Wheelabrator North Broward Inc.
A Waste Management Company
2600 N.W. 48th Street
Pompano Beach, FL 33073
(954) 971-8701
(954) 971-8703 Fax

July 15, 2005

#7099340000063608243

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
Second Quarter of 2005, Report Submittal

Dear Mr. Tallam:

As required by F.A.C. 62-296.416, please find enclosed the 2005 second quarter report on mercury stack testing which was conducted on Unit #2.

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

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

Sincerely,

Christopher M. Carey
Regional Vice President

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section #7099340000063608212
FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, #7099340000063608182
Broward County Department of Planning and Environmental Protection, Air Quality Division #7099340000063608151
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/receptionist071805

WM WASTE MANAGEMENT

CleanAir.

BEST AVAILABLE COPY

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

RECEIVED
JUL 21 2005
BUREAU OF AIR REGULATION

REPORT ON MERCURY TESTING

Performed for:
WHEELABRATOR NORTH BROWARD
UNIT 2 FF OUTLET
POMPANO BEACH, FLORIDA

Client Reference No: 14500124
CleanAir Project No: 9708-3
Revision 0: July 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

Reviewed by,

Peter Kaufmann

CONTENTS

PROJECT OVERVIEW

Wheelabrator North Broward, Inc. operates a Refuse to Energy Facility located in Pompano Beach, Florida. The facility's emission levels are regulated by the Florida Department of Environmental Protection. Wheelabrator North Broward, Inc. contracted Clean Air Engineering (CleanAir) to perform a compliance test program at their municipal waste combustor (MWC) facility in Pompano Beach, Florida. Testing was conducted in accordance with 40 CFR 60 Subpart Cb and applicable sections of PSD-FL-112(B) and PA86-22. The sampling was conducted at the Unit 2 Fabric Filter (FF) Outlet on June 16, 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.
K. O'Halloren - 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 (2004) Start Time	Stop Time	Unit	Location	Pollutant	Method	Run No.
June 16, 2005						
09:00	11:15	2	FF Outlet	Mercury	EPA 29	1
11:17	13:32	2	FF Outlet	Mercury	EPA 29	2
13:35	15:50	2	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 2 FF Outlet			
Mercruy (µg/dscm @ 7% O_2)	EPA M29	30	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.

WHEELABRATOR NORTH BROWARD
POMPANO BEACH, FLORIDA

Client Reference No: 14500124
CleanAir Project No: 9708-3

RESULTS

Table 2-1:
Unit 2 FF Outlet - Mercury

Run No.		1	2	3	Average
Date (2005)		Jun 16	Jun 16	Jun 16	
Start Time (approx.)		09:00	11:17	13:35	
Stop Time (approx.)		11:15	13:32	15:50	
Process Conditions					
R_P	Steam Production Rate Klbs/hour	184	184	184	**184**
P_1	SDA Inlet Temperature (°F)	310	310	310	**310**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.2	9.0	8.6	**8.9**
CO_2	Carbon dioxide (dry volume %)	10.2	10.3	10.6	**10.4**
T_s	Sample temperature (°F)	301	299	300	**300**
B_w	Actual water vapor in gas (% by volume)	22.8	23.1	23.8	**23.2**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	183,689	177,103	174,653	**178,481**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	95,850	92,358	90,162	**92,790**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	82.66	78.11	78.54	
%I	Isokinetic sampling (%)	102.7	100.7	103.7	
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B Prorated (µg)	<0.100	<0.100	<0.100	
$m_{n\text{-}2b}$	Fraction 2B Prorated (µg)	42.8	85.8	44.9	
$m_{n\text{-}3a}$	Fraction 3A Prorated (µg)	<0.200	0.203	<0.200	
$m_{n\text{-}3b}$	Fraction 3B Prorated (µg)	<0.700	<0.700	<0.700	
$m_{n\text{-}3c}$	Fraction 3C Prorated (µg)	0.692	0.637	<0.400	
m_n	Total matter corrected for allowable blanks (µg)	43.5	86.6	44.9	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	1.2E-09	2.4E-09	1.3E-09	**1.6E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.4E-09	2.9E-09	1.4E-09	**1.9E-09**
C_{sd}	Concentration (µg/dscm)	19	39	20	**26**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	22	46	23	**30**
$E_{lb/hr}$	Rate (lb/hr)	0.0067	0.014	0.0068	**0.0090**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.0E-05	4.1E-05	2.1E-05	**2.7E-05**

RESULTS

Table 2-2:
Quality Assurance and Quality Control

RPD Results

Run Number	FH Front Half	BH H2O2/HNO4	A Empty Impinger	B KMnO4	C HCl
U2 FF Outlet R1	NA	0.8%	NA	NA	0.5%
U2 FF Outlet R2	NA	0.3%	2.1%	NA	1.2%
U2 FF Outlet R3	NA	1.2%	NA	NA	NA
U2 FF Outlet FB	NA	NA	NA	NA	NA
Reagent Blank (16th)	NA	NA	NA	NA	NA
Reagent Blank (17th)				NA	

Sample Spike and Recovery

U2 FF Outlet R3	117%	89%	77%	99%	95%
	117%	91%	77%	101%	96%

Blanks

Reagent Blank (16th)	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
Reagent Blank (17th)				< 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 2 FF Outlet as shown in Figure 3-1.

