REPORT ON MERCURY TESTING

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

CLIENT REFERENCE NO: 14800198
CLEANAIR PROJECT NO: 10455-8
REVISION 0: OCTOBER 23, 2008

Wheelabrator North Broward Inc.
A Waste Management Company
2600 N.W. 48th Street
Pompano Beach, FL 33073

October 27, 2008

CERTIFIED MAIL #7005 1160 0002 3457 2191

Mr. Lee Hoefert
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
Third Quarter of 2008, Report Submittal

Dear Mr. Hoefert:

As required by F.A.C. 62-296.416, please find enclosed the 2008 third 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 #7005 1160 0002 3457 2207
FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, CERTIFIED MAIL #7005 1160 0002 3457 2214
Broward County Department of Planning and Environmental Protection, Air Quality Division CERTIFIED MAIL #7005 1160 0002 3457 2221
Chuck Faller (with)
Tim Porter (without)
Rob French – MPI - (with)
Ram Tewari – BCWRS (without)
File: 3.7.2 (without)
5.1.3.2 (without)

WM WASTE MANAGEMENT

CleanAir.

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800-627-0033
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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: 14800198
CleanAir Project No: 10455-8
Revision 0: October 23, 2008

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

Submitted by,

Scott Brown
Project Manager
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Reviewed by,

Scott Lehmann
Midwest Engineering Group Leader
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REVISION HISTORY

REPORT ON MERCURY TESTING

Revision History

DRAFT REPORT REVISION HISTORY

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

FINAL REPORT REVISION HISTORY

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

CONTENTS

PROJECT OVERVIEW

Wheelabrator North Broward, Inc. operates a Refuse to Energy facility, located in Pompano Beach, Florida. The facility's emission levels are regulated by the Florida Department of Environmental Protection. Wheelabrator North Broward, Inc. contracted Clean Air Engineering (CleanAir) to perform a compliance test program at their municipal waste combustor (MWC) facility in Pompano Beach, Florida. Testing was conducted in accordance with 40 CFR 60 Subpart Cb and applicable sections of PSD–FL-112(B) and PA86-22. The sampling was conducted at the Unit 2 Fabric Filter (FF) Outlet on September 16, 2008.

The testing included the determination of the following constituents:

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

Coordinating and observing the field portion of the program were:

C. Faller	- Wheelabrator North Broward, Inc.
B. Preksta	- CleanAir

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

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

Table 1-1:
Schedule of Activities

Run Number	Location	Method	Analyte	Date	Start Time	End Time
1	Unit 2 Outlet	USEPA Method 29	Mercury	09/16/08	08:04	10:23
2	Unit 2 Outlet	USEPA Method 29	Mercury	09/16/08	10:43	12:58
3	Unit 2 Outlet	USEPA Method 29	Mercury	09/16/08	13:18	15:35

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	8.8	70

[1] Limits obtained from 40 Code of Federal Register part 60 Subpart Cb - Emission Guidelines and Compliance Times for Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994 published in Federal Register as 62 FR 45123 on December 19, 1995 as modified on August 25, 1997, 40 CFR 60.33b (a) (3), Rule 62-296.416 (3) (b) and and PSD-FL-112.

The test conditions and results of analysis are presented in Table 2-1 on page 2-1, and the Quality Control and Quality Assurance Results are shown in Table 2-2 on page 2-2.

End of Section 1 -- Project Overview

RESULTS

Table 2-1:
Unit 2 FF Outlet – Mercury

Run No.		1	2	3	Average
Date (2008)		Sep 16	Sep 16	Sep 16	
Start Time (approx.)		08:04	10:43	13:18	
Stop Time (approx.)		10:23	12:58	15:35	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	180.5	180.0	180.1	**180.2**
P_1	SDA Outlet Temperature - (°F)	320	320	320	**320**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.8	8.8	8.8	**8.8**
CO_2	Carbon dioxide (dry volume %)	9.5	9.8	9.8	**9.7**
T_s	Sample temperature (°F)	308	308	307	**308**
B_w	Actual water vapor in gas (% by volume)	22.3	23.6	23.3	**23.1**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	167,605	169,358	169,093	**168,685**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,577	87,061	87,348	**87,329**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	66.07	66.31	66.76	**66.38**
%I	Isokinetic sampling (%)	100.9	101.9	102.2	**101.7**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	12.9156	14.3406	15.8261	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	12.9156	14.3406	15.8261	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	4.3E-10	4.8E-10	5.2E-10	**4.8E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	5.0E-10	5.5E-10	6.0E-10	**5.5E-10**
C_{sd}	Concentration (µg/dscm)	6.9	7.6	8.4	**7.6**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	7.9	8.8	9.6	**8.8**
$E_{lb/hr}$	Rate (lb/hr)	0.0023	0.0025	0.0027	**0.0025**

RESULTS

Table 2-2:
Quality Assurance and Quality Control

Run Number		FH Front Half	BH H_2O_2/HNO_4	A Empty Impinger	B $KMnO_4$	C HCl
			RPD RESULTS			
U2 FF O-N R1		NA	0.2%	NA	NA	NA
U2 FF O-N R2		NA	0.1%	NA	NA	NA
U2 FF O-N R3		NA	0.8%	NA	NA	NA
North Field Blank		NA	NA	NA	NA	
North Reagent Blank		NA	NA	NA	NA	NA
			Sample Spike and Recovery			
U2 FF O-N R3	#1	100%	86%	101%	91%	88%
	#2	101%	86%	101%	90%	89%
			Reagent and Field Blank Results			
North Field Blank	#1	< 0.1	< 0.3	< 0.2	< 0.5	
	#2	< 0.1	< 0.3	< 0.2	< 0.5	
North Reagent Blank	#1	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4
	#2	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4

End of Section 2 – Results

DESCRIPTION OF INSTALLATION

PROCESS DESCRIPTION

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

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

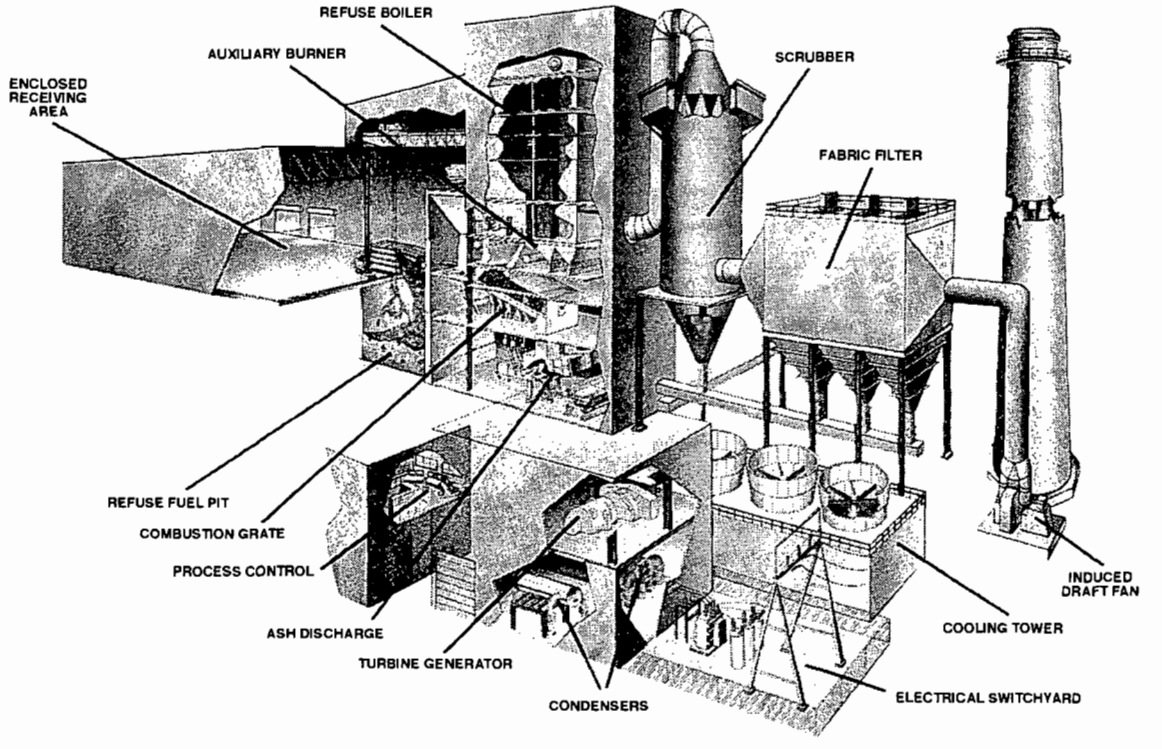


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

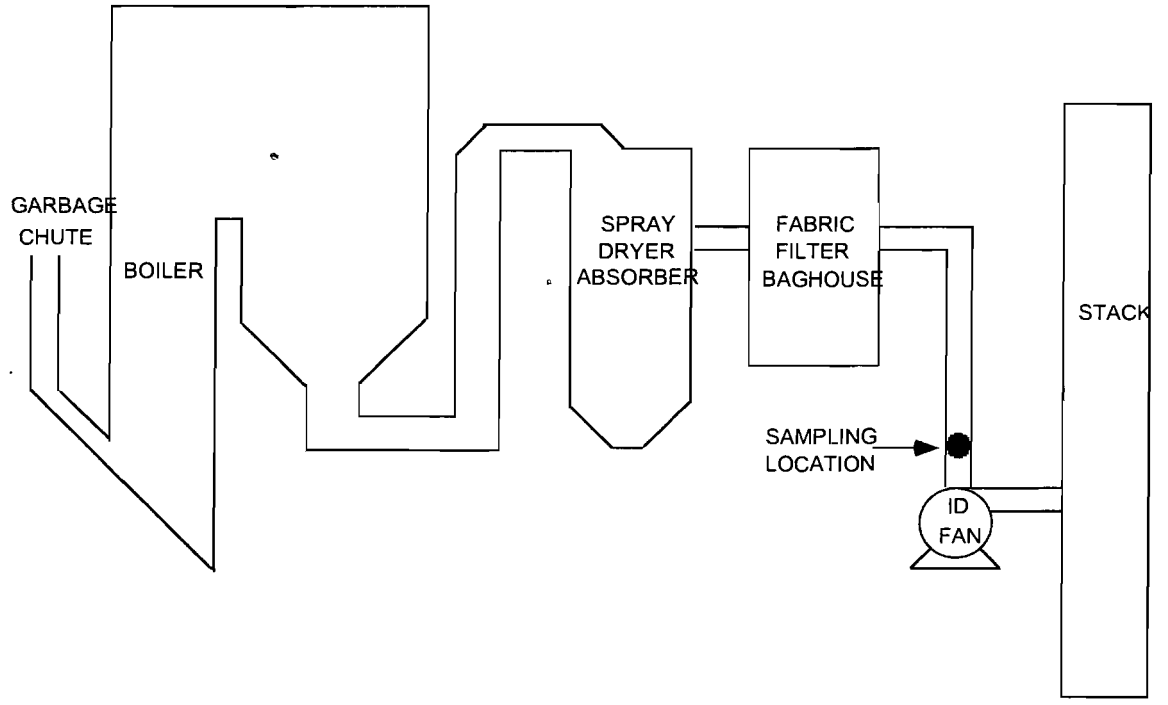


Figure 3-2: Process Schematic

DESCRIPTION OF INSTALLATION

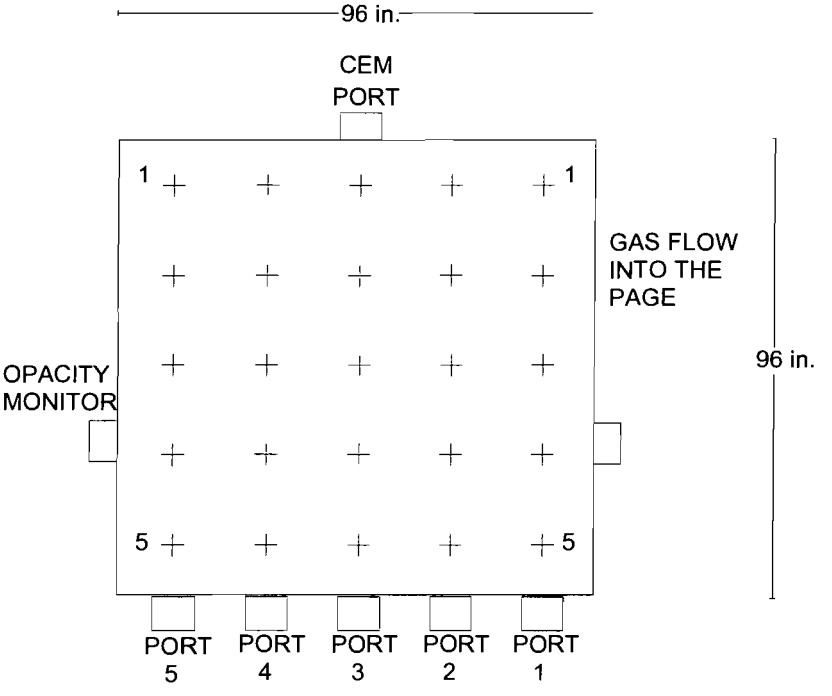
DESCRIPTION OF SAMPLING LOCATION(S)

Sampling point locations were determined according to EPA Method 1.

Table 3-1 outlines the sampling point configurations. Figure 3-3 illustrates the sampling points and orientation of sampling ports for the source tested in the program.

Table 3-1:
Sampling Points

Location	Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
Unit 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.

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

End of Section 4 – Methodology

APPENDIX

TEST METHOD SPECIFICATIONS

A

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Specification Sheet for EPA Method 29

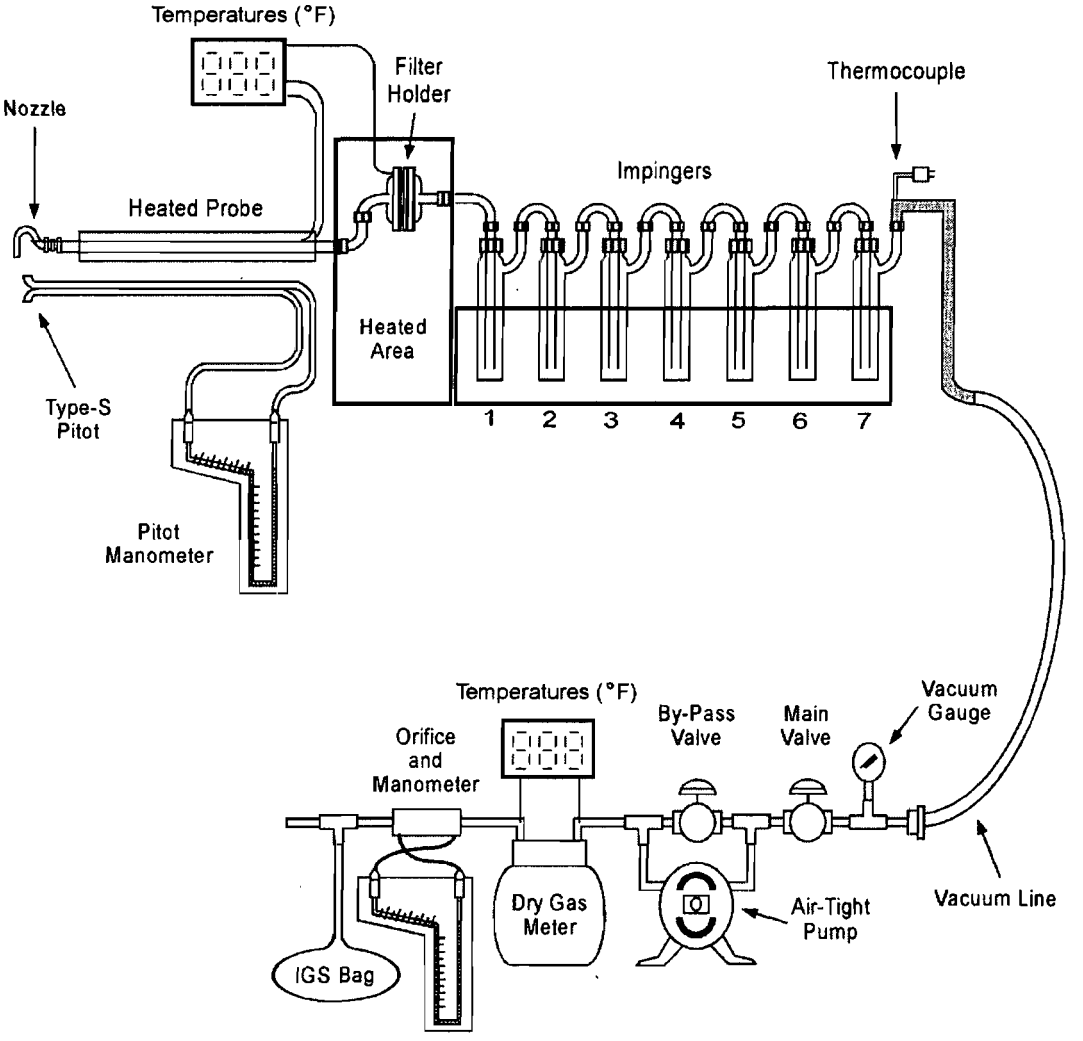
Source Location Name(s)	Unit 2 FF Outlet
Pollutant(s) to be Determined	Mercury
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	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	0.84
Pitot Tube Calibration by	Geometric or Wind Tunnel	Geometric
Pitot Tube Attachment	Attached to Probe	Attached to Probe
Metering System Console		
Meter Type	Dry Gas Meter	Dry Gas Meter
Meter Accuracy	±2%	±1%
Meter Resolution	N/A	0.01 cubic feet
Meter Size	N/A	0.1 dcf/revolution
Meter Calibrated Against	Wet Test Meter or Standard DGM	Wet Test Meter
Pump Type	N/A	Rotary Vane
Temperature Measurements	N/A	Type K Thermocouple/Pyrometer
Temperature Resolution	5.4°F	1.0°F
ΔP Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
ΔH Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
Barometer	Mercury or Aneroid	Digital Barometer calibrated w/Mercury Aneroid
Filter Description		
Filter Location	After Probe	Exit of Probe
Filter Holder Material	Borosilicate Glass	Borosilicate Glass
Filter Support Material	Teflon (or other non-metallic)	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	248°F±25°F	248°F±25°F
Filter Material	Quartz or Glass Fiber	Quartz Fiber
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

