Wheelabrator North Broward Inc.
A Waste Management Company

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

October 18, 2005

#70031010000154666145

Mr. Laxmana Tallam, P.E.
Air Permitting/Compliance/Enforcement Supervisor
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 2005, Report Submittal

Dear Mr. Tallam:

As required by F.A.C. 62-296.416, please find enclosed the 2005 third quarter report on mercury stack testing which was conducted on Unit #3.

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,

Christopher M. Carey
Regional Vice President

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section #70031010000154666152
FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, #70031010000154666169
Broward County Department of Planning and Environmental Protection, Air Quality Division #70031010000154666176
Chuck Faller (with)
Matt Killeen (without)
Tim Porter (without)
Sandy Gutner – MPI - (with)
Jeff Turpin – BCOIWM (without)
File: 3.7.2 (without)
5.1.3.2 (without)

s:admin/receptionist101805

WM WASTE MANAGEMENT

CleanAir.

CleanAir Engineering
500 W. Wood Street
Palatine, IL 60067-4975
800-627-0033
www.cleanair.com

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

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REPORT ON MERCURY TESTING

Performed for:
WHEELABRATOR NORTH BROWARD
UNIT 3 FF OUTLET
POMPANO BEACH, FLORIDA

Client Reference No: 14500124
CleanAir Project No: 9708-4
Revision 0: October 14, 2005

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
847-654-4544

Reviewed by,

Peter Kaufmann
Manager - Palatine Source
847-654-4560

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 3 Fabric Filter (FF) Outlet on September 20, 2005.

The testing included the determination of the following constituents:

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

Coordinating and observing the field portion of the program were:

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

The schedule of activities is shown in Table 1-1. A summary of the results is presented in Table 1-2 on page 1-2.

Table 1-1:
Schedule of Activities

Date (2005) Start Time	Stop Time	Unit	Location	Pollutant	Method	Run No.
September 20						
08:30	11:18	3	FF Outlet	Mercury	EPA 29	1
12:04	14:17	3	FF Outlet	Mercury	EPA 29	2
14:35	16:50	3	FF Outlet	Mercury	EPA 29	3

PROJECT OVERVIEW

Table 1-2:
Summary of Test Results

Source Constituent (Units)	Sampling Method	Average Emission	Permit Limit[1]
Unit 3 FF Outlet			
Mercruy (µg/dscm @ 7% O_2)	EPA M29	6.0	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.

RESULTS

Table 2-1:
Unit 3 FF Outlet - Mercury

Run No.		1	2	3	Average
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	182	185	184	**184**
P_1	SDA Outlet Temperature (°F)	315	306	305	**309**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.4	9.4	9.6	**9.5**
CO_2	Carbon dioxide (dry volume %)	9.6	9.8	9.4	**9.6**
T_s	Sample temperature (°F)	303	296	297	**299**
B_w	Actual water vapor in gas (% by volume)	24.2	25.1	24.9	**24.7**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	201,689	190,999	181,267	**191,318**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	103,248	97,458	102,308	**101,005**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	85.919	82.910	81.984	**83.604**
%I	Isokinetic sampling (%)	102.6	104.9	98.8	**102.1**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B Prorated (µg)	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B Prorated (µg)	10.0180	10.9757	12.8701	
$m_{n\text{-}3a}$	Fraction 3A Prorated (µg)	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B Prorated (µg)	*<0.5000*	*<0.5000*	*<0.5000*	
$m_{n\text{-}3c}$	Fraction 3C Prorated (µg)	0.8182	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	10.8362	10.9757	12.8701	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	2.8E-10	2.9E-10	3.5E-10	**3.1E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	3.4E-10	3.5E-10	4.3E-10	**3.7E-10**
C_{sd}	Concentration (µg/dscm)	4.5	4.7	5.5	**4.9**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	5.4	5.6	6.8	**6.0**
$E_{lb/hr}$	Rate (lb/hr)	1.7E-03	1.7E-03	2.1E-03	**1.9E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.8E-06	5.1E-06	6.1E-06	**5.3E-06**

RESULTS

Table 2-2:
Quality Assurance and Quality Control

RPD RESULTS

Run Number		FH Front Half	BH H_2O_2/HNO_4	A Empty Impinger	B KMnO4	C HCl
U3 FF Outlet R1		NA	0.1%	NA	NA	4.3%
U3 FF Outlet R2		NA	0.6%	NA	NA	NA
U3 FF Outlet R3		NA	0.9%	NA	NA	NA
Field Blank		NA	NA	NA	NA	NA
Reagent Blank		NA	NA	NA	NA	NA
Sample Spike and Recovery						
U3 FF Outlet R3	#1	121%	95%	102%	102%	88%
	#2	121%	95%	102%	100%	90%
Blanks						
Field Blank	#1	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
	#2	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
Reagent Blank	#1	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
	#2	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4

DESCRIPTION OF INSTALLATION

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

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

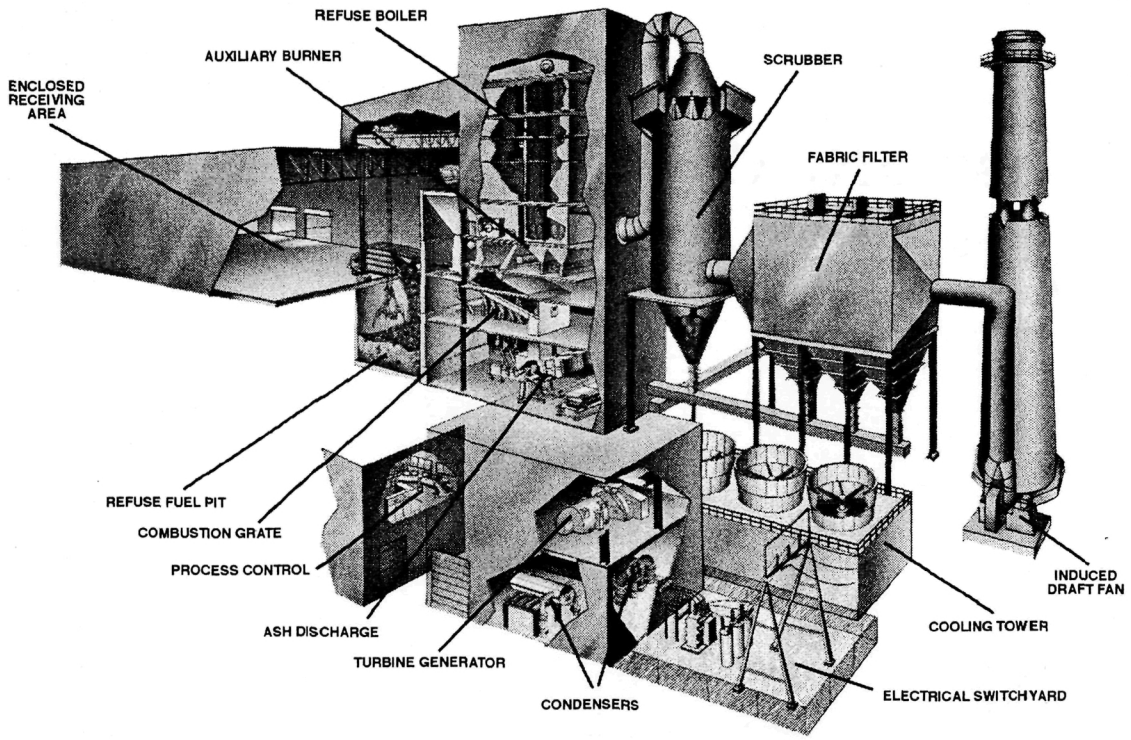

Figure 3-1: General Process Schematic

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 20-09-05
Start Time: 12:04
End Time: 14:17

	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	517.36	314.49	42.90	37.67	5.23	15.45	292.24	5.90	-10.28
Unit 2	506.73	300.80	43.26	32.65	10.61	15.28	278.36	6.18	-10.14
Unit 3	510.70	305.12	43.28	38.88	4.40	15.32	295.32	5.94	-8.59

	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	190.46	878.67	831.96	83.05	-0.08	267.96	1177.53	2.53	182.95
Unit 2	189.00	885.47	829.87	80.86	-0.10	269.89	1054.37	9.95	184.39
Unit 3	192.03	888.92	829.54	79.14	-0.10	277.02	1171.53	3.44	184.03

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 20-09-05
Start Time: 14:35
End Time: 16:50

	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	509.70	307.79	45.89	35.10	10.78	15.28	289.33	5.56	-12.71
Unit 2	503.64	300.02	44.43	29.99	14.44	15.74	274.06	5.92	-10.00
Unit 3	516.81	305.00	46.35	37.76	8.60	15.06	296.42	6.09	-8.50

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.81	881.49	832.18	84.54	-0.10	267.17	1165.01	2.83	183.19
Unit 2	188.59	887.29	831.93	82.93	-0.11	269.18	1038.73	9.96	184.03
Unit 3	192.50	891.00	829.89	81.50	-0.10	276.28	1184.09	2.97	184.21

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 20-09-05
Start Time: 08:30
End Time: 09:45

	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	513.24	309.60	44.33	37.11	7.22	14.75	292.89	4.63	-11.72
Unit 2	511.35	301.94	46.47	32.47	14.00	14.10	286.61	6.27	-10.43
Unit 3	522.68	314.74	47.34	40.36	6.99	13.80	306.76	6.13	-8.02

	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	191.32	877.23	835.19	86.38	-0.08	267.74	1134.22	6.09	182.93
Unit 2	189.40	883.28	831.19	87.79	-0.09	269.78	1057.95	9.93	184.20
Unit 3	191.11	886.30	826.19	84.45	-0.08	276.90	1165.99	2.52	182.25

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Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 20-09-05
Start Time: 10:17
End Time: 11:18

	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	508.54	309.12	41.73	35.69	6.04	16.24	295.53	6.08	-12.24
Unit 2	506.93	299.40	43.97	33.86	10.11	15.01	281.92	6.24	-10.23
Unit 3	508.19	305.88	43.34	38.16	5.19	15.27	298.19	5.90	-8.52

	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	188.05	875.87	863.78	82.14	-0.14	267.26	1147.80	2.52	176.73
Unit 2	189.56	882.98	827.58	81.80	-0.09	269.25	1052.66	9.27	185.01
Unit 3	191.46	886.48	825.69	78.83	-0.09	276.40	1158.98	4.21	184.57

OPERATING DATA

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WHEELABRATOR NORTH BROWARD
POMPANO BEACH, FLORIDA

Client Reference No: 14500124
CleanAir Project No: 9708-4

APPENDIX

SAMPLE CALCULATIONS

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

Sample data taken from Run 1

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

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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)	=	581.3	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)	=	27.36	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)	=	92.20	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	90.46	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9870	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.67	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)	=	85.919	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)	=	-11.10	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.18	in. Hg

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Date 10/12

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

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

Where:

T_s	= average sample gas temperature (°F)	=	303.04	°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)	=	29.18	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)	=	29.18	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.18	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)	=	85.919	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	27.36	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2415	
		=	24.15	%

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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)	=	29.18	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.18	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	=	0.2415	
B_w	= actual water vapor in gas	=	0.2415	
		=	24.15	%

9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.6	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.00	%

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Date 10/12

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

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

Where:

M_{CO2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.6	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.0	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.91	%

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	=	0.2415	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.91	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)	=	27.03	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.84	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.03	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.18	in. Hg
T_s	= average sample gas temperature (°F)	=	303.04	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.744	√in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	52.52	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)	=	52.52	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	201,689	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)	=	201,689	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.18	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	303.0	°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)	=	136,129	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	=	0.2415	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	136,129	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	103,248	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)	=	103,248	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
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)	=	85,421	dscfm

QA/QC SB
Date 10/12

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 (ft³/min)	=	103,248	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	6,194,891	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 (ft³/min)	=	103,248	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 (m³/hr)	=	175,443	dry std m³/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 m³/hr)	=	175,443	dry std m³/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 Nm³/hr)	=	163,481	dry Nm³/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)*	=	*0.276*	*in.*
B_w	= proportion of water vapor in the gas stream by volume	=	0.2415	
P_s	= absolute sample gas pressure (in. Hg)	=	29.18	in. Hg
T_s	= average sample gas temperature (°F)	=	303.0	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	85.919	dscf
V_s	= sample gas velocity (ft/sec)	=	52.52	ft/sec
θ	= total sampling time (min)	=	125	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
I	= *percent of isokinetic sampling (%)*	=	102.61	%

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)	=	90.46	dcf
T_m	= average dry gas meter temperature (°F)	=	92.20	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.7991	
P_{bar}	= *barometric pressure (in. Hg)*	=	*30.00*	*in. Hg*
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.674	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.91	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.286	√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	=	0.9969	

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LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

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

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

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

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

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

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

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

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

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

Definitions and Notes

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

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SS Metals-1 Version 10-2003a

EPA Method 29 Sample Calculations - Mercury Analytical Result

Sample data taken from Run 1

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

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

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L

1. Total blank amount (µg)

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

Where:

m_{1b-B}	= mercury amount in blank for Fraction 1b	=	<0.1000	µg
m_{2b-B}	= mercury amount in blank for Fraction 2b	=	<0.3000	µg
m_{3a-B}	= mercury amount in blank for Fraction 3a	=	<0.2000	µg
m_{3b-B}	= mercury amount in blank for Fraction 3b	=	<0.4000	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	=	10.0180	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	=	0.8182	µg
$m_{total-S}$	= total amount of mercury in sample	=	10.8362	µg

3. Allowable blank correction (µg)

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

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

Where:

$m_{total-B}$	= total amount of mercury in blank	=	<1.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	10.8362	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	0.5418	µg
MAX	= Arithmetic operator that returns the maximum of two values			
MIN	= Arithmetic operator that returns the minimum of two values			
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg

NOTE: In this case, the second criteria applies.

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

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

Where:

$m_{total-S}$	= total amount of mercury in sample	=	10.8362	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	10.8362	µg

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

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

Where:

m_n	= total mercury in sample corrected for allowable blank	=	10.8362	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	10.0180	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	=	0.8182	µg
$m_{total-S}$	= total amount of mercury in sample	=	10.8362	µg
m_{n-1b}	= mercury corrected for blank - prorated for Fraction 1b	=	<0.1000	µg
m_{n-2b}	= mercury corrected for blank - prorated for Fraction 2b	=	10.0180	µg
m_{n-3a}	= mercury corrected for blank - prorated for Fraction 3a	=	<0.2000	µg
m_{n-3b}	= mercury corrected for blank - prorated for Fraction 3b	=	<0.5000	µg
m_{n-3c}	= mercury corrected for blank - prorated for Fraction 3c	=	0.8182	µg

EPA Method 29 Sample Calculations - Mercury Emissions Results

Sample data taken from Run 1

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

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0_L

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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= Mercury concentration (lb/dscf)	=	2.7810E-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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= Mercury concentration (µg/dscm)	=	4.4533E+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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
1000	= conversion factor (µg/mg)	=	1000	µg/mg
C_{sd}	= Mercury concentration (mg/dscm)	=	4.4533E-03	mg/dscm

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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	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)	=	4.7792E+00	µg/Nm³ dry

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	2.7810E-10	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= Mercury concentration corrected to x% oxygen (lb/dscf)	=	3.3614E-10	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	2.7810E-10	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	9.6	%
C_{sdy}	= Mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	3.4762E-10	lb/dscf @ y%CO_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	2.7810E-10	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	103,248	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	201,689	acfm
C_a	= Mercury concentration at actual gas conditions (lb/acf)	=	1.4236E-10	lb/acf

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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	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)	=	103,248	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= Mercury emission rate (lb/hr)	=	1.7228E-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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	103,248	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)	=	2.1703E-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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	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)	=	103,248	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{T/yr}$	= Mercury emission rate (Ton/yr)	=	7.5458E-03	Ton/yr

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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= Mercury emission rate - Fd-based (lb/MMBtu)	=	4.8368E-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)	=	10.8362	µg
V_{mstd}	= volume metered, standard (dscf)	=	85.9190	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	9.6	%
100	= conversion factor	=	100	
E_{Fc}	= Mercury emission rate - Fc-based (lb/MMBtu)	=	5.2723E-06	lb/MMBtu

PARAMETERS

B

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Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9870	0.9870	0.9870	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-11.1000	-11.0000	30.0000	
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.)	0.2760	0.2760	0.2760	
O_2	Oxygen (dry volume %)	9.4000	9.4000	9.6000	**9.4667**
CO_2	Carbon dioxide (dry volume %)	9.6000	9.8000	9.4000	**9.6000**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.0000	80.8000	81.0000	**80.9333**
V_{lc}	Total Liquid collected (ml)	581.30	589.30	576.50	
V_m	Volume metered, meter conditions (ft^3)	90.4630	86.6250	86.4300	
T_m	Dry gas meter temperature (°F)	92.2000	87.7400	92.6800	
T_s	Sample temperature (°F)	303.0400	296.4800	296.5600	**298.6933**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.6736	1.5080	1.5080	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	27.3618	27.7384	27.1359	**27.4120**
V_{mstd}	Volume metered, standard (dscf)	85.9190	82.9102	81.9842	**83.6045**
P_s	Sample gas pressure, absolute (in. Hg)	29.1838	29.1912	32.2059	**30.1936**
P_v	Vapor pressure, actual (in. Hg)	29.1838	29.1912	32.2059	**30.1936**
B_{wo}	Moisture measured in sample (% by volume)	24.1539	25.0689	24.8679	**24.6969**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	24.1539	25.0689	24.8679	**24.6969**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.7437	0.7063	0.7038	**0.7180**
M_d	MW of sample gas, dry (lb/lb-mole)	29.9120	29.9440	29.8880	**29.9147**
M_s	MW of sample gas, wet (lb/lb-mole)	27.0348	26.9498	26.9317	**26.9721**
V_s	Velocity of sample (ft/sec)	52.5232	49.7393	47.2051	**49.8225**
%I	Isokinetic sampling (%)	102.6093	104.8983	98.8098	**102.1058**
Q_a	Volumetric flow rate, actual (acfm)	201,689	190,999	181,267	**191,318**
Q_s	Volumetric flow rate, standard (scfm)	136,129	130,064	136,171	**134,121**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	103,248	97,458	102,308	**101,005**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	85,421	80,631	83,171	**83,074**
Q_a	Volumetric flow rate, actual (acf/hr)	12,101,341	11,459,925	10,876,049	**11,479,105**
Q_s	Volumetric flow rate, standard (scf/hr)	8,167,718	7,803,838	8,170,250	**8,047,269**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	6,194,891	5,847,504	6,138,480	**6,060,292**
Q_a	Volumetric flow rate, actual (m^3/hr)	342,717	324,552	308,016	**325,095**
Q_s	Volumetric flow rate, standard (m^3/hr)	231,315	221,009	231,386	**227,903**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	175,443	165,605	173,845	**171,631**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	145,151	137,011	141,328	**141,163**
Q_a	Volumetric flow rate, normal (Nm^3/hr)	215,543	205,940	215,610	**212,365**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	163,481	154,314	161,992	**159,929**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	135,254	127,669	131,692	**131,538**

Comments:

Average includes 3 runs.