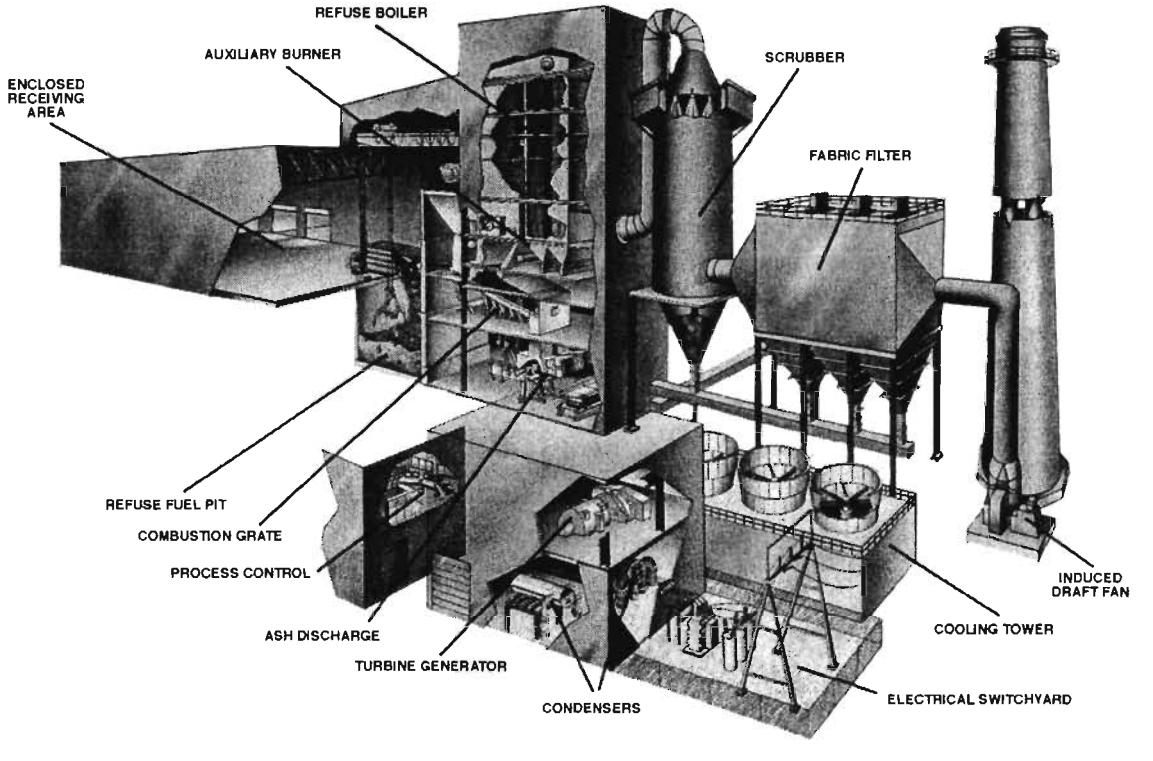


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

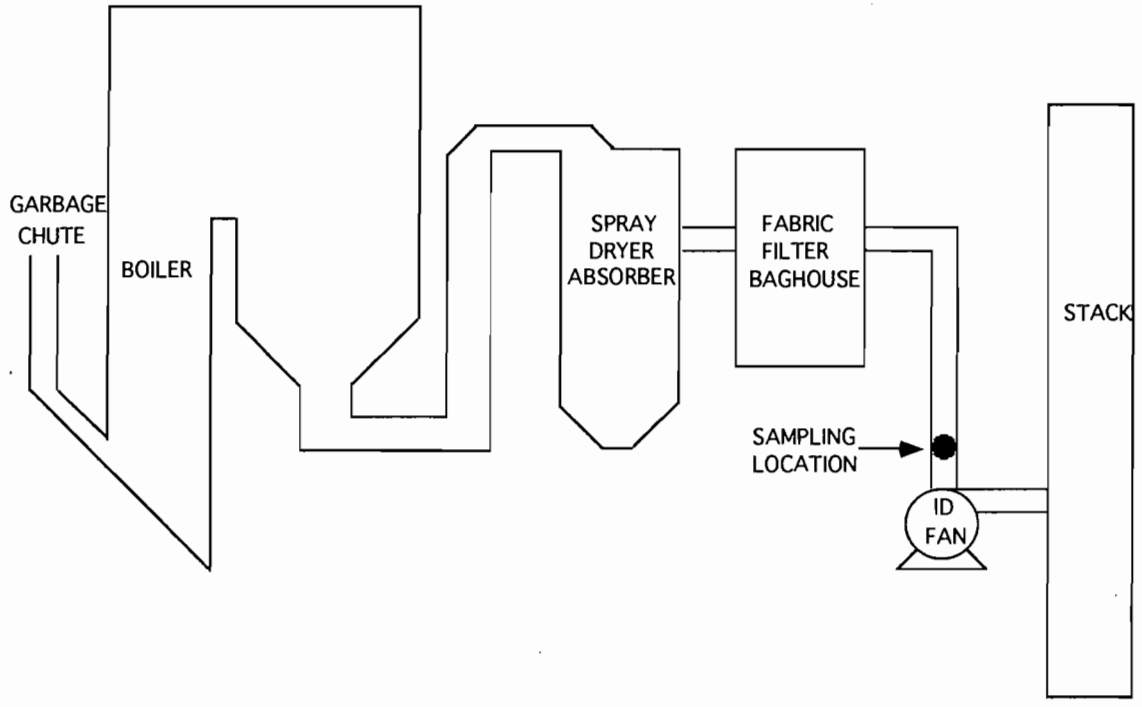


Figure 3-2: Process Schematic

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.