Specification Sheet for EPA Method 29

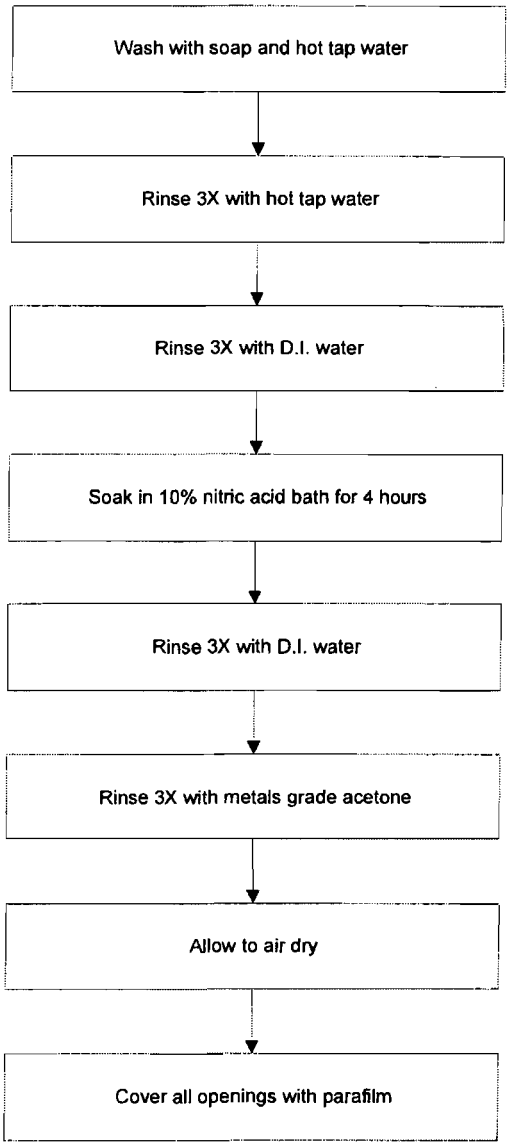
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types	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

EPA Method 29
Sampling Train Configuration



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

EPA Method 29
Glassware Preparation Procedures



EPA Method 29
Sample Recovery Flowchart
(includes Mercury)

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

Container 1
Tared Quartz Filter
Petri Dish

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

Remove any particulate or filter fiber to sample container

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

Container 3
Probe Rinse
250 ml Polyethylene

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

Brush/rinse 3X with a total of 100 ml 0.1N HNO_3

Visual Inspection

Label container and measure volume by weight

Container 4
1000 ml Polyethylene

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

Measure impinger volume by weight

Transfer to sample container

Rinse each piece 3X with a total of 100 ml 0.1N HNO_3

Visual Inspection

Label container and measure volume by weight

Container 5A
250 ml Polyethylene

Impinger 4 and U-bend

Measure impinger volume by weight to within 0.5 ml

Transfer to sample container

Rinse with 100 ml of 0.1N HNO_3

Visual Inspection

Label container and measure volume by weight

Container 5B
950 ml Glass

Impingers 5, 6 and U-bends

Measure impinger volume by weight

Transfer to sample container

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

Rinse 3X with 100 ml of water

Visual Inspection

Label container and measure volume by weight

Container 6
Silica Gel

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

Recycle silica gel

Container 5C
250 ml Glass

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

Pour HCl rinse into bottle containing 200 ml of water

Label container and measure volume by weight

Container 8A
Nitric Acid Blank
1000 ml Plastic

300 ml of 0.1N HNO_3

Container 8B
Water Blank
250 ml Plastic

100 ml of water

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

200 ml of absorbing solution

Container 10*
Permanganate Blank
500 ml Glass

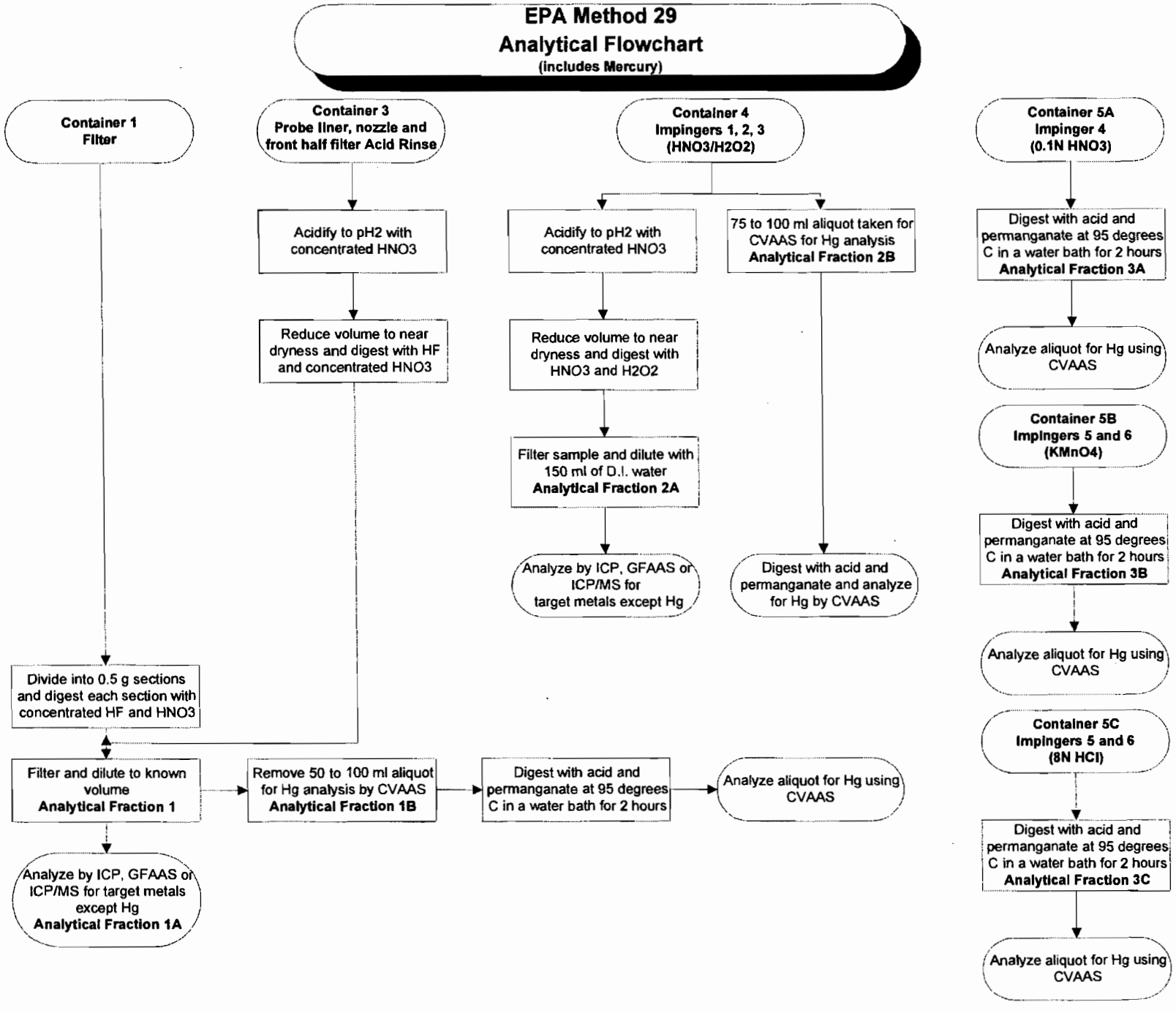
100 ml $KMnO_4$ solution

Container 11
HCl Rinse Blank
250 ml Glass

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

Container 12
Filter Blanks
Petri Dish

3 clean, unused filters


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

SAMPLE CALCULATIONS

B

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

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

Sample data taken from Run 1

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

101408 131457
P

1. Volume of water collected (wscf)

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

Where:

V_{lc}	= total volume of liquid collected in impingers and silica gel (ml)	=	403.1	ml
0.04707	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04707	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	18.97	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)	=	30.00	in. Hg
T_m	= average dry gas meter temperature (°F)	=	88.60	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	69.30	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9860	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	0.99	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)	=	66.074	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)	=	30.00	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-9.80	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)	=	29.28	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)	=	308.24	°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)	=	29.28	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)	=	29.28	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.28	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)	=	66.074	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	18.97	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2231	
		=	22.31	%

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7. Saturated moisture content (% by volume)

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

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.28	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.28	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000 100.00	 %

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

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2231	
B_w	= actual water vapor in gas	=	0.2231	
		=	22.31	%

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 (%)	=	9.5	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.8	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.73	%

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

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

Where:

M_{CO2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.5	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.8	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.7	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.87	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	=	0.2231	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.87	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)	=	27.22	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.84	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.22	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.28	in. Hg
T_s	= average sample gas temperature (°F)	=	308.24	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.619	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	43.65	ft/sec

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

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

Where:

A_s	= cross sectional area of sampling location (ft^2)	=	64.00	ft^2
V_s	= sample gas velocity (ft/sec)	=	43.65	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	167,605	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)	=	167,605	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.28	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	308.2	°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)	=	112,726	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	=	0.2231	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	112,726	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	87,577	dscfm

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

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

Where:

Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	87,577	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.8	%
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)	=	76,236	dscfm

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	87,577	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,254,634	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)	=	87,577	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)	=	148,814	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)	=	148,814	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)	=	138,668	dry Nm^3/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.265	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2231	
P_s	= absolute sample gas pressure (in. Hg)	=	29.28	in. Hg
T_s	= average sample gas temperature (°F)	=	308.2	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	66.074	dscf
V_s	= sample gas velocity (ft/sec)	=	43.65	ft/sec
θ	= total sampling time (min)	=	125	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
I	= percent of isokinetic sampling (%)	=	100.91	%

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)	=	69.30	dcf
T_m	= average dry gas meter temperature (°F)	=	88.60	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.8221	
P_{bar}	= barometric pressure (in. Hg)	=	30.00	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	0.994	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.87	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	0.994	√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	=	0.9976	

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

Definitions and Notes

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

USEPA Method 29
Mercury Analyte Calculations

Sample data taken from Run 1

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

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

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O

1. Total blank amount (µg)

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

Where:

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

2. Total sample amount (µg)

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

Where:

m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	12.9156	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	12.9156	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	=	12.9156	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	0.6458	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	=	12.9156	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	12.9156	µg

5. Sample corrected for allowable blank (µg)

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

Where:

m_n	= total mercury in sample corrected for allowable blank	=	12.9156	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	12.9156	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	12.9156	µg
m_{n-1b}	= mercury corrected for blank - Fraction 1b	=	<0.1000	µg
m_{n-2b}	= mercury corrected for blank - Fraction 2b	=	12.9156	µg
m_{n-3a}	= mercury corrected for blank - Fraction 3a	=	<0.2000	µg
m_{n-3b}	= mercury corrected for blank - Fraction 3b	=	<0.5000	µg
m_{n-3c}	= mercury corrected for blank - Fraction 3c	=	<0.4000	µg

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USEPA Method 29
Mercury Sample Calculations

Sample data taken from Run 1

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P_O

1. Mercury concentration (lb/dscf)

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

Where:

m_n	= mercury collected in sample (total µg)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= mercury concentration (lb/dscf)	=	4.3101E-10	lb/dscf

2. Mercury concentration (µg/dscm)

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

Where:

m_n	= mercury collected in sample (total µg)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= mercury concentration (µg/dscm)	=	6.9021E+00	µg/dscm

3. Mercury concentration (mg/dscm)

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

Where:

m_n	= mercury collected in sample (total µg)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	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)	=	6.9021E-03	mg/dscm

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4. Mercury concentration (µg/Nm3 dry)

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

Where:

m_n	= mercury collected in sample (total µg)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	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)	=	7.4071E+00	µg/Nm^3 dry

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

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

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	4.3101E-10	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.8	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= mercury concentration corrected to x% oxygen (lb/dscf)	=	4.9513E-10	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	4.3101E-10	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.5	%
C_{sdy}	= mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	5.4636E-10	lb/dscf @ y%CO_2

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

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

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	4.3101E-10	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	87,577	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	167,605	acfm
C_a	= mercury concentration at actual gas conditions (lb/acf)	=	2.2521E-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)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	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)	=	87,577	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= mercury emission rate (lb/hr)	=	2.2648E-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)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	87,577	dscfm
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min
$E_{g/s}$	= mercury emission rate (g/s)	=	2.8531E-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)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	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)	=	87,577	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)	=	9.9199E-03	Ton/yr

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

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

Where:

m_n	= mercury collected in sample (total µg)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,750	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.8	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= mercury emission rate - Fd-based (lb/MMBtu)	=	7.2587E-06	lb/MMBtu

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

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

Where:

m_n	= mercury collected in sample (total µg)	=	12.9156	µg
V_{mstd}	= volume metered, standard (dscf)	=	66.0741	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 (%)	=	9.5	%
100	= conversion factor	=	100	
E_{Fc}	= mercury emission rate - Fc-based (lb/MMBtu)	=	8.2864E-06	lb/MMBtu

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 16	Sep 16	Sep 16	
Start Time (approx.)		08:04	10:43	13:18	
Stop Time (approx.)		10:23	12:58	15:35	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9860	0.9860	0.9860	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-9.8000	-9.7000	-9.7000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	30.00	30.00	30.00	**30.0000**
D_n	Nozzle diameter (in.)	0.2650	0.2650	0.2650	
O_2	Oxygen (dry volume %)	8.8000	8.8000	8.8000	**8.8000**
CO_2	Carbon dioxide (dry volume %)	9.4667	9.8000	9.8000	**9.6889**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.7333	81.4000	81.4000	**81.5111**
V_{lc}	Total Liquid collected (ml)	403.10	436.20	430.70	
V_m	Volume metered, meter conditions (ft^3)	69.3000	70.6800	71.3400	
T_m	Dry gas meter temperature (°F)	88.6000	97.5400	99.0000	
T_s	Sample temperature (°F)	308.2400	307.6800	307.4400	**307.7867**
ΔH	Meter box orifice pressure drop (in. H_2O)	0.9944	1.0104	1.0116	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	18.9739	20.5319	20.2730	**19.9263**
V_{mstd}	Volume metered, standard (dscf)	66.0741	66.3119	66.7565	**66.3808**
P_s	Sample gas pressure, absolute (in. Hg)	29.2794	29.2868	29.2868	**29.2843**
P_v	Vapor pressure, actual (in. Hg)	29.2794	29.2868	29.2868	**29.2843**
B_{wo}	Moisture measured in sample (% by volume)	22.3096	23.6424	23.2944	**23.0822**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	22.3096	23.6424	23.2944	**23.0822**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.6191	0.6245	0.6241	**0.6225**
M_d	MW of sample gas, dry (lb/lb-mole)	29.8667	29.9200	29.9200	**29.9022**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2193	27.1018	27.1433	**27.1548**
V_s	Velocity of sample (ft/sec)	43.6471	44.1038	44.0346	**43.9285**
%I	Isokinetic sampling (%)	100.9128	101.8767	102.2230	**101.6708**
Q_a	Volumetric flow rate, actual (acfm)	167,605	169,358	169,093	**168,685**
Q_s	Volumetric flow rate, standard (scfm)	112,726	114,017	113,874	**113,539**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,577	87,061	87,348	**87,329**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,236	75,787	76,036	**76,020**
Q_a	Volumetric flow rate, actual (acf/hr)	10,056,285	10,161,508	10,145,570	**10,121,121**
Q_s	Volumetric flow rate, standard (scf/hr)	6,763,560	6,841,032	6,832,439	**6,812,344**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,254,634	5,223,651	5,240,860	**5,239,715**
Q_a	Volumetric flow rate, actual (m^3/hr)	284,800	287,780	287,329	**286,636**
Q_s	Volumetric flow rate, standard (m^3/hr)	191,548	193,742	193,499	**192,930**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	148,814	147,937	148,424	**148,392**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,543	128,780	129,204	**129,176**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	178,488	180,532	180,306	**179,775**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	138,668	137,850	138,304	**138,274**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	120,711	119,999	120,394	**120,368**

Comments:
Average includes 3 runs.

