989E-05	6.832E-05	6.832E-05	µg	4	400	1.989E-05	6.832E-05	6.832E-05			
14553-1c	6/4/2010	16:13:32	0.0025753	0.0088426	0.8842621	µg	4	400	0.0025888	0.0088891	0.8889055	0.0025618	0.0087962	0.8796187
14553-2c	6/4/2010	16:15:19	0.0003712	0.0012746	0.1274553	µg	4	400	0.0003733	0.0012818	0.1281819	0.0003691	0.0012673	0.1267288
14553-2c dup	6/4/2010	16:17:08	0.0004834	0.0016598	0.1659791	µg	4	400	0.0004747	0.0016301	0.1630086	0.000492	0.0016895	0.1689496
0.004ug = DL	6/4/2010	16:18:22	0.0012738	0.0043737	0.0043737	µg	4	400	0.0012738	0.0043737	0.0043737			
0.080ug = STD.2	6/4/2010	16:19:39	0.0242881	0.0833956	0.0833956	µg	4	400	0.0242881	0.0833956	0.0833956			
REAGENT BLANK	6/4/2010	16:20:57	3.279E-05	0.0001126	0.0001126	µg	4	400	3.279E-05	0.0001126	0.0001126			
14553-3c	6/4/2010	16:22:43	0.0004927	0.0016919	0.1691853	µg	4	400	0.0005317	0.0018257	0.1825665	0.0004538	0.001558	0.1558042
14553-3c spk	6/4/2010	16:24:33	0.0266467	0.0914941	9.149413	µg	4	400	0.0268816	0.0923006	9.230065	0.0264119	0.0906876	9.068761
14553-4c	6/4/2010	16:26:22	-0.0001329	-0.0004565	-0.0456574	µg	4	400	-0.0001588	-0.0005452	-0.0545283	-0.0001071	-0.0003678	-0.0367864
14553-5c	6/4/2010	16:28:09	2.089E-05	7.173E-05	0.0071734	µg	4	400	1.471E-05	5.052E-05	0.005053	2.706E-05	9.293E-05	0.0092938
0.004ug = DL	6/4/2010	16:29:21	0.0011815	0.0040567	0.0040567	µg	4	400	0.0011815	0.0040567	0.0040567			
0.080ug = QC STD 3	6/4/2010	16:31:58	0.0250831	0.0861251	0.0861251	µg	4	400	0.0250831	0.0861251	0.0861251			
REAGENT BLANK	6/4/2010	16:33:23	1.735E-05	0.0000596	0.0000596	µg	4	400	1.735E-05	0.0000596	0.0000596			

PLANT DATA

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

UNIT #2

Date	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (ton)
5/25/2010	Mercury	29	1	184.9	2.18	77.5
5/25/2010	Mercury	29	2	184.1	2.18	77.2
5/25/2010	Mercury	29	3	184.0	2.17	76.8

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 05/25/10
Start Time: 7:39:00
End Time: 9:50:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	SPECIFIC GRAVITY
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O	" H2O
Unit 1	537.26	319.45	46.99	38.30	8.69	12.27	304.31	6.66	-9.99	1.105
Unit 2 29 run 1	518.88	319.42	40.71	32.36	8.35	14.18	298.05	6.20	-10.14	1.105
Unit 3	438.89	319.68	33.09	28.71	4.38	17.44	308.11	6.25	-7.58	1.105

	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	AVAILABLE CaO
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr	
Unit 1	184.28	895.50	832.21	78.43	-0.10	273.82	1161.87	4.73	175.76	1.099
Unit 2	193.90	900.19	839.14	75.73	-0.10	271.61	1205.27	4.61	184.91	1.099
Unit 3	189.53	899.46	831.52	78.04	-0.09	280.16	1110.42	7.95	175.94	1.099

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 05/25/10
Start Time: 10:18:00
End Time: 12:29:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	SPECIFIC GRAVITY
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O	" H2O
Unit 1	524.94	319.76	40.54	32.43	8.10	13.95	302.55	6.53	-9.29	1.108
Unit 2 29 run 2	512.08	319.99	36.87	30.45	6.42	15.32	297.22	6.06	-9.73	1.108
Unit 3	433.59	319.79	30.54	25.04	5.50	18.69	308.15	6.15	-7.21	1.108

	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	AVAILABLE CaO
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr	
Unit 1	183.44	895.43	831.16	73.74	-0.09	274.39	1170.74	5.19	175.23	1.126
Unit 2	191.71	899.83	830.32	73.51	-0.09	272.15	1174.63	7.06	184.14	1.126
Unit 3	188.76	899.21	825.69	74.28	-0.09	280.71	1129.83	10.27	175.60	1.126

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Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 05/25/10
Start Time: 12:50:00
End Time: 15:00:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	SPECIFIC GRAVITY
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O	" H2O
Unit 1	531.87	320.47	43.76	34.11	9.65	13.00	302.80	6.64	-9.51	1.107
Unit 2 29 run 3	513.16	320.13	37.33	29.99	7.34	15.24	296.53	6.21	-9.88	1.107
Unit 3	436.07	319.84	29.94	25.19	4.75	19.01	308.40	6.23	-7.20	1.107

	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	AVAILABLE CaO
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr	
Unit 1	182.27	895.05	830.50	76.41	-0.10	274.13	1169.47	4.96	174.43	1.119
Unit 2	192.06	899.58	829.84	73.34	-0.09	271.92	1175.93	7.97	184.00	1.119
Unit 3	188.29	898.87	826.65	73.83	-0.09	280.48	1132.09	9.09	175.11	1.119