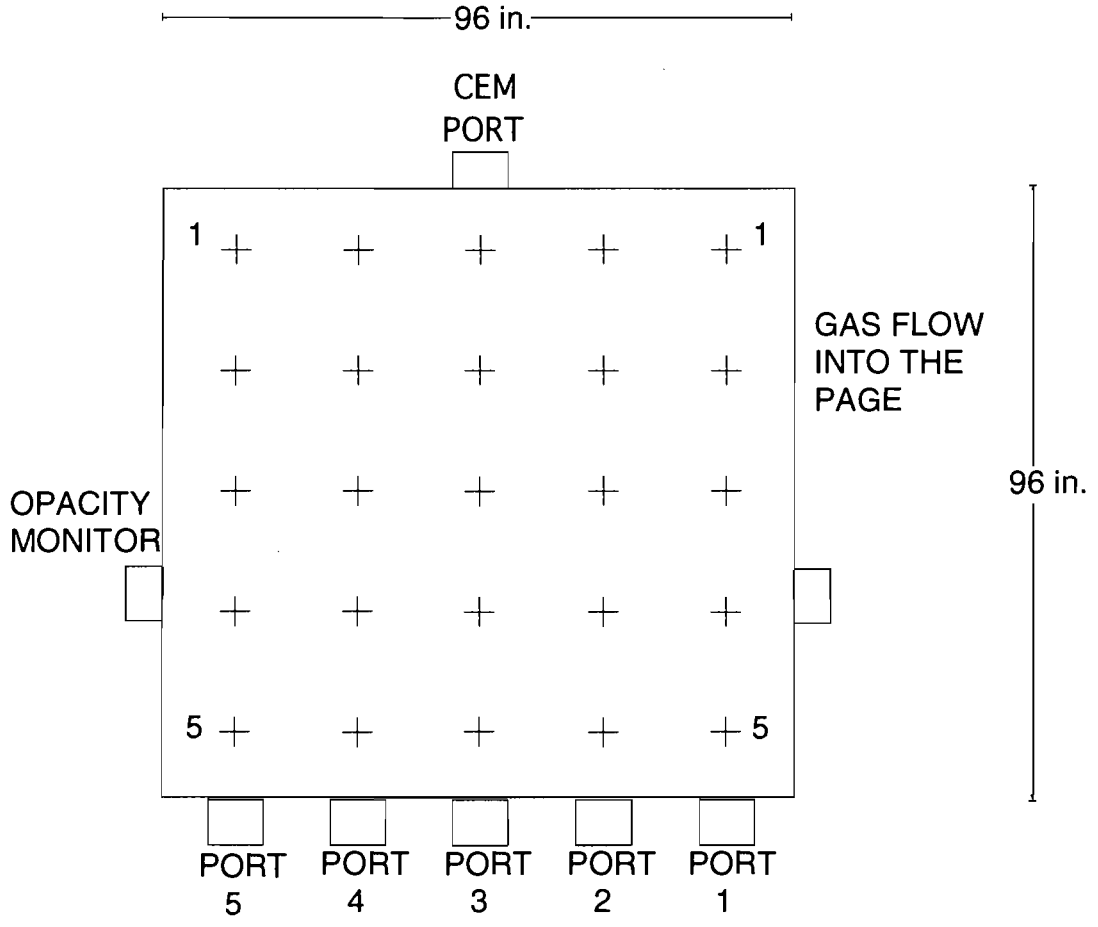
Table 4-2 outlines the sampling point configurations. Figure 4-1 illustrates the sampling points and orientation of sampling ports for the source tested in the program.

Table 4-2:
Sampling Points

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

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 2 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)