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2008)		Sep 16	Sep 16	Sep 16	
Start Time (approx.)		08:04	10:43	13:18	
Stop Time (approx.)		10:23	12:58	15:35	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	180.5	180.0	180.1	**180.2**
P_1	SDA Outlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,750	9,750	9,750	**9,750**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.8000	8.8000	8.8000	**8.8000**
CO_2	Carbon dioxide (dry volume %)	9.4667	9.8000	9.8000	**9.6889**
T_s	Sample temperature (°F)	308.2400	307.6800	307.4400	**307.7867**
B_w	Actual water vapor in gas (% by volume)	22.3096	23.6424	23.2944	**23.0822**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	167,605	169,358	169,093	**168,685**
Q_s	Volumetric flow rate, standard (scfm)	112,726	114,017	113,874	**113,539**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,577	87,061	87,348	**87,329**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,236	75,787	76,036	**76,020**
Q_a	Volumetric flow rate, actual (acf/hr)	10,056,285	10,161,508	10,145,570	**10,121,121**
Q_s	Volumetric flow rate, standard (scf/hr)	6,763,560	6,841,032	6,832,439	**6,812,344**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,254,634	5,223,651	5,240,860	**5,239,715**
Q_a	Volumetric flow rate, actual (m^3/hr)	284,800	287,780	287,329	**286,636**
Q_s	Volumetric flow rate, standard (m^3/hr)	191,548	193,742	193,499	**192,930**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	148,814	147,937	148,424	**148,392**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,543	128,780	129,204	**129,176**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	178,488	180,532	180,306	**179,775**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	138,668	137,850	138,304	**138,274**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	120,711	119,999	120,394	**120,368**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	66.0741	66.3119	66.7565	**66.3808**
%I	Isokinetic sampling (%)	100.9128	101.8767	102.2230	**101.6708**
Laboratory Data					
m_{n-1b}	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
m_{n-2b}	Fraction 2B (µg)	12.9156	14.3406	15.8261	
m_{n-3a}	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m_{n-3b}	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m_{n-3c}	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	12.9156	14.3406	15.8261	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	4.3101E-10	4.7685E-10	5.2274E-10	**4.7687E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	4.9513E-10	5.4779E-10	6.0051E-10	**5.4781E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	5.4636E-10	5.8390E-10	6.4009E-10	**5.9012E-10**
C_a	Concentration (lb/acf)	2.2521E-10	2.4513E-10	2.7003E-10	**2.4679E-10**
C_{sd}	Concentration (µg/dscm)	6.9021E+00	7.6362E+00	8.3710E+00	**7.6364E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	7.9289E+00	8.7721E+00	9.6163E+00	**8.7724E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	8.7491E+00	9.3504E+00	1.0250E+01	**9.4499E+00**
C_{sd}	Concentration (mg/dscm)	6.9021E-03	7.6362E-03	8.3710E-03	**7.6364E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	7.9289E-03	8.7721E-03	9.6163E-03	**8.7724E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	8.7491E-03	9.3504E-03	1.0250E-02	**9.4499E-03**
C_a	Concentration (µg/m^3 (actual,wet))	3.6065E+00	3.9255E+00	4.3242E+00	**3.9520E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	7.4071E+00	8.1949E+00	8.9835E+00	**8.1952E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	8.5090E+00	9.4140E+00	1.0320E+01	**9.4143E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	9.3893E+00	1.0035E+01	1.1000E+01	**1.0141E+01**
$E_{lb/hr}$	Rate (lb/hr)	2.2648E-03	2.4909E-03	2.7396E-03	**2.4985E-03**
$E_{g/s}$	Rate (g/s)	2.8531E-04	3.1380E-04	3.4513E-04	**3.1475E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	7.2587E-06	8.0307E-06	8.8035E-06	**8.0309E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	8.2864E-06	8.8559E-06	9.7081E-06	**8.9501E-06**

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 16	Sep 16	Sep 16	
Start Time (approx.)		08:04	10:43	13:18	
Stop Time (approx.)		10:23	12:58	15:35	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	<3.3372E-12	<3.3252E-12	<3.3030E-12	**<3.3218E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.8336E-12	<3.8199E-12	<3.7944E-12	**<3.8160E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<4.2302E-12	<4.0717E-12	<4.0446E-12	**<4.1155E-12**
C_a	Concentration (lb/acf)	<1.7437E-12	<1.7094E-12	<1.7062E-12	**<1.7198E-12**
C_{sd}	Concentration (µg/dscm)	<5.3440E-02	<5.3248E-02	<5.2894E-02	**<5.3194E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<6.1390E-02	<6.1170E-02	<6.0762E-02	**<6.1107E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<6.7741E-02	<6.5202E-02	<6.4768E-02	**<6.5904E-02**
C_{sd}	Concentration (mg/dscm)	<5.3440E-05	<5.3248E-05	<5.2894E-05	**<5.3194E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<6.1390E-05	<6.1170E-05	<6.0762E-05	**<6.1107E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<6.7741E-05	<6.5202E-05	<6.4768E-05	**<6.5904E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.7924E-02	<2.7373E-02	<2.7323E-02	**<2.7540E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.7350E-02	<5.7145E-02	<5.6764E-02	**<5.7086E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<6.5882E-02	<6.5645E-02	<6.5208E-02	**<6.5578E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<7.2697E-02	<6.9973E-02	<6.9507E-02	**<7.0726E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.7536E-05	<1.7370E-05	<1.7311E-05	**<1.7405E-05**
$E_{g/s}$	Rate (g/s)	<2.2091E-06	<2.1882E-06	<2.1808E-06	**<2.1927E-06**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<5.6201E-08	<5.5999E-08	<5.5626E-08	**<5.5942E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<6.4158E-08	<6.1754E-08	<6.1342E-08	**<6.2418E-08**

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 16	Sep 16	Sep 16	
Start Time (approx.)		08:04	10:43	13:18	
Stop Time (approx.)		10:23	12:58	15:35	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	4.3101E-10	4.7685E-10	5.2274E-10	**4.7687E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	4.9513E-10	5.4779E-10	6.0051E-10	**5.4781E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	5.4636E-10	5.8390E-10	6.4009E-10	**5.9012E-10**
C_a	Concentration (lb/acf)	2.2521E-10	2.4513E-10	2.7003E-10	**2.4679E-10**
C_{sd}	Concentration (µg/dscm)	6.9021E+00	7.6362E+00	8.3710E+00	**7.6364E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	7.9289E+00	8.7721E+00	9.6163E+00	**8.7724E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	8.7491E+00	9.3504E+00	1.0250E+01	**9.4499E+00**
C_{sd}	Concentration (mg/dscm)	6.9021E-03	7.6362E-03	8.3710E-03	**7.6364E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	7.9289E-03	8.7721E-03	9.6163E-03	**8.7724E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	8.7491E-03	9.3504E-03	1.0250E-02	**9.4499E-03**
C_a	Concentration (µg/m^3 (actual,wet))	3.6065E+00	3.9255E+00	4.3242E+00	**3.9520E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	7.4071E+00	8.1949E+00	8.9835E+00	**8.1952E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	8.5090E+00	9.4140E+00	1.0320E+01	**9.4143E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	9.3893E+00	1.0035E+01	1.1000E+01	**1.0141E+01**
$E_{lb/hr}$	Rate (lb/hr)	2.2648E-03	2.4909E-03	2.7396E-03	**2.4985E-03**
$E_{g/s}$	Rate (g/s)	2.8531E-04	3.1380E-04	3.4513E-04	**3.1475E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	7.2587E-06	8.0307E-06	8.8035E-06	**8.0309E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	8.2864E-06	8.8559E-06	9.7081E-06	**8.9501E-06**

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 16	Sep 16	Sep 16	
Start Time (approx.)		08:04	10:43	13:18	
Stop Time (approx.)		10:23	12:58	15:35	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<6.6743E-12	<6.6504E-12	<6.6061E-12	**<6.6436E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.6672E-12	<7.6397E-12	<7.5888E-12	**<7.6319E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<8.4604E-12	<8.1433E-12	<8.0891E-12	**<8.2309E-12**
C_a	Concentration (lb/acf)	<3.4875E-12	<3.4187E-12	<3.4125E-12	**<3.4396E-12**
C_{sd}	Concentration (µg/dscm)	<1.0688E-01	<1.0650E-01	<1.0579E-01	**<1.0639E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.2278E-01	<1.2234E-01	<1.2152E-01	**<1.2221E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.3548E-01	<1.3040E-01	<1.2954E-01	**<1.3181E-01**
C_{sd}	Concentration (mg/dscm)	<1.0688E-04	<1.0650E-04	<1.0579E-04	**<1.0639E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.2278E-04	<1.2234E-04	<1.2152E-04	**<1.2221E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.3548E-04	<1.3040E-04	<1.2954E-04	**<1.3181E-04**
C_s	Concentration (µg/m^3 (actual,wet))	<5.5847E-02	<5.4746E-02	<5.4646E-02	**<5.5080E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.1470E-01	<1.1429E-01	<1.1353E-01	**<1.1417E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.3176E-01	<1.3129E-01	<1.3042E-01	**<1.3116E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.4539E-01	<1.3995E-01	<1.3901E-01	**<1.4145E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.5071E-05	<3.4739E-05	<3.4622E-05	**<3.4811E-05**
$E_{g/s}$	Rate (g/s)	<4.4181E-06	<4.3763E-06	<4.3615E-06	**<4.3853E-06**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.1240E-07	<1.1200E-07	<1.1125E-07	**<1.1188E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.2832E-07	<1.2351E-07	<1.2268E-07	**<1.2484E-07**

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QA/QC _____
Date _____

Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

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

Run No.		1	2	3	Average
Date (2008)		Sep 16	Sep 16	Sep 16	
Start Time (approx.)		08:04	10:43	13:18	
Stop Time (approx.)		10:23	12:58	15:35	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.6686E-11	<1.6626E-11	<1.6515E-11	**<1.6609E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.9168E-11	<1.9099E-11	<1.8972E-11	**<1.9080E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<2.1151E-11	<2.0358E-11	<2.0223E-11	**<2.0577E-11**
C_a	Concentration (lb/acf)	<8.7187E-12	<8.5468E-12	<8.5312E-12	**<8.5989E-12**
C_{sd}	Concentration (µg/dscm)	<2.6720E-01	<2.6624E-01	<2.6447E-01	**<2.6597E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<3.0695E-01	<3.0585E-01	<3.0381E-01	**<3.0554E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<3.3870E-01	<3.2601E-01	<3.2384E-01	**<3.2952E-01**
C_{sd}	Concentration (mg/dscm)	<2.6720E-04	<2.6624E-04	<2.6447E-04	**<2.6597E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<3.0695E-04	<3.0585E-04	<3.0381E-04	**<3.0554E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<3.3870E-04	<3.2601E-04	<3.2384E-04	**<3.2952E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.3962E-01	<1.3686E-01	<1.3662E-01	**<1.3770E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.8675E-01	<2.8572E-01	<2.8382E-01	**<2.8543E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.2941E-01	<3.2823E-01	<3.2604E-01	**<3.2789E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.6349E-01	<3.4986E-01	<3.4753E-01	**<3.5363E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.7678E-05	<8.6848E-05	<8.6554E-05	**<8.7027E-05**
$E_{g/s}$	Rate (g/s)	<1.1045E-05	<1.0941E-05	<1.0904E-05	**<1.0963E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.8100E-07	<2.8000E-07	<2.7813E-07	**<2.7971E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<3.2079E-07	<3.0877E-07	<3.0671E-07	**<3.1209E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	<1.3349E-11	<1.3301E-11	<1.3212E-11	**<1.3287E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.5334E-11	<1.5279E-11	<1.5178E-11	**<1.5264E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.6921E-11	<1.6287E-11	<1.6178E-11	**<1.6462E-11**
C_a	Concentration (lb/acf)	<6.9750E-12	<6.8374E-12	<6.8250E-12	**<6.8791E-12**
C_{sd}	Concentration (µg/dscm)	<2.1376E-01	<2.1299E-01	<2.1157E-01	**<2.1278E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.4556E-01	<2.4468E-01	<2.4305E-01	**<2.4443E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.7096E-01	<2.6081E-01	<2.5907E-01	**<2.6361E-01**
C_{sd}	Concentration (mg/dscm)	<2.1376E-04	<2.1299E-04	<2.1157E-04	**<2.1278E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.4556E-04	<2.4468E-04	<2.4305E-04	**<2.4443E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.7096E-04	<2.6081E-04	<2.5907E-04	**<2.6361E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.1169E-01	<1.0949E-01	<1.0929E-01	**<1.1016E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.2940E-01	<2.2858E-01	<2.2706E-01	**<2.2835E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.6353E-01	<2.6258E-01	<2.6083E-01	**<2.6231E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.9079E-01	<2.7989E-01	<2.7803E-01	**<2.8290E-01**
$E_{lb/hr}$	Rate (lb/hr)	<7.0142E-05	<6.9479E-05	<6.9243E-05	**<6.9621E-05**
$E_{g/s}$	Rate (g/s)	<8.8363E-06	<8.7527E-06	<8.7230E-06	**<8.7706E-06**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.2480E-07	<2.2400E-07	<2.2251E-07	**<2.2377E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.5663E-07	<2.4701E-07	<2.4537E-07	**<2.4967E-07**

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Date _____

QA/QC DATA

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Nozzle Calibration Sheet

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

NORTH

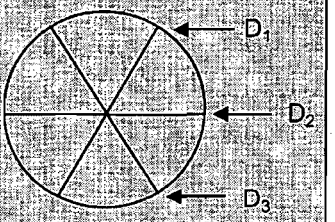
Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
265-1	0.265	0.265	0.265	0.000	0.265

D_1, D_2, D_3 = three nozzle diameter measurements

ΔD = maximum difference between any two diameters

ΔD = 0.004 inches*

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



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

QA/QC_____

Date_____

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-13

Date of Calibration: 7/21/2008

Meter Box Y_d: 0.9860

Calibration Conducted by: OLEG

Meter Box ΔH@: 1.8221

Barometric Pressure: 29.10

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
0.935	3.00	-1.70	1.0000	0.000	10.000	10.000	984.142	994.387	10.245	75.5	75.5	75.50	89.0	82.0	85.50	10.25	0.9826	1.8280
0.938	3.00	-1.70	1.0000	0.000	10.000	10.000	994.387	1004.643	10.256	75.5	75.5	75.50	90.0	82.0	86.00	10.22	0.9824	1.8174
0.375	0.50	-1.00	1.0000	0.000	5.000	5.000	8.225	13.324	5.099	75.5	75.5	75.50	83.0	81.0	82.00	12.79	0.9887	1.9010
0.376	0.50	-1.00	1.0000	0.000	5.000	5.000	13.324	18.428	5.104	75.5	75.5	75.50	83.0	81.0	82.00	12.74	0.9878	1.8862
0.676	1.50	-1.20	1.0000	0.000	10.000	10.000	20.923	31.145	10.222	75.5	75.5	75.50	87.0	81.0	84.00	14.17	0.9871	1.7500
0.676	1.50	-1.20	1.0000	0.000	10.000	10.000	31.145	41.365	10.220	75.5	75.5	75.50	87.0	81.0	84.00	14.17	0.9872	1.7500
															Averages		0.98597	1.82212

Nomenclature

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

Equations

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

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

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

Vacuum Gauge

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

CleanAir ENGINEERI

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 66-13 Office: _____

Calibrated by: OLEG Client: _____

Date: 7/21/08 Job No: _____

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

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

Tolerance = ±2°F difference from reference setting.