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Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	182	185	184	**184**
P_1	SDA Outlet Temperature (°F)	315	306	305	**309**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.4000	9.4000	9.6000	**9.4667**
CO_2	Carbon dioxide (dry volume %)	9.6000	9.8000	9.4000	**9.6000**
T_s	Sample temperature (°F)	303.0400	296.4800	296.5600	**298.6933**
B_w	Actual water vapor in gas (% by volume)	24.1539	25.0689	24.8679	**24.6969**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	201,689	190,999	181,267	**191,318**
Q_s	Volumetric flow rate, standard (scfm)	136,129	130,064	136,171	**134,121**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	103,248	97,458	102,308	**101,005**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	85,421	80,631	83,171	**83,074**
Q_a	Volumetric flow rate, actual (acf/hr)	12,101,341	11,459,925	10,876,049	**11,479,105**
Q_s	Volumetric flow rate, standard (scf/hr)	8,167,718	7,803,838	8,170,250	**8,047,269**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	6,194,891	5,847,504	6,138,480	**6,060,292**
Q_a	Volumetric flow rate, actual (m^3/hr)	342,717	324,552	308,016	**325,095**
Q_s	Volumetric flow rate, standard (m^3/hr)	231,315	221,009	231,386	**227,903**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	175,443	165,605	173,845	**171,631**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	145,151	137,011	141,328	**141,163**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	215,543	205,940	215,610	**212,365**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	163,481	154,314	161,992	**159,929**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	135,254	127,669	131,692	**131,538**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	85.9190	82.9102	81.9842	**83.6045**
%I	Isokinetic sampling (%)	102.6093	104.8983	98.8098	**102.1058**
Laboratory Data					
m_{n-1b}	Fraction 1B Prorated (µg)	<0.1000	<0.1000	<0.1000	**<0.1000**
m_{n-2b}	Fraction 2B Prorated (µg)	10.0180	10.9757	12.8701	**11.2879**
m_{n-3a}	Fraction 3A Prorated (µg)	<0.2000	<0.2000	<0.2000	**<0.2000**
m_{n-3b}	Fraction 3B Prorated (µg)	<0.5000	<0.5000	<0.5000	**<0.5000**
m_{n-3c}	Fraction 3C Prorated (µg)	0.8182	<0.4000	<0.4000	**<0.5394**
m_n	Total matter corrected for allowable blanks (µg)	10.8362	10.9757	12.8701	**11.5607**
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	2.7810E-10	2.9190E-10	3.4615E-10	**3.0538E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	3.3614E-10	3.5282E-10	4.2579E-10	**3.7158E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	3.4762E-10	3.5743E-10	4.4189E-10	**3.8231E-10**
C_a	Concentration (lb/acf)	1.4236E-10	1.4894E-10	1.9537E-10	**1.6222E-10**
C_{sd}	Concentration (µg/dscm)	4.4533E+00	4.6744E+00	5.5431E+00	**4.8903E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	5.3827E+00	5.6499E+00	6.8185E+00	**5.9504E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	5.5667E+00	5.7237E+00	7.0763E+00	**6.1222E+00**
C_{sd}	Concentration (mg/dscm)	4.4533E-03	4.6744E-03	5.5431E-03	**4.8903E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	5.3827E-03	5.6499E-03	6.8185E-03	**5.9504E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	5.5667E-03	5.7237E-03	7.0763E-03	**6.1222E-03**
C_a	Concentration (µg/m^3 (actual,wet))	2.2797E+00	2.3851E+00	3.1285E+00	**2.5978E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	4.7792E+00	5.0164E+00	5.9487E+00	**5.2481E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	5.7766E+00	6.0633E+00	7.3174E+00	**6.3858E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	5.9740E+00	6.1425E+00	7.5940E+00	**6.5702E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.7228E-03	1.7069E-03	2.1248E-03	**1.8515E-03**
$E_{g/s}$	Rate (g/s)	2.1703E-04	2.1503E-04	2.6768E-04	**2.3324E-04**
$E_{T/yr}$	Rate (Ton/yr)	7.5458E-03	7.4761E-03	9.3067E-03	**8.1095E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.8368E-06	5.0768E-06	6.1269E-06	**5.3468E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	5.2723E-06	5.4210E-06	6.7020E-06	**5.7984E-06**

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Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	<2.5664E-12	<2.6595E-12	<2.6895E-12	**<2.6385E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.1020E-12	<3.2145E-12	<3.3084E-12	**<3.2083E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.2080E-12	<3.2565E-12	<3.4335E-12	**<3.2993E-12**
C_a	Concentration (lb/acf)	<1.3138E-12	<1.3570E-12	<1.5180E-12	**<1.3963E-12**
C_{sd}	Concentration (µg/dscm)	<4.1097E-02	<4.2588E-02	<4.3069E-02	**<4.2251E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<4.9674E-02	<5.1476E-02	<5.2979E-02	**<5.1376E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<5.1371E-02	<5.2149E-02	<5.4982E-02	**<5.2834E-02**
C_{sd}	Concentration (mg/dscm)	<4.1097E-05	<4.2588E-05	<4.3069E-05	**<4.2251E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<4.9674E-05	<5.1476E-05	<5.2979E-05	**<5.1376E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.1371E-05	<5.2149E-05	<5.4982E-05	**<5.2834E-05**
C_a	Concentration (µg/m³ (actual,wet))	<2.1038E-02	<2.1731E-02	<2.4308E-02	**<2.2359E-02**
C_{sd}	Concentration (µg/Nm³ dry)	<4.4104E-02	<4.5704E-02	<4.6221E-02	**<4.5343E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm³ dry)	<5.3308E-02	<5.5243E-02	<5.6856E-02	**<5.5136E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm³ dry)	<5.5130E-02	<5.5965E-02	<5.9005E-02	**<5.6700E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.5898E-05	<1.5551E-05	<1.6510E-05	**<1.5987E-05**
$E_{g/s}$	Rate (g/s)	<2.0028E-06	<1.9591E-06	<2.0798E-06	**<2.0139E-06**
$E_{T/yr}$	Rate (Ton/yr)	<6.9635E-05	<6.8115E-05	<7.2313E-05	**<7.0021E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<4.4635E-08	<4.6255E-08	<4.7606E-08	**<4.6165E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<4.8654E-08	<4.9391E-08	<5.2074E-08	**<5.0040E-08**

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Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	2.5710E-10	2.9190E-10	3.4615E-10	**2.9838E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	3.1076E-10	3.5282E-10	4.2579E-10	**3.6312E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	3.2137E-10	3.5743E-10	4.4189E-10	**3.7356E-10**
C_a	Concentration (lb/acf)	1.3161E-10	1.4894E-10	1.9537E-10	**1.5864E-10**
C_{sd}	Concentration (µg/dscm)	4.1171E+00	4.6744E+00	5.5431E+00	**4.7782E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.9763E+00	5.6499E+00	6.8185E+00	**5.8149E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	5.1464E+00	5.7237E+00	7.0763E+00	**5.9821E+00**
C_{sd}	Concentration (mg/dscm)	4.1171E-03	4.6744E-03	5.5431E-03	**4.7782E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.9763E-03	5.6499E-03	6.8185E-03	**5.8149E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	5.1464E-03	5.7237E-03	7.0763E-03	**5.9821E-03**
C_a	Concentration (µg/m^3 (actual,wet))	2.1076E+00	2.3851E+00	3.1285E+00	**2.5404E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	4.4183E+00	5.0164E+00	5.9487E+00	**5.1278E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	5.3404E+00	6.0633E+00	7.3174E+00	**6.2404E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	5.5229E+00	6.1425E+00	7.5940E+00	**6.4198E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.5927E-03	1.7069E-03	2.1248E-03	**1.8081E-03**
$E_{g/s}$	Rate (g/s)	2.0064E-04	2.1503E-04	2.6768E-04	**2.2778E-04**
$E_{T/yr}$	Rate (Ton/yr)	6.9760E-03	7.4761E-03	9.3067E-03	**7.9196E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.4716E-06	5.0768E-06	6.1269E-06	**5.2251E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	4.8742E-06	5.4210E-06	6.7020E-06	**5.6657E-06**

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Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.1327E-12	<5.3190E-12	<5.3791E-12	**<5.2769E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.2039E-12	<6.4291E-12	<6.6168E-12	**<6.4166E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<6.4159E-12	<6.5131E-12	<6.8669E-12	**<6.5986E-12**
C_a	Concentration (lb/acf)	<2.6275E-12	<2.7141E-12	<3.0360E-12	**<2.7925E-12**
C_{sd}	Concentration (µg/dscm)	<8.2194E-02	<8.5176E-02	<8.6139E-02	**<8.4503E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<9.9347E-02	<1.0295E-01	<1.0596E-01	**<1.0275E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.0274E-01	<1.0430E-01	<1.0996E-01	**<1.0567E-01**
C_{sd}	Concentration (mg/dscm)	<8.2194E-05	<8.5176E-05	<8.6139E-05	**<8.4503E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<9.9347E-05	<1.0295E-04	<1.0596E-04	**<1.0275E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.0274E-04	<1.0430E-04	<1.0996E-04	**<1.0567E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<4.2076E-02	<4.3462E-02	<4.8617E-02	**<4.4718E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<8.8208E-02	<9.1409E-02	<9.2441E-02	**<9.0686E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.0662E-01	<1.1049E-01	<1.1371E-01	**<1.1027E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.1026E-01	<1.1193E-01	<1.1801E-01	**<1.1340E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.1797E-05	<3.1103E-05	<3.3019E-05	**<3.1973E-05**
$E_{g/s}$	Rate (g/s)	<4.0056E-06	<3.9182E-06	<4.1597E-06	**<4.0278E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.3927E-04	<1.3623E-04	<1.4463E-04	**<1.4004E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<8.9271E-08	<9.2510E-08	<9.5211E-08	**<9.2331E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<9.7308E-08	<9.8782E-08	<1.0415E-07	**<1.0008E-07**

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Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.2832E-11	<1.3298E-11	<1.3448E-11	**<1.3192E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.5510E-11	<1.6073E-11	<1.6542E-11	**<1.6041E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.6040E-11	<1.6283E-11	<1.7167E-11	**<1.6497E-11**
C_a	Concentration (lb/acf)	<6.5689E-12	<6.7851E-12	<7.5899E-12	**<6.9813E-12**
C_{sd}	Concentration (µg/dscm)	<2.0548E-01	<2.1294E-01	<2.1535E-01	**<2.1126E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.4837E-01	<2.5738E-01	<2.6490E-01	**<2.5688E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.5686E-01	<2.6074E-01	<2.7491E-01	**<2.6417E-01**
C_{sd}	Concentration (mg/dscm)	<2.0548E-04	<2.1294E-04	<2.1535E-04	**<2.1126E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.4837E-04	<2.5738E-04	<2.6490E-04	**<2.5688E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.5686E-04	<2.6074E-04	<2.7491E-04	**<2.6417E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.0519E-01	<1.0865E-01	<1.2154E-01	**<1.1180E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.2052E-01	<2.2852E-01	<2.3110E-01	**<2.2672E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.6654E-01	<2.7621E-01	<2.8428E-01	**<2.7568E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.7565E-01	<2.7982E-01	<2.9503E-01	**<2.8350E-01**
$E_{lb/hr}$	Rate (lb/hr)	<7.9492E-05	<7.7757E-05	<8.2549E-05	**<7.9933E-05**
$E_{g/s}$	Rate (g/s)	<1.0014E-05	<9.7956E-06	<1.0399E-05	**<1.0070E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.4817E-04	<3.4058E-04	<3.6156E-04	**<3.5010E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.2318E-07	<2.3128E-07	<2.3803E-07	**<2.3083E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.4327E-07	<2.4695E-07	<2.6037E-07	**<2.5020E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	2.0998E-11	<1.0638E-11	<1.0758E-11	**<1.4131E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.5380E-11	<1.2858E-11	<1.3234E-11	**<1.7157E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.6247E-11	<1.3026E-11	<1.3734E-11	**<1.7669E-11**
C_a	Concentration (lb/acf)	1.0749E-11	<5.4281E-12	<6.0720E-12	**<7.4164E-12**
C_{sd}	Concentration (µg/dscm)	3.3625E-01	<1.7035E-01	<1.7228E-01	**<2.2629E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.0643E-01	<2.0590E-01	<2.1192E-01	**<2.7475E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.2032E-01	<2.0860E-01	<2.1993E-01	**<2.8295E-01**
C_{sd}	Concentration (mg/dscm)	3.3625E-04	<1.7035E-04	<1.7228E-04	**<2.2629E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.0643E-04	<2.0590E-04	<2.1192E-04	**<2.7475E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.2032E-04	<2.0860E-04	<2.1993E-04	**<2.8295E-04**
C_a	Concentration (µg/m^3 (actual,wet))	1.7213E-01	<8.6924E-02	<9.7234E-02	**<1.1876E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	3.6086E-01	<1.8282E-01	<1.8488E-01	**<2.4285E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.3617E-01	<2.2097E-01	<2.2742E-01	**<2.9485E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.5107E-01	<2.2386E-01	<2.3602E-01	**<3.0365E-01**
$E_{lb/hr}$	Rate (lb/hr)	1.3008E-04	<6.2206E-05	<6.6039E-05	**<8.6108E-05**
$E_{g/s}$	Rate (g/s)	1.6387E-05	<7.8365E-06	<8.3193E-06	**<1.0848E-05**
$E_{T/yr}$	Rate (Ton/yr)	5.6975E-04	<2.7246E-04	<2.8925E-04	**<3.7715E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.6521E-07	<1.8502E-07	<1.9042E-07	**<2.4688E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.9809E-07	<1.9756E-07	<2.0830E-07	**<2.6798E-07**

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Date _____

Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

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

Run No.		4	5	6	Average
Date (2005)		Sep 21	Sep 21	Sep 21	
Start Time (approx.)		*08:05*	*10:43*	*13:15*	
Stop Time (approx.)		10:20	12:59	15:29	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9870	0.9870	0.9870	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-12.5000	-12.5000	-12.3000	
A_s	Sample location area (ft²)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	30.50	30.50	30.50	**30.5000**
D_n	Nozzle diameter (in.)	0.2760	0.2760	0.2760	
O_2	Oxygen (dry volume %)	10.2000	10.0000	10.2000	**10.1333**
CO_2	Carbon dioxide (dry volume %)	9.2000	9.2000	9.2000	**9.2000**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.6000	80.8000	80.6000	**80.6667**
V_{lc}	Total Liquid collected (ml)	514.50	478.00	488.00	
V_m	Volume metered, meter conditions (ft³)	94.0750	85.9000	86.3800	
T_m	Dry gas meter temperature (°F)	91.2400	93.9600	97.3200	
T_s	Sample temperature (°F)	306.3600	305.7200	307.8800	**306.6533**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.8012	1.4640	1.4956	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft³)	24.2175	22.4995	22.9702	**23.2290**
V_{mstd}	Volume metered, standard (dscf)	91.0187	82.6343	82.6014	**85.4181**
P_s	Sample gas pressure, absolute (in. Hg)	29.5809	29.5809	29.5956	**29.5858**
P_v	Vapor pressure, actual (in. Hg)	29.5809	29.5809	29.5956	**29.5858**
B_{wo}	Moisture measured in sample (% by volume)	21.0155	21.4008	21.7579	**21.3914**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.0155	21.4008	21.7579	**21.3914**
$\sqrt{\Delta P}$	Velocity head (√in. H_2O)	0.7667	0.6947	0.6957	**0.7190**
M_d	MW of sample gas, dry (lb/lb-mole)	29.8800	29.8720	29.8800	**29.8773**
M_s	MW of sample gas, wet (lb/lb-mole)	27.3834	27.3313	27.2952	**27.3366**
V_s	Velocity of sample (ft/sec)	53.5514	48.5494	48.7093	**50.2700**
%I	Isokinetic sampling (%)	101.4417	101.9984	102.3239	**101.9213**
Q_a	Volumetric flow rate, actual (acfm)	205,637	186,430	187,044	**193,037**
Q_s	Volumetric flow rate, standard (scfm)	140,072	127,095	127,218	**131,462**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	110,635	99,896	99,538	**103,356**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	85,165	78,335	76,623	**80,041**
Q_a	Volumetric flow rate, actual (acf/hr)	12,338,236	11,185,784	11,222,632	**11,582,217**
Q_s	Volumetric flow rate, standard (scf/hr)	8,404,342	7,625,703	7,633,095	**7,887,713**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	6,638,124	5,993,742	5,972,293	**6,201,386**
Q_a	Volumetric flow rate, actual (m³/hr)	349,426	316,788	317,832	**328,015**
Q_s	Volumetric flow rate, standard (m³/hr)	238,016	215,964	216,174	**223,385**
Q_{std}	Volumetric flow rate, dry standard (dry m³/hr)	187,996	169,746	169,139	**175,627**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m³/hr)	144,716	133,110	130,200	**136,009**
Q_s	Volumetric flow rate, normal (Nm³/hr)	221,788	201,240	201,435	**208,154**
Q_{std}	Volumetric flow rate, dry normal (Nm³/hr)	175,178	158,173	157,607	**163,652**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm³/hr)	134,849	124,035	121,323	**126,736**

Comments:

Average includes 3 runs.

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CALIBRATION DATA

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Wheelabrator North Broward, Inc
Clean Air Project No: 9708
Unit 3 FF Outlet

USEPA Method 29 (Mercury)
QA/QC Results

Run No.		1	2	3	
Date (2005)		Sep 20	Sep 20	Sep 20	
Start Time (approx.)		08:30	12:04	14:35	
Stop Time (approx.)		11:18	14:17	16:50	
Total Duration of Test Run (min.)		168	133	135	
Net Sampling Time (min.)		125	125	125	
Sampling System Calibration Summary					
	Nozzle ID No:	.276-1	.276-1	.276-1	
D_n	Nozzle Diameter (in):	0.276	0.276	0.276	
	Probe ID No:	M-8-2	M-8-2	M-8-2	
C_p	Pitot Coefficient:	0.84	0.84	0.84	
	Meter Box ID. No:	66-13	66-13	66-13	
Y_d	Meter Box Yd - Field Sheet	0.9870	0.9870	0.9870	
	Meter Box Yd - Database	0.9870	0.9870	0.9870	
	Meter Box ΔH@ - Field Sheet	1.7991	1.7991	1.7991	
	Meter Box ΔH@ - Database	1.7991	1.7991	1.7991	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0289	0.0277	0.0277	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0050	0.0030	0.0030	
	Sample Volume				
	Minimum Volume Required (dscf)	60.00	60.00	60.00	
V_{mstd}	Actual Sample Volume (dscf)	85.92	82.91	81.98	
	Alternative Method 5 Post-Test Calibration (EPA ALT-009)				
$\sqrt{\Delta H_{avg}}$	Average of Square Root of ΔH (in. W.C.)	1.286	1.225	1.218	
Y_{qa}	Alternative Meter Calibration Factor	0.9969	0.9872	0.9894	**Average**
	Variation from full-test Y_d (average ≤ ±5%)	-1.0%	0.0%	-0.2%	**-0.4%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	Actual Variation (%)	102.61	104.90	98.81	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	0	
	Number of points >110%	0	0	0	
	Number of points <80%	0	0	0	
	Number of points >120%	0	0	0	

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Date _____

Nozzle Calibration Sheet

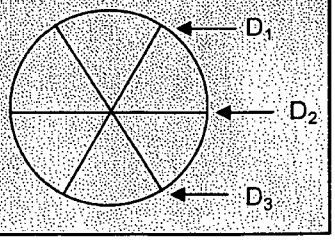
Client	WHEELABRATOR	Project Number	9708
Calibrated by	D DRESIA	Unit	3
Date	9/20/05	Runs	ALL

Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
.275-1	0.275	0.275	0.275	0.000	0.275

D_1, D_2, D_3 = three nozzle diameter measurements

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

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



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

QA/QC_____
Date_____

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-13

Date of Calibration: 12/9/04

Meter Box Y_d: 0.9870

Calibration conducted by: M. V.