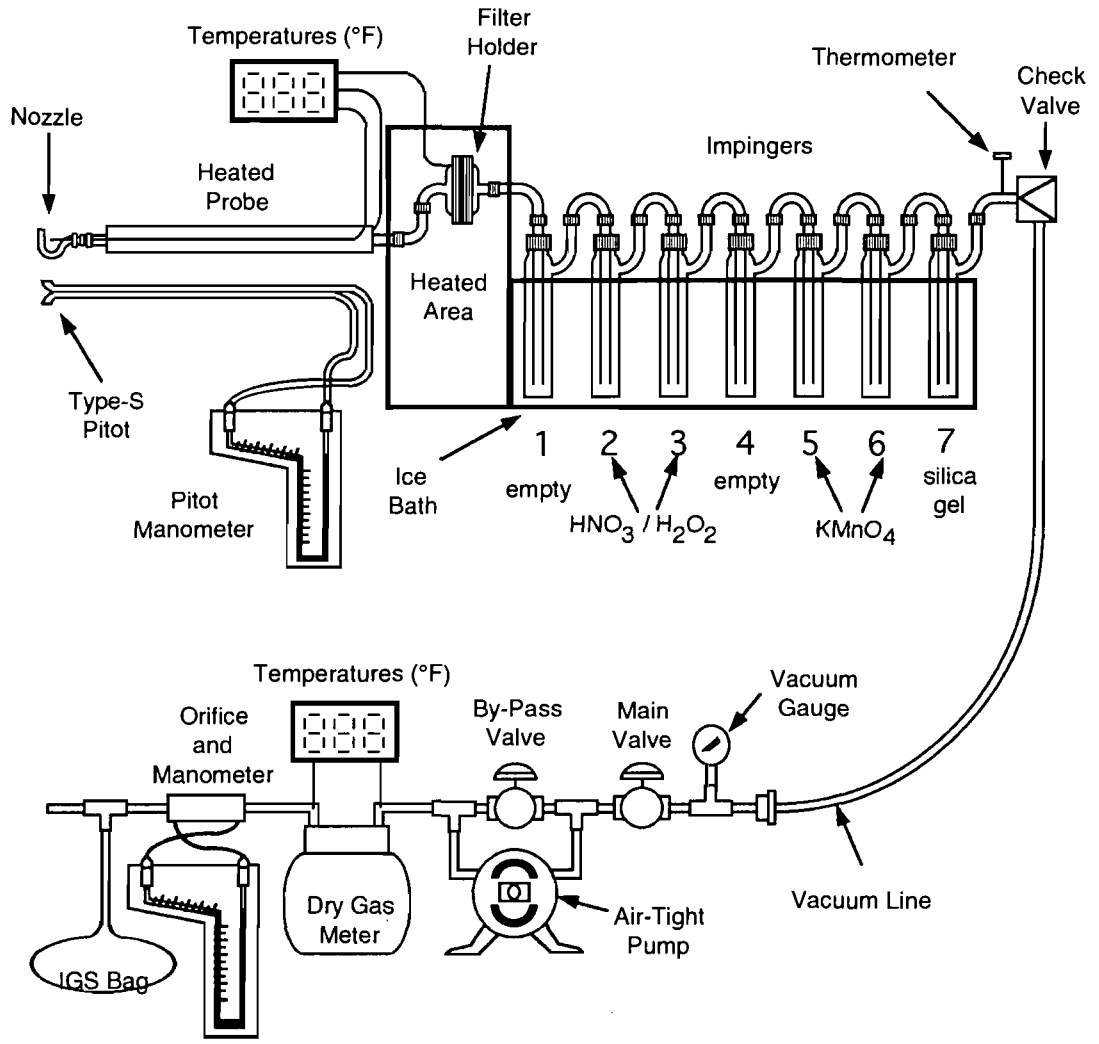
Any liquid collected in the fourth impinger was transferred to a separate polyethylene container, and the impinger was rinsed into the same container with 0.1 Normal nitric acid. The contents of impingers 5 and 6 were collected into an amber glass container. Both impingers 5 and 6 and the connecting 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

WHEELABRATOR NORTH BROWARD
POMPANO BEACH, FLORIDA

Client Reference No: 14500124
CleanAir Project No: 9708-3

APPENDIX

SAMPLE CALCULATIONS

A

This Page Intentionally Left Blank

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.

071105 155225

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)	=	520.0	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)	=	24.48	ft^3

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

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

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.85	in. Hg
T_m	= average dry gas meter temperature (°F)	=	88.30	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	86.54	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9910	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.48	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)	=	82.656	dscf

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.85	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-9.10	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.18	in. Hg

QA/QC _____
Date _____

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

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

Where:

T_s	= average sample gas temperature (°F)	=	301.40	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	29.18	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)	=	82.656	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	24.48	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2285	
		=	22.85	%

QA/QC _____
Date _____

7. Saturated moisture content (% by volume)

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

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.18	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	=	0.2285	
B_w	= actual water vapor in gas	=	0.2285	
		=	22.85	%

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 (%)	=	10.2	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.60	%

QA/QC
Date

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 (%)	=	10.2	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.6	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.00	%

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	=	0.2285	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.00	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)	=	27.26	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.84	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.26	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.18	in. Hg
T_s	= average sample gas temperature (°F)	=	301.40	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.710	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	49.89	ft/sec

QA/QC
Date

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)	=	61.36	ft^2
V_s	= sample gas velocity (ft/sec)	=	49.89	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	183,689	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)	=	183,689	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)	=	301.4	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	124,234	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	=	0.2285	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	124,234	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	95,850	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)	=	95,850	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
7	= oxygen content of corrected gas (%)	=	7.0	%
Q_{std7}	= volumetric flow rate at STP and 7%O_2, dry basis (dscfm)	=	80,680	dscfm

QA/QC
Date

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	95,850	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,751,020	dscf/hr

18. *Metric Conversion of Gas Volumes (Q_{std} example)*

$$Q_{std-metric} = (Q_{std-english})\left(\frac{60}{35.31}\right)$$

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft^3/min)	=	95,850	dscfm
35.31	= conversion factor (ft^3/m^3)	=	35.31	ft^3/m^3
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m^3/hr)	=	162,872	dry std m^3/hr

19. Standard to Normal Conversion of Gas Volumes (Q_{std} example)

$$Q_{Normal} = (Q_{std-metric})\left(\frac{32+460}{68+460}\right)$$

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m^3/hr)	=	162,872	dry std m^3/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm^3/hr)	=	151,767	dry Nm^3/hr

QA/QC _____
Date _____

20. Percent Isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.275	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2285	
P_s	= absolute sample gas pressure (in. Hg)	=	29.18	in. Hg
T_s	= average sample gas temperature (°F)	=	301.4	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	82.656	dscf
V_s	= sample gas velocity (ft/sec)	=	49.89	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 (%)	=	102.69	%

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)	=	86.54	dcf
T_m	= average dry gas meter temperature (°F)	=	88.30	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.8492	
P_{bar}	= barometric pressure (in. Hg)	=	29.85	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.484	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.00	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.215	√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	=	0.9691	

QA/QC
Date

LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

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

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

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

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

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

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

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

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

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

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.