Calibration Reference Information

Reference Used: Omega CL23A Serial No: T-225950

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

Calibration Report No: R044701

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10455	Meter No.	66-13	Orifice	C-3
Location	warehouse	Meter Yd	0.9860	Orifice K'	0.4413
Test Date	10/07/08	Meter ΔH@	1.8221	Orifice Cal. Date	03/11/08
Operator	r. vicere	Full Test Cal. Date	07/21/08		

Leak Checks

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

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

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

Barom. Press. (P_b) 29.43 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (In. W.C.)	Vacuum (In. Hg)	Net Run Time - Θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run - T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	0.0	431.10	68	68								
1	5.0	434.04	69	68	77	1.10	20	5.0	2.94	68.3	0.9672	-0.4%
2	10.0	436.96	70	68	77	1.10	20	5.0	2.92	68.8	0.9748	0.4%
3	15.0	439.89	71	68	78	1.10	20	5.0	2.93	69.3	0.9714	0.0%
										Average Y_i	0.9711	
										Cal. Error	-1.5%	

Calculations and Specifications

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

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

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

CleanAir ENGINEERING

SAMPLE PROBE CALIBRATION DATA

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

Thermocouple Calibration

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

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

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

Geometric Pitot Calibration — *diagrams on reverse*

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

If repairs are required, pitot does not meet specification.

[X] **"S" Pitot**

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

Calculations

z = A sin γ = 0.02314 <0.125"

w = A sin θ = 0.01158 <0.03125"

Does assembly meet specifications? (YES / NO)

[ ] **Standard Pitot**

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

Does assembly meet specifications? YES / NO

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

If "NO" wind tunnel calibration is required.

Wind Tunnel Pitot Calibration

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

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

CDS603A-Pitot.xls, October, 2004

CleanAir. ENGINEERING

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FIELD DATA

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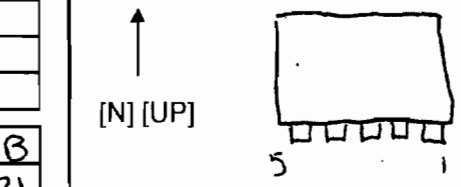
TEST LOCATION: Outlet Mercury **TESTING METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 1

FIELD DATA SHEET

Client	Wheelabrator
Plant	N. Broward
Meter Operator	K. Kirchner
Probe Operator	"
Project No.	10455
Date	9-16-08

Cross-Section of Test Location



Amb. Temp. (°F)	80
Bar. Press.	30.00 [in. Hg] [mbar]
Probe I.D. No.	~~KK30.00~~ 67-8-20
Liner Material	Glass

Meter Box	66-13	Sample Box No.	66-B
Meter Y_d	0.9860	Meter $\Delta H_@$	1.8221
K Factor	2.53	Pitot C_p	.84
Leak Rate Before	.003 (cfm) [Lpm]	@	14 (in. Hg)
Leak Rate After	.002 (cfm) [Lpm]	@	8 (in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑	Bad ☐	

Filter No.	NA		
Thimble No.	NA		
Nozzle Diameter	.205	Nozzle I.D.	66-205-1

Duct Dimensions (in.)	96x96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow (In) [Out] of page	First point all the way (In) [Out]
-9.8	10		

Start Time:	08:04
Stop Time:	10:23

Traverse Point Number	Min/pt KK 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft) [L] 503.900	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)~~ °F	Notes
5-1	5	.35	.89	506.58	309	250	256	65	82	82	3	9.3	
2	10	.39	.99	509.33	308	250	253	57	84	82	3	8.8	
3	15	.38	.96	512.09	308	250	251	56	88	83	3	8.4	
4	20	.33	.83	514.67	309	250	253	56	89	83	3	8.3	
5	25	.30	.76	517.11	309	250	256	58	90	84	3	8.1	Stop Test 08:29 Change Port
4-1	30	.35	.89	519.73	309	250	255	65	87	84	3	8.6	Restart 08:35 17.21 Vc .10
2	35	.35	.89	522.40	308	250	247	60	90	84	3	8.4	
3	40	.33	.86	524.95	308	249	250	51	92	85	3	8.3	Change K-Factor to 2.66
4	45	.36	.94	527.65	308	250	258	45	92	86	3	8.6	
5	50	.33	.86	530.21	308	249	254	44	92	86	3	8.5	Stop Test 08:55 Change Port
3-1	55	.34	.88	532.82	309	250	253	52	89	86	3	8.9	Restart 08:58 530.33 Vc .12
2	60	.38	.99	535.61	308	250	253	47	91	86	3.5	8.1	
3	65	.36	.94	538.310	308	250	247	47	92	86	3.5	8.0	
	Total	*7.6864	11.6800	69.300	4009					2255			
	Average	.6191	1.0358		308.2400				88.6000				

Sum of square roots. Subtract .48 From Total V. Circle correct bracketed units on data sheet.

QA/QC KAK
Date 9-16-08

$V_{mSTD} \approx 66.23$
$\%I = 101.2$

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 1

FIELD DATA SHEET

Client Wheelabrator	Project No. 10455
Plant N. Broward	Date 9-16-08
Meter Operator	K.K.
Probe Operator	K.K.

Cross-Section of Test Location

[N] [UP]

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

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

Duct Dimensions (in.)

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. 538.310 (ft³) [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	Filter T_f (°F) Set Points	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	~~XAD Trap Temp T_t~~ (°F)	Notes
						250	250					0	
3-4	70	.35	.91	540.95	308	250	257	48	92	87	3.5	8.0	
5	75	.32	.83	543.51	308	250	252	49	92	86	3.5	7.9	Stop Test 09:23 Change Port
~~2~~ 1-1	80	.34	.88	546.24	308	250	256	59	90	87	3.5	8.8	Restart 09:26 543.63 ΔV: .12
2	85	.37	.96	548.95	309	250	246	55	92	87	3.5	8.6	
3	90	.52	1.4	552.25	308	250	251	55	93	87	4.5	8.8	
4	95	.53	1.4	555.59	309	250	249	55	95	88	4.5	8.5	
5	100	.56	1.3	558.82	309	250	258	58	95	88	4.5	8.1	Stop Test 09:51 Change Port
1-1	105	.47	1.2	561.98	308	250	249	65	91	88	4	8.9	Restart 09:58 550.96 ΔV: .14
2	110	.43	1.1	564.97	309	250	248	60	94	89	4	8.6	
3	115	.42	1.1	567.94	307	250	259	60	95	89	4	8.8	
4	120	.40	1.0	570.77	307	250	254	61	96	89	4	7.9	
5	125	.44	1.1	573.680	307	249	251	62	96	89	4	8.3	
	Total	*7.7901	13.1800		3697					2175			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KK

Date 9-16-08

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 2

FIELD DATA SHEET

Client	Wheelabrator	Project No.	10455
Plant	N. Broward	Date	9-16-08
Meter Operator	K. Kirchner		
Probe Operator	" "		

Cross-Section of Test Location

Amb. Temp. (°F)	87	Bar. Press.	30.00 [in. Hg] [mbar]
Probe I.D. No.	67-8-20		
Liner Material	Glass		

Meter Box	66-13	Sample Box No.	66-M1
Meter Y_d	0.9860	Meter $\Delta H_@$	1.8221
K Factor	2.6	Pitot C_p	.84
Leak Rate Before	.003 [cfm]	[Lpm] @	15 (in. Hg)
Leak Rate After	.002 [cfm]	[Lpm] @	8 (in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑	Bad ☐	

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

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

Start Time:	10:43
Stop Time:	12:58

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] 575.950	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	~~XAD Trap Temp.~~ ~~T_t~~ (°F)	Notes
5-1	5	.34	.88	578.660	309	247	250	66	91	90	3	8.4	
2	10	.34	.88	581.27	308	248	252	57	94	90	3	8.6	
3	15	.37	.96	584.01	308	248	255	53	96	91	3	8.5	
4	20	.50	1.3	587.17	310	248	247	53	98	91	4	8.6	
5	25	.48	1.2	590.26	310	248	250	53	99	92	3.5	7.9	Stop Test 11:09 Change Port
4-1	30	.34	.88	592.94	310	248	250	64	99	95	3	8.2	Restart 11:11 590.38 Vc 12
2	35	.35	.91	595.59	308	248	253	62	99	95	3.5	8.2	
3	40	.36	.94	598.33	308	248	243	62	99	94	3.5	8.0	
4	45	.41	1.1	601.32	308	247	250	62	101	96	4	8.9	
5	50	.44	1.1	604.29	309	248	246	54	103	97	4	8.6	Stop Test 11:33 Change Port
3-1	55	.32	.83	606.96	307	248	251	59	98	96	3.5	8.7	Restart 11:37 604.42 Vc 13
2	60	.37	.96	609.71	307	249	250	56	101	97	3.5	8.4	
3	65	.38	.99	612.560	307	248	253	51	102	97	3.5	7.9	
	Total	*8.0431	12.9300	70.6830	4009					2501			
	Average	.6245	1.0104		307.6800				97.5400				

*Sum of square roots.

Subtract .47 From Total V.

Circle correct bracketed units on data sheet.

QA/QC KgK
Date 9-16-08

CleanAir ENGINEERING

%I = 102

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

UNIT: 2 **RUN:** 2

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: N. Broward	Date: 9-16-08
Meter Operator: K.K	
Probe Operator: K.K.	

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L] 612.566	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) 2 0	Notes
3-4	70	.37	.96	615.32	308	248	248	59	101	97	3.5	8.9	
5	75	.34	.88	617.90	308	248	251	54	102	98	3.5	8.6	Stop Test 12:02 Change Port
2-1	80	.45	1.2	621.13	307	248	249	59	98	97	4	8.9	Restart 12:06 Vi 611 8.01
2	85	.43	1.1	624.10	307	248	253	53	100	97	4	8.0	
3	90	.40	1.0	626.93	309	247	245	56	102	98	4	8.8	
4	95	.40	1.0	629.76	308	248	245	58	101	98	4	8.1	
5	100	.42	1.1	632.70	308	248	248	60	101	98	4	8.3	Stop Test 12:31 Change Port
1-1	105	.38	.99	635.67	306	248	254	64	97	97	4	8.8	Restart 12:33 632.81 Vi 611
2	110	.41	1.1	638.60	306	248	249	58	99	97	4	8.9	
3	115	.39	1.0	641.43	306	248	252	58	101	97	4	9.2	
4	120	0.40	1.0	644.29	308	248	245	59	102	98	4	9.2	
5	125	.39	1.0	647.100	302	248	248	60	102	98	4	9.1	
	Total	*7.5691	12.3300		3683					2376			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KAK

Date 9-16-08

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

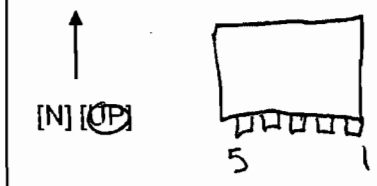
TEST LOCATION: Outlet **TESTING** Mercury **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 3

FIELD DATA SHEET

Client	Wheelabrator	Project No.	10455
Plant	N. Broward	Date	9-16-08
Meter Operator	K. Kirchner		
Probe Operator	"	"	

Cross-Section of Test Location



Amb. Temp. (°F)	90	Bar. Press.	30.00 [in. Hg] [mbar]
Probe I.D. No.	67-8-20		
Liner Material	Glass		

Meter Box	66-13	Sample Box No.	6699
Meter Y_d	0.9860	Meter $\Delta H_@$	1.8221
K Factor	2.6	Pitot C_p	.84
Leak Rate Before	.003 [cfm] [Lpm]	@	12 (in. Hg)
Leak Rate After	.002 [cfm] [Lpm]	@	8 (in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑	Bad ☐	

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

Duct Dimensions (in.) 96x96

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

Start Time:	13:18	Stop Time:	15:35

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. [ft^3] [L] 648.960	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in. Hg)	~~XAD Trap Temp~~ T_t (°F) O2	Notes
5-1	5	.37	.96	651.92	308	250	254	66	97	98	3.5	9.1	
2	10	.45	1.2	655.03	308	249	253	54	101	98	4	8.3	
3	15	.36	.94	657.86	307	250	252	50	100	98	3.5	7.8	
4	20	.34	.88	660.52	307	250	252	51	100	97	3.5	7.9	
5	25	.32	.83	663.06	307	249	249	52	98	97	3	8.4	Stop Test 13:43 Change Port
4-1	30	.40	1.0	666.02	308	250	247	62	98	97	3.5	8.1	Restart 13:46 663.17 Vc .11
2	35	.37	.96	668.77	308	250	251	57	100	97	3.5	7.9	
3	40	.37	.96	671.48	307	250	248	57	101	98	3.5	8.0	
4	45	.33	.86	674.08	307	250	250	58	98	96	3.5	7.8	
5	50	.32	.83	676.67	308	250	257	59	99	97	3.5	7.8	Stop Test 14:11 Change Port
3-1	55	.32	.83	679.36	308	251	250	58	97	97	3.5	7.7	Restart 14:14 676.77 Vc .10
2	60	.37	.96	682.17	309	250	251	46	100	97	3.5	7.8	
3	65	.37	.96	684.950	307	250	251	47	101	97	3.5	7.8	
	Total	*7.7993	12.1700	~~KK~~ 71.340	3999					2554			
	Average	.6241	1.0116		307.4400				99.0000				

*Sum of square roots.

Subtract .51 From Total V.

Circle correct bracketed units on data sheet.

QA/QC KJK

Date 9-16-08

%I 102.2

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 3

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: N. Broward	Date: 9-16-08
Meter Operator: K.K	
Probe Operator: K.K.	

Cross-Section of Test Location

[N] [UP]

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

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L] 684.950	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in Hg)	~~XAD Trap Temp.~~ T_t (°F)	Notes
3-4	70	.38	.99	687.77	307	250	255	47	101	97	4	7.6	
5	75	.36	.94	690.54	307	250	252	47	101	98	3.5	7.7	Stop Test 14:39 Change Port
2-1	80	.40	1.0	693.48	307	249	256	51	101	99	4	8.6	Restart 14:42 690.66 Vc .12
2	85	.40	1.0	696.30	307	250	252	49	102	99	4	7.8	
3	90	.43	1.1	699.30	307	250	255	53	103	100	4	7.9	
4	95	.53	1.4	702.67	308	250	249	51	102	100	5	8.0	
5	100	.50	1.3	705.93	309	250	249	46	102	100	4.5	8.0	Stop Test 15:07 Change Port 706.11
1-1	105	.43	1.1	709.09	309	250	249	55	98	100	4.5	8.6	Restart 15:10 Vc .18
2	110	.39	1.0	711.91	308	250	253	49	101	99	4	8.3	
3	115	.38	.99	714.69	305	250	253	50	~~102~~ 102	98	4	8.1	
4	120	.43	1.1	717.67	307	250	252	52	101	97	4.5	8.0	
5	125	.46	1.2	720.810	306	250	252	53	~~97~~ 99	96	4.5	7.8	
	Total	*7.8029	13.1200		3687					2396			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KK

Date 9/16/08

CleanAir ENGINEERING

Impinger Weight Sheet

Client	WHEELABRATOR			Unit Name / Location	UNIT 2
Plant	NORTH BROWARD	Job No.	10455	Method	EPA M29

Run No.	1	Filter Type	QUARTZ		Sample Box No.	M9
Date	9/16/08	Lot No.	55287		pH	
Analyst	BOB PREKSTA	Filter No.	N/A		Rinse	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	733.2	443.3	289.9	
Impinger 2	@.5% HNO_3 10% H_2O_2	623.3	542.6	80.7	QA/QC
Impinger 3	5% HNO_3/10% H_2O_2	552.6	541.0	11.6	Date
Impinger 4	EMPTY	441.8	438.0	3.8	
Impinger 5	4% $KMnO_4$/10% H_2SO_4	535.4	533.3	3.2	Total Weight (gm)
Impinger 6	4% $KMnO_4$/10% H_2SO_4	546.9	546.2	0.7	389.9
Impinger 7	SILICA GEL	731.3	717.0	14.3	404.2

Run No.	2	Filter Type	QUARTZ		Sample Box No.	M1
Date	9/16/08	Lot No.	55287		pH	
Analyst	B. PREKSTA	Filter No.	N/A		Rinse	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	782.7	442.9	339.8	
Impinger 2	5% HNO_3/10% H_2O_2	628.0	555.1	72.9	QA/QC
Impinger 3	5% HNO_3/10% H_2O_2	555.6	550.1	5.5	Date
Impinger 4	EMPTY	526.5	524.8	1.7	
Impinger 5	4% $KMnO_4$/10% H_2SO_4	567.4	567.8	-0.4	Total Weight (gm)
Impinger 6	4% $KMnO_4$/10% H_2SO_4	534.5	532.2	2.3	421.8
Impinger 7	SILICA GEL	738.4	724.0	14.4	436.2

Run No.	3	Filter Type	QUARTZ		Sample Box No.	M9
Date	9/16/08	Lot No.	55287		pH	
Analyst	B. PREKSTA	Filter No.	N/A		Rinse	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	792.6	~~548.8~~	347.6	445.0 TR 9/16
Impinger 2	5% HNO_3 10% H_2O_2	609.0	546.6	62.4	QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	548.7	543.6	5.1	Date
Impinger 4	EMPTY	440.5	440.3	0.2	
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	526.0	524.9	1.1	Total Weight (gm)
Impinger 6	4% $KMnO_4$ 10% H_2SO_4	542.0	541.7	0.3	416.7
Impinger 7	SILICA GEL	664.3	650.3	14.0	430.7