Meter Box ΔH@: 1.7991

Signature

Barometric Pressure: 29.05

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	In	Out	T_{ds} Avg.	In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
0.936	3.00	-1.80	1.0000	0.000	10.000	10.000	637.925	648.258	10.333	66.0	66.0	66.00	91.0	70.0	80.50	10.41	0.9825	1.8636
0.936	3.00	-1.80	1.0000	0.000	10.000	10.000	648.258	658.575	10.317	66.0	66.0	66.00	91.0	70.0	80.50	10.41	0.9840	1.8636
0.395	0.50	-1.10	1.0000	0.000	5.000	5.000	661.920	667.048	5.128	66.0	66.0	66.00	82.0	70.0	76.00	12.32	0.9896	1.7402
0.396	0.50	-1.10	1.0000	0.000	5.000	5.000	667.048	672.171	5.123	66.0	66.0	66.00	82.0	70.0	76.00	12.31	0.9905	1.7373
0.676	1.50	-1.30	1.0000	0.000	10.000	10.000	676.066	686.336	10.270	66.0	66.0	66.00	87.0	68.0	77.50	14.41	0.9880	1.7923
0.675	1.50	-1.30	1.0000	0.000	10.000	10.000	686.336	696.611	10.275	66.0	66.0	66.00	87.0	68.0	77.50	14.43	0.9875	1.7972

Averages 0.98700 1.79905

Nomenclature

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

Equations

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

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

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

Vacuum Gauge		DGM Thermocouples		
Standard (in.Hg)	Gauge (in.Hg)	Standard (°F)	Inlet (°F)	Outlet (°F)
5.0	5.3			
10.0	10.4			
15.0	15.6			
20.0	20.3			
25.0	25.0			

CleanAir ENGINEERING

Pyrometer Calibration Test Report

Pyrometer No.:	66-13	Office:	Palatine, Il
Calibrated By:	M. V.	Client:	
Date:	12/9/04	Job Number:	

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
50 °F	49 °F
100 °F	98 °F
150 °F	149 °F
200 °F	200 °F
250 °F	251 °F
300 °F	300 °F
350 °F	350 °F
400 °F	399 °F
450 °F	448 °F
500 °F	498 °F
550 °F	549 °F
600 °F	600 °F

Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	Omega Engineering, Inc.	Exp.Date:	9/15/05
Report No:	R 044791		

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Meter Box Critical Orifice Post-Test Calibration Data

Project No.	9706/9708	Meter No.	66-13	Orifice	A-4
Location	Palatine Warehouse	Meter Yd	0.9870	Orifice K'	0.4930
Test Date	10/12/2005	Meter ΔH@	1.7991	Orifice Cal. Date	9/28/2005
Operator	P. Bihun	Full Test Cal. Date	12/9/2004		

Barom. Press. (P_b) 29.50 in. Hg

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

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

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (in. W.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	811.900	70	68								
1	5.0	815.15	70	68	71	1.30	16.5	5.0	3.25	69.0	0.9839	-0.1%
2	10.0	818.40	71	68	71	1.30	16.5	5.0	3.25	69.3	0.9843	-0.1%
3	15.0	821.645	72	69	72	1.30	16.5	5.0	3.25	70.0	0.9863	0.2%
										Average Y_i	0.9848	
										Cal. Error	-0.2%	

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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

Meter Box Critical Orifice Post-Test Calibration Data

Project No. 9706/9708 Meter No. 16-13 Orifice A-4

Location Palatine Warehouse Meter Y_d 0.98700 Orifice K' 0.4930

Test Date 10/12/05 Meter $\Delta H_@$ 1.79905 Orifice Cal. Date 9/28/05

Operator R. Bikun Full Test Cal. Date 12/9/04

Leak Checks

Negative Pressure *No movement of Manometer in one-minute*	☑ Pass ☐ Fail
Positive Pressure *No movement of Manometer in one-minute*	☑ Pass ☐ Fail

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

Bar. Press. (P_b) 29.50 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	811.900	70	68								
1	5	815.15	70	68	71	1.3	16.5					
2	10	818.40	71	68	71	1.3	16.5					
3	15	821.645	72	69	72	1.3	16.5					
										Average Y_i		
										Cal. Error		

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: M5 I.D. number: M-8-2

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 = 2		<10 °
b1 = 1	b2 = 2		<5°
γ = 0	θ = 2		
Pa = 0.355	Pb = 0.355		Pa + Pb = A
A = 0.710	Dt = 0.25		
Calculations			
z = A sin γ = 0.000			<0.125"
w = A sin θ = 0.02478			<0.03125"

Does assembly meet specifications? (YES / NO)

[ ] **Standard Pitot**

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

Does assembly meet specifications? YES / NO

If "YES" "S" pitot Cp=0.84; Std pitot Cp=0.99
If "NO" wind tunnel calibration is required.

Wind Tunnel Pitot Calibration

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

Pitot Side 'A':

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

Pitot Side 'B':

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

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

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

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

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

PROBE Cp = 0.84 Calibrated by: _____ Date: 2/24/05

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FIELD DATA

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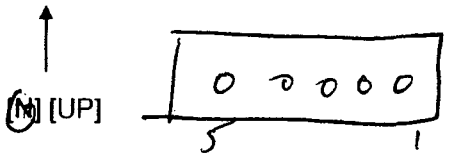
TEST LOCATION: FF Outlet Mercury TESTING METHOD: 29 PAGE 1 OF 2

UNIT: 3 RUN: 1

FIELD DATA SHEET

Client	Wyeth Laboratories	Project No.	9708
Plant	North Brunswick	Date	9/20/05
Meter Operator	PB		
Probe Operator	PB		

Cross-Section of Test Location



Amb. Temp. (°F)	82	Bar. Press.	30.00 [in. Hg] [mbar]
Probe I.D. No.	M-8-2		
Liner Material	Glass		

Meter Box	1060-13	Sample Box No.	607-21
Meter Y_d	0.9870	Meter $\Delta H_@$	1.7905
K Factor	3.00	Pitot C_p	0.84
Leak Rate Before	0.007 [cfm] [Lpm]	@	15 (in. Hg)
Leak Rate After	0.005 [cfm] [Lpm]	@	9 (in. Hg)
Pitot Leak Check Before:	☒	After: Good ☒	Bad ☐

Duct Dimensions (in.)	96x96		
Static Pres (in. H_2O)	-11.1	Port Len. (in.)	10
Gas Flow	(In) [Out] of page	First point all the way	(In) [Out]

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.226	Nozzle I.D.	226-1

Start Time:	8:30	Stop Time:	11:18

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol: 755.410 (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						
1-1	5	.28	.84	757.95	295	250	255	66	82	81	2.5	N/A	
2	10	.38	1.1	760.96	301	250	252	60	82	81	3.0		
3	15	.52	1.5	764.32	307	250	256	54	85	81	3.5		
4	20	.51	1.5	767.75	307	250	257	52	89	82	3.5		771.510
5	25	.56	1.7	771.395	307	250	252	52	91	83	4.0		-0.115
2-1	30	.86	2.6	775.95	309	249	253	54	93	85	5.5		
2	35	.68	2.0	779.92	309	249	247	51	95	85	4.5		
3	40	.63	1.9	783.75	307	250	260	52	97	87	4.5		
4	45	.58	1.7	787.42	307	250	246	54	97	87	4.0		791.382
5	50	.63	1.9	791.300	309	250	260	59	97	88	4.5		-0.082
3-1	55	.58	1.7	795.02	309	249	254	62	96	89	4.0		
2	60	.74	2.2	799.13	308	250	251	60	97	89	5.0		
		9.03799											
	Total	9.7454		90.4630									
	Average	.74373	1.6136		303.040				92.2090				

Sum of square roots: 90.89

Circle correct bracketed units on data sheet.

QA/QC D

Date 9/20/05

2119

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

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

UNIT: 3 RUN: 1

FIELD DATA SHEET

Client	Wheelabrator	Project No.	9708
Plant	North Braddock	Date	9/20/05
Meter Operator	PB		
Probe Operator	PB		

Cross-Section of Test Location

[N] [UP]

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

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

Duct Dimensions (in.)

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L]	Stack Temp. Ts (°F)	ProbeT$_p$ (°F) Set Points	Filter T$_f$ (°F) Set Points	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
						250	250						
3	65	.67	2.0	803.15	309	250	261	51	99	90	4.5	N/A	
4	70	.61	1.8	806.93	309	250	250	46	99	90	4.5		Pump @ 9:40
5	75	.43	1.3	810.200	299	251	251	58	93	90	4.0		Pump @ 10:07
4-1	80	.63	1.9	814.19	299	250	260	58	96	91	4.5		Leak ✓ good
2	85	.65	2.0	818.15	300	250	246	54	98	91	5.0		0.120 +10.3
3	90	.58	1.7	821.87	299	250	247	51	100	92	4.5		
4	95	.50	1.5	825.32	296	250	261	54	101	93	4.0		
5	100	.43	1.3	828.590	299	250	251	56	101	93	4.0		828.690
5-1	105	.51	1.5	832.07	297	249	253	61	99	93	4.0		-0.05
2	110	.55	1.7	835.80	299	250	260	57	101	94	4.5		
3	115	.54	1.6	839.40	299	250	255	57	101	94	4.5		
4	120	.51	1.5	842.86	297	250	253	58	102	94	4.5		
5	125	.45	1.7	846.240	299	251	257	58	102	94	4.0		
	Total	*9.5552											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC D2

Date 9/20/05

CleanAir ENGINEERING

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

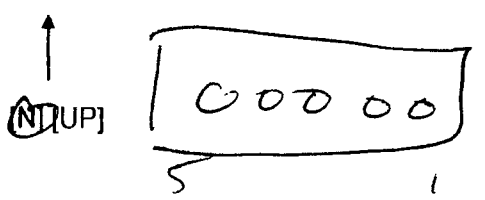
UNIT: 3 RUN: 2

FIELD DATA SHEET

Client	Wheelabrator	Project No.	9708
Plant	North Broward	Date	9/20/05
Meter Operator	PB		
Probe Operator	PB		

Meter Box	66-13	Sample Box No.	71-20
Meter Y_d	6.98 700	Meter $\Delta H_@$	1.7785
K Factor	3.00	Pitot C_p	0.84
Leak Rate Before	0.001 [cfm] [Lpm]	@	15 (in. Hg)
Leak Rate After	0.003 [cfm] [Lpm]	@	9 (in. Hg)
Pitot Leak Check Before: ☒	After: Good ☒	Bad ☐	

Cross-Section of Test Location



Duct Dimensions (in.)	96x96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-11.0	10		

Amb. Temp. (°F)	80	Bar. Press.	30.62 (in. Hg) [mbar]
Probe I.D. No.	M-5-2		
Liner Material	Glass		

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.776	Nozzle I.D.	276-1

Start Time:	12:04	Stop Time:	14:17

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L] PB	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
				846.535		250	250						
1-1	5	.55	1.7	850.76	295	250	245	61	83	85	3.5	N/A	
2	10	.53	1.6	854.32	292	250	243	52	85	85	3.5		
3	15	.40	1.2	857.46	291	250	245	48	87	84	3.0		
4	20	.53	1.6	861.07	297	250	251	49	88	84	3.5		
5	25	.56	1.7	864.775	297	250	257	51	89	84	3.5		864.84 -0.065
1-1	30	.68	2.0	868.74	298	244	242	56	88	83	4.0		
2	35	.53	1.6	872.33	297	250	256	54	90	83	3.5		
3	40	.48	1.4	875.68	297	250	251	55	90	83	3.5		
4	45	.47	1.4	879.64	298	250	246	58	90	84	3.5		
5	50	.42	1.3	882.270	297	250	256	60	90	84	3.5		
3-1	55	.57	1.7	885.97	297	249	241	63	88	84	4.0		882.305 -0.038
2	60	.61	1.8	889.75	297	249	256	60	90	84	4.0	↓	
		Σ.669352											
	Total			84.625									
	Average	.70633	1.5080		296.480				87.7401				

Sum of square roots. 19.5

Circle correct bracketed units on data sheet. 3553

QA/QC DC Date 9/20/05

2065 86.64

CleanAir ENGINEERING

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

UNIT: 3 RUN: 2

FIELD DATA SHEET

Client Wheelabrator	Project No. 9708
Plant North Broward	Date 9/20/05
Meter Operator	PB
Probe Operator	PB

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	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						
3	60	.57	1.7	893.42	295	250	250	61	91	84	4.0	N/A	
4	70	.52	1.5	896.91	299	250	247	62	92	84	4.0		
5	75	.43	1.3	900.140	298	250	259	64	92	84	3.5		Leak ✓ ok
4-1	80	.58	1.7	903.89	296	250	255	65	89	85	4.0		900.250
2	85	.59	1.8	907.71	297	250	252	63	92	85	4.0		-0.110
3	90	.51	1.5	911.17	297	250	244	61	93	85	3.5		
4	95	.47	1.4	914.51	297	250	245	63	94	86	3.5		
5	100	.38	1.1	917.460	297	250	255	60	94	86	3.0		
5-1	105	.42	1.3	920.73	296	249	243	62	91	86	3.5		917.515
2	110	.44	1.3	923.95	297	250	259	59	93	87	3.5		-0.055
3	115	.45	1.4	927.32	297	251	251	59	95	88	4.0		
4	120	.48	1.4	930.686	296	251	253	58	95	88	4.0		
5	125	.42	1.3	933.905	297	250	259	58	95	88	3.5		
	Total	*8.96478											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC D²

Date 9/20/05

CleanAir ENGINEERING

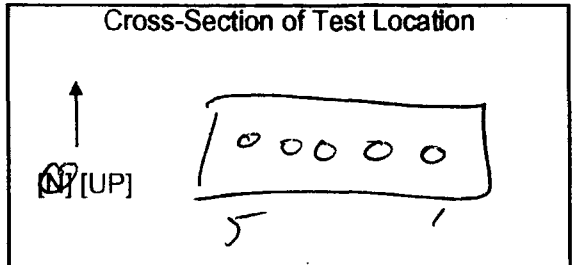
TEST LOCATION: FF outlet Mercury TESTING METHOD: 29 PAGE 1 OF 2

UNIT: 3 RUN: 3

FIELD DATA SHEET

Client Wheelabrator	Project No. 9708
Plant North Brevard	Date 9/20/05
Meter Operator	PB
Probe Operator	PB

Cross-Section of Test Location



Amb. Temp. (°F) 85	Bar. Press. 30.05 (in. Hg) [mbar]
Probe I.D. No. M-A-2	
Liner Material Glass	

Meter Box 166-13	Sample Box No. 47-27	
Meter Y_d 0.9700	Meter $\Delta H_@$ 1.7805	
K Factor	Pitot C_p 0.84	
Leak Rate Before 0.004 [cfm] [Lpm] @ 15 (in. Hg)		
Leak Rate After 0.003 [cfm] [Lpm] @ 8 (in. Hg)		
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐	

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]
-11.10	10		

Filter No. N/A			
Thimble No. N/A			
Nozzle Diameter 0.276	Nozzle I.D.	276-1	

Start Time: 14:35	Stop Time: 16:50

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. 934.180 [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_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
						250	250						
1-1	5	.23	.69	936.55	283	250	257	66	88	88	2.5	N/A	
2	10	.25	.75	939.01	284	250	260	48	90	88	2.5		
3	15	.32	.96	941.77	295	250	256	43	91	88	3.0		
4	20	.41	1.2	944.89	296	251	247	42	92	88	3.0		
5	25	.58	1.7	948.555	298	250	259	42	94	89	4.0		
2-1	30	.73	2.2	952.71	297	250	245	47	94	89	4.5		948.620
2	35	.66	2.0	956.68	300	251	253	44	96	89	4.5		-0.065
3	40	.57	1.7	960.41	298	250	259	46	97	90	4.5		
4	45	.51	1.5	963.91	296	250	248	47	97	90	4.0		
5	50	.47	1.4	967.260	297	250	260	49	96	90	4.0		
3-1	55	.53	1.6	970.86	297	250	249	56	94	90	4.0		962.295
2	60	.64	1.9	974.75	298	250	250	54	96	91	4.5	↓	0.035
	Total												
	Average	0.7038	1.5080		294.5600				92.1680				

Sum of square roots. 17.6 86.430 3539

Circle ~~correct~~ bracketed units on data sheet.