071105 155225

G

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	=	42.8082	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.7000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	0.6922	µg
$m_{total-S}$	= total amount of mercury in sample	=	43.5004	µg

3. Allowable blank correction (µg)

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

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

Where:

$m_{total-B}$	= total amount of mercury in blank	=	<1.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	43.5004	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	2.1750	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	=	43.5004	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	43.5004	µg

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

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

Where:

m_n	= total mercury in sample corrected for allowable blank	=	43.5004	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	42.8082	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.7000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	0.6922	µg
$m_{total-S}$	= total amount of mercury in sample	=	43.5004	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	=	42.8082	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	=	<0.7000	µg
m_{n-3c}	= mercury corrected for blank - prorated for Fraction 3c	=	0.6922	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.

071105 155225

LG

1. Mercury concentration (lb/dscf)

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

Where:

m_n	= Mercury collected in sample (total µg)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	dscf
2.205 x 10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= Mercury concentration (lb/dscf)	=	1.1605E-09	lb/dscf

2. Mercury concentration (µg/dscm)

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

Where:

m_n	= Mercury collected in sample (total µg)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= Mercury concentration (µg/dscm)	=	1.8583E+01	µg/dscm

3. Mercury concentration (mg/dscm)

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

Where:

m_n	= Mercury collected in sample (total µg)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
1000	= conversion factor (µg/mg)	=	1000	µg/mg
C_{sd}	= Mercury concentration (mg/dscm)	=	1.8583E-02	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)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	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)	=	1.9943E+01	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)	=	1.1605E-09	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= Mercury concentration corrected to x% oxygen (lb/dscf)	=	1.3787E-09	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	1.1605E-09	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%
C_{sdy}	= Mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	1.3652E-09	lb/dscf @ y%CO_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	1.1605E-09	lb/dscf
Q_{std}	= *volumetric flow rate at standard conditions, dry basis (dscfm)*	=	95,850	*dscfm*
Q_a	= volumetric flow rate at actual conditions (acfm)	=	183,689	acfm
C_a	= Mercury concentration at actual gas conditions (lb/acf)	=	6.0553E-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)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	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)	=	95,850	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= Mercury emission rate (lb/hr)	=	6.6738E-03	lb/hr

9. Mercury emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{Q_{std}}{(10^6)(60)}\right)$$

Where:

m_n	= Mercury collected in sample (total µg)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	95,850	dscfm
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min
$E_{g/s}$	= Mercury emission rate (g/s)	=	8.4074E-04	g/s

10. Mercury emission rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= Mercury collected in sample (total µg)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	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)	=	95,850	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)	=	2.9231E-02	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)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	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 (%)	=	9.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= Mercury emission rate - Fd-based (lb/MMBtu)	=	1.9838E-05	lb/MMBtu

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

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

Where:

m_n	= Mercury collected in sample (total µg)	=	43.5004	µg
V_{mstd}	= volume metered, standard (dscf)	=	82.6561	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 (%)	=	10.2	%
100	= conversion factor	=	100	
E_{Fc}	= Mercury emission rate - Fc-based (lb/MMBtu)	=	2.0706E-05	lb/MMBtu

PARAMETERS

B

This Page Intentionally Left Blank

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Jun 16	Jun 16	Jun 16	
Start Time (approx.)		09:00	11:17	13:35	
Stop Time (approx.)		11:15	13:32	15:50	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9910	1.0093	0.9910	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-9.1000	-9.1000	-9.2000	
A_s	Sample location area (ft^2)	61.3611	61.3611	61.3611	
P_{bar}	Barometric pressure (in. Hg)	29.85	29.85	29.85	**29.8500**
D_n	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O_2	Oxygen (dry volume %)	9.2000	9.0000	8.6000	**8.9333**
CO_2	Carbon dioxide (dry volume %)	10.2000	10.3000	10.6000	**10.3667**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.6000	80.7000	80.8000	**80.7000**
V_{lc}	Total Liquid collected (ml)	520.00	498.50	520.00	
V_m	Volume metered, meter conditions (ft^3)	86.5350	81.7750	83.8150	
T_m	Dry gas meter temperature (°F)	88.3000	98.1600	98.7400	
T_s	Sample temperature (°F)	301.4000	299.3600	300.3200	**300.3600**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.4840	1.2980	1.3680	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	24.4764	23.4644	24.4764	**24.1391**
V_{mstd}	Volume metered, standard (dscf)	82.6561	78.1109	78.5398	**79.7689**
P_s	Sample gas pressure, absolute (in. Hg)	29.1809	29.1809	29.1735	**29.1784**
P_v	Vapor pressure, actual (in. Hg)	29.1809	29.1809	29.1735	**29.1784**
B_{wo}	Moisture measured in sample (% by volume)	22.8469	23.1005	23.7598	**23.2357**
B_{ws}	*Saturated moisture content (% by volume)*	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	22.8469	23.1005	23.7598	**23.2357**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.7101	0.6853	0.6746	**0.6900**
M_d	MW of sample gas, dry (lb/lb-mole)	30.0000	30.0080	30.0400	**30.0160**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2584	27.2341	27.1793	**27.2239**
V_s	Velocity of sample (ft/sec)	49.8928	48.1040	47.4385	**48.4784**
%I	Isokinetic sampling (%)	102.6897	100.7128	103.7316	**102.3780**
Q_a	Volumetric flow rate, actual (acfm)	183,689	177,103	174,653	**178,481**
Q_s	Volumetric flow rate, standard (scfm)	124,234	120,102	118,261	**120,865**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	95,850	92,358	90,162	**92,790**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	80,680	79,069	79,784	**79,844**
Q_a	Volumetric flow rate, actual (acf/hr)	11,021,313	10,626,179	10,479,162	**10,708,884**
Q_s	Volumetric flow rate, standard (scf/hr)	7,454,031	7,206,098	7,095,638	**7,251,922**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,751,020	5,541,453	5,409,731	**5,567,401**
Q_a	Volumetric flow rate, actual (m^3/hr)	312,130	300,940	296,776	**303,282**
Q_s	Volumetric flow rate, standard (m^3/hr)	211,103	204,081	200,953	**205,379**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	162,872	156,937	153,207	**157,672**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	137,094	134,356	135,571	**135,674**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	196,709	190,166	187,251	**191,376**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	151,767	146,237	142,761	**146,922**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	127,747	125,196	126,328	**126,423**