CleanAir. ENGINEERING

QA/QC_____
Date_____

ORSAT READINGS

TEST LOCATION: U2 OUTLET **PAGE** 1 **OF** 1

Client	WHEELABRATOR	Project Number	10455	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	BROWARD-NORTH	Unit	2	
Orsat ID	#12	Fuel Type	MSW	Leak Check Passed ☑

Run Number	Method Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Fo	Analyst	Analysis Date	Analysis Time
1	M29	1	9.2	17.2		1.22	TR	9/16	11:56
		2	9.6	18.8	9.2				
		3	9.6	18.8	9.2				
		Avg.	9.6		9.2				
2	M29	1	9.8	18.6	8.8	1.23	TR	9/16	1412
		2	9.8	18.6	8.8				
		3	9.8	18.6	8.8				
		Avg.	9.8		8.8				
3	M29	1	9.8	18.6	8.8	1.23	TR	9/16	1617
		2	9.8	18.6	8.8				
		3	9.8	18.6	8.8				
		Avg.							
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							

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

FDB083-Orsat.xls, July 2006

QA/QC_____
Date_____

CleanAir ENGINEERING

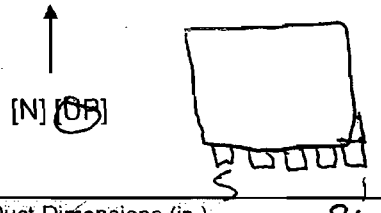
TEST LOCATION: Outlet | Mercury **TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 4

FIELD DATA SHEET

Client	Wheelabrator
Plant	N. Broward
Meter Operator	K. Kirchner
Probe Operator	" "
Project No.	10455
Date	9-17-08

Cross-Section of Test Location



Duct Dimensions (in.) 96x96

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

Meter Box	66-13	Sample Box No.	66-M9
Meter Y_d	0.9860	Meter $\Delta H@$	1.8221
K Factor	2.6	Pitot C_p	.84
Leak Rate Before	.003 [cfm] [Lpm] @	15	(in. Hg)
Leak Rate After	.003 [cfm] [Lpm] @	9	(in. Hg)
Pitot Leak Check Before: ☑	After: Good ☑	Bad ☐	

Filter No.	68		
Thimble No.	18		
Nozzle Diameter	0.265	Nozzle I.D.	67-265-1

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

Start Time:	07:24	Stop Time:	09:40

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L] 722.900	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) 62	Notes
5-1	5	.42	1.1	725.89	310	249	252	60	82	81	4	8.6	
2	10	.37	.96	728.61	310	250	257	51	85	81	3.5	7.9	
3	15	.38	.99	731.40	309	250	251	50	87	81	3.5	8.1	
4	20	.38	.99	734.19	309	250	250	50	88	82	4	8.6	
5	25	.34	.88	736.82	310	250	250	51	90	82	3.5	8.3	Stop Test 07:49 Change Port
4-1	30	.42	1.1	739.80	309	250	250	58	86	82	4	8.3	NV: 736.93 ΔV: .11 Restart 07:52
2	35	.44	1.1	742.71	310	249	252	55	90	84	4	8.1	
3	40	.39	1.0	745.54	309	250	249	54	90	84	4	8.1	
4	45	.35	.91	748.19	310	250	250	56	92	85	3.5	7.8	
5	50	.32	.83	750.76	310	250	250	57	91	85	3.5	7.8	Stop Test 08:17 Change Port
3-1	55	.32	.83	753.37	310	250	249	64	89	85	3.5	8.7	NV: 750.88 ΔV: .12 Restart 08:19
2	60	.36	.94	755.90	309	250	252	62	91	85	3.5	8.5	
3	65	.37	.96	758.470	308	249	249	54	91	85	4	8.5	
	Total	*1.9395	17.5900	71.210	4023				2234	1685			
	Average	.6332	1.0404		309.2400				88.0600				

* Sum of square roots.

Subtract .44 From Total V.

Circle correct bracketed units on data sheet.

QA/QC KGK

Date 9-17-08

%I = 101.7

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 4

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: N. Broward	Date: 9-17-08
Meter Operator: K.K.	
Probe Operator: K.K.	

Cross-Section of Test Location

[N] [UP]

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

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

Duct Dimensions (in.)

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	~~XAD Trap Temp.~~ T_t (°F)	Notes
3-4	70	.39	1.0	761.49	309	250	252	46	92	86	4	9.0	
5	75	.35	.91	764.18	309	250	251	45	92	86	4	8.0	Stop Test 08:44 Change Port
2-1	80	.41	1.1	767.19	309	250	251	53	89	87	4	8.8	New V=764.31 ΔV=.13 Restart 08:47
2	85	.43	1.1	770.18	309	250	249	48	92	87	4.5	8.4	
3	90	.47	1.2	773.27	309	250	253	49	94	88	4.5	8.5	
4	95	.47	1.2	776.37	309	249	253	51	94	88	4.5	7.9	
5	100	.47	1.2	779.492	309	250	247	52	94	88	4.5	8.5	Stop Test 09:12 Change Port
1-1	105	.40	1.0	782.37	310	250	249	98	92	88	4.5	9.0	New V=779.56 ΔV=.08 Restart 09:15
2	110	.35	.91	785.07	309	250	248	54	94	88	4	8.4	
3	115	.43	1.1	788.03	308	250	250	54	94	88	4.5	8.8	
4	120	.51	1.3	791.21	308	250	248	55	94	88	5	8.9	
5	125	.53	1.4	794.550	310	247	248	57	97	89	5.5	8.4	
	Total	*7.8908	13.4200		3708					2169			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC VSK

Date 9-17-08

FDS005-General ds, Feb 2002

CleanAir ENGINEERING

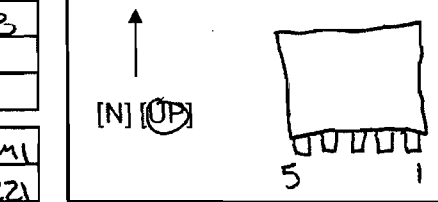
TEST LOCATION: Outlet | Mercury **TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 5

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: N. Broward	Date: 9-17-08
Meter Operator: K Kirchner	
Probe Operator: " "	

Cross-Section of Test Location



Amb. Temp. (°F): 85	Bar. Press.: 29.95 [in. Hg] [mbar]
Probe I.D. No.:	67-8-20
Liner Material:	Glass

Meter Box: 66-13	Sample Box No.: 66-M1	
Meter Y_d: 0.9860	Meter $\Delta H_@$: 1.8221	
K Factor: 2.6	Pitot C_p: .84	
Leak Rate Before: .002 [cfm] [Lpm] @ 12 (in. Hg)		
Leak Rate After: .002 [cfm] [Lpm] @ 9 (in. Hg)		
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐	

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

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

Start Time: 09:57 Stop Time: 12:12

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] 795.500	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in.Hg)	~~XAD Trap Temp~~ T_t ~~(°F)~~ O_2	Notes
5-1	5	.40	1.0	798.39	310	251	254	66	87	87	3	9.3	
2	10	.43	1.1	801.39	309	249	258	50	88	86	3	9.3	
3	15	.43	1.1	804.43	310	248	256	46	91	87	3	8.7	
4	20	.42	1.1	807.44	310	251	253	46	92	87	3	8.9	
5	25	.35	.91	810.13	310	249	249	46	93	88	3	8.8	Stop Test 10:27 Change Port
4-1	30	.41	1.1	813.39	310	248	254	54	91	88	3.5	8.9	New V=810.39 ΔV=.26 Restart 10:29
2	35	.41	1.1	816.32	311	251	254	51	94	88	3.5	8.6	
3	40	.42	1.1	819.25	309	250	252	53	94	88	3.5	8.5	
4	45	.39	1.0	822.09	309	249	249	54	96	89	3	8.3	
5	50	.37	.96	824.77	309	249	249	56	95	89	3	8.7	Stop Test 10:49 Change Port
3-1	55	.33	.86	827.42	309	251	248	65	95	90	3	9.0	New V=824.85 ΔV=.08 Restart 10:52
2	60	.39	1.0	830.23	309	250	250	59	98	92	3	8.3	
3	65	.39	1.0	833.050	308	248	252	45	98	92	3	8.1	
	Total	*8.1686	13.3300	72.030	4023					2363			
	Average	.6340	1.0420		309.0000				94.2400				

*Sum of square roots.

Subtract .56 From Total V

Circle correct bracketed units on data sheet.

QA/QC K&K

Date 9-17-08

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 5

FIELD DATA SHEET

Client Wheelabrator	Project No. 10455
Plant N. Broward	Date 9-17-08
Meter Operator K.K.	
Probe Operator K.K.	

Cross-Section of Test Location

[N] [UP]

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

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

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

Duct Dimensions (in.)

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP ($in. H_2O$)	Orifice Setting ΔH ($in. H_2O$)	Gas Sample Volume V_m Init. Vol. (ft³)[L] 833.050	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	~~XAD Trap Temp~~ T_t ~~(°F)~~ O_2	Notes
3-4	70	.37	.96	835.81	309	249	251	43	99	93	3	7.9	
5	75	.35	.91	838.55	309	251	247	45	98	93	3	8.6	Stop Test 11:17 Change Port
2-1	80	.47	1.2	841.70	310	250	249	54	97	94	3.5	8.7	N.W V=838.65 ΔP=.10 Restart 11:20
2	85	.44	1.1	844.68	308	249	249	45	99	94	3.5	7.8	
3	90	.46	1.2	847.73	308	248	249	47	101	95	3.5	8.9	
4	95	.42	1.1	850.71	309	250	250	49	102	96	3.5	8.8	
5	100	.48	1.2	853.81	309	248	249	50	102	97	3.5	9.2	Stop Test 11:45 Change Port
1-1	105	.35	.91	856.62	308	251	250	51	99	97	3.5	8.8	N.W V=853.93 ΔP=.12 Restart 11:47
2	110	.34	.88	859.26	308	252	248	55	100	97	3	8.5	
3	115	.33	.86	861.84	308	248	251	57	101	97	3	8.9	
4	120	.47	1.2	864.96	308	248	251	59	102	97	3.5	9.1	
5	125	.46	1.2	868.090	308	250	253	61	101	98	3.5	8.2	
	Total	*7.6809	*2.7200		3702					2349			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KK
Date 9-17-08

CleanAir ENGINEERING

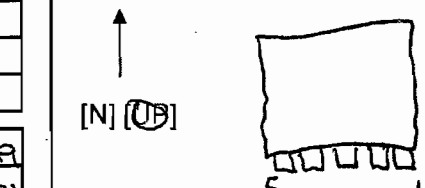
TEST LOCATION: Outlet | Mercury **TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 6

FIELD DATA SHEET

Client	Wheelabrator	Project No.	10455
Plant	N. Broward	Date	9-17-08
Meter Operator	K. Kirchner		
Probe Operator	" "		

Cross-Section of Test Location



Amb. Temp. (°F)	96	Bar. Press.	2995 [in. Hg] [mbar]
Probe I.D. No.	67-8-20		
Liner Material	Glass		

Meter Box	66-13	Sample Box No.	66-19
Meter Y_d	0.9860	Meter $\Delta H_@$	1.8221
K Factor	2.6	Pitot C_p	.84
Leak Rate Before	.003 [cfm]	[Lpm] @	12 (in. Hg)
Leak Rate After	[cfm]	[Lpm] @	(in. Hg)
Pitot Leak Check Before: ☑	After: Good ☐	Bad ☐	

Filter No.	49		
Thimble No.	42		
Nozzle Diameter	.265	Nozzle I.D.	67-265-1

Duct Dimensions (in.)	96x96		
Static Pres ($in. H_2O$)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.8	16		

Start Time:	12:30	Stop Time:	14:46

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. 369.050 [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_f °F	Notes
5-1	5	.37	.96	871.88	309	252	252	65	98	99	3.5	8.2	
2	10	.37	.96	874.61	307	251	251	53	99	98	3.5	8.1	
3	15	.38	.99	877.41	307	249	250	47	99	98	3.5	7.9	
4	20	.40	1.0	880.25	309	249	249	47	99	99	3.5	8.3	
5	25	.36	.94	882.97	309	249	252	49	100	98	3.5	8.2	Stop Test 12:55 Change Port
4-1	30	.34	.88	885.70	308	250	251	61	96	96	3.5	8.2	New V=383.01 ΔV=.10 Restart 12:57
2	35	.34	.88	888.34	309	250	255	58	97	96	3.5	8.0	
3	40	.35	.91	891.05	308	249	251	59	97	95	3.5	8.0	
4	45	.38	.99	893.83	308	251	251	52	98	95	3.5	8.3	
5	50	.33	.86	896.46	308	248	249	51	98	95	3.5	8.2	Stop Test 13:22 Change Port
3-1	55	.35	.91	899.26	305	252	251	61	97	95	3.5	8.7	New V=896.56 ΔV=.10 Restart 13:24
2	60	.36	.94	901.99	307	252	250	58	98	95	3.5	8.9	
3	65	.40	1.0	904.790	308	250	252	60	98	95	4	8.7	
	Total	*7.8382	12.2500	71.850	~~4398~~					2528			
	Average	.6335	1.0360		307.800				98.5600				

Sum of square roots. Subtract .65 From Total V

Circle correct bracketed units on data sheet.

QA/QC KAK
Date 9-17-08

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 6

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 10455
Plant: N. Broward	Date: 9-17-08
Meter Operator: K.K.	
Probe Operator: K.K	

Cross-Section of Test Location

[N] [UP]

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

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³)[L] 904.790	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	~~XAD Trap Temp.~~ T_t ~~(°F)~~ O_2	Notes
3-4	70	.48	1.2	907.85	310	248	254	62	101	96	4.5	9.1	
5	75	.47	1.2	910.98	310	251	254	58	103	97	4.5	8.5	Stop Test 13:49 Change Port
2-1	80	.40	1.0	913.93	308	250	252	55	98	97	4	8.7	New V=911.10 ΔV=.12 Restart 13:52
2	85	.40	1.0	916.73	308	251	248	47	99	96	4	8.6	
3	90	.46	1.2	919.92	309	251	252	47	102	98	4.5	8.6	
4	95	.51	1.3	923.18	309	249	247	46	103	98	5	8.0	
5	100	.49	1.3	926.46	309	251	249	49	103	98	5	8.7	Stop Test 14:17 Change Port
1-1	105	.37	.96	929.55	307	251	249	63	101	99	4	8.9	New V=926.77 ΔV=.31 Restart 14:21
2	110	.40	1.0	932.35	306	250	252	57	102	99	4	8.5	
3	115	.38	.99	935.16	304	248	251	58	103	99	4	9.1	
4	120	.48	1.2	938.28	306	248	251	60	105	100	4.5	8.8	
5	125	.51	1.3	941.550	307	255	248	59	104	99	5	8.7	
	Total	*.9998	13.6500		3693					2400			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC K.K

Date 9-17-08

CleanAir ENGINEERING

ORSAT READINGS

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

Client	WHEELABRATOR	Project Number	10455	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	BROWARD - NORTH	Unit	2	
Orsat ID	#12	Fuel Type	MSW	Leak Check Passed ☑

Run Number	Method Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	F_O	Analyst	Analysis Date	Analysis Time
4	29	1	9.8	18.8	9.0	1.21	TR	9/17	11:11
		2	9.8	18.8	9.0				
		3	9.8	18.8	9.0				
		Avg.							
5	29	1	10.0	19.0	9.0	1.21	TR	9/17	1328
		2	10.0	19.0	9.0				
		3	10.0	19.0	9.0				
		Avg.							
6	29	1	10.0	19.0	9.0	1.21	TR	9/17	1537
		2	10.0	19.0	9.0				
		3	10.0	19.0	9.0				
		Avg.							
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							

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

Acceptable ranges for F_O:

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

QA/QC_____
Date_____

CleanAir ENGINEERING

Impinger Weight Sheet

Client	WHEELABRATOR			Unit Name / Location	2
Plant	BROWARD NORTH	Job No.	10455	Method	M29

Run No.	4	Filter Type	QUARTZ	—	Sample Box No.	M9
Date	9/17	Lot No.	55287	—	pH	—
Analyst	TR	Filter No.	—	—	Rinse	—

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	774.9	446.8	328.1	
Impinger 2	5% HNO_3 10% H_2O_2	625.1	550.6	74.5	QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	550.1	541.2	8.9	Date
Impinger 4	EMPTY	441.3	439.4	1.9	
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	526.1	~~525.6~~ TR	0.5	Total Weight (gm)
Impinger 6	4% $KMnO_4$ 10% H_2SO_4	540.0	539.3	0.7	414.6
Impinger 7	SILICA GEL	711.7	695.7	16.0	430.6