QA/QC 9/21/05

Date DR

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

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

UNIT: 3 RUN: 3

FIELD DATA SHEET

Client Wheelabrator	Project No. 9708
Plant North Broward	Date 9/20/05
Meter Operator	RB
Probe Operator	RB

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt / Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (IV) [L]	Stack Temp. Ts (°F)	ProbeT$_p$ (°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
3	10	~~.64~~ .58	~~1.9~~ 1.7	978.416	~~298~~ 302 PB	250	253	53	~~96~~ 97 PB	91	4.5	N/A	
4	20	.50	1.5	981.97	301	250	254	59	97	91	4.0		
5	25	.45	1.4	985.325	297	250	261	62	97	91	4.0		Leak ✓ OK
4-1	80	.62	1.9	989.31	296	250	258	64	93	91	4.5		~~[illegible]~~
2	85	.62	1.9	993.14	297	250	259	51	97	91	4.5		985.425
3	90	.53	1.6	996.80	298	250	255	47	97	91	4.5		~~-0.075~~
4	95	.53	1.6	1000.41	298	249	244	45	97	91	4.5		-.1
5	100	.48	1.4	1003.830	297	250	254	45	97	91	4.0		
5-1	105	.48	1.4	1007.27	298	250	252	50	94	91	4.0		~~1003.830~~
2	110	.53	1.6	1010.86	299	250	251	47	96	91	4.5		-0.06
3	115	.53	1.6	1014.43	298	250	260	49	98	91	4.5		
4	120	.48	1.4	1017.85	297	250	257	50	98	91	4.5		
5	125	.38	1.1	1020.870	297	251	256	50	98	91	4.0	✓	
	Total	*											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC D2

Date 9/21/05

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

ORSAT READINGS

TEST LOCATION: FF OUTLET UNIT 3 **PAGE** 1 **OF** 1

Client	WHEELABRATOR	Project Number	9708	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	NORTH	Unit	3	
Orsat ID	#3	Fuel Type	MW	Leak Check Passed ☑

Run Number	Method Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Fo	Analyst	Analysis Date	Analysis Time
1	m29	1	9.6	19.0	9.4		D²	9/20	1254
		2	9.6	19.0	9.4				
		3	9.6	19.0	9.4				
		Avg	(9.6)		(9.4)				
2	m29	1	9.8	19.2	9.4		D²	9/20	1519
		2	9.8	19.2	9.4				
		3	9.8	19.2	9.4				
		Avg	(9.8)		(9.4)				
3	m29	1	9.4	19.0	9.6		D²	9/20	1735
		2	9.4	19.0	9.6				
		3	9.4	19.0	9.6				
		Avg	(9.4)		(9.6)				
		1							
		2							
		3							
		Avg							
		1							
		2							
		3							
		Avg							
		1							
		2							
		3							
		Avg							

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

Acceptable ranges for Fo:

Coal:	Anthracite and lignite	1.016-1.130	Gas:	Natural	1.600-1.836
	Bituminous	1.083-1.230		Propane	1.434-1.586
Oil:	Distillate	1.260-1.413		Butane	1.405-1.553
	Residual	1.210-1.370	Wood:		1.000-1.120

FDS003-Orsat.xls, August 2004

QA/QC D²
Date 9/20/06

CleanAir ENGINEERING

Impinger Weight Sheet

Client	WHEELABRATOR		Unit Name / Location	3 FF OUTLET
Plant	NORTH	Job No. 9708	Method	29

Run No.	1	Filter Type	QUARTZ		Sample Box No.	67-27
Date	9/20/05	Lot No.	D1441301		pH	NA
Analyst	D²	Filter No.	NA		Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	786.5	436.8	349.7	
Impinger 2	5%/10%	699.3	518.9	180.4	QA/QC D²
Impinger 3	5%/10%	545.7	520.9	24.8	Date 9/20
Impinger 4	EMPTY	430.1	426.8	3.3	
Impinger 5	KMNO4	529.9	531.8	-1.9	Total Weight (gm)
Impinger 6	KMNO4	531.7	531.3	0.4	556.7
Impinger 7	GEL	764.0	739.4	24.6	581.3

Run No.	2	Filter Type	QUARTZ		Sample Box No.	71-20
Date	9/20/05	Lot No.	D1441301		pH	NA
Analyst	D²	Filter No.	NA		Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	830.2	432.5	397.7	
Impinger 2	5%/10%	704.1	551.7	152.4	QA/QC D²
Impinger 3	5%/10%	578.9	561.7	17.2	Date 9/20
Impinger 4	EMPTY	440.6	438.1	2.5	
Impinger 5	KMNO4	555.6	557.6	-2.0	Total Weight (gm)
Impinger 6	KMNO4	525.8	525.8	0.0	~~571.8~~ D² 567.8
Impinger 7	GEL	737.7	716.2	21.5	~~593.3~~ D² 589.3

Run No.	3	Filter Type	QUARTZ		Sample Box No.	67-27
Date	9/20/05	Lot No.	D1441301		pH	NA
Analyst	D²	Filter No.	NA		Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	778.9	438.2	340.7	
Impinger 2	5%/10%	730.3	520.9	209.4	QA/QC D²
Impinger 3	5%/10%	529.8	522.1	7.7	Date 9/21
Impinger 4	EMPTY	429.4	428.6	0.8	
Impinger 5	KMNO4	532.3	532.3	0.0	Total Weight (gm)
Impinger 6	KMNO4	532.0	531.6	.4	559
Impinger 7	GEL	780.9	763.4	17.5	576.5

CleanAir. ENGINEERING

QA/QC D²
Date 9/21/05

Impinger Weight Sheet

Client	WHEELABRATOR		Unit Name / Location	3 FF OUTLET
Plant	NORTH	Job No. 9708	Method	M29

Run No.	Field BLANK	Filter Type	QUARTZ		Sample Box No.	67-27
Date	9/21/05	Lot No.	NA		pH	NA
Analyst	DZ	Filter No.	NA		Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)		
Impinger 1	EMPTY	437.7	437.7			
Impinger 2	5%/10%	510.9	510.9		QA/QC	
Impinger 3	5%/10%	520.8	520.7		Date	
Impinger 4	EMPTY	427.7	427.7			
Impinger 5	KMnO4	526.4	526.5		Total Weight (gm)	
Impinger 6	KMNO4	532.0	532.1			
Impinger 7	GEL	731.9	731.9			

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

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)		
Impinger 1						
Impinger 2					QA/QC	
Impinger 3					Date	
Impinger 4						
Impinger 5					Total Weight (gm)	
Impinger 6						
Impinger 7						

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

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)		
Impinger 1						
Impinger 2					QA/QC	
Impinger 3					Date	
Impinger 4						
Impinger 5					Total Weight (gm)	
Impinger 6						
Impinger 7						

CleanAir ENGINEERING

QA/QC_____
Date_____

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

UNIT: 3 RUN: 4

FIELD DATA SHEET

Client	Wheelabrator
Plant	North Broward
Meter Operator	PB
Probe Operator	PB
Project No.	9708
Date	9/21/05

Cross-Section of Test Location

(N) [UP]

0 0 0 0 0

5 1

Amb. Temp. (°F)	70
Bar. Press.	30.50 (in. Hg) [mbar]
Probe I.D. No.	M-8-2
Liner Material	Glass

Meter Box	Ide-13
Meter Y_d	0.98700
K Factor	3.00
Leak Rate Before	0.004 [cfm] [Lpm] @ 15 (in. Hg)
Leak Rate After	0.003 [cfm] [Lpm] @ 8 (in. Hg)
Pitot Leak Check Before:	☒ After: Good ☒ Bad ☐
Sample Box No.	71-20
Meter $\Delta H_@$	1.77202
Pitot C_p	0.84

Duct Dimensions (in.)	96x96

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow	First point all the way
-2.50	10	(In) [Out] of page	(In) [Out]

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.276	Nozzle I.D.	276-1

Start Time:	8:05
Stop Time:	10:20

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L] 21.550	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						
1-1	5	.70	2.1	25.666	307	250	240	61	85	83	3.5	N/A	
2	10	.33	.94	28.449	298	251	250	58	87	83	2.5		
3	15	.41	1.2	31.65	303	250	257	47	90	84	3.0		
4	20	.55	1.7	35.35	306	250	241	47	91	85	3.5		
5	25	.80	2.4	39.690	307	250	253	47	93	85	4.0		39.80
2-1	30	.75	2.3	44.105	309	249	255	54	92	86	4.0		-0.11
2	35	.70	2.1	48.13	308	250	251	57	95	87	4.0		
3	40	.68	2.0	52.14	307	250	257	51	96	87	3.5		
4	45	.60	1.8	55.93	307	250	243	55	96	88	3.5		
5	50	.55	1.7	59.660	304	250	257	56	96	88	3.5		
3-1	55	.75	2.3	63.92	308	250	253	62	93	89	4.0		53.70
2	60	.72	2.2	68.10	307	251	250	58	96	89	4.0		-0.04
									1110	1034			
	Total	*		94.075							0°		
	Average	0.7166	1.8092		306.3602				94.4800				
		Sum of square roots.			Circle correct bracketed units on data sheet.				2144				
		22.79			3671	QA/QC D^2			91.2400				
						Date 9/21/05							

CleanAir ENGINEERING

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

UNIT: 3 RUN: 4

FIELD DATA SHEET

Client	Weatherford	Project No.	1708
Plant	North Broward	Date	9/21/05
Meter Operator	PB		
Probe Operator	PB		

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

Cross-Section of Test Location

↑

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L]	Stack Temp. Ts (°F)	ProbeT$_p$ (°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						
3	65	.63	1.9	71.99	307	250	252	57	97	89	3.5	N/A	
4	70	.56	1.7	75.74	305	250	246	59	97	90	3.5		
5	75	.47	1.4	79.685	307	250	258	61	97	90	3.0		Leak check OK
4-1	80	.70	2.1	83.29	306	250	252	63	93	90	4.0		[redacted]
2	85	.77	2.3	87.58	306	250	251	51	97	90	4.5		79.195
3	90	.67	2.0	91.56	309	250	258	44	98	90	4.0		0.11
4	95	.59	1.8	95.40	309	250	243	47	97	90	3.5		
5	100	.54	1.6	99.00	306	250	254	47	97	91	3.5		99.04
5-1	105	.18	.54	101.10	307	249	242	55	94	90	2.5		-0.043
2	110	.68	2.0	105.05	306	250	259	58	93	90	4.0		
3	115	.60	1.8	108.82	306	250	243	55	96	90	4.0		
4	120	.55	1.7	112.52	307	250	251	54	96	90	3.5		
5	125	.48	1.4	115.925	307	250	249	54	96	90	3.5		
	Total	*							1248	1170			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC DZ

Date 9/21/05

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

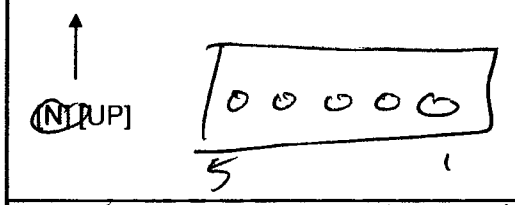
TEST LOCATION: FF Outlet Mercury **TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 3 **RUN:** 5

FIELD DATA SHEET

Client	Sherlabrator	Project No.	9708
Plant	North Brownsville	Date	9/21/05
Meter Operator	PB		
Probe Operator	PB		

Cross-Section of Test Location



Amb. Temp. (°F)	80	Bar. Press.	30.80 (in. Hg) [mbar]
Probe I.D. No.	M-5-2		
Liner Material	Glass		

Meter Box	166-13	Sample Box No.	67-27
Meter Y_d	0.98700	Meter $\Delta H_@$	1.7780
K Factor	3.00	Pitot C_p	0.84
Leak Rate Before	0.000 (cfm) [Lpm]	@	5 (in. Hg)
Leak Rate After	0.004 (cfm) [Lpm]	@	5 (in. Hg)
Pitot Leak Check Before:	☒	After: Good ☒	Bad ☐

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.276	Nozzle I.D.	276-1

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow (in) [Out] of page	First point all the way (in) [Out]
-12.50	10		

Duct Dimensions (in.) 96 x 96

Start Time:	10:43	Stop Time:	12:59

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	Filter T_f (°F) Set Points	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
				116.195		250	250						
1-1	5	.35	1.0	119.05	298	248	250	63	90	89	2.5	N/A	
2	10	.37	1.1	122.4	298	250	254	48	91	89	2.5		
3	15	.37	1.1	125.61	303	250	240	43	93	89	2.5		
4	20	.45	1.4	128.39	306	280	252	42	93	89	3.0		
5	25	.53	1.6	132.01	304	250	285	43	94	89	3.0		132.135
2-1	30	.62	1.9	PB 135.136.04	307	250	242	49	93	90	3.5		-0.625
2	35	.48	1.4	139.43	306	250	243	45	96	90	3.0		
3	40	.53	1.6	143.04	306	250	242	46	98	91	3.5		
4	45	.60	1.8	146.85	307	250	257	47	99	91	3.5		
5	56	.57	1.7	150.535	308	250	242	48	99	91	3.5		
3-1	55	.36	1.1	153.55	307	249	259	54	95	92	3.0		150.565
2	60	.53	1.6	157.18	307	250	245	51	96	92	3.5		-0.03
	Total	*		84.0125	D²								
	Average	0.6947	1.464		305.770					93.9600			

* Sum of square roots.

Circle ~~correct~~ bracketed units on data sheet.

QA/QC D² Date 9/21/05

12.3 85.9000 3659 2219

CleanAir ENGINEERING

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

UNIT: 3 RUN: 5

FIELD DATA SHEET

Client	Wheelabrator	Project No.	9208
Plant	North Broward	Date	9/21/05
Meter Operator			PB
Probe Operator			PB

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
3	65	.53	1.6	160.80	307	250	259	50	98	92	3.5	N/A	
4	70	.50	1.5	164.29	308	250	248	51	98	93	3.5		
5	75	.45	1.4	167.660	307	256	259	53	98	93	3.5		
4 -1	80	.60	1.8	171.55	307	250	244	57	95	92	3.5		167.765
2	85	.55	1.7	175.24	307	250	251	46	98	92	3.5		Leak Ck OK
3	90	.50	1.5	178.72	305	250	244	43	97	92	3.5		-0.105
4	95	.47	1.4	182.08	307	250	257	43	97	92	3.5		
5	100	.47	1.4	185.445	308	250	241	44	98	93	3.5		185.565
5 -1	105	.42	1.3	188.77	305	249	259	50	96	93	3.0		-0.06
2	110	.43	1.3	192.02	304	250	252	46	99	93	3.0		
3	115	.48	1.4	195.42	305	250	250	47	100	94	3.5		
4	120	.55	1.7	199.14	307	250	249	47	99	94	4.0		
5	125	.43	1.3	202.465	307	250	253	47	99	94	3.0		
	Total	*											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC DR

Date 9/21/05

CleanAir ENGINEERING

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

UNIT: 3 **RUN:** 6

FIELD DATA SHEET

Client	Weatherford
Plant	North Broward
Meter Operator	PB
Probe Operator	PB
Project No.	9708
Date	9/21/05

Cross-Section of Test Location

[N] [UP]

10 6 0 0 6

5 1

Duct Dimensions (in.) 96x96

Amb. Temp. (°F)	90
Bar. Press.	30.57 [in. Hg] [mbar]
Probe I.D. No.	M-5-2
Liner Material	Glass

Meter Box	Lib-03
Meter Y_d	0.98700
K Factor	3.00
Leak Rate Before	0.005 [cfm] [Lpm] @ 5 (in. Hg)
Leak Rate After	0.005 [cfm] [Lpm] @ 5 (in. Hg)
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐
Sample Box No.	III-20
Meter $\Delta H_@$	1.7405
Pitot C_p	0.84

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-12.30	10		

Filter No.	N/A	
Thimble No.	N/A	
Nozzle Diameter	0.276	Nozzle I.D. 276-1

Start Time: 13:15 Stop Time: 15:29

Traverse Point Number	Min/pt / Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. 202.670 [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
1-1	5	.28	.84	205.28	296	248	250	64	95	94	2.5	N/A	
2	10	.30	.90	207.97	296	250	244	63	96	94	2.5		
3	15	.41	1.2	211.13	304	249	239	56	95	94	3.0		
4	20	.50	1.5	214.60	308	250	245	54	97	94	3.0		
5	25	.62	1.9	218.510	308	250	240	55	98	94	3.5		218,560
2-1	30	.75	2.3	222.85	309	250	243	57	97	94	4.0		-0.05
2	35	.62	1.9	226.79	308	249	240	58	99	94	3.5		
3	40	.53	1.6	230.42	305	250	247	59	100	95	3.0		
4	45	.45	1.4	233.79	307	250	240	62	100	95	3.0		
5	50	.48	1.4	237.165	307	250	240	58	101	95	3.0		237,220
3-1	55	.47	1.4	240.161	306	250	247	60	98	96	3.0		-0.055
2	60	.51	1.5	244.13	305	250	241	58	161	96	3.5		
	Total	*	1.4956 PB	84.380									
	Average	0.1457	0.7478		307.880				97.320				

* Sum of square roots. 17.84

Circle correct bracketed units on data sheet. 307.59 2.312

QA/QC D Date 9/22/05

CleanAir ENGINEERING

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

UNIT: 3 RUN: 6

FIELD DATA SHEET

Client Wheelabrator	Project No. 9708
Plant North Brevard	Date 9/21/05
Meter Operator	PB
Probe Operator	PB

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft^3] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	Filter T_f (°F) Set Points	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
						252	250						
3	65	.53	1.6	247.76	304	250	241	58	102	97	3.5	N/A	
4	70	.47	1.4	251.16	307	250	247	61	102	97	3.0		Leak V OK
5	75	.42	1.3	254.420	308	250	242	64	101	97	3.0		[redacted]
4-1	80	.63	1.9	258.43	307	250	248	64	99	97	4.0		254.525
2	85	.65	2.0	262.45	307	250	249	58	102	97	4.0		-0.105
3	90	.55	1.7	266.18	306	250	240	51	103	97	3.5		
4	95	.53	1.6	269.81	309	250	243	51	103	97	3.5		
5	100	.45	1.4	273.245	310	250	247	53	103	97	3.5		
5-1	105	.15	.45	275.110	310	250	249	62	96	96	2.5		273.288
2	110	.55	1.7	278.86	312	250	250	61	96	96	4.0		+0.04
3	115	.55	1.7	282.57	315	250	249	56	98	95	4.0		
4	120	.48	1.4	285.54	325	249	247	57	98	95	3.5		
5	125	.45	1.4	289.300	316	250	251	57	98	95	3.5		
	Total	*											
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC_____

Date_____

CleanAir ENGINEERING

ORSAT READINGS

TEST LOCATION: FF OUTLET-3 **PAGE** 1 **OF** 1

Client	WHEELABRATOR	Project Number	9708	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	NORTH	Unit	3	
Orsat ID	3	Fuel Type	MW	Leak Check Passed ☑

Run Number	Method Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Fo	Analyst	Analysis Date	Analysis Time
4	M29	1	9.2	19.4	10.2		D²	9/21	1136
		2	9.2	19.4	10.2				
		3	9.2	19.4	10.2				
		Avg	(9.2)		(10.2)				
5	M29	1	9.2	19.2	10.0		D²	9/21	1406
		2	9.2	19.2	10.0				
		3	9.2	19.2	10.0				
		Avg	(9.2)		(10.0)				
6	M29	1	9.2	19.4	10.2		D²	9/21	1549
		2	9.2	19.4	10.2				
		3	9.2	19.4	10.2				
		Avg	9.2		10.2				
		1							
		2							
		3							
		Avg							
		1							
		2							
		3							
		Avg							
		1							
		2							
		3							
		Avg							

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

Acceptable ranges for Fo:

Coal:	Anthracite and lignite	1.016-1.130	Gas:	Natural	1.600-1.836
	Bituminous	1.083-1.230		Propane	1.434-1.586
Oil:	Distillate	1.260-1.413		Butane	1.405-1.553
	Residual	1.210-1.370	Wood:		1.000-1.120

FDS003-Orsat.xls, August 2004

QA/QC_____
Date_____

CleanAir. ENGINEERING

Impinger Weight Sheet

Client	WHEELABRATOR	Unit Name / Location	3 FF OUTLET
Plant	NORTH	Job No. 9708	Method M29