Comments:

Average includes 3 runs.

071105 154829

LLL@

Prepared by Clean Air Engineering Proprietary Software
SS ISOKINETIC Version 12-2004b

QA/QC Date 6/13

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2005)		Jun 16	Jun 16	Jun 16	
Start Time (approx.)		09:00	11:17	13:35	
Stop Time (approx.)		11:15	13:32	15:50	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184	184	184	184
P_1	SDA Outlet Temperature (°F)	310	310	310	310
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 %)	9.2000	9.0000	8.6000	8.9333
CO_2	Carbon dioxide (dry volume %)	10.2000	10.3000	10.6000	10.3667
T_s	Sample temperature (°F)	301.4000	299.3600	300.3200	300.3600
B_w	Actual water vapor in gas (% by volume)	22.8469	23.1005	23.7598	23.2357
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	183,689	177,103	174,653	178,481
Q_s	Volumetric flow rate, standard (scfm)	124,234	120,102	118,261	120,865
Q_{std}	Volumetric flow rate, dry standard (dscfm)	95,850	92,358	90,162	92,790
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	80,680	79,069	79,784	79,844
Q_a	Volumetric flow rate, actual (acf/hr)	11,021,313	10,626,179	10,479,162	10,708,884
Q_s	Volumetric flow rate, standard (scf/hr)	7,454,031	7,206,098	7,095,638	7,251,922
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,751,020	5,541,453	5,409,731	5,567,401
Q_a	Volumetric flow rate, actual (m^3/hr)	312,130	300,940	296,776	303,282
Q_s	Volumetric flow rate, standard (m^3/hr)	211,103	204,081	200,953	205,379
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	162,872	156,937	153,207	157,672
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	137,094	134,356	135,571	135,674
Q_s	Volumetric flow rate, normal (Nm^3/hr)	196,709	190,166	187,251	191,376
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	151,767	146,237	142,761	146,922
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	127,747	125,196	126,328	126,423
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	82.6561	78.1109	78.5398	79.7689
%I	Isokinetic sampling (%)	102.6897	100.7128	103.7316	102.3780
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B Prorated (µg)	<0.1000	<0.1000	<0.1000	<0.1000
$m_{n\text{-}2b}$	Fraction 2B Prorated (µg)	42.8082	85.7627	44.9403	57.8371
$m_{n\text{-}3a}$	Fraction 3A Prorated (µg)	<0.2000	0.2031	<0.2000	<0.2010
$m_{n\text{-}3b}$	Fraction 3B Prorated (µg)	<0.7000	<0.7000	<0.7000	<0.7000
$m_{n\text{-}3c}$	Fraction 3C Prorated (µg)	0.6922	0.6373	<0.4000	<0.5765
m_n	Total matter corrected for allowable blanks (µg)	43.5004	86.6031	44.9403	58.3479
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	1.1605E-09	2.4447E-09	1.2617E-09	1.6223E-09
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.3767E-09	2.8556E-09	1.4258E-09	1.8867E-09
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.3652E-09	2.8482E-09	1.4283E-09	1.8806E-09
C_a	Concentration (lb/acf)	6.0553E-10	1.2749E-09	6.5133E-10	8.4392E-10
C_{sd}	Concentration (µg/dscm)	1.8583E+01	3.9149E+01	2.0204E+01	2.5979E+01
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.2077E+01	4.5729E+01	2.2833E+01	3.0213E+01
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.1862E+01	4.5610E+01	2.2873E+01	3.0115E+01
C_{sd}	Concentration (mg/dscm)	1.8583E-02	3.9149E-02	2.0204E-02	2.5979E-02
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.2077E-02	4.5729E-02	2.2833E-02	3.0213E-02
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.1862E-02	4.5610E-02	2.2673E-02	3.0115E-02
C_a	Concentration (µg/m^3 (actual,wet))	9.6968E+00	2.0416E+01	1.0430E+01	1.3514E+01
C_{sd}	Concentration (µg/Nm^3 dry)	1.9943E+01	4.2013E+01	2.1683E+01	2.7880E+01
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	2.3693E+01	4.9075E+01	2.4503E+01	3.2423E+01
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	2.3462E+01	4.8948E+01	2.4546E+01	3.2319E+01
$E_{lb/hr}$	Rate (lb/hr)	6.6738E-03	1.3547E-02	8.8254E-03	9.0155E-03
$E_{g/s}$	Rate (g/s)	8.4074E-04	1.7066E-03	8.5984E-04	1.1357E-03
$E_{T/yr}$	Rate (Ton/yr)	2.9231E-02	5.9337E-02	2.9895E-02	3.9488E-02
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.9838E-05	4.1091E-05	2.0517E-05	2.7148E-05
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.0706E-05	4.3198E-05	2.1663E-05	2.8522E-05