Run No.	5	Filter Type	QUARTZ	—	Sample Box No.	M1
Date	9/17	Lot No.	55287	—	pH	—
Analyst	TR	Filter No.	—	—	Rinse	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	762.0	446.3	315.7	
Impinger 2	5% HNO_3 10% H_2O_2	639.4	547.0	92.4	QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	558.4	549.9	8.5	Date
Impinger 4	EMPTY	527.3	526.3	1.0	
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	567.3	566.1	1.2	Total Weight (gm)
Impinger 6	4% $KMnO_4$ 10% H_2SO_4	532.9	532.0	0.9	419.7
Impinger 7	EMPTY	682.0	668.9	13.1	432.8

Run No.	~~3~~ 5B 6	Filter Type	QUARTZ	—	Sample Box No.	- M9
Date	9/17	Lot No.	55287	—	pH	—
Analyst	TR	Filter No.	—	—	Rinse	—

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	782.5	445.0		
Impinger 2	5% HNO_3 10% H_2O_2	596.1	541.0		QA/QC
Impinger 3	5% HNO_3 10% H_2O_2	545.9	542.8		Date
Impinger 4	EMPTY	439.2	439.2		
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	527.0	526.9		Total Weight (gm)
Impinger 6	4% $KMnO_4$ 10% H_2SO_4	540.8	540.2		
Impinger 7	EMPTY	722.6	708.4		

CleanAir. ENGINEERING

QA/QC_____
Date_____

FIELD DATA PRINTOUTS

F

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Field Data Printout

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

Location: Unit 2 Outlet
Test Run: 1
Client: Wheelabrator North Broward, Inc.
Project No: 10455
Source Area (ft^2): 64.00000
Meter Operator: K. Kirchner 384
Probe Operator: K. Kirchner 384
Test Date: 9/16/08
Start Time: 08:04
Stop Time: 10:23
Leak Rate Before: 0.003 cfm @ 14 "Hg
Leak Rate After: 0.002 cfm @ 8 "Hg

Bar. Press. (in. Hg): 30.00
Static P: -9.8
O_2 (dry volume %): 8.80
CO_2 (dry volume %): 9.47
N_2+CO (dry volume %): 81.73

H_2O (condensate, ml or gm): 388.8
H_2O (silica, g): 14.3
Actual Moisture (%): 22.31

Nozzle ID No: 66-265-1
Nozzle Diameter (D_n): 0.265
Probe ID No: 67-8-20
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

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

Traverse Point	Run Time 5.0 min/read	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (dcf)	Stack T_s (°F)	Dry Gas Meter $T_{m\text{-}in}$ (°F)	Dry Gas Meter $T_{m\text{-}out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{in.\ H_2O}$)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			503.900						
5-01	5.0	0.35	0.89	506.580	309	82	82	0.59	2.68	103.4
5-02	10.0	0.39	0.99	509.330	308	84	82	0.62	2.75	100.2
5-03	15.0	0.38	0.96	512.090	308	88	83	0.62	2.76	101.5
5-04	20.0	0.33	0.83	514.670	309	89	83	0.57	2.58	101.7
5-05	25.0	0.30	0.76	517.110	309	90	84	0.55	2.44	100.7
LEAK CHECK	25.0			517.210						
4-01	30.0	0.35	0.89	519.730	309	87	84	0.59	2.52	96.6
4-02	35.0	0.35	0.89	522.400	308	90	84	0.59	2.67	102.0
4-03	40.0	0.33	0.86	524.950	308	92	85	0.57	2.55	100.0
4-04	45.0	0.36	0.94	527.650	308	92	86	0.60	2.70	101.3
4-05	50.0	0.33	0.86	530.210	308	92	86	0.57	2.56	100.3
LEAK CHECK	50.0			530.330						
3-01	55.0	0.34	0.88	532.820	309	89	86	0.58	2.49	96.5
3-02	60.0	0.38	0.99	535.610	308	91	86	0.62	2.79	102.0
3-03	65.0	0.36	0.94	538.310	308	92	86	0.60	2.70	101.3
3-04	70.0	0.35	0.91	540.950	308	92	87	0.59	2.64	100.4
3-05	75.0	0.32	0.83	543.510	308	92	86	0.57	2.56	101.9
LEAK CHECK	75.0			543.630						
2-01	80.0	0.34	0.88	546.240	308	90	87	0.58	2.61	100.8
2-02	85.0	0.37	0.96	548.950	309	92	87	0.61	2.71	100.3
2-03	90.0	0.52	1.40	552.250	308	93	87	0.72	3.30	103.0
2-04	95.0	0.53	1.40	555.590	309	95	88	0.73	3.34	103.0
2-05	100.0	0.50	1.30	558.820	309	95	88	0.71	3.23	102.5
LEAK CHECK	100.0			558.960						
1-01	105.0	0.47	1.20	561.980	308	91	88	0.69	3.02	99.1
1-02	110.0	0.43	1.10	564.970	309	94	89	0.66	2.99	102.3
1-03	115.0	0.42	1.10	567.940	307	95	89	0.65	2.97	102.6
1-04	120.0	0.40	1.00	570.770	307	96	89	0.63	2.83	100.1
1-05	125.0	0.44	1.10	573.680	307	96	89	0.66	2.91	98.1
Final	125.0		0.99440	69.30000	308.24000	88.60000		0.61906	69.30000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6191	1.0358	69.3000	308.2400	88.6000				
		☑ 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 Outlet
Test Run: 2
Client: Wheelabrator North Broward, Inc.
Project No: 10455
Source Area (ft^2): 64.00000
Meter Operator: K. Kirchner 384
Probe Operator: K. Kirchner 384
Test Date: 9/16/08
Start Time: 10:43
Stop Time: 12:58
Leak Rate Before: 0.003 cfm @ 15 "Hg
Leak Rate After: 0.002 cfm @ 8 "Hg

Bar. Press. (in. Hg): 30.00
Static P: -9.7
O_2 (dry volume %): 8.80
CO_2 (dry volume %): 9.80
N_2+CO (dry volume %): 81.40
H_2O (condensate, ml or gm): 421.8
H_2O (silica, g): 14.4
Actual Moisture (%): 23.64

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

Traverse Point	Run Time 5.0 min/read	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (dcf)	Stack T_s (°F)	Dry Gas Meter $T_{m\text{-}in}$ (°F)	Dry Gas Meter $T_{m\text{-}out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{in.\ H_2O}$)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			575.950						
5-01	5.0	0.34	0.88	578.660	309	91	90	0.58	2.71	106.0
5-02	10.0	0.34	0.88	581.270	308	94	90	0.58	2.61	101.7
5-03	15.0	0.37	0.96	584.010	308	96	91	0.61	2.74	102.1
5-04	20.0	0.50	1.30	587.170	310	98	91	0.71	3.16	101.3
5-05	25.0	0.48	1.20	590.260	310	99	92	0.69	3.09	100.9
LEAK CHECK	25.0			590.380						
4-01	30.0	0.34	0.88	592.940	310	99	95	0.58	2.56	99.0
4-02	35.0	0.35	0.91	595.590	308	99	95	0.59	2.65	100.9
4-03	40.0	0.36	0.94	598.330	308	99	94	0.60	2.74	103.0
4-04	45.0	0.41	1.10	601.320	308	101	96	0.64	2.99	104.9
4-05	50.0	0.44	1.10	604.290	309	103	97	0.66	2.97	100.4
LEAK CHECK	50.0			604.420						
3-01	55.0	0.32	0.83	606.960	307	98	96	0.57	2.54	101.1
3-02	60.0	0.37	0.96	609.710	307	101	97	0.61	2.75	101.4
3-03	65.0	0.38	0.99	612.560	307	102	97	0.62	2.85	103.6
3-04	70.0	0.37	0.96	615.320	308	101	97	0.61	2.76	101.8
3-05	75.0	0.34	0.88	617.900	308	102	98	0.58	2.58	99.1
LEAK CHECK	75.0			618.010						
2-01	80.0	0.45	1.20	621.130	307	98	97	0.67	3.12	104.7
2-02	85.0	0.43	1.10	624.100	307	100	97	0.66	2.97	101.7
2-03	90.0	0.40	1.00	626.930	309	102	98	0.63	2.83	100.3
2-04	95.0	0.40	1.00	629.760	308	101	98	0.63	2.83	100.4
2-05	100.0	0.42	1.10	632.700	308	101	98	0.65	2.94	101.8
LEAK CHECK	100.0			632.810						
1-01	105.0	0.38	0.99	635.670	306	97	97	0.62	2.86	104.4
1-02	110.0	0.41	1.10	638.600	306	99	97	0.64	2.93	102.8
1-03	115.0	0.39	1.00	641.430	306	101	97	0.62	2.83	101.6
1-04	120.0	0.40	1.00	644.290	308	102	98	0.63	2.86	101.3
1-05	125.0	0.39	1.00	647.100	302	102	98	0.62	2.81	100.4
Final	125.0		1.01040	70.68000	307.68000	97.54000		0.62449	70.68000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6245	1.0104	70.6800	307.6800	97.5400				
		☐ 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 Outlet
Test Run: 3
Client: Wheelabrator North Broward, Inc.
Project No: 10455
Source Area (ft^2): 64.00000
Meter Operator: K. Kirchner 384
Probe Operator: K. Kirchner 384
Test Date: 9/16/08
Start Time: 13:18
Stop Time: 15:35
Leak Rate Before: 0.003 cfm @ 12 "Hg
Leak Rate After: 0.002 cfm @ 8 "Hg

Bar. Press. (in. Hg): 30.00
Static P: -9.7
O_2 (dry volume %): 8.80
CO_2 (dry volume %): 9.80
N_2+CO (dry volume %): 81.40
H_2O (condensate, ml or gm): 416.7
H_2O (silica, g): 14.0
Actual Moisture (%): 23.29

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

Traverse Point	Run Time 5.0 min/read	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (dcf)	Stack T_s (°F)	Dry Gas Meter $T_{m\text{-}in}$ (°F)	Dry Gas Meter $T_{m\text{-}out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{}$in. H_2O)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			648.960						
5-01	5.0	0.37	0.96	651.920	308	97	98	0.61	2.96	109.1
5-02	10.0	0.45	1.20	655.030	308	101	98	0.67	3.11	103.6
5-03	15.0	0.36	0.94	657.860	307	100	98	0.60	2.83	105.4
5-04	20.0	0.34	0.88	660.520	307	100	97	0.58	2.66	102.0
5-05	25.0	0.32	0.83	663.060	307	98	97	0.57	2.54	100.6
LEAK CHECK	25.0			663.170						
4-01	30.0	0.40	1.00	666.020	308	98	97	0.63	2.85	101.0
4-02	35.0	0.37	0.96	668.770	308	100	97	0.61	2.75	101.2
4-03	40.0	0.37	0.96	671.480	307	101	98	0.61	2.71	99.5
4-04	45.0	0.33	0.86	674.080	307	98	96	0.57	2.60	101.5
4-05	50.0	0.32	0.83	676.670	308	99	97	0.57	2.59	102.5
LEAK CHECK	50.0			676.770						
3-01	55.0	0.32	0.83	679.360	308	97	97	0.57	2.59	102.7
3-02	60.0	0.37	0.96	682.170	309	100	97	0.61	2.81	103.5
3-03	65.0	0.37	0.96	684.950	307	101	97	0.61	2.78	102.1
3-04	70.0	0.38	0.99	687.770	307	101	97	0.62	2.82	102.2
3-05	75.0	0.36	0.94	690.540	307	101	98	0.60	2.77	103.1
LEAK CHECK	75.0			690.660						
2-01	80.0	0.40	1.00	693.480	307	101	99	0.63	2.82	99.5
2-02	85.0	0.40	1.00	696.300	307	102	99	0.63	2.82	99.4
2-03	90.0	0.43	1.10	699.300	307	103	100	0.66	3.00	101.8
2-04	95.0	0.53	1.40	702.670	308	102	100	0.73	3.37	103.3
2-05	100.0	0.50	1.30	705.930	309	102	100	0.71	3.26	102.9
LEAK CHECK	100.0			706.110						
1-01	105.0	0.43	1.10	709.090	309	98	100	0.66	2.98	101.7
1-02	110.0	0.39	1.00	711.910	308	101	99	0.62	2.82	100.8
1-03	115.0	0.38	0.99	714.690	305	102	98	0.62	2.78	100.5
1-04	120.0	0.43	1.10	717.670	307	101	97	0.66	2.98	101.6
1-05	125.0	0.46	1.20	720.810	306	99	96	0.68	3.14	103.7
Final	125.0		1.01160	71.34000	307.44000	99.00000		0.62409	71.34000	
25 points sampled		Sq.RtΔP								
QC-Check: Field Averages		0.6241	1.0116	71.3400	307.4400	99.0000				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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USEPA Method 3 Laboratory Data

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

Location: Unit 2 Outlet
Client: Wheelabrator North Broward, Inc.
Project No: 10455
Method: EPA Method 3
Fuel Type: Municipal Waste
F_o for Fuel: 1.03 to 1.3

Analyst: T. Richards
Analyst Emp No: 714

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
1	1	9.2	17.2	8.0	82.8	29.79		
	2	9.6	18.8	9.2	81.2	29.90		
	3	9.6	18.8	9.2	81.2	29.90		
	Avg.	9.46667		8.80000	81.73333	29.87	1.27817	*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	18.6	8.8	81.4	29.92		
	2	9.8	18.6	8.8	81.4	29.92		
	3	9.8	18.6	8.8	81.4	29.92		
	Avg.	9.80000		8.80000	81.40000	29.92	1.23469	*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	18.6	8.8	81.4	29.92		
	2	9.8	18.6	8.8	81.4	29.92		
	3	9.8	18.6	8.8	81.4	29.92		
	Avg.	9.80000		8.80000	81.40000	29.92	1.23469	*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 Outlet
Client: Wheelabrator North Broward, Inc.
Project No: 10455

Test Method: USEPA Method 29
Analyte: Mercury
Analyst: B. Preksta
Analyst Emp No: 32

Test Run: 1

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	733.2	443.3	289.9
Impinger 2	5%HNO3/10%H2O2	623.3	542.6	80.7
Impinger 3	5%HNO3/10%H2O2	552.6	541.0	11.6
Impinger 4	Empty	441.8	438.0	3.8
Impinger 5	4%KMnO4/10%H2SO4	535.4	533.3	2.1
Impinger 6	4%KMnO4/10%H2SO4	546.9	546.2	0.7
Impinger 7	Silica Gel	731.3	717.0	14.3
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
388.8	Liquid (gm)		
0.0	less rinse (gm)		
388.8	Net Liquid (gm)	389.9	☐ QA/QC OK
+ 14.3	Silica Gel (gm)	14.3	☑ QA/QC OK
403.1	Total Vlc (gm)	404.2	☐ QA/QC OK

Test Run: 2

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	782.7	442.9	339.8
Impinger 2	5%HNO3/10%H2O2	628.0	555.1	72.9
Impinger 3	5%HNO3/10%H2O2	555.6	550.1	5.5
Impinger 4	Empty	526.5	524.8	1.7
Impinger 5	4%KMnO4/10%H2SO4	567.4	567.8	-0.4
Impinger 6	4%KMnO4/10%H2SO4	534.5	532.2	2.3
Impinger 7	Silica Gel	738.4	724.0	14.4
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
421.8	Liquid (gm)		
0.0	less rinse (gm)		
421.8	Net Liquid (gm)	421.8	☑ QA/QC OK
+ 14.4	Silica Gel (gm)	14.4	☑ QA/QC OK
436.2	Total Vlc (gm)	436.2	☑ QA/QC OK

Test Run: 3

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	792.6	445.0	347.6
Impinger 2	5%HNO3/10%H2O2	609.0	546.6	62.4
Impinger 3	5%HNO3/10%H2O2	548.7	543.6	5.1
Impinger 4	Empty	440.5	440.3	0.2
Impinger 5	4%KMnO4/10%H2SO4	526.0	524.9	1.1
Impinger 6	4%KMnO4/10%H2SO4	542.0	541.7	0.3
Impinger 7	Silica Gel	664.3	650.3	14.0
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
416.7	Liquid (gm)		
0.0	less rinse (gm)		
416.7	Net Liquid (gm)	416.7	☑ QA/QC OK
+ 14.0	Silica Gel (gm)	14.0	☑ QA/QC OK
430.7	Total Vlc (gm)	430.7	☑ QA/QC OK

Test Run:

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

Rinse: (ml or gm)

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

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LABORATORY DATA

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Wheelabrator North Broward, Inc.
Clean Air Project No: 10455
Unit 2 Outlet