Run No.	4	Filter Type	QUARTZ	Sample Box No.	71-20
Date	9/21/05	Lot No.	D1441301	pH	NA
Analyst	D²	Filter No.	NA	Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	794.0	434.2	359.8	
Impinger 2	5%/10%	667.1	552.5	114.6	QA/QC 5/4
Impinger 3	5%/10%	589.3	571.6	17.7	Date D²
Impinger 4	EMPTY	441.3	439.5	1.8	
Impinger 5	KMNO4	529.9	529.7	0.2	Total Weight (gm)
Impinger 6	KMNO4	559.0	559.6	-.6	493.5
Impinger 7	GEL	770.6	749.6	21.0	514.5

Run No.	5	Filter Type	QUARTZ	Sample Box No.	62-27
Date	9/21/05	Lot No.	D1441301	pH	NA
Analyst	D²	Filter No.	NA	Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	806.4	437.9	368.5	
Impinger 2	5%/10%	597.4	511.9	85.5	QA/QC D³
Impinger 3	5%/10%	526.6	521.5	5.1	Date 5/4
Impinger 4	EMPTY	428.6	427.9	0.7	
Impinger 5	KMNO4	528.4	527.4	1.0	Total Weight (gm)
Impinger 6	KMNO4	533.6	533.0	0.6	461.4
Impinger 7	GEL	748.5	731.9	16.6	478

Run No.	6	Filter Type	QUARTZ	Sample Box No.	71-20
Date	9/21/05	Lot No.	D1441301	pH	NA
Analyst	D²	Filter No.	NA	Rinse	NA

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	EMPTY	797.0	433.9	363.1	
Impinger 2	5%/10%	641.7	548.4	93.3	QA/QC D²
Impinger 3	5%/10%	582.9	571.1	11.8	Date 9/22
Impinger 4	EMPTY	442.2	439.8	2.4	
Impinger 5	KMNO4	561.8	561.8	0.0	Total Weight (gm)
Impinger 6	KMNO4	532.2	531.7	0.5	471.1
Impinger 7	GEL	786.7	769.8	16.9	488.0

QA/QC D²
Date 9/22

CleanAir ENGINEERING

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FIELD DATA PRINTOUTS

E

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Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Test Run: 1
Client: Wheelabrator North Broward, Inc
Project No: 9708
Source Area (ft²): 64.00000

Bar. Press. (in. Hg): 30.00
Static P: -11.1
O_2 (dry volume %): 9.40
CO_2 (dry volume %): 9.60
N_2+CO (dry volume %): 81.00

Nozzle ID No: 276-1
Nozzle Diameter (D_n): 0.276
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 9/20/05
Start Time: 08:30
Stop Time: 11:18
Leak Rate Before: 0.007 cfm @ 15 "Hg
Leak Rate After: 0.005 cfm @ 9 "Hg

H_2O (condensate, ml or gm): 556.7
H_2O (silica, g): 24.6
Actual Moisture (%): 24.15

Meter Box ID. No: 66-13
Meter ΔH@: 1.79910
Meter Y_d: 0.98700

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			755.410						
1-01	5.0	0.28	0.84	757.950	295	82	81	0.53	2.54	102.5
1-02	10.0	0.38	1.10	760.900	301	82	81	0.62	2.95	102.6
1-03	15.0	0.50	1.50	764.320	307	85	81	0.71	3.42	104.0
1-04	20.0	0.51	1.50	767.750	307	89	82	0.71	3.43	102.8
1-05	25.0	0.56	1.70	771.395	307	91	83	0.75	3.64	104.0
Leak-Check	25.0			771.510						
2-01	30.0	0.86	2.60	775.950	309	93	85	0.93	4.44	102.2
2-02	35.0	0.68	2.00	779.920	309	95	85	0.82	3.97	102.4
2-03	40.0	0.63	1.90	783.750	307	97	87	0.79	3.83	102.1
2-04	45.0	0.58	1.70	787.420	307	97	87	0.76	3.67	101.9
2-05	50.0	0.63	1.90	791.300	309	97	88	0.79	3.88	103.5
Leak-Check	50.0			791.382						
3-01	55.0	0.58	1.70	795.020	309	96	89	0.76	3.64	101.1
3-02	60.0	0.74	2.20	799.130	308	97	89	0.86	4.11	101.1
3-03	65.0	0.67	2.00	803.150	309	99	90	0.82	4.02	103.6
3-04	70.0	0.61	1.80	806.930	309	99	90	0.78	3.78	102.1
3-05	75.0	0.43	1.30	810.200	299	93	90	0.66	3.27	104.9
Leak-Check	75.0			810.320						
4-01	80.0	0.63	1.90	814.190	299	96	91	0.79	3.87	102.4
4-02	85.0	0.65	2.00	818.150	300	98	91	0.81	3.96	103.0
4-03	90.0	0.58	1.70	821.870	299	100	92	0.76	3.72	102.0
4-04	95.0	0.50	1.50	825.320	296	101	93	0.71	3.45	101.5
4-05	100.0	0.43	1.30	828.590	299	101	93	0.66	3.27	103.9
Leak-Check	100.0			828.640						
5-01	105.0	0.51	1.50	832.070	297	99	93	0.71	3.43	100.2
5-02	110.0	0.55	1.70	835.800	299	101	94	0.74	3.73	104.8
5-03	115.0	0.54	1.60	839.400	299	101	94	0.73	3.60	102.0
5-04	120.0	0.51	1.50	842.860	297	102	94	0.71	3.46	100.7
5-05	125.0	0.45	1.40	846.240	299	102	94	0.67	3.38	104.8
Final	125.0		1.67360	90.46300	303.04000	92.20000		0.74373	90.46300	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7437	1.6736	90.4630	303.0400	92.2000				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

101205 090950

QA/QC 10/12
Date SB

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Test Run: 2
Client: Wheelabrator North Broward, Inc
Project No: 9708
Source Area (ft²): 64.00000

Bar. Press. (in. Hg): 30.00
Static P: -11.0
O_2 (dry volume %): 9.40
CO_2 (dry volume %): 9.80
N_2+CO (dry volume %): 80.80

Nozzle ID No: .276-1
Nozzle Diameter (D_n): 0.276
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 9/20/05
Start Time: 12:04
Stop Time: 14:17
Leak Rate Before: 0.006 cfm @ 15 "Hg
Leak Rate After: 0.003 cfm @ 9 "Hg

H_2O (condensate, ml or gm): 567.8
H_2O (silica, g): 21.5
Actual Moisture (%): 25.07

Meter Box ID. No: 66-13
Meter $\Delta H@$: 1.79910
Meter Y_d: 0.98700

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			847.045						
1-01	5.0	0.55	1.70	850.760	295	83	85	0.74	3.72	107.8
1-02	10.0	0.53	1.60	854.332	292	85	85	0.73	3.57	105.2
1-03	15.0	0.40	1.20	857.460	291	87	84	0.63	3.13	105.7
1-04	20.0	0.53	1.60	861.070	297	88	84	0.73	3.61	106.4
1-05	25.0	0.56	1.70	864.775	297	89	84	0.75	3.70	106.2
Leak-Check	25.0			864.810						
2-01	30.0	0.68	2.00	868.740	298	88	83	0.82	3.93	102.6
2-02	35.0	0.53	1.60	872.330	297	90	83	0.73	3.59	105.7
2-03	40.0	0.48	1.40	875.680	297	90	83	0.69	3.35	103.6
2-04	45.0	0.47	1.40	879.040	298	90	84	0.69	3.36	105.0
2-05	50.0	0.42	1.30	882.270	297	90	84	0.65	3.23	106.7
Leak-Check	50.0			882.305						
3-01	55.0	0.57	1.70	885.970	297	88	84	0.75	3.67	104.2
3-02	60.0	0.61	1.80	889.750	297	90	84	0.78	3.78	103.7
3-03	65.0	0.57	1.70	893.420	295	91	84	0.75	3.67	103.9
3-04	70.0	0.50	1.50	896.910	299	92	84	0.71	3.49	105.7
3-05	75.0	0.43	1.30	900.140	298	92	84	0.66	3.23	105.3
Leak-Check	75.0			900.250						
4-01	80.0	0.58	1.70	903.890	296	89	85	0.76	3.64	102.4
4-02	85.0	0.59	1.80	907.710	297	92	85	0.77	3.82	106.3
4-03	90.0	0.51	1.50	911.170	297	93	85	0.71	3.46	103.4
4-04	95.0	0.47	1.40	914.510	297	94	86	0.69	3.34	103.8
4-05	100.0	0.38	1.10	917.460	297	94	86	0.62	2.95	101.8
Leak-Check	100.0			917.515						
5-01	105.0	0.42	1.30	920.730	296	91	86	0.65	3.22	105.8
5-02	110.0	0.44	1.30	923.950	297	93	87	0.66	3.22	103.4
5-03	115.0	0.45	1.40	927.320	297	95	88	0.67	3.37	106.7
5-04	120.0	0.45	1.40	930.660	296	95	88	0.67	3.34	105.7
5-05	125.0	0.42	1.30	933.905	297	95	88	0.65	3.25	106.3
Final	125.0		1.50800	86.62500	296.48000	87.74000		0.70633	86.62500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7063	1.5080	86.6250	296.4800	87.7400				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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QA/QC JO SB
Date 10/12

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Test Run: 3
Client: Wheelabrator North Broward, Inc
Project No: 9708
Source Area (ft²): 64.00000

Bar. Press. (in. Hg): 30.00
Static P: 30.0
O_2 (dry volume %): 9.60
CO_2 (dry volume %): 9.40
N_2+CO (dry volume %): 81.00

Nozzle ID No: .276-1
Nozzle Diameter (D_n): 0.276
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 9/20/05
Start Time: 14:35
Stop Time: 16:50
Leak Rate Before: 0.004 cfm @ 15 "Hg
Leak Rate After: 0.003 cfm @ 8 "Hg

H_2O (condensate, ml or gm): 559.0
H_2O (silica, g): 17.5
Actual Moisture (%): 24.87

Meter Box ID. No: 66-13
Meter ΔH@: 1.79910
Meter Y_d: 0.98700

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			934.180						
1-01	5.0	0.23	0.69	936.550	283	88	88	0.48	2.37	99.2
1-02	10.0	0.25	0.75	939.010	284	90	88	0.50	2.46	98.6
1-03	15.0	0.32	0.96	941.770	295	91	88	0.57	2.76	98.5
1-04	20.0	0.41	1.20	944.890	296	92	88	0.64	3.12	98.4
1-05	25.0	0.58	1.70	948.555	298	94	89	0.76	3.66	97.2
Leak-Check	25.0			948.620						
2-01	30.0	0.73	2.20	952.710	297	94	89	0.85	4.09	96.7
2-02	35.0	0.66	2.00	956.680	300	96	89	0.81	3.97	98.7
2-03	40.0	0.57	1.70	960.410	298	97	90	0.75	3.73	99.4
2-04	45.0	0.51	1.50	963.910	296	97	90	0.71	3.50	98.4
2-05	50.0	0.47	1.40	967.260	297	96	90	0.69	3.35	98.2
Leak-Check	50.0			967.295						
3-01	55.0	0.53	1.60	970.860	297	94	90	0.73	3.57	98.7
3-02	60.0	0.64	1.90	974.750	298	96	91	0.80	3.89	97.9
3-03	65.0	0.58	1.70	978.460	302	97	91	0.76	3.71	98.2
3-04	70.0	0.50	1.50	981.970	301	97	91	0.71	3.51	99.9
3-05	75.0	0.45	1.40	985.325	297	97	91	0.67	3.36	100.4
Leak-Check	75.0			985.425						
4-01	80.0	0.62	1.90	989.310	296	93	91	0.79	3.88	99.4
4-02	85.0	0.62	1.90	993.190	297	97	91	0.79	3.88	99.0
4-03	90.0	0.53	1.60	996.800	298	97	91	0.73	3.61	99.6
4-04	95.0	0.53	1.60	1000.410	298	97	91	0.73	3.61	99.6
4-05	100.0	0.45	1.40	1003.830	297	97	91	0.67	3.42	102.3
Leak-Check	100.0			1003.890						
5-01	105.0	0.48	1.40	1007.270	298	94	91	0.69	3.38	98.2
5-02	110.0	0.53	1.60	1010.860	299	96	91	0.73	3.59	99.2
5-03	115.0	0.53	1.60	1014.430	298	98	91	0.73	3.57	98.4
5-04	120.0	0.48	1.40	1017.850	297	98	91	0.69	3.42	99.0
5-05	125.0	0.38	1.10	1020.870	297	98	91	0.62	3.02	98.2
Final	125.0		1.50800	86.43000	296.56000	92.68000		0.70384	86.43000	
25 points sampled		Sq.Rt.ΔP:								
QC-Check: Field Averages		0.7038	1.5080	86.4300	296.5600	92.6800				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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QA/QC SB
Date 10/11

USEPA Method 4 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Client: Wheelabrator North Broward, Inc
Project No: 9708

Test Run: 1

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	786.5	436.8	349.7
Impinger 2	5%HNO3/10%H2O2	699.3	518.9	180.4
Impinger 3	5%HNO3/10%H2O2	545.7	520.9	24.8
Impinger 4	Empty	430.1	426.8	3.3
Impinger 5	4%KMnO4/10%H2SO4	529.9	531.8	-1.9
Impinger 6	4%KMnO4/10%H2SO4	531.7	531.3	0.4
Impinger 7	Silica Gel	764.0	739.4	24.6
Impinger 8				

Rinse: (ml or gm)

	Field Data Check	
556.7 Liquid (gm)		
0.0 less rinse (gm)		
556.7 Net Liquid (gm)	556.7	☑ QA/QC OK
+ 24.6 Silica Gel (gm)	24.6	☑ QA/QC OK
581.3 Total Vlc (gm)	581.3	☑ QA/QC OK

Test Run: 2

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	830.2	432.5	397.7
Impinger 2	5%HNO3/10%H2O2	704.1	551.7	152.4
Impinger 3	5%HNO3/10%H2O2	578.9	561.7	17.2
Impinger 4	Empty	440.6	438.1	2.5
Impinger 5	4%KMnO4/10%H2SO4	555.6	557.6	-2.0
Impinger 6	4%KMnO4/10%H2SO4	525.8	525.8	0.0
Impinger 7	Silica Gel	737.7	716.2	21.5
Impinger 8				

Rinse: (ml or gm)

	Field Data Check	
567.8 Liquid (gm)		
0.0 less rinse (gm)		
567.8 Net Liquid (gm)	567.8	☑ QA/QC OK
+ 21.5 Silica Gel (gm)	21.5	☑ QA/QC OK
589.3 Total Vlc (gm)	589.3	☑ QA/QC OK

Test Run: 3

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	778.9	438.2	340.7
Impinger 2	5%HNO3/10%H2O2	730.3	520.9	209.4
Impinger 3	5%HNO3/10%H2O2	529.8	522.1	7.7
Impinger 4	Empty	429.4	428.6	0.8
Impinger 5	4%KMnO4/10%H2SO4	532.3	532.3	0.0
Impinger 6	4%KMnO4/10%H2SO4	532.0	531.6	0.4
Impinger 7	Silica Gel	780.9	763.4	17.5
Impinger 8				

Rinse: (ml or gm)

	Field Data Check	
559.0 Liquid (gm)		
0.0 less rinse (gm)		
559.0 Net Liquid (gm)	559.0	☑ QA/QC OK
+ 17.5 Silica Gel (gm)	17.5	☑ QA/QC OK
576.5 Total Vlc (gm)	576.5	☑ 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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OOL●

QA/QC SB
Date 10/12

USEPA Method 3 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Client: Wheelabrator North Broward, Inc
Project No: 9708
Method: EPA Method 3
Fuel Type: Municipal Waste
F_o for Fuel: 1.03 to 1.3

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	9.6	19.0	9.4	81.0	29.91		
	2	9.6	19.0	9.4	81.0	29.91		
	3	9.6	19.0	9.4	81.0	29.91		
	Avg.	9.60000		9.40000	81.00000	29.91	1.19792	*All measurements in spec.*
CEM or Other Avg:		9.60000		9.40000	81.00000	29.91200		☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
2	1	9.8	19.2	9.4	80.8	29.94		
	2	9.8	19.2	9.4	80.8	29.94		
	3	9.8	19.2	9.4	80.8	29.94		
	Avg.	9.80000		9.40000	80.80000	29.94	1.17347	*All measurements in spec.*
CEM or Other Avg:		9.80000		9.40000	80.80000	29.94400		☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
3	1	9.4	19.0	9.6	81.0	29.89		
	2	9.4	19.0	9.6	81.0	29.89		
	3	9.4	19.0	9.6	81.0	29.89		
	Avg.	9.40000		9.60000	81.00000	29.89	1.20213	*All measurements in spec.*
CEM or Other Avg:		9.40000		9.60000	81.00000	29.88800		☑ Fo value within expected range.