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 10-2003a

QA/QC
Date 6/13

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

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

Run No.		*1*	*2*	*3*	*Average*
Date (2005)		Jun 16	Jun 16	Jun 16	
Start Time (approx.)		09:00	11:17	13:35	
Stop Time (approx.)		11:15	13:32	15:50	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	<2.6677E-12	<2.8229E-12	<2.8075E-12	**<2.7660E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.1693E-12	<3.2973E-12	<3.1727E-12	**<3.2131E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.1384E-12	<3.2888E-12	<3.1783E-12	**<3.2019E-12**
C_a	Concentration (lb/acf)	<1.3920E-12	<1.4721E-12	<1.4493E-12	**<1.4378E-12**
C_{sd}	Concentration (µg/dscm)	<4.2719E-02	<4.5205E-02	<4.4958E-02	**<4.4294E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<5.0752E-02	<5.2802E-02	<5.0806E-02	**<5.1454E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<5.0258E-02	<5.2666E-02	<5.0896E-02	**<5.1273E-02**
C_{sd}	Concentration (mg/dscm)	<4.2719E-05	<4.5205E-05	<4.4958E-05	**<4.4294E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<5.0752E-05	<5.2802E-05	<5.0806E-05	**<5.1454E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.0258E-05	<5.2666E-05	<5.0896E-05	**<5.1273E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.2291E-02	<2.3574E-02	<2.3209E-02	**<2.3025E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<4.5845E-02	<4.8513E-02	<4.8248E-02	**<4.7535E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<5.4465E-02	<5.6666E-02	<5.4524E-02	**<5.5218E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<5.3935E-02	<5.6520E-02	<5.4620E-02	**<5.5025E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.5342E-05	<1.5643E-05	<1.5188E-05	**<1.5391E-05**
$E_{g/s}$	Rate (g/s)	<1.9327E-06	<1.9707E-06	<1.9133E-06	**<1.9389E-06**
$E_{T/yr}$	Rate (Ton/yr)	<6.7197E-05	<6.8516E-05	<6.6523E-05	**<6.7412E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<4.5604E-08	<4.7447E-08	<4.5653E-08	**<4.6235E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<4.7600E-08	<4.9881E-08	<4.8204E-08	**<4.8562E-08**

071105 154829
LLL@_G

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 10-2003a

QA/QC
Date 6/13

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Jun 16	Jun 16	Jun 16	
Start Time (approx.)		09:00	11:17	13:35	
Stop Time (approx.)		11:15	13:32	15:50	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	1.1420E-09	2.4210E-09	1.2617E-09	**1.6082E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.3567E-09	2.8279E-09	1.4258E-09	**1.8701E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.3435E-09	2.8206E-09	1.4283E-09	**1.8641E-09**
C_a	Concentration (lb/acf)	5.9590E-10	1.2625E-09	6.5133E-10	**8.3659E-10**
C_{sd}	Concentration (µg/dscm)	1.8287E+01	3.8769E+01	2.0204E+01	**2.5754E+01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.1726E+01	4.5285E+01	2.2833E+01	**2.9948E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.1514E+01	4.5168E+01	2.2873E+01	**2.9852E+01**
C_{sd}	Concentration (mg/dscm)	1.8287E-02	3.8769E-02	2.0204E-02	**2.5754E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.1726E-02	4.5285E-02	2.2833E-02	**2.9948E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.1514E-02	4.5168E-02	2.2873E-02	**2.9852E-02**
C_a	Concentration (µg/m³ (actual,wet))	9.5425E+00	2.0218E+01	1.0430E+01	**1.3397E+01**
C_{sd}	Concentration (µg/Nm³ dry)	1.9625E+01	4.1606E+01	2.1683E+01	**2.7638E+01**
C_{sd7}	Concentration @7% O_2 (µg/Nm³ dry)	2.3316E+01	4.8598E+01	2.4503E+01	**3.2139E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm³ dry)	2.3089E+01	4.8473E+01	2.4546E+01	**3.2036E+01**
$E_{lb/hr}$	Rate (lb/hr)	6.5676E-03	1.3416E-02	6.8254E-03	**8.9363E-03**
$E_{g/s}$	Rate (g/s)	8.2736E-04	1.6901E-03	8.5984E-04	**1.1258E-03**
$E_{T/yr}$	Rate (Ton/yr)	2.8766E-02	5.8762E-02	2.9895E-02	**3.9141E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.9522E-05	4.0692E-05	2.0517E-05	**2.6910E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.0377E-05	4.2779E-05	2.1663E-05	**2.8273E-05**