USEPA Method 29
Mercury (Hg) Laboratory Parameters

Detection Limits		
$m_{1b\text{-}DL}$	Fraction 1B Detection Limit (µg)	0.0000
$m_{2b\text{-}DL}$	Fraction 2B Detection Limit (µg)	0.0000
$m_{3a\text{-}DL}$	Fraction 3A Detection Limit (µg)	0.0000
$m_{3b\text{-}DL}$	Fraction 3B Detection Limit (µg)	0.0000
$m_{3c\text{-}DL}$	Fraction 3C Detection Limit (µg)	0.0000
Blank Analysis		
$m_{1b\text{-}B}$	Fraction 1B Blank (µg)	<0.1000
$m_{2b\text{-}B}$	Fraction 2B Blank (µg)	<0.2000
$m_{3a\text{-}B}$	Fraction 3A Blank (µg)	<0.2000
$m_{3b\text{-}B}$	Fraction 3B Blank (µg)	<0.5000
$m_{3c\text{-}B}$	Fraction 3C Blank (µg)	<0.4000
$m_{total\text{-}B}$	Total Blank Amount (µg)	<1.4000

Run No.		**1**	**2**	**3**
Date (2008)		Sep 16	Sep 16	Sep 16
Start Time (approx.)		08:04	10:43	13:18
Stop Time (approx.)		10:23	12:58	15:35
Sample Analysis				
$m_{1b\text{-}S}$	Fraction 1B Sample (µg)	<0.1000	<0.1000	<0.1000
$m_{2b\text{-}S}$	Fraction 2B Sample (µg)	12.9156	14.3406	15.8261
$m_{3a\text{-}S}$	Fraction 3A Sample (µg)	<0.2000	<0.2000	<0.2000
$m_{3b\text{-}S}$	Fraction 3B Sample (µg)	<0.5000	<0.5000	<0.5000
$m_{3c\text{-}S}$	Fraction 3C Sample (µg)	<0.4000	<0.4000	<0.4000
$m_{total\text{-}S}$	Total Sample Amount (µg)	12.9156	14.3406	15.8261
Allowable Blank				
$m_{T\text{-}B\text{-}allow}$	Total Allowable Blank (µg)	0.0000	0.0000	0.0000
Sample Corrected for Blank				
m_n	Total Sample Amount (µg)	12.9156	14.3406	15.8261
Sample Corrected for Blank - Prorated Fractions				
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000
$m_{n\text{-}2b}$	Fraction 2B (µg)	12.9156	14.3406	15.8261
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000

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Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 10455 North Broward

Mercury

EPA Method 29 Analysis

Analytical Report
11419

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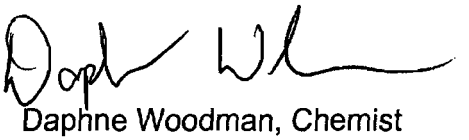
Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX: 910-792-6853 e1lab@e1lab.com

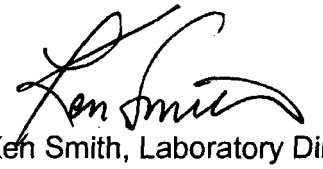
The following data for Analytical Report 11419
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:



Daphne Woodman, Chemist
September 25, 2008

Report Reviewed and Finalized By:



Ken Smith, Laboratory Director
September 25, 2008

SUMMARY OF RESULTS

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Summary of Analysis

Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front half µg	H_2O_2 /HNO_3 µg	Empty Impinger µg	$KMnO_4$ µg	HCl µg
U2 FF O-N R1	#1	12.9	< 0.1	12.9	< 0.2	< 0.5	< 0.4
	#2		< 0.1	12.9	< 0.2	< 0.5	< 0.4
U2 FF O-N R2	#1	14.3	< 0.1	14.3	< 0.2	< 0.5	< 0.4
	#2		< 0.1	14.3	< 0.2	< 0.5	< 0.4
U2 FF O-N R3	#1	15.8	< 0.1	15.8	< 0.2	< 0.5	< 0.4
	#2		< 0.1	15.9	< 0.2	< 0.5	< 0.4
North Field Blank	#1	< 0.5	< 0.1	< 0.3	< 0.2	< 0.5	----
	#2		< 0.1	< 0.3	< 0.2	< 0.5	----
North Reagent Blank	#1	< 0.5	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.2	< 0.2	< 0.5	< 0.4

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ANALYTICAL NARRATIVE

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Element One Analytical Narrative

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

Summary of Analysis

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

Detection Limits

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

Analysis QA/QC

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

Additional Comments

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

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QUALITY CONTROL SUMMARY

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Summary of Quality Control Data

Mercury Duplicate Analysis RPD

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

Run Number	Front half	H_2O_2/HNO_3	Empty Imp	$KMnO_4$	HCl
U2 FF O-N R1	NA	0.2%	NA	NA	NA
U2 FF O-N R2	NA	0.1%	NA	NA	NA
U2 FF O-N R3	NA	0.8%	NA	NA	NA
North Field Blank	NA	NA	NA	NA	----
North 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 O-N R3	#1	100%	86%	101%	91%	88%
	#2	101%	86%	101%	90%	89%

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SAMPLE CUSTODY

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11419

CHAIN OF CUSTODY FORM

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

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	1	UNIT 2 TR ~~Unit 3~~ FF Outlet		Filter	1	N/A	x				
	1	"		Front-Half 0.1N HNO3 Rinse	1	195.9	x				
	1	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1	809.7	x				
	1	"		Imp. 4 + 0.1N HNO3 Rinse	1	314.9	x				
	1	"		Imp. 5,6 KMnO4+H2O Rinse	1	757.4	x				
	1	"		Imp. 5,6 HCl Rinse	1	477.6	x				
		"									
		"									
	2	"		Filter	1	N/A	x				
	2	"		Front-Half 0.1N HNO3 Rinse	1	163.1	x				
	2	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1	862.4	x				
	2	"		Imp. 4 + 0.1N HNO3 Rinse	1	313.9	x				
	2	"		Imp. 5,6 KMnO4+H2O Rinse	1	793.3	x				
	2	V		Imp. 5,6 HCl Rinse	1	422.6	x				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
R. Preksta	9/19	Lisa Bratton	9/22/08 0918		
Courier: FED EX	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC
PO Number:

This form was completed by: Bob Preksta
Signature R. Preksta Date 9/19

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

CLS

11419

CHAIN OF CUSTODY FORM

CLIENT Wheelabrator
PLANT North Broward
PROJECT MANAGER Scott Brown

PROJECT NO. 10455
DEPT. 66

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	3	~~Unit 3 FF Outlet~~ UNIT 2 TR		Filter	1		x				
	3	"		Front-Half 0.1N HNO3 Rinse	1	160.7	x				
	3	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1	832.7	x				
	3	"		Imp. 4 + 0.1N HNO3 Rinse	1	303.2	x				
	3	"		Imp. 5,6 KMnO4+H2O Rinse	1	846.1	x				
	3	"		Imp. 5,6 HCl Rinse	1	415	x				
		"									
		"									
	FB	"		Filter	1		x				
	FB	"		Front-Half 0.1N HNO3 Rinse	1	132.3	x				
	FB	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1	353.4	x				
	FB	"		Imp. 4 + 0.1N HNO3 Rinse	1	305	x				
	FB	"		Imp. 5,6 KMnO4+H2O Rinse	1	938.8	x				
	FB	V		Imp. 5,6 HCl Rinse	~~0~~	—	x				

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R. Preksta 9/19

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CHAIN OF CUSTODY FORM

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

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Archive (Hg)				ADDITIONAL INFORMATION
	4	Unit 2 TR ~~Unit 3 FF~~ Outlet		Filter	1		x				
	4			Front-Half 0.1N HNO3 Rinse	1	181.3	x				
	4			Imp. 1,2,3 + 0.1N HNO3 Rinse	1	~~181.3~~	x	893.9			
	4			Imp. 4 + 0.1N HNO3 Rinse	1	313.6	x				
	4			Imp. 5,6 KMnO4+H2O Rinse	1	953.2	x				
	4			Imp. 5,6 HCl Rinse	1	430.0	x				
	5			Filter	1	–	x				
	5			Front-Half 0.1N HNO3 Rinse	1	162.0	x				
	5			Imp. 1,2,3 + 0.1N HNO3 Rinse	1	859.2	x				
	5			Imp. 4 + 0.1N HNO3 Rinse	1	291.6	x				
	5			Imp. 5,6 KMnO4+H2O Rinse	1	925.4	x				
	5	V		Imp. 5,6 HCl Rinse	1	364.8	x				

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TR Preksta	9/19	Lisa Bratton	9/22/08 0918		
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11419

CHAIN OF CUSTODY FORM

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

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Archive (Hg)				ADDITIONAL INFORMATION
	6	~~Unit 3~~ Unit 2 FF Outlet		Filter		1	x				
	6			Front-Half 0.1N HNO3 Rinse	168.4	1	x				
	6			Imp. 1,2,3 + 0.1N HNO3 Rinse	480.1	1	x				
	6			Imp. 4 + 0.1N HNO3 Rinse	329.6	1	x				
	6			Imp. 5,6 KMnO4+H2O Rinse	983.9	1	x				
	6	V		Imp. 5,6 HCl Rinse	422.6	1	x				
				Filter							
				Front-Half 0.1N HNO3 Rinse							
				Imp. 1,2,3 + 0.1N HNO3 Rinse							
				Imp. 4 + 0.1N HNO3 Rinse							
				Imp. 5,6 KMnO4+H2O Rinse							
				Imp. 5,6 HCl Rinse							

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R. Preksta	9/19	Lisa Bratton	9/22/08 0918		
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CHAIN OF CUSTODY FORM

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

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

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
R. Preksta	9/19	Lisa Bratton	9/22/08 0918		
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time

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Signature R. Preksta Date 9/19

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ANALYTICAL DATA

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Analytical Calculations

Metals-

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

Where-

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

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

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

Mercury-

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

Where-

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

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

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

Arcadis One AIR TESTING SAMPLE SUBMISSION FORM Lab ID 11419

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

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

Date Rec	09.22.08
Time Rec	0918

HNO_3 Lot: 074993	HF Lot: 5107113	HCl Lot: 410803	**Ref. Method: 29**
Volume Marked Y / N	Volume Loss Y / N / ?		

Sample Identification

1	U3 FF Outlet-North R1	4	North Field Blank	6	U3 FF Outlet North R4
2	U3 FF Outlet North R2	5	North Reagent Blank	7	U3 FF Outlet North R5
	U3 FF Outlet North R2 Duplicate				U3 FF Outlet North R5 Duplicate
3	U3 FF Outlet North R3			8	U3 FF Outlet North R6
	U3 FF Outlet North R3 Spike				U3 FF Outlet North R6 Spike

Analyses Requested

Samples 1-5	Hg
Samples 6-8	**ARCHIVE**

Runs / FB	Acetone (FH)		HNO_3 (FH)		5% HNO_3/10% H_2O_2 (BH)			HNO_3 (A)		$KMnO_4$ (B)		HCl (C)	
	pH <2.0 Y / N		pH <2.0 Y / N		pH <2.0 Y / N			pH <2.0 (Y) / N		pH <2.0 (Y) / N		pH <2.0 (Y) N	
Lab ID	BV ml	FV ml	BV ml	FV ml	BV ml	Used	FV ml	BV ml	FV ml	BV ml	FV ml	BV ml	FV ml
1			166		720			110	200	290	500	270	400
2.D			134		780			115		330		210	
3.S			140		750			100		390		210	V
4			106		300			105	V	490	V		
6													
7.D													
8.S													

Reagent Blank

Lab ID	Fraction			SV, ml	BV, ml	Used	FV, ml	pH	Prep By / Date
5	C-7	FH	Acetone Blank						
	C-8	FH	0.1N HNO_3			100			
	C-8	FH/A	0.1N HNO_3	310					
	C-8	B	DI H_2O	206		33			
	C-9	BH	5% HNO_3/10% H_2O_2	210					
	C-10	B	4% $KmnO_4$/10%H_2SO_4	180		100			
	C-11	C	8N HCl & DI	100			400		
	C-12	FH	Filter						

Lab Communications ESS 9.24.08

11419-~~5B~~ 4B and 12B Filters were combined back with B fractions.

SS Page 1 of 2
SS by LLB
9/22/2008 11:35:24 AM

FH Prep By/Date 9.24.08 ESS
BH Prep By/Date 9.23.08 ESS
BH/FH Prep By/Date NA
Labeled By/Date 9.23.08 ESS

A Prep By/Date 9.23.08 ESS
B Prep By/Date 9.23.08 ESS
C Prep By/Date 9.24.08 ESS
ID Verification By/Date RLC 9/23/08

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Method 29 Microwave Worksheet