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

101205 090950
OOL●

QA/QC SB
Date 10/15

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Test Run: 4
Client: Wheelabrator North Broward, Inc
Project No: 9708
Source Area (ft^2): 64.00000

Bar. Press. (in. Hg): 30.50
Static P: -12.5
O_2 (dry volume %): 10.20
CO_2 (dry volume %): 9.20
N_2+CO (dry volume %): 80.60

Nozzle ID No: .276-1
Nozzle Diameter (D_n): 0.276
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 9/21/05
Start Time: 08:05
Stop Time: 10:20
Leak Rate Before: 0.004 cfm @ 15 "Hg
Leak Rate After: 0.003 cfm @ 8 "Hg

H_2O (condensate, ml or gm): 493.5
H_2O (silica, g): 21.0
Actual Moisture (%): 21.02

Meter Box ID. No: 66-13
Meter ΔH@: 1.79910
Meter Y_d: 0.98700

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			21.550						
1-01	5.0	0.70	2.10	25.660	307	85	83	0.84	4.11	103.0
1-02	10.0	0.33	0.99	28.490	298	87	83	0.57	2.83	102.2
1-03	15.0	0.41	1.20	31.650	303	90	84	0.64	3.16	102.4
1-04	20.0	0.55	1.70	35.350	306	91	85	0.74	3.70	103.7
1-05	25.0	0.80	2.40	39.690	307	93	85	0.89	4.34	100.9
Leak-Check	25.0			39.800						
2-01	30.0	0.75	2.30	44.050	309	92	86	0.87	4.25	102.1
2-02	35.0	0.70	2.10	48.130	308	95	87	0.84	4.08	101.0
2-03	40.0	0.68	2.00	52.140	307	96	87	0.82	4.01	100.5
2-04	45.0	0.60	1.80	55.930	307	96	88	0.77	3.79	101.0
2-05	50.0	0.55	1.70	59.660	304	96	88	0.74	3.73	103.6
Leak-Check	50.0			59.700						
3-01	55.0	0.75	2.30	63.920	308	93	89	0.87	4.22	101.0
3-02	60.0	0.72	2.20	68.100	307	96	89	0.85	4.18	101.7
3-03	65.0	0.63	1.90	71.990	307	97	89	0.79	3.89	101.0
3-04	70.0	0.56	1.70	75.740	305	97	90	0.75	3.75	103.0
3-05	75.0	0.47	1.40	79.085	307	97	90	0.69	3.35	100.4
Leak-Check	75.0			79.195						
4-01	80.0	0.70	2.10	83.290	306	93	90	0.84	4.10	101.2
4-02	85.0	0.77	2.30	87.580	306	97	90	0.88	4.29	100.7
4-03	90.0	0.67	2.00	91.560	309	98	90	0.82	3.98	100.2
4-04	95.0	0.59	1.80	95.400	309	97	90	0.77	3.84	103.1
4-05	100.0	0.54	1.60	99.000	306	97	91	0.73	3.60	100.7
Leak-Check	100.0			99.040						
5-01	105.0	0.18	0.54	101.100	307	94	90	0.42	2.06	100.0
5-02	110.0	0.68	2.00	105.050	306	93	90	0.82	3.95	99.0
5-03	115.0	0.60	1.80	108.820	306	96	90	0.77	3.77	100.2
5-04	120.0	0.55	1.70	112.520	307	96	90	0.74	3.70	102.8
5-05	125.0	0.48	1.40	115.925	307	96	90	0.69	3.41	101.2
Final	125.0		1.80120	94.07500	306.36000	91.24000		0.76667	94.07500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7667	1.8012	94.0750	306.3600	91.2400				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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SS ISOKINETIC Version 12-2004a

QA/QC SB
Date 10/12

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Test Run: 5
Client: Wheelabrator North Broward, Inc
Project No: 9708
Source Area (ft²): 64.00000

Test Date: 9/21/05
Start Time: 10:43
Stop Time: 12:59
Leak Rate Before: 0.004 cfm @ 45 "Hg
Leak Rate After: 0.004 cfm @ 8 "Hg

Bar. Press. (in. Hg): 30.50
Static P: -12.5
O_2 (dry volume %): 10.00
CO_2 (dry volume %): 9.20
N_2+CO (dry volume %): 80.80

H_2O (condensate, ml or gm): 461.4
H_2O (silica, g): 16.6
Actual Moisture (%): 21.40

Nozzle ID No: .276-1
Nozzle Diameter (D_n): 0.276
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 66-13
Meter ΔH@: 1.79910
Meter Y_d: 0.98700

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			116.195						
1-01	5.0	0.35	1.00	119.050	298	90	89	0.59	2.86	99.7
1-02	10.0	0.37	1.10	122.400	298	91	89	0.61	3.35	113.7*
1-03	15.0	0.37	1.10	125.010	303	93	89	0.61	2.61	88.7*
1-04	20.0	0.45	1.40	128.390	306	93	89	0.67	3.38	104.5
1-05	25.0	0.53	1.60	132.010	306	94	89	0.73	3.62	103.1
Leak-Check	25.0			132.135						
2-01	30.0	0.62	1.90	136.040	307	93	90	0.79	3.91	102.9
2-02	35.0	0.48	1.40	139.430	306	96	90	0.69	3.39	101.1
2-03	40.0	0.53	1.60	143.040	306	98	91	0.73	3.61	102.2
2-04	45.0	0.60	1.80	146.850	307	99	91	0.77	3.81	101.4
2-05	50.0	0.57	1.70	150.535	308	99	91	0.75	3.69	100.7
Leak-Check	50.0			150.565						
3-01	55.0	0.36	1.10	153.550	307	95	92	0.60	2.99	102.7
3-02	60.0	0.53	1.60	157.180	307	96	92	0.73	3.63	102.9
3-03	65.0	0.53	1.60	160.800	307	98	92	0.73	3.62	102.5
3-04	70.0	0.50	1.50	164.290	308	98	93	0.71	3.49	101.7
3-05	75.0	0.45	1.40	167.660	307	98	93	0.67	3.37	103.4
Leak-Check	75.0			167.765						
4-01	80.0	0.60	1.80	171.550	307	95	92	0.77	3.79	101.0
4-02	85.0	0.55	1.70	175.240	307	98	92	0.74	3.69	102.6
4-03	90.0	0.50	1.50	178.720	305	97	92	0.71	3.48	101.4
4-04	95.0	0.47	1.40	182.080	307	97	92	0.69	3.36	101.0
4-05	100.0	0.47	1.40	185.445	308	98	93	0.69	3.36	101.1
Leak-Check	100.0			185.505						
5-01	105.0	0.42	1.30	188.770	305	96	93	0.65	3.27	103.7
5-02	110.0	0.43	1.30	192.020	304	99	93	0.66	3.25	101.7
5-03	115.0	0.48	1.40	195.420	305	100	94	0.69	3.40	100.6
5-04	120.0	0.55	1.70	199.140	307	99	94	0.74	3.72	103.1
5-05	125.0	0.43	1.30	202.415	307	99	94	0.66	3.28	102.6
Final	125.0		1.46400	85.90000	305.72000	93.96000		0.69469	85.90000	

25 points sampled

QC-Check: Field Averages	Sq.Rt.ΔP	ΔH	Metered	Stack	Dry Gas Meter
	0.6947	1.4640	85.9000	305.7200	93.9600
	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK

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QA/QC SB
Date 10/12

Field Data Printout

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

Location: Unit 3 FF Outlet
Test Run: 6
Client: Wheelabrator North Broward, Inc
Project No: 9708
Source Area (ft²): 64.00000

Bar. Press. (in. Hg): 30.50
Static P: -12.3
O_2 (dry volume %): 10.20
CO_2 (dry volume %): 9.20
N_2+CO (dry volume %): 80.60

Nozzle ID No: .276-1
Nozzle Diameter (D_n): 0.276
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 9/21/05
Start Time: 13:15
Stop Time: 15:29
Leak Rate Before: 0.005 cfm @ 15 "Hg
Leak Rate After: 0.005 cfm @ 9 "Hg

H_2O (condensate, ml or gm): 471.1
H_2O (silica, g): 16.9
Actual Moisture (%): 21.76

Meter Box ID. No: 66-13
Meter ΔH@: 1.79910
Meter Y_d: 0.98700

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			202.670						
1-01	5.0	0.28	0.84	205.280	296	95	94	0.53	2.61	101.2
1-02	10.0	0.30	0.90	207.970	296	96	94	0.55	2.69	100.7
1-03	15.0	0.41	1.20	211.130	304	95	94	0.64	3.16	101.9
1-04	20.0	0.50	1.50	214.600	308	97	94	0.71	3.47	101.4
1-05	25.0	0.62	1.90	218.510	308	98	94	0.79	3.91	102.7
Leak-Check	25.0			218.560						
2-01	30.0	0.75	2.30	222.850	309	97	94	0.87	4.29	102.7
2-02	35.0	0.62	1.90	226.790	308	99	94	0.79	3.94	103.4
2-03	40.0	0.53	1.60	230.420	305	100	95	0.73	3.63	102.5
2-04	45.0	0.45	1.40	233.790	307	100	95	0.67	3.37	103.4
2-05	50.0	0.48	1.40	237.165	307	101	95	0.69	3.38	100.2
Leak-Check	50.0			237.220						
3-01	55.0	0.47	1.40	240.610	306	98	96	0.69	3.39	101.8
3-02	60.0	0.51	1.50	244.130	305	101	96	0.71	3.52	101.1
3-03	65.0	0.53	1.60	247.760	306	102	97	0.73	3.63	102.2
3-04	70.0	0.47	1.40	251.160	307	102	97	0.69	3.40	101.7
3-05	75.0	0.42	1.30	254.420	308	101	97	0.65	3.26	103.3
Leak-Check	75.0			254.525						
4-01	80.0	0.63	1.90	258.430	307	99	97	0.79	3.91	101.3
4-02	85.0	0.65	2.00	262.450	307	102	97	0.81	4.02	102.4
4-03	90.0	0.55	1.70	266.180	306	103	97	0.74	3.73	103.1
4-04	95.0	0.53	1.60	269.810	309	103	97	0.73	3.63	102.3
4-05	100.0	0.45	1.40	273.245	310	103	97	0.67	3.44	105.1
Leak-Check	100.0			273.285						
5-01	105.0	0.15	0.45	275.160	310	96	96	0.39	1.88	99.9
5-02	110.0	0.55	1.70	278.860	312	96	96	0.74	3.70	103.4
5-03	115.0	0.55	1.70	282.570	315	98	95	0.74	3.71	103.7
5-04	120.0	0.48	1.40	285.940	325	98	95	0.69	3.37	101.5
5-05	125.0	0.45	1.40	289.300	316	98	95	0.67	3.36	103.9
Final	125.0		1.49560	86.38000	307.88000	97.32000		0.69571	86.38000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6957	1.4956	86.3800	307.8800	97.3200				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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Date 10/17

USEPA Method 3 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 3 FF Outlet
Client: Wheelabrator North Broward, Inc
Project No: 9708
Method: EPA Method 3
Fuel Type: Municipal Waste
F_o for Fuel: 1.03 to 1.3

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
4	1	9.2	19.4	10.2	80.6	29.88		
	2	9.2	19.4	10.2	80.6	29.88		
	3	9.2	19.4	10.2	80.6	29.88		
	Avg.	9.20000		10.20000	80.60000	29.88	1.16304	*All measurements in spec.*
CEM or Other Avg:		9.20000		10.20000	80.60000	29.88000		☑ 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
5	1	9.2	19.2	10.0	80.8	29.87		
	2	9.2	19.2	10.0	80.8	29.87		
	3	9.2	19.2	10.0	80.8	29.87		
	Avg.	9.20000		10.00000	80.80000	29.87	1.18478	*All measurements in spec.*
CEM or Other Avg:		9.20000		10.00000	80.80000	29.87200		☑ 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
6	1	9.2	19.4	10.2	80.6	29.88		
	2	9.2	19.4	10.2	80.6	29.88		
	3	9.2	19.4	10.2	80.6	29.88		
	Avg.	9.20000		10.20000	80.60000	29.88	1.16304	*All measurements in spec.*
CEM or Other Avg:		9.20000		10.20000	80.60000	29.88000		☑ Fo value within expected range.

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

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QA/QC SB
Date 10/12

USEPA Method 4 Laboratory Data

Location: Unit 3 FF Outlet
Client: Wheelabrator North Broward, Inc
Project No: 9708

Test Method: USEPA Method 29
Analyte: Mercury

Test Run: 4

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	794.0	434.2	359.8
Impinger 2	5%HNO3/10%H2O2	667.1	552.5	114.6
Impinger 3	5%HNO3/10%H2O2	589.3	571.6	17.7
Impinger 4	Empty	441.3	439.5	1.8
Impinger 5	4%KMnO4/10%H2SO4	529.9	529.7	0.2
Impinger 6	4%KMnO4/10%H2SO4	559.0	559.6	-0.6
Impinger 7	Silica Gel	770.6	749.6	21.0
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
493.5	Liquid (gm)		
0.0	less rinse (gm)		
493.5	Net Liquid (gm)	493.5	☑ QA/QC OK
+ 21.0	Silica Gel (gm)	21.0	☑ QA/QC OK
514.5	Total Vlc (gm)	514.5	☑ QA/QC OK

Test Run: 5

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	806.4	437.9	368.5
Impinger 2	5%HNO3/10%H2O2	597.4	511.9	85.5
Impinger 3	5%HNO3/10%H2O2	526.6	521.5	5.1
Impinger 4	Empty	428.6	427.9	0.7
Impinger 5	4%KMnO4/10%H2SO4	528.4	527.4	1.0
Impinger 6	4%KMnO4/10%H2SO4	533.6	533.0	0.6
Impinger 7	Silica Gel	748.5	731.9	16.6
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
461.4	Liquid (gm)		
0.0	less rinse (gm)		
461.4	Net Liquid (gm)	461.4	☑ QA/QC OK
+ 16.6	Silica Gel (gm)	16.6	☑ QA/QC OK
478.0	Total Vlc (gm)	478.0	☑ QA/QC OK

Test Run: 6

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	797.0	433.9	363.1
Impinger 2	5%HNO3/10%H2O2	641.7	548.4	93.3
Impinger 3	5%HNO3/10%H2O2	582.9	571.1	11.8
Impinger 4	Empty	442.2	439.8	2.4
Impinger 5	4%KMnO4/10%H2SO4	561.8	561.8	0.0
Impinger 6	4%KMnO4/10%H2SO4	532.2	531.7	0.5
Impinger 7	Silica Gel	786.7	769.8	16.9
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
471.1	Liquid (gm)		
0.0	less rinse (gm)		
471.1	Net Liquid (gm)	471.1	☑ QA/QC OK
+ 16.9	Silica Gel (gm)	16.9	☑ QA/QC OK
488.0	Total Vlc (gm)	488.0	☑ 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: 9708
Unit 3 FF Outlet

USEPA Method 29
Mercury (Hg) Laboratory Parameters

Blank Analysis				
m_{1b-B}	Fraction 1B Blank (µg)	<0.1000		
m_{2b-B}	Fraction 2B Blank (µg)	<0.3000		
m_{3a-B}	Fraction 3A Blank (µg)	<0.2000		
m_{3b-B}	Fraction 3B Blank (µg)	<0.4000		
m_{3c-B}	Fraction 3C Blank (µg)	<0.4000		
$m_{total-B}$	Total Blank Amount (µg)	<1.4000		
Run No.		**1**	**2**	**3**
Date (2005)		Sep 20	Sep 20	Sep 20
Start Time (approx.)		08:30	12:04	14:35
Stop Time (approx.)		11:18	14:17	16:50
Sample Analysis				
m_{1b-S}	Fraction 1B Sample (µg)	<0.1000	<0.1000	<0.1000
m_{2b-S}	Fraction 2B Sample (µg)	10.0180	10.9757	12.8701
m_{3a-S}	Fraction 3A Sample (µg)	<0.2000	<0.2000	<0.2000
m_{3b-S}	Fraction 3B Sample (µg)	<0.5000	<0.5000	<0.5000
m_{3c-S}	Fraction 3C Sample (µg)	0.8182	<0.4000	<0.4000
$m_{total-S}$	Total Sample Amount (µg)	10.8362	10.9757	12.8701
Allowable Blank				
$m_{T-B-allow}$	Total Allowable Blank (µg)	0.0000	0.0000	0.0000
Sample Corrected for Blank				
m_n	Total Sample Amount (µg)	10.8362	10.9757	12.8701
Sample Corrected for Blank - Prorated Fractions				
m_{n-1b}	Fraction 1B Prorated (µg)	<0.1000	<0.1000	<0.1000
m_{n-2b}	Fraction 2B Prorated (µg)	10.0180	10.9757	12.8701
m_{n-3a}	Fraction 3A Prorated (µg)	<0.2000	<0.2000	<0.2000
m_{n-3b}	Fraction 3B Prorated (µg)	<0.5000	<0.5000	<0.5000
m_{n-3c}	Fraction 3C Prorated (µg)	0.8182	<0.4000	<0.4000

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Date 10/12

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Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 9708

Mercury

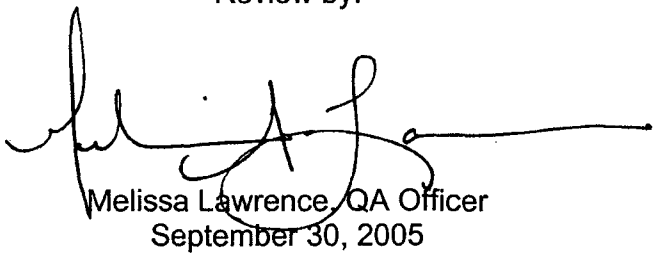
EPA Method 29 Analysis

Analytical Report
5934

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 5934
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:



Melissa Lawrence, QA Officer
September 30, 2005

Report Reviewed and Finalized By:

Ken Smith, Laboratory Director
September 30, 2005

SUMMARY OF RESULTS

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Summary of Analysis

Boiler #6 Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front half µg	H_2O_2/ HNO_3 µg	Empty Impinger µg	$KMnO_4$ µg	HCl µg
U3 FF Outlet R1	#1	10.8	< 0.1	10.0	< 0.2	< 0.5	0.80
	#2		< 0.1	10.0	< 0.2	< 0.5	0.84
U3 FF Outlet R2	#1	11.0	< 0.1	11.0	< 0.2	< 0.5	< 0.4
	#2		< 0.1	10.9	< 0.2	< 0.5	< 0.4
U3 FF Outlet R3	#1	12.9	< 0.1	12.8	< 0.2	< 0.5	< 0.4
	#2		< 0.1	12.9	< 0.2	< 0.5	< 0.4
Field Blank	#1	< 0.5	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.5	< 0.4
Reagent Blank	#1	< 0.4	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.4	< 0.4

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ANALYTICAL NARRATIVE

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Element One Analytical Narrative

Client:	Clean Air Engineering, IL	Element One #:	5934
Client ID:	Wheelabrator, N. Broward	Analyst:	CML, IJJ
Method:	M29	Dates Received:	9/23/05
Analytes:	Hg	Dates Analyzed:	9/27-30/05

Summary of Analysis

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

Detection Limits

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

Analysis QA/QC

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

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. Nothing unusual was noticed with any of the samples or analyses.