Lab ID # e 11419 / 11411

Client: Clean Air Engr

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

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

Element One, Inc. Form 104 - Revision 1.0

6mls HNO_3 074993

3mls HF 5107113

18

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
Calib Blank	9/24/2008	8:31:04	0.00055351			µg			0.00055351					
STD1=.004ug	9/24/2008	8:32:18	0.00109113			µg			0.00109113					
STD2=.04ug	9/24/2008	8:33:33	0.01397292			µg			0.01397292					
STD3=.08ug	9/24/2008	8:34:49	0.02660077			µg			0.02660077					
STD4=.16ug	9/24/2008	8:36:05	0.05220641			µg			0.05220641					
STD5=.2ug	9/24/2008	8:37:23	0.06635198			µg			0.06635198					
0.004ug = DL	9/24/2008	8:40:22	0.00132077	0.00399822	0.00399822	µg			0.00132077	0.00399822	0.00399822			
0.080ug = STD.2	9/24/2008	8:41:38	0.02526573	0.07648412	0.07648412	µg			0.02526573	0.07648412	0.07648412			
0.080ug = QC STD 3	9/24/2008	8:42:57	0.02485844	0.07525119	0.07525119	µg			0.02485844	0.07525119	0.07525119			
11419-1BH	9/24/2008	8:45:57	0.02370295	0.07175331	12.9155964	µg	4	720	0.02367703	0.07167483	12.9014699	0.02372888	0.07183179	12.9297229
11419-2BH	9/24/2008	8:47:41	0.02514532	0.07611963	14.8433278	µg	4	780	0.025262	0.07647283	14.9122036	0.02502864	0.07576642	14.7744521
11419-2BH DUP	9/24/2008	8:49:26	0.02429375	0.07354177	14.3406459	µg	4	780	0.02430886	0.07358751	14.3495647	0.02427864	0.07349603	14.3317271
11419-3BH	9/24/2008	8:51:12	0.0278826	0.08440588	15.826104	µg	4	750	0.02777785	0.08408878	15.7666473	0.02798735	0.08472299	15.8855607
11419-3BH SPK	9/24/2008	8:52:59	0.05060693	0.15319671	28.7243839	µg	4	750	0.05067536	0.15340386	28.7632246	0.0505385	0.15298956	28.6855433
11419-4BH	9/24/2008	8:54:47	0.00017678	0.00053515	0.04013686	µg	4	300	0.00020983	0.0006352	0.04764065	0.00014373	0.0004351	0.03263306
11419-5BH	9/24/2008	8:56:36	0.0000134	0.00004057	0.00213006	µg	4	210	0.000037	0.000112	0.00588032	-0.0000101	-0.0000308	-0.0016202
0.004ug = DL	9/24/2008	9:03:11	0.00124051	0.00375527	0.00375527	µg	4	690	0.00124051	0.00375527	0.00375527			
0.080ug = STD.2	9/24/2008	9:04:27	0.0265941	0.08050536	0.08050536	µg	4	690	0.0265941	0.08050536	0.08050536			
REAGENT BLANK	9/24/2008	9:05:43	0.00007641	0.00023131	0.00023131	µg	4	690	0.00007641	0.00023131	0.00023131			
11419-1B	9/24/2008	9:14:25	-0.000114	-0.0003451	-0.0431427	µg	4	500	-0.0001044	-0.0003162	-0.0395271	-0.0001235	-0.000374	-0.0467582
11419-2B	9/24/2008	9:16:11	-0.0000265	-0.0000803	-0.0100403	µg	4	500	-0.0000053	-0.000016	-0.0020121	-0.0000477	-0.0001445	-0.0180684
11419-2B DUP	9/24/2008	9:17:57	0.00000744	0.00002254	0.00281831	µg	4	500	0.00002257	0.00006833	0.00854165	-0.0000076	-0.0000232	-0.002905
11419-3B	9/24/2008	9:19:44	-0.0001207	-0.0003656	-0.0457058	µg	4	500	-0.0001694	-0.0005128	-0.0641046	-0.0000721	-0.0002184	-0.0273069
11419-3B SPK	9/24/2008	9:21:32	0.02396389	0.0725432	9.06790058	µg	4	500	0.02406279	0.07284261	9.10532699	0.02386498	0.07224379	9.03047418
11419-4B	9/24/2008	9:23:20	-0.0002184	-0.0006612	-0.0826612	µg	4	500	-0.000229	-0.0006932	-0.0866589	-0.0002078	-0.0006293	-0.0786635
0.004ug = DL	9/24/2008	9:24:35	0.00121892	0.00368991	0.00368991	µg	4	500	0.00121892	0.00368991	0.00368991			
0.080ug = STD.2	9/24/2008	9:25:51	0.02572314	0.07786879	0.07786879	µg	4	500	0.02572314	0.07786879	0.07786879			
REAGENT BLANK	9/24/2008	9:27:07	0.00009965	0.00030166	0.00030166	µg	4	500	0.00009965	0.00030166	0.00030166			
11419-5B	9/24/2008	9:28:54	-0.000281	-0.0008506	-0.1063347	µg	4	500	-0.000237	-0.0007176	-0.0897067	-0.0003249	-0.0009837	-0.1229627
11419-1A	9/24/2008	9:43:00	0.00085493	0.00258805	0.12940299	µg	4	200	0.00084171	0.00254803	0.1274019	0.00086815	0.00262808	0.13140409
11419-2A	9/24/2008	9:44:45	-0.0001153	-0.0003491	-0.0174591	µg	4	200	-0.000147	-0.000445	-0.0222509	-0.0000836	-0.0002533	-0.0126673
0.004ug = DL	9/24/2008	9:45:58	0.00132039	0.00399709	0.00399709	µg	4	200	0.00132039	0.00399709	0.00399709			
0.080ug = STD.2	9/24/2008	9:47:14	0.02499462	0.07566343	0.07566343	µg	4	200	0.02499462	0.07566343	0.07566343			
REAGENT BLANK	9/24/2008	9:48:30	0.00014588	0.00044162	0.00044162	µg	4	200	0.00014588	0.00044162	0.00044162			
Calib Blank	9/24/2008	11:22:34	0.00051398			µg	4	200	0.00051398					
STD1=.004ug	9/24/2008	11:23:48	0.0013245			µg	4	200	0.0013245					
STD2=.04ug	9/24/2008	11:25:03	0.01369345			µg	4	200	0.01369345					
STD3=.08ug	9/24/2008	11:26:19	0.02586791			µg	4	200	0.02586791					
STD4=.16ug	9/24/2008	11:27:38	0.04965321			µg	4	200	0.04965321					
STD5=.2ug	9/24/2008	11:29:00	0.06101433			µg	4	200	0.06101433					
Reagent Blank	9/24/2008	11:30:46	0.00000437	0.00001413	0.00001413	µg	4	200	0.00002576	0.00008324	0.00008324	-0.000017	-0.0000549	-0.0000549
0.004ug = DL	9/24/2008	11:31:59	0.00133743	0.00432166	0.00432166	µg	4	200	0.00133743	0.00432166	0.00432166			
0.080ug = STD.2	9/24/2008	11:33:15	0.02530208	0.08175919	0.08175919	µg	4	200	0.02530208	0.08175919	0.08175919			
REAGENT BLANK	9/24/2008	11:34:31	0.00002747	0.00008878	0.00008878	µg	4	200	0.00002747	0.00008878	0.00008878			
0.080ug = STD.2	9/24/2008	11:35:47	0.02523164	0.08153158	0.08153158	µg	4	200	0.02523164	0.08153158	0.08153158			
0.080ug = QC STD 3	9/24/2008	11:37:06	0.02504438	0.08092648	0.08092648	µg	4	200	0.02504438	0.08092648	0.08092648			
REAGENT BLANK	9/24/2008	11:38:22	-0.0000022	-0.0000071	-0.0000071	µg	4	200	-0.0000022	-0.0000071	-0.0000071			
11419-2A DUP	9/24/2008	11:40:07	-0.0000682	-0.0002204	-0.0110202	µg	4	200	-0.0000392	-0.0001267	-0.0063354	-0.0000972	-0.0003141	-0.015705
11419-3A	9/24/2008	11:41:53	0.00021046	0.00068008	0.03400424	µg	4	200	0.00022798	0.0007367	0.03683507	0.00019294	0.00062346	0.03117341
11419-3A SPK	9/24/2008	11:43:39	0.02498569	0.08073683	4.03684182	µg	4	200	0.02503537	0.08089735	4.0448679	0.02493602	0.08057631	4.02881574
11419-4A	9/24/2008	11:45:26	-0.0000408	-0.0001318	-0.0065919	µg	4	200	-0.0000417	-0.0001347	-0.0067387	-0.0000398	-0.0001289	-0.006445
11419-5A	9/24/2008	11:47:14	-0.0001053	-0.0003403	-0.0170156	µg	4	200	-0.0001019	-0.0003293	-0.0164661	-0.0001087	-0.0003513	-0.0175651
0.004ug = DL	9/24/2008	11:57:27	0.00133276	0.00430659	0.00430659	µg	4	200	0.00133276	0.00430659	0.00430659			
0.080ug = STD.2	9/24/2008	11:58:43	0.02511147	0.08114326	0.08114326	µg	4	200	0.02511147	0.08114326	0.08114326			
REAGENT BLANK	9/24/2008	11:59:59	-0.0001009	-0.0003261	-0.0003261	µg	4	200	-0.0001009	-0.0003261	-0.0003261			
0.004ug = DL	9/24/2008	12:04:36	0.00125285	0.00404837	0.00404837	µg	4	200	0.00125285	0.00404837	0.00404837			
0.080ug = QC STD 3	9/24/2008	12:05:52	0.02486256	0.08033895	0.08033895	µg	4	200	0.02486256	0.08033895	0.08033895			
REAGENT BLANK	9/24/2008	12:07:09	-0.0000932	-0.0003014	-0.0003014	µg	4	200	-0.0000932	-0.0003014	-0.0003014			
Calib Blank	9/25/2008	8:46:58	0.00022763			µg			0.00022763					
STD1=.004ug	9/25/2008	8:48:12	0.00136324			µg			0.00136324					
STD2=.04ug	9/25/2008	8:49:26	0.01320324			µg			0.01320324					
STD3=.08ug	9/25/2008	8:50:43	0.02690959			µg			0.02690959					
STD4=.16ug	9/25/2008	8:51:59	0.05197953			µg			0.05197953					
STD5=.2ug	9/25/2008	8:53:17	0.06409655			µg			0.06409655					
0.004ug = DL	9/25/2008	9:00:18	0.00140789	0.00434979	0.00434979	µg			0.00140789	0.00434979	0.00434979			
0.080ug = STD.2	9/25/2008	9:01:33	0.02837434	0.08766487	0.08766487	µg			0.02837434	0.08766487	0.08766487			
0.080ug = QC STD 3	9/25/2008	9:02:52	0.02585156	0.07987055	0.07987055	µg			0.02585156	0.07987055	0.07987055			
11419-1C	9/25/2008	9:05:53	0.00051927	0.00160434	0.16043494	µg	4	400	0.00054527	0.00168466	0.1684665	0.00049328	0.00152403	0.15240337
11419-3C	9/25/2008	9:11:07	0.0006208	0.00191802	0.19180217	µg	4	400	0.00062803	0.00194035	0.1940358	0.00061357	0.00189568	0.16956853
11419-3C SPK	9/25/2008	9:12:54	0.02292035	0.07081433	7.08143356	µg	4	400	0.02284233	0.07057327	7.05732729	0.02299837	0.07105539	7.10553982
11419-5C	9/25/2008	9:14:42	-0.0000468	-0.0001447	-0.0144786	µg	4	400	-0.0000484	-0.0001496	-0.0149631	-0.0000452	-0.0001399	-0.0139941
0.004ug = DL	9/25/2008	9:23:04	0.0014303	0.00441904	0.00441904	µg	4	400	0.0014303	0.00441904	0.00441904			
0.004ug = DL	9/25/2008	9:24:16	0.00131685	0.00406852	0.00406852	µg	4	400	0.00131685	0.00406852	0.00406852			
0.080ug = STD.2	9/25/2008	9:25:33	0.02782888	0.08597964	0.08597964	µg	4	400	0.02782888	0.08597964	0.08597964			
REAGENT BLANK	9/25/2008	9:26:49	0.00001215	0.00003756	0.00003756	µg	4	400	0.00001215	0.00003756	0.00003756			
11419-LRB	9/25/2008	9:32:01	-0.0000409	-0.0001266	-0.003166	µg	4	100	-0.0000391	-0.0001209	-0.0030249	-0.0000428	-0.0001322	-0.0033071

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
11419-LRB SPK	9/25/2008	9:33:46	0.02483455	0.0767284	1.91821004	µg	4	100	0.02487738	0.07686074	1.92151862	0.02479171	0.07659605	1.91490147
11419-2FH	9/25/2008	9:37:18	0.00083845	0.00259048	0.06476208	µg	4	100	0.00086354	0.00266799	0.06669982	0.00081336	0.00251297	0.06282434
11419-2FH DUP	9/25/2008	9:39:06	0.00079863	0.00246743	0.06168599	µg	4	100	0.0008115	0.00250722	0.06268053	0.00078575	0.00242765	0.06069145
11419-3FH	9/25/2008	9:40:54	0.00043477	0.00134326	0.03358156	µg	4	100	0.00043141	0.0013329	0.03332255	0.00043812	0.00135362	0.03384057
11419-3FH SPK	9/25/2008	9:42:41	0.02603299	0.08043108	2.01077717	µg	4	100	0.02582944	0.07980221	1.99505528	0.02623653	0.08105996	2.02649905
11419-4FH	9/25/2008	9:44:30	0.00021329	0.000659	0.01647504	µg	4	100	0.00021853	0.00067518	0.01687964	0.00020805	0.00064281	0.01607044
0.004ug = DL	9/25/2008	9:45:45	0.00133668	0.0041298	0.0041298	µg	4	100	0.00133668	0.0041298	0.0041298			
0.080ug = STD.2	9/25/2008	9:47:00	0.02786541	0.0860925	0.0860925	µg	4	100	0.02786541	0.0860925	0.0860925			
REAGENT BLANK	9/25/2008	9:48:16	0.00002727	0.00008427	0.00008427	µg	4	100	0.00002727	0.00008427	0.00008427			
11419-5FH	9/25/2008	9:50:04	0.00009901	0.0003059	0.00764763	µg	4	100	0.00006741	0.00020826	0.00520673	0.00013061	0.00040354	0.01008854
0.004ug = DL	9/25/2008	10:07:04	0.0012894	0.00398372	0.00398372	µg	20	1	0.0012894	0.00398372	0.00398372			
0.080ug = STD.2	9/25/2008	10:08:20	0.02568317	0.07935028	0.07935028	µg	20	1	0.02568317	0.07935028	0.07935028			
REAGENT BLANK	9/25/2008	10:09:36	0.00002412	0.00007454	0.00007454	µg	20	1	0.00002412	0.00007454	0.00007454			
0.004ug = DL	9/25/2008	10:25:46	0.0012986	0.00401214	0.00401214	µg	40	1	0.0012986	0.00401214	0.00401214			
0.080ug = STD.2	9/25/2008	10:27:01	0.02518438	0.07780923	0.07780923	µg	40	1	0.02518438	0.07780923	0.07780923			
0.080ug = QC STD 3	9/25/2008	10:28:19	0.02460633	0.07602332	0.07602332	µg	40	1	0.02460633	0.07602332	0.07602332			
REAGENT BLANK	9/25/2008	10:29:36	-0.0000094	-0.0000293	-0.0000293	µg	40	1	-0.0000094	-0.0000293	-0.0000293			
11419-2C	9/25/2008	10:31:19	0.00065026	0.00200904	0.20090493	µg	4	400	0.00064877	0.00200445	0.20044531	0.00065175	0.00201364	0.20136455
11419-2C DUP	9/25/2008	10:36:05	0.00072566	0.002242	0.22420049	µg	4	400	0.00070398	0.00217503	0.21750341	0.00074734	0.00230897	0.23089757
11419-1FH	9/25/2008	10:37:51	0.0009729	0.00300585	0.07514646	µg	4	100	0.00096237	0.00297335	0.07433378	0.00098342	0.00303836	0.07595914
0.004ug = DL	9/25/2008	10:44:26	0.00126979	0.00392314	0.00392314	µg	40	1	0.00126979	0.00392314	0.00392314			
0.080ug = QC STD 3	9/25/2008	10:45:42	0.02439739	0.07537777	0.07537777	µg	40	1	0.02439739	0.07537777	0.07537777			
REAGENT BLANK	9/25/2008	10:46:58	0.00002139	0.0000661	0.0000661	µg	40	1	0.00002139	0.0000661	0.0000661			

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PLANT DATA

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WHEELABRATOR 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 (tons)
9/16/2008	Mercury	29	1	180.5	2.32	79.0
9/16/2008	Mercury	29	2	180.0	2.25	76.4
9/16/2008	Mercury	29	3	180.1	2.28	77.5

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 09/16/08
Start Time: 8:04
End Time: 10:23

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	510.53	319.90	36.96	32.84	4.12	17.48	304.62	6.52	-10.09
Unit 2 29 run 1	491.84	320.07	31.22	23.97	7.25	20.78		6.37	-10.12
Unit 3	516.99	320.25	40.32	30.94	9.38	16.08	308.21	6.36	-9.18

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	176.21	871.46	821.13	76.63	-0.10	270.90	1181.54	2.49	170.11
Unit 2	187.69	884.29	830.94	78.74	-0.10	270.72	1169.94	3.17	180.53
Unit 3	176.55	888.23	827.53	81.52	-0.09	277.54	1178.85	3.78	169.22

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 09/16/08
Start Time: 10:43
End Time: 12:58

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	504.81	320.08	35.39	30.32	5.07	17.51	286.57	7.60	-11.17
Unit 2 29 run 2	502.91	320.32	34.13	28.62	5.51	18.10		6.47	-10.00
Unit 3	505.62	319.37	35.28	26.96	8.32	17.53	309.14	6.19	-8.41

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	180.21	872.65	827.42	73.88	-0.11	271.45	1159.72	2.79	173.18
Unit 2	186.86	884.23	830.07	80.27	-0.09	271.31	1184.69	6.65	179.97
Unit 3	181.84	889.31	831.30	76.27	-0.09	278.14	1206.05	6.25	173.79

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 09/16/08
Start Time: 13:18
End Time: 15:35

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	498.04	319.79	32.77	28.82	3.95	19.16	296.97	5.25	-8.29
Unit 2 29 run 3	506.55	319.95	34.29	29.37	4.92	18.33	53.07	6.22	-9.79
Unit 3	502.56	319.97	35.59	30.25	5.35	17.69	309.88	6.67	-9.05

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	183.08	874.79	825.07	73.48	-0.09	272.24	1131.70	2.65	176.85
Unit 2	187.16	884.52	830.60	81.28	-0.10	272.01	1182.72	4.68	180.08
Unit 3	184.05	889.85	836.03	78.77	-0.09	278.90	1179.43	5.24	175.75

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 09/17/08
Start Time: 7:24
End Time: 9:40

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	508.87	319.49	36.79	33.00	3.79	16.94	302.28	6.68	-10.24
Unit 2 29 run 4	497.98	319.99	33.95	27.02	6.93	18.36		6.36	-10.42
Unit 3	508.33	320.04	37.82	32.69	5.13	16.49	309.84	5.67	-8.34

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	184.16	874.94	825.56	77.00	-0.10	272.99	1159.80	2.49	177.57
Unit 2	187.20	885.32	831.70	82.69	-0.10	273.17	1149.26	4.80	180.07
Unit 3	188.62	891.92	834.68	79.24	-0.09	279.70	1199.93	9.41	180.49

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 09/17/08
Start Time: 9:57
End Time: 12:12

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
	DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	519.67	320.46	40.36	35.43	4.93	14.77	292.78	6.91	-10.68
Unit 2 29 run 5	510.75	319.88	36.95	30.83	6.12	16.14		6.38	-10.26
Unit 3	504.29	320.09	37.42	32.96	4.45	15.91	309.81	7.43	-10.10

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	186.20	875.48	824.20	80.00	-0.09	273.75	1137.51	2.52	179.68
Unit 2	186.79	885.35	829.05	85.51	-0.10	273.93	1169.64	4.45	179.91
Unit 3	188.55	891.92	833.66	80.82	-0.09	280.42	1180.31	7.67	180.21

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 09/17/08
Start Time: 12:30
End Time: 14:46

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		507.28	319.58	36.71	32.04	4.67	16.51	291.02	6.41	-9.90
Unit 2	29 run 6	510.53	320.14	35.97	27.80	8.17	16.88		6.39	-10.03
Unit 3		510.31	319.95	38.50	33.90	4.60	15.76	309.84	9.12	-11.73

		FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
		KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1		187.46	876.18	827.94	77.32	-0.11	273.66	1114.05	2.73	180.60
Unit 2		187.09	885.23	829.29	81.11	-0.10	273.80	1174.72	4.40	180.10
Unit 3		188.15	891.64	829.03	80.42	-0.09	280.34	1198.59	10.49	180.46

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