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QUALITY CONTROL SUMMARY

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Summary of Quality Control Data

Mercury Duplicate Analysis RPD

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

Run Number	Front half	H2O2/HNO4	Empty Impinger	KMnO4	HCl
U3 FF Outlet R1	NA	0.1%	NA	NA	4.3%
U3 FF Outlet R2	NA	0.6%	NA	NA	NA
U3 FF Outlet R3	NA	0.9%	NA	NA	NA
Field Blank	NA	NA	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA

Mercury Spike Recoveries

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

Run Number		Front half	H2O2/HNO4	Empty Impinger	KMnO4	HCl
U3 FF Outlet R3	#1	121%	95%	102%	102%	88%
	#2	121%	95%	102%	100%	90%

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SAMPLE CUSTODY

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CHAIN OF CUSTODY FORM

5934

CLIENT: Wheelabrator North Broward | PROJECT NO.: 9708

PLANT: Same | DEPT.: 66

PROJECT MANAGER: Scott Brown

EPA METHOD 29 FOR Hg

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	1	Unit 3 FF Outlet	9/20	Filter	1		X				
	1	"		Front-Half 0.1N HNO3 Rinse	1		X				
	1	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1		X				
	1	"		Imp. 4 + 0.1N HNO3 Rinse	1		X				
	1	"		Imp. 5,6 KMnO4+H2O Rinse	1		X				
	1	"	↓	Imp. 5,6 HCl Rinse	1		X				
		"									
		"									
	2	"	9/20	Filter	1		X				
	2	"		Front-Half 0.1N HNO3 Rinse	1		X				
	2	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1		X				
	2	"		Imp. 4 + 0.1N HNO3 Rinse	1		X				
	2	"		Imp. 5,6 KMnO4+H2O Rinse	1		X				
	2	V	↓	Imp. 5,6 HCl Rinse	1		X				

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D Dreska			9/23/05 10:00		
Courier: Fed Ex	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by: Element One	Date / Time 9/23/05 10:00

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC 28403

PO Number:

This form was completed by: Dick Dreska

Signature: D Dreska Date: 9/22/05

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

CHAIN OF CUSTODY FORM

5934

CLIENT: Wheelabrator North Broward
PLANT: Same
PROJECT MANAGER: Scott Brown
PROJECT NO.: 9708
DEPT.: 66

COPY

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	Archive			ADDITIONAL INFORMATION
	3	Unit 3 FF Outlet	9/20	Filter	1		X				
	3	"	"	Front-Half 0.1N HNO3 Rinse	1		X				
	3	"	"	Imp. 1,2,3 + 0.1N HNO3 Rinse	1		X				
	3	"	"	Imp. 4 + 0.1N HNO3 Rinse	1		X				
	3	"	"	Imp. 5,6 KMnO4+H2O Rinse	1		X				
	3	"	"	Imp. 5,6 HCl Rinse	1		X				
		"									
		"									
	4	"	9/21	Filter	1			X			
	4	"	"	Front-Half 0.1N HNO3 Rinse	1			X			
	4	"	"	Imp. 1,2,3 + 0.1N HNO3 Rinse	1			X			
	4	"	"	Imp. 4 + 0.1N HNO3 Rinse	1			X			
	4	"	"	Imp. 5,6 KMnO4+H2O Rinse	1			X			
	4	V	V	Imp. 5,6 HCl Rinse	1			X			

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CHAIN OF CUSTODY FORM

5934

CLIENT Wheelabrator North Broward | PROJECT NO. 9708

PLANT Same | DEPT. 66

PROJECT MANAGER Scott Brown

COPY

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	Archive			ADDITIONAL INFORMATION
	5	Unit 3 FF Outlet	9/21	Filter	1			X			
	5			Front-Half 0.1N HNO3 Rinse	1			X			
	5			Imp. 1,2,3 + 0.1N HNO3 Rinse	1			X			
	5			Imp. 4 + 0.1N HNO3 Rinse	1			X			
	5			Imp. 5,6 KMnO4+H2O Rinse	1			X			
	5			Imp. 5,6 HCl Rinse	1			X			
	6		9/21	Filter	1			X			
	6			Front-Half 0.1N HNO3 Rinse	1			X			
	6			Imp. 1,2,3 + 0.1N HNO3 Rinse	1			X			
	6			Imp. 4 + 0.1N HNO3 Rinse	1			X			
	6			Imp. 5,6 KMnO4+H2O Rinse	1			X			
	6	V		Imp. 5,6 HCl Rinse	1			X			

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			9.23.05 10:00		
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CHAIN OF CUSTODY FORM

5934

CLIENT Wheelabrator North Broward | PROJECT NO. 9708

PLANT Same | DEPT. 66

PROJECT MANAGER Scott Brown

COPY

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	NA	*Field Blank*	9/21	Filter	1		X				
	NA	"		Front-Half 0.1N HNO3 Rinse	1		X				
	NA	"		Imp. 1,2,3 + 0.1N HNO3 Rinse	1		X				
	NA	"		Imp. 4 + 0.1N HNO3 Rinse	1		X				
	NA	"		Imp. 5,6 KMnO4+H2O Rinse	1		X				
	NA	V	↓	Imp. 5,6 HCl Rinse	1		X				
	NA	Reagent Blanks	9/20	3 Quartz Filters	1	NA	X				
	NA	"		0.1 N HNO3	1	300	X				
	NA	"		DI H2O	1	100	X				
	NA	"		5% HNO3 / 10% H2O2	1	200	X				
	NA	"		4% KMnO4 / 10% H2SO4	1	100	X				
	NA	V	↓	8N HCl / DI H2O	1	225	X				

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			9.23.05 10:00		
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Forwarding Lab: Element One
Wilmington, NC 28403

PO Number:

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Dick Dreska

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Date 9/22

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ANALYTICAL DATA

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One AIR TESTING SAMPLE SUBMISSION FORM Lab ID # 5934

DUE DATE: 10.7.05

Project ID/ Number: Wheelabrator, N. Broward 9708

Client: **Clean Air IL**	Date / Time Received: 9.23.05 / 1000

HNO_3 Lot: 1104120	HF Lot: 5104060 4110940	HCl Lot: 4104090	**Ref. Method:**
Volume Marked (Y) / N	Volume Loss Y / (N) ?	pH < 2.0 (Y) / N	**29**

	Sample Identification		Sample Identification
1	U3 FF Outlet R1	7	U3 FF Outlet R4
2	U3 FF Outlet R2	8	U3 FF Outlet R5
3	U3 FF Outlet R3	9	U3 FF Outlet R6
4	U3 FF Outlet R3 Spike	10	U3 FF Outlet R6 Spike
5	Field Blank		
6	Reagent Blank		
Analyses Requested	**Samples 1-6**	**Hg**	
Analyses Requested	**Samples 7-10**	**Archive**	

	Front Half		Back Half			HNO_3 (A)		$KMnO_4$ (B)		HCl (C)	
SAMPLE	BV, ml	FV, ml	BV, ml	Used	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml
1	168	100	900	—	—	110	200	360	500	240	400
2	146	↓	880	—	—	106	↓	355	↓	255	↓
3/4	168	↓	880	—	—	105	↓	370	↓	265	↓
5	164	↓	330	—	—	110	↓	365	↓	230	↓
7											
8											
9/10											

5934-6		**REAGENT BLANK**	BV, ml	FV, ml	Comments
C-8A	A		200	200	
C-8A	FH & A	0.1N HNO_3	100	100	
C-8B	B	DI H_2O	—	—	
C-9	BH	5% HNO_3/10% H_2O_2	280	—	
C-10	B	4% $KMnO_4$/10%H_2SO_4	100 mL KMnO4 35 mL DI	Calculate as 400 mL	
C-11	C	8N HCl	225	400	
C-12	FH	Filter	—	100	

Request by _____ to analyze Archived Samples 7-10 Due Date_____

Received by_____ Date_____

Sample Submission by Dan Smith

9/23/2005 2:01:26 PM

Element One, Inc. M 29 Sample Submission Form Revision 1.0

elementOne

Method 29 Microwave Worksheet

Lab ID # e 5934

Client: CAE

Date Digested: 9.27.05 Initials: JD Worksheet Prepared by:

Sample Lab ID	Sample Description	Sample Weight (g)	Weight Digested (g)	Spike	Prep Volume (ml)	Weight In Micro / Weight Out Micro	Units
BLK					100ml		ug/L
BLK-SPK				5ug	↓		↓
5934-1	FH Filter	N/A	Full	↓	↓		↓
2	↓	↓	↓				
3/4							
5							
6	↓	↓	↓		↓		↓

*See SSF for list of analytes

Element One, Inc. Form 104 - Revision

PerkinElmer FIMS-100 CVAA

Sample_ID	Date	Time	Mean_Sig	Mean_ST	Mean_SA	Units	Alq.	Vol.	Sig 1	Std_U 1	Smp_U 1	Sig 2	Std_U 2	Smp_U 2
Calib Blank	9/27/2005	10:07:57	0.00055907			µg	4	500	0.00055907					
STD1=.004ug	9/27/2005	10:09:01	0.00104219			µg	4	500	0.00104219					
STD2=.04ug	9/27/2005	10:10:03	0.01025447			µg	4	500	0.01025447					
STD3=.08ug	9/27/2005	10:11:09	0.02044612			µg	4	500	0.02044612					
STD4=.12ug	9/27/2005	10:12:14	0.03058016			µg	4	500	0.03058016					
STD5=.16ug	9/27/2005	10:13:21	0.04091878			µg	4	500	0.04091878					
STD6=.2ug	9/27/2005	10:14:29	0.05084727			µg	4	500	0.05084727					
0.004 = DL	9/27/2005	10:17:10	0.00103596	0.00400595	0.00400595	µg	4	500	0.00103596	0.00400595	0.00400595			
0.080 = QC STD 2	9/27/2005	10:18:18	0.01879054	0.07314656	0.07314656	µg	4	500	0.01879054	0.07314656	0.07314656			
0.080 = QC STD 3	9/27/2005	10:19:24	0.02049478	0.07983193	0.07983193	µg	4	500	0.02049478	0.07983193	0.07983193			
REAGENT BLANK	9/27/2005	10:20:28	0.00011107	0.00042937	0.00042937	µg	4	500	0.00011107	0.00042937	0.00042937			
5934-A-1	9/27/2005	10:22:01	-0.0000908	-0.0003512	-0.0175648	µg	4	200	-0.0000974	-0.0003765	-0.0188274	-0.0000843	-0.000326	-0.0163022
5934-A-2	9/27/2005	10:23:35	-0.0001323	-0.0005114	-0.0255725	µg	4	200	-0.0001593	-0.0006157	-0.0307888	-0.0001053	-0.0004071	-0.0203561
5934-A-3	9/27/2005	10:25:10	-0.0000623	-0.0002411	-0.0120587	µg	4	200	-0.0000727	-0.0002812	-0.014063	-0.000052	-0.000201	-0.0100544
5934-A-4-SPK	9/27/2005	10:26:46	0.02090053	0.08142484	4.07124229	µg	4	200	0.02091842	0.0814951	4.07475504	0.02088263	0.08135459	4.06772953
5934-A-5	9/27/2005	10:28:23	-0.0000894	-0.0003459	-0.0172962	µg	4	200	-0.0000518	-0.0002003	-0.0100191	-0.0001271	-0.0004914	-0.0245733
5934-A-6	9/27/2005	10:30:01	-0.0001734	-0.0006703	-0.0335163	µg	4	200	-0.0001794	-0.0006936	-0.0346813	-0.0001674	-0.000647	-0.0323514
5934-B-1	9/27/2005	10:31:39	-0.0000811	-0.0003136	-0.0392085	µg	4	500	-0.000088	-0.0003401	-0.0425193	-0.0000742	-0.0002871	-0.0358977
5934-B-2	9/27/2005	10:33:18	-0.0000043	-0.0000167	-0.0020877	µg	4	500	-0.000022	-0.0000853	-0.0106739	0.00001344	0.00005198	0.00649852
5934-B-3	9/27/2005	10:34:54	-0.0001189	-0.0004597	-0.0574701	µg	4	500	-0.0001115	-0.000431	-0.0538794	-0.0001263	-0.0004884	-0.0610608
5934-B-4-SPK	9/27/2005	10:36:28	0.02071359	0.08069092	10.0863659	µg	4	500	0.02085761	0.08125631	10.1570398	0.02056958	0.08012553	10.0156919
0.004 = DL	9/27/2005	10:37:32	0.00111008	0.00429269	0.00429269	µg	4	500	0.00111008	0.00429269	0.00429269			
0.080 = QC STD 2	9/27/2005	10:38:40	0.02027187	0.07895699	0.07895699	µg	4	500	0.02027187	0.07895699	0.07895699			
REAGENT BLANK	9/27/2005	10:39:44	0.00012745	0.00049267	0.00049267	µg	4	500	0.00012745	0.00049267	0.00049267			
5934-B-5	9/27/2005	10:41:17	-0.000169	-0.0006533	-0.0816647	µg	4	500	-0.0001921	-0.0007427	-0.0928425	-0.0001458	-0.0005638	-0.070487
5934-B-6	9/27/2005	10:42:50	-0.000162	-0.0006261	-0.0626165	µg	4	400	-0.000164	-0.0006342	-0.0634233	-0.0001599	-0.000618	-0.0618097
5934-BH-1	9/27/2005	10:44:24	0.01146938	0.04452456	10.0180262	µg	4	900	0.01146277	0.04449879	10.0122277	0.01147599	0.04455033	10.0238247
5934-BH-2	9/27/2005	10:45:58	0.01284476	0.04988957	10.9757066	µg	4	880	0.01288207	0.05003519	11.0077436	0.01280744	0.04974395	10.9436697
5934-BH-3	9/27/2005	10:47:33	0.01504928	0.05850047	12.8701052	µg	4	880	0.01498237	0.05823891	12.8125619	0.01511619	0.05876203	12.9276484
5934-BH-4-SPK	9/27/2005	10:49:10	0.03436102	0.13454679	29.6002952	µg	4	880	0.03437625	0.1346072	29.6135849	0.03434579	0.13448638	29.5870055
5934-BH-5	9/27/2005	10:50:46	-0.0000585	-0.0002264	-0.0186815	µg	4	330	0.00001438	0.00005559	0.00458665	-0.0001315	-0.0005084	-0.0419496
5934-BH-6	9/27/2005	10:52:22	-0.0001533	-0.0005928	-0.0414976	µg	4	280	-0.0001637	-0.0006327	-0.0442959	-0.000143	-0.0005528	-0.0386994
0.004 = DL	9/27/2005	10:56:44	0.00112954	0.00436798	0.00436798	µg	1.6	100	0.00112954	0.00436798	0.00436798			
0.080 = QC STD 2	9/27/2005	10:57:51	0.02032786	0.07917676	0.07917676	µg	1.6	100	0.02032786	0.07917676	0.07917676			
REAGENT BLANK	9/27/2005	10:58:55	0.00016283	0.00062945	0.00062945	µg	1.6	100	0.00016283	0.00062945	0.00062945			
0.004 = DL	9/27/2005	11:34:45	0.00106206	0.00410692	0.00410692	µg		1	0.00106206	0.00410692	0.00410692			
0.080 = QC STD 3	9/27/2005	11:35:52	0.02019753	0.07866525	0.07866525	µg		1	0.02019753	0.07866525	0.07866525			
REAGENT BLANK	9/27/2005	11:36:57	0.0001139	0.00044031	0.00044031	µg		1	0.0001139	0.00044031	0.00044031			
Calib Blank	9/27/2005	15:32:14	0.00059434			µg			0.00059434					
STD1=.004ug	9/27/2005	15:33:18	0.00102272			µg			0.00102272					
STD2=.04ug	9/27/2005	15:34:22	0.01017056			µg			0.01017056					
STD3=.08ug	9/27/2005	15:35:27	0.02020743			µg			0.02020743					
STD4=.12ug	9/27/2005	15:36:33	0.03061948			µg			0.03061948					
STD5=.16ug	9/27/2005	15:37:40	0.04044742			µg			0.04044742					
STD6=.2ug	9/27/2005	15:38:48	0.05104265			µg			0.05104265					
0.004 = DL	9/27/2005	15:41:29	0.00106477	0.00418271	0.00418271	µg			0.00106477	0.00418271	0.00418271			
0.080 = QC STD 2	9/27/2005	15:42:36	0.02015284	0.07923218	0.07923218	µg			0.02015284	0.07923218	0.07923218			
0.080 = QC STD 3	9/27/2005	15:43:42	0.02015915	0.07925699	0.07925699	µg			0.02015915	0.07925699	0.07925699			
REAGENT BLANK	9/27/2005	15:44:47	0.00017412	0.00068397	0.00068397	µg			0.00017412	0.00068397	0.00068397			
5934-C-1	9/27/2005	15:46:20	0.00208275	0.00818195	0.81819581	µg	4	400	0.00203828	0.00800722	0.80072264	0.00212723	0.00835668	0.83566899
5934-C-2	9/27/2005	15:47:53	0.00073221	0.00287627	0.28762775	µg	4	400	0.00071449	0.00280666	0.28066632	0.00074993	0.00294589	0.29458918
5934-C-3	9/27/2005	15:49:28	0.00023515	0.00092372	0.0923727	µg	4	400	0.00024991	0.00098167	0.09816749	0.0002204	0.00086577	0.0865779
5934-C-4-SPK	9/27/2005	15:51:03	0.0181567	0.07137791	7.13779196	µg	4	400	0.0179877	0.07071302	7.07130235	0.01832569	0.07204281	7.20428156
5934-C-5	9/27/2005	15:52:40	-0.0000601	-0.0002361	-0.0236107	µg	4	400	-0.0000183	-0.000072	-0.0072064	-0.0001018	-0.0004001	-0.0400149
5934-C-6	9/27/2005	15:54:17	-0.0002573	-0.0010107	-0.1010712	µg	4	400	-0.0002649	-0.0010409	-0.104091	-0.0002496	-0.0009805	-0.0980514
5934-FH-BLK	9/27/2005	15:55:55	-0.0001815	-0.0007129	-0.0178237	µg	4	100	-0.0002488	-0.0009774	-0.0244373	-0.0001141	-0.0004484	-0.0112101
5934-FH-BLK-SPK	9/27/2005	15:57:34	0.01786306	0.07022265	4.38891585	µg	1.6	100	0.01782339	0.07006656	4.37916049	0.01790273	0.07037874	4.39867122
5934-FH-1	9/27/2005	15:59:10	-0.0001087	-0.0004271	-0.0106777	µg	4	100	-0.0000367	-0.0001441	-0.0036041	-0.0001807	-0.00071	-0.0177514
5934-FH-2	9/27/2005	16:00:43	-0.0001132	-0.0004448	-0.0111212	µg	4	100	-0.0001235	-0.0004851	-0.012128	-0.0001029	-0.0004045	-0.0101143
0.004 = DL	9/27/2005	16:01:48	0.0009728	0.00382141	0.00382141	µg	4	100	0.0009728	0.00382141	0.00382141			
0.080 = QC STD 2	9/27/2005	16:02:55	0.01946334	0.07651901	0.07651901	µg	4	100	0.01946334	0.07651901	0.07651901			
REAGENT BLANK	9/27/2005	16:04:00	0.00007769	0.0003052	0.0003052	µg	4	100	0.00007769	0.0003052	0.0003052			
5934-FH-3	9/27/2005	16:05:33	-0.0000269	-0.0001058	-0.0026458	µg	4	100	-0.0000429	-0.0001686	-0.0042154	-0.0000109	-0.000043	-0.0010762
5934-FH-4-SPK	9/27/2005	16:07:06	0.02465665	0.09695849	2.42396228	µg	4	100	0.02465544	0.0969537	2.42384267	0.02465787	0.09696327	2.42408189
5934-FH-5	9/27/2005	16:08:40	0.00001208	0.00004746	0.00118665	µg	4	100	0.00007768	0.00030514	0.00762873	-0.0000535	-0.0002102	-0.0052554
5934-FH-6	9/27/2005	16:10:15	-0.0002484	-0.000976	-0.0244019	µg	4	100	-0.0002492	-0.0009789	-0.0244733	-0.0002477	-0.0009732	-0.0243304
0.004 = DL	9/27/2005	16:11:21	0.00100274	0.00393903	0.00393903	µg	4	100	0.00100274	0.00393903	0.00393903			
0.080 = QC STD 3	9/27/2005	16:12:28	0.02031831	0.0798833	0.0798833	µg	4	100	0.02031831	0.0798833	0.0798833			
REAGENT BLANK	9/27/2005	16:13:32	0.00009182	0.00036071	0.00036071	µg	4	100	0.00009182	0.00036071	0.00036071			

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METHODOLOGY

VELOCITY AND VOLUMETRIC FLOW RATE - EPA METHOD 2

EPA Method 2 was used, in conjunction with the wet method testing, to determine the gas velocity and flow rate at the FF Outlet test location.

Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the EPA Method 1 traverse points. The velocity pressures were measured with a Type S pitot tube. Gas temperature measurements were made using a Type K thermocouple and digital pyrometer. Figure 4-2 includes the components of the EPA Method 2 sampling apparatus.

GAS COMPOSITION AND MOLECULAR WEIGHT - EPA METHOD 3B

In order to determine the oxygen (O_2) concentration, carbon dioxide (CO_2) concentration and gas molecular weight, a time-integrated sample of the gas was obtained for each sampling train and analyzed in accordance with EPA Method 3B. The gas sample was collected into a vinyl sample bag from isokinetic test methods. The contents of the bag was analyzed for O_2 and CO_2 concentrations using an Orsat gas analyzer.

MOISTURE CONTENT - EPA METHOD 4

The flue gas moisture content at each of the test locations was determined in accordance with EPA Method 4, in conjunction with the mercury testing. Figure 4-2 includes the components of the EPA Method 4 sampling apparatus. The gas moisture was determined by quantitatively condensing the moisture in chilled impingers. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. The amount of water condensed and the volume of gas sampled were used to calculate the gas moisture content in accordance with EPA Method 4.

METHODOLOGY

MERCURY EMISSIONS - EPA METHOD 29

EPA Method 29 was used to measure mercury emissions at the Unit 3 FF Outlet. This method defines metal emissions as particulate and gaseous material isokinetically withdrawn through a temperature controlled probe and collected on a high-efficiency filter and in acidified absorbing solutions.

Figure 4-2 illustrates the EPA Method 29 sampling train which was used. The sampling apparatus contained a glass-lined temperature-controlled probe equipped with a pitot tube (for measuring stack flow rate) and a sharp-edged glass button-hook nozzle. The exit of the probe was connected to a high efficiency quartz fiber filter (Pallflex 2500QAT-UP) supported in a glass filter holder inside an oven. The exit of the filter holder connected directly to a series of seven full size impingers.

The first impinger of the sampling train was left empty to accommodate collection of the flue gas moisture. The second and third impingers of the sampling apparatus each contained 100 milliliters of 5% nitric acid/10% hydrogen peroxide solution. The fourth impinger was left empty. The fifth and sixth impingers each contained 100 milliliters of 4% potassium permanganate/10% sulfuric acid solution. The seventh impinger contained 200 to 300 grams of silica gel. All of the impingers were maintained at a temperature below 68°F for the duration of each test.

Procedures for selecting sampling locations and for the operation of the apparatus were derived from EPA Method 29 and associated EPA Methods 1 through 5. The entire sampling apparatus was leak-checked before and after each test run. Sampling was performed at an average isokinetic rate greater than 90% and less than 110%.

At the conclusion of each test run, the probe and nozzle was rinsed and brushed with 0.1 Normal nitric acid to remove any particulate matter. These rinses were collected into polyethylene sample containers. The quartz fiber filter was recovered and placed into a polyethylene sample container. The volume of liquid collected in each of the impingers was quantified.

The liquid from the first three impingers was transferred to a leak-free polyethylene storage container. The back-half of the filter housing, the first three impingers and all connecting glassware were rinsed with 0.1 Normal nitric acid which was be added to the storage container.

METHODOLOGY

MERCURY EMISSIONS (CONTINUED)

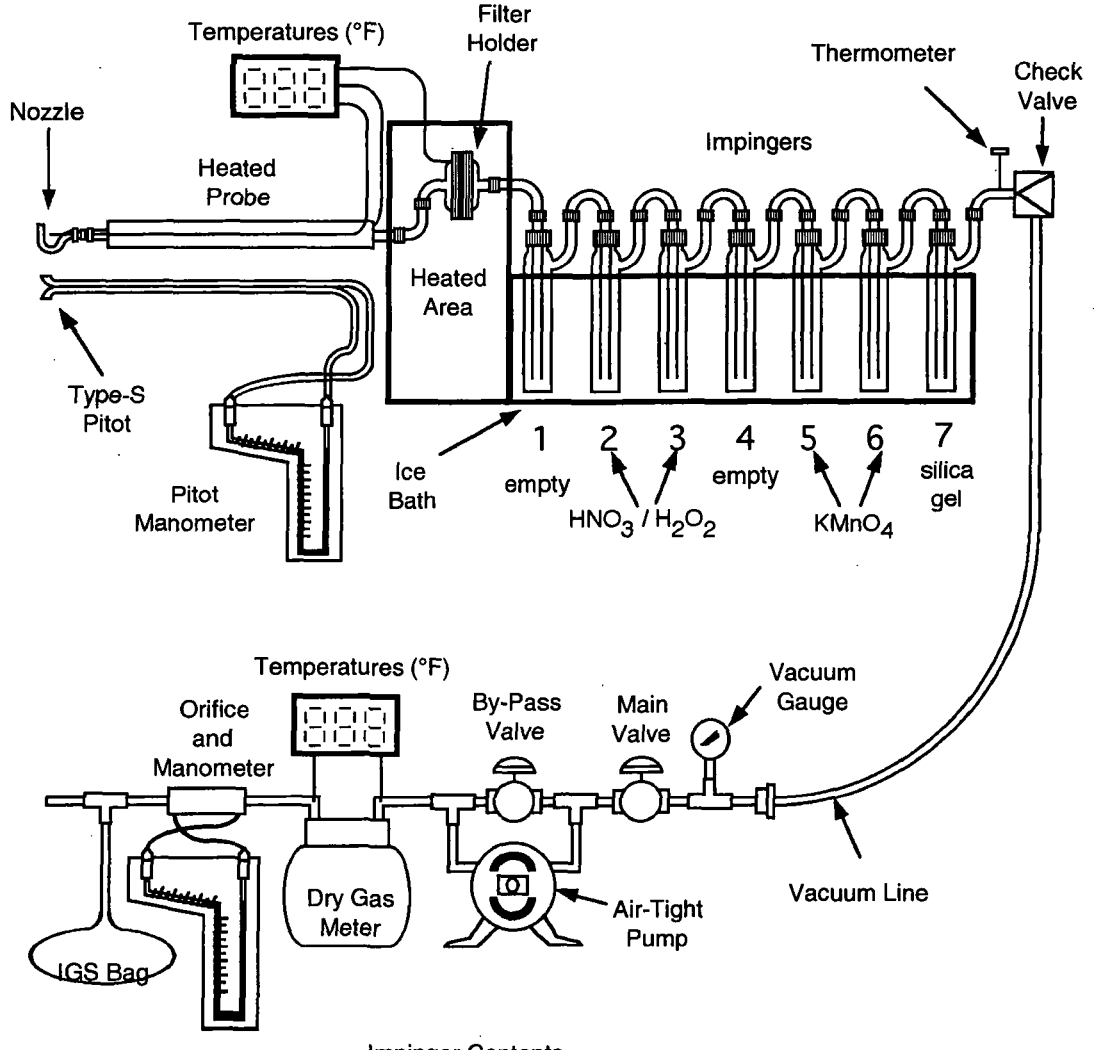
Any liquid collected in the fourth impinger was transferred to a separate polyethylene container, and the impinger was rinsed into the same container with 0.1 Normal nitric acid. The contents of impingers 5 and 6 were collected into an amber glass container. Both impingers 5 and 6 and the connecting glassware were then rinsed with acidified potassium permanganate followed by distilled water. These rinses were collected in the glass container. Any residual potassium permanganate retained by the impingers was removed using a rinse of 8 Normal hydrochloric acid, which was collected into a separate glass container. 200 milliliters of distilled water was used to rinse impingers 5 and 6 and added to the same container to also dilute the acid.

All containers were sealed, labeled and liquid levels marked prior to transport to the laboratory. The silica gel weight and the volume of condensate collected in the impingers were used to determine moisture content of the stack gas.

The nitric acid probe rinses, and samples recovered from impingers 1 through 3 were reduced to near dryness and digested with hydrofluoric acid and concentrated nitric acid. The filter was digested with hydrofluoric and nitric acids. The samples obtained from Impingers 4, 5 and 6 were digested separately with acidified potassium permanganate and subsequently analyzed only for mercury. The digested samples were analyzed by cold vapor atomic absorption spectroscopy (CVAAS per Method 7470 in EPA publication SW 846) for mercury by Element One, Inc of Wilmington, North Carolina.

METHODOLOGY

MERCURY EMISSIONS (CONTINUED)



Impinger Contents
1) empty
2) 100 ml 5% HNO_3/10% H_2O_2
3) 100 ml 5% HNO_3/10% H_2O_2
4) empty
5) 100 ml 4% $KMnO_4$/10% H_2SO_4
6) 100 ml 4% $KMnO_4$/10% H_2SO_4
7) 300 g silica gel

Figure 4-2: Metals Sampling Apparatus (EPA Method 29)

METHODOLOGY

QUALITY ASSURANCE AND QUALITY CONTROL

All testing followed the EPA quality assurance and quality control guidelines as outlined in the respective methods. Field blanks and matrix spikes for the mercury testing were done as shown in the following Table 4-3. The results of the analysis are shown in Table 2-2.

Table 4-3:
Method Field Blanks and Matrix Spikes

Method	Reagent Blank Sets	Field Blank	Duplicate Analysis	Matrix Spikes
EPA M29	1	1	On all analysis	1 predigested filter blank and 1 postdigested sample

DESCRIPTION OF INSTALLATION

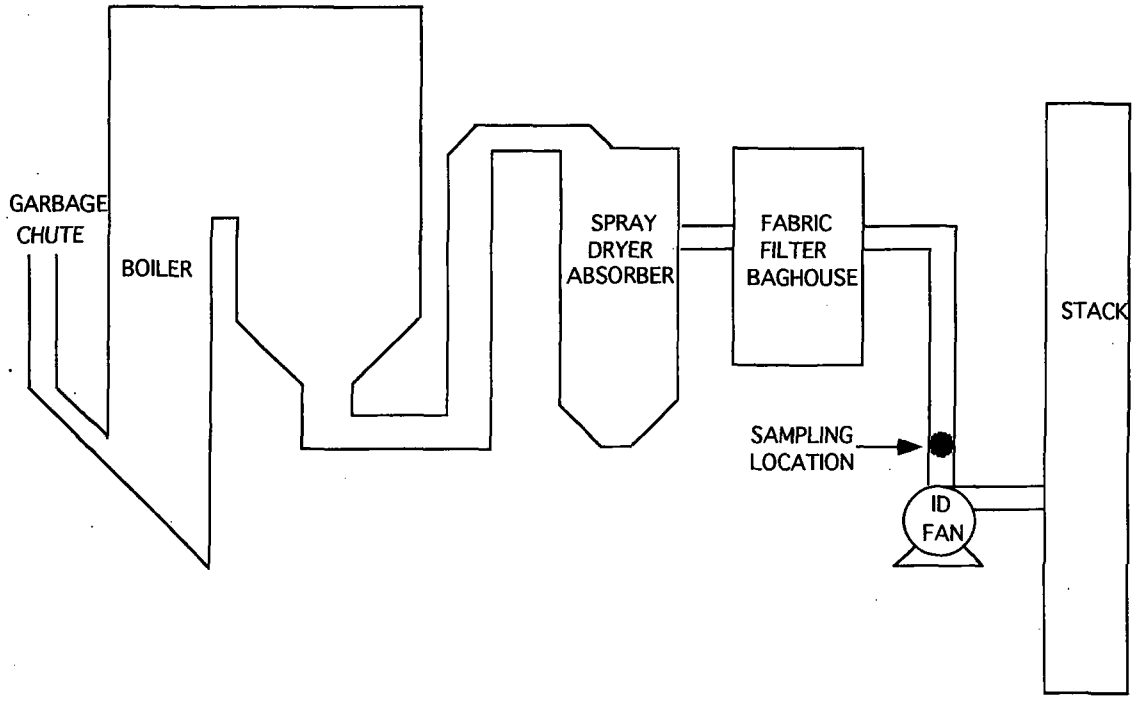


Figure 3-2: Process Schematic

METHODOLOGY

The sampling 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.

These sampling, recovery and analytical procedures are summarized on pages 4-1 through 4-7.

The sampling nozzles were calibrated on site. All other equipment was calibrated at the Clean Air Engineering laboratory prior to shipment to the job site. A post-test calibration was performed on the meter boxes at the conclusion of testing to verify that calibration was maintained throughout the test program. Calibration sheets can be found in Appendix Section C.

SAMPLING POINT DETERMINATION - EPA METHOD 1

Sampling point locations were determined according to EPA Method 1.

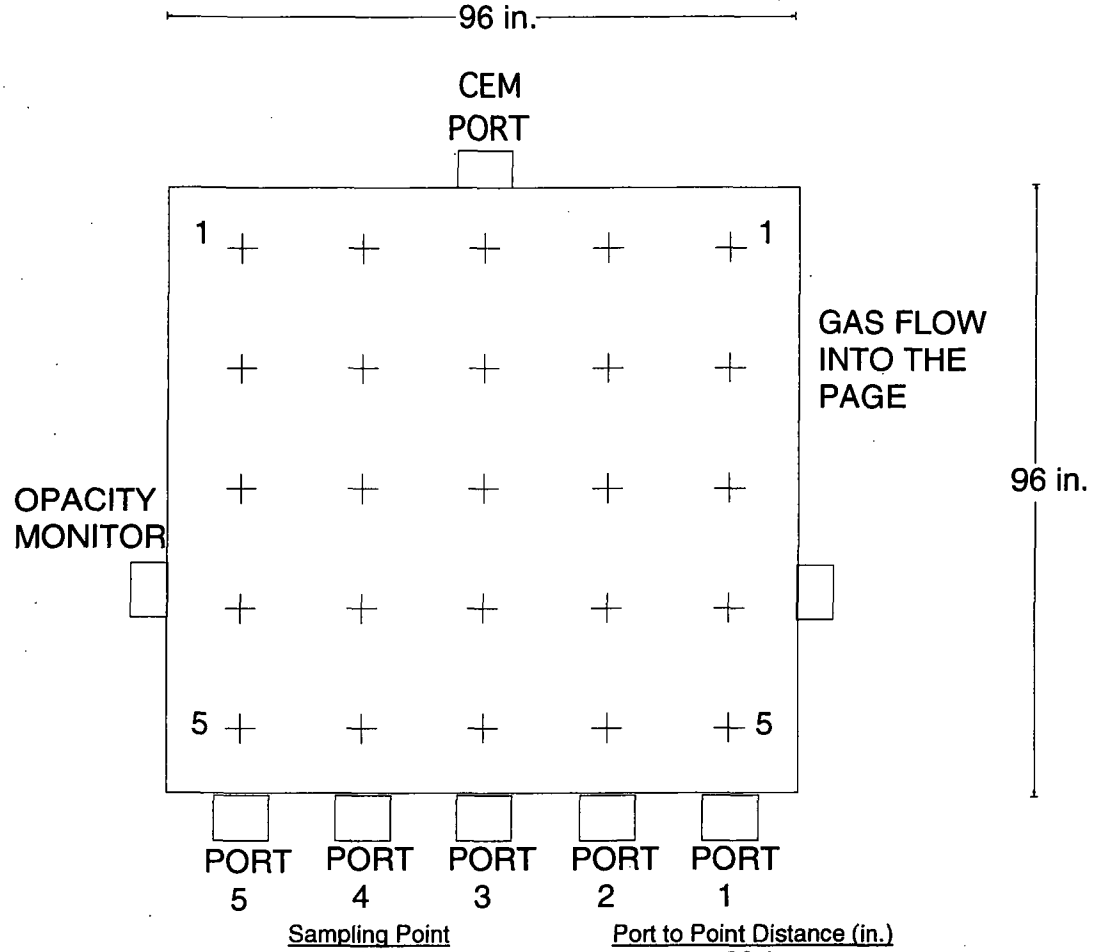
Table 4-2 outlines the sampling point configurations. Figure 4-1 illustrates the sampling points and orientation of sampling ports for the source tested in the program.

Table 4-2:
Sampling Points

Location Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
Unit 3 FF Outlet							
Mercury	29	1-3	5	5	5	125	4-1

METHODOLOGY

SAMPLING POINT DETERMINATION (CONTINUED)



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

Diameters upstream from disturbance: 2 diameters Limit: 2
Diameters downstream from disturbance: 0.5 diameters Limit: 0.5

Figure 4-1: Unit 3 FF Outlet - Sampling Point Determination (EPA Method 1)

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 21-09-05
Start Time: 08:05
End Time: 10:25

	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	512.19	315.66	41.78	32.59	9.20	16.01	295.83	5.74	-12.62
Unit 2	509.57	315.05	42.22	33.94	8.28	15.79	297.02	6.29	-10.57
Unit 3	521.22	314.88	46.87	38.58	8.29	14.20	305.64	6.26	-7.31

	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	190.54	881.62	828.46	84.56	-0.10	267.02	1173.75	2.91	183.55
Unit 2	188.51	887.65	829.18	85.52	-0.10	269.12	1046.16	6.85	184.12
Unit 3	191.45	891.16	830.42	84.44	-0.09	276.21	1126.26	0.98	183.23

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Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 21-09-05
Start Time: 10:44
End Time: 12:59

	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	516.00	315.00	43.36	30.76	12.60	14.07	296.77	5.31	-11.93
Unit 2	506.83	314.91	40.88	28.56	12.32	14.92	297.04	6.27	-10.35
Unit 3	512.87	314.79	42.63	33.07	9.56	14.32	305.18	6.27	-7.04

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	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	190.93	882.00	828.54	83.84	-0.10	267.80	1186.55	3.00	184.10
Unit 2	188.81	887.66	829.09	83.73	-0.10	269.99	1055.02	6.83	184.26
Unit 3	192.95	891.51	830.65	79.65	-0.09	277.06	1133.31	3.07	184.73

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 21-09-05
Start Time: 13:16
End Time: 15:26

	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	516.04	315.22	42.76	29.79	12.97	14.77	296.42	5.65	-11.71
Unit 2	505.78	314.91	39.04	28.14	10.90	16.10	297.71	6.28	-10.16
Unit 3	512.71	318.17	41.67	31.75	9.92	15.31	307.67	6.21	-7.18

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	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	190.22	882.10	830.63	83.58	-0.09	267.90	1191.84	4.08	183.40
Unit 2	188.72	887.24	828.30	83.06	-0.10	270.03	1053.63	6.69	184.14
Unit 3	192.40	891.11	830.70	78.07	-0.09	277.22	1141.78	2.55	184.16

CONTROL ROOM STACK TEST LOG

Date: 9-21-05

Unit	Test	Run #	Start Time	End Time	Slurry S.G.
3	Mercury	4	0805	1025	
3	Mercury	5	1044	1259	
3	Mercury	6	1316	1526	

CONTROL ROOM STACK TEST LOG

Date: 9-20-05

Unit	Test	Run #	Start Time	End Time	Slurry S.G.
3	Mercury	1	0830	0945	
3	Mercury	1	1017	1118	
3	Mercury	2	1204	1419	
3	Mercury	3	1435	16:50	

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