071105 154829
LLL@_G

QA/QC
Date 6/13

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Jun 16	Jun 16	Jun 16	
Start Time (approx.)		09:00	11:17	13:35	
Stop Time (approx.)		11:15	13:32	15:50	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.3354E-12	5.7329E-12	<5.6150E-12	**<5.5611E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.3386E-12	6.6965E-12	<6.3454E-12	**<6.4601E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<6.2769E-12	6.6791E-12	<6.3566E-12	**<6.4375E-12**
C_a	Concentration (lb/acf)	<2.7840E-12	2.9897E-12	<2.8987E-12	**<2.8908E-12**
C_{sd}	Concentration (µg/dscm)	<8.5438E-02	9.1805E-02	<8.9916E-02	**<8.9053E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.0150E-01	1.0723E-01	<1.0161E-01	**<1.0345E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.0052E-01	1.0696E-01	<1.0179E-01	**<1.0309E-01**
C_{sd}	Concentration (mg/dscm)	<8.5438E-05	9.1805E-05	<8.9916E-05	**<8.9053E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.0150E-04	1.0723E-04	<1.0161E-04	**<1.0345E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.0052E-04	1.0696E-04	<1.0179E-04	**<1.0309E-04**
C_a	Concentration (µg/m³ (actual,wet))	<4.4583E-02	4.7875E-02	<4.6418E-02	**<4.6292E-02**
C_{sd}	Concentration (µg/Nm³ dry)	<9.1690E-02	9.8522E-02	<9.6495E-02	**<9.5569E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm³ dry)	<1.0893E-01	1.1508E-01	<1.0905E-01	**<1.1102E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm³ dry)	<1.0787E-01	1.1478E-01	<1.0924E-01	**<1.1063E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.0684E-05	3.1769E-05	<3.0376E-05	**<3.0943E-05**
$E_{g/s}$	Rate (g/s)	<3.8654E-06	4.0021E-06	<3.8266E-06	**<3.8980E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.3439E-04	1.3915E-04	<1.3305E-04	**<1.3553E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<9.1209E-08	9.6358E-08	<9.1307E-08	**<9.2958E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<9.5200E-08	1.0130E-07	<9.6408E-08	**<9.7636E-08**

071105 154829
LLL@_G

QA/QC
Date 6/13

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

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

Run No.		1	2	3	Average
Date (2005)		Jun 16	Jun 16	Jun 16	
Start Time (approx.)		09:00	11:17	13:35	
Stop Time (approx.)		11:15	13:32	15:50	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.8674E-11	<1.9760E-11	<1.9652E-11	**<1.9362E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<2.2185E-11	<2.3081E-11	<2.2209E-11	**<2.2492E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<2.1969E-11	<2.3022E-11	<2.2248E-11	**<2.2413E-11**
C_a	Concentration (lb/acf)	<9.7441E-12	<1.0305E-11	<1.0145E-11	**<1.0065E-11**
C_{sd}	Concentration (µg/dscm)	<2.9903E-01	<3.1643E-01	<3.1471E-01	**<3.1006E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<3.5526E-01	<3.6962E-01	<3.5564E-01	**<3.6017E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<3.5181E-01	<3.6866E-01	<3.5627E-01	**<3.5891E-01**
C_{sd}	Concentration (mg/dscm)	<2.9903E-04	<3.1643E-04	<3.1471E-04	**<3.1006E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<3.5526E-04	<3.6962E-04	<3.5564E-04	**<3.6017E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<3.5181E-04	<3.6866E-04	<3.5627E-04	**<3.5891E-04**
C_a	Concentration (µg/m³ (actual,wet))	<1.5604E-01	<1.6502E-01	<1.6246E-01	**<1.6117E-01**
C_{sd}	Concentration (µg/Nm³ dry)	<3.2091E-01	<3.3959E-01	<3.3773E-01	**<3.3275E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm³ dry)	<3.8126E-01	<3.9666E-01	<3.8167E-01	**<3.8653E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm³ dry)	<3.7755E-01	<3.9564E-01	<3.8234E-01	**<3.8517E-01**
$E_{lb/hr}$	Rate (lb/hr)	<1.0739E-04	<1.0950E-04	<1.0631E-04	**<1.0774E-04**
$E_{g/s}$	Rate (g/s)	<1.3529E-05	<1.3795E-05	<1.3393E-05	**<1.3572E-05**
$E_{T/yr}$	Rate (Ton/yr)	<4.7038E-04	<4.7962E-04	<4.6566E-04	**<4.7189E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<3.1923E-07	<3.3213E-07	<3.1957E-07	**<3.2364E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<3.3320E-07	<3.4916E-07	<3.3743E-07	**<3.3993E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	1.8466E-11	1.7990E-11	<1.1230E-11	**<1.5895E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.1938E-11	2.1013E-11	<1.2691E-11	**<1.8547E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.1725E-11	2.0959E-11	<1.2713E-11	**<1.8466E-11**
C_a	Concentration (lb/acf)	9.6357E-12	9.3815E-12	<5.7973E-12	**<8.2715E-12**
C_{sd}	Concentration (µg/dscm)	2.9571E-01	2.8808E-01	<1.7983E-01	**<2.5454E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.5131E-01	3.3650E-01	<2.0323E-01	**<2.9701E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.4789E-01	3.3563E-01	<2.0358E-01	**<2.9570E-01**
C_{sd}	Concentration (mg/dscm)	2.9571E-04	2.8808E-04	<1.7983E-04	**<2.5454E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.5131E-04	3.3650E-04	<2.0323E-04	**<2.9701E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.4789E-04	3.3563E-04	<2.0358E-04	**<2.9570E-04**
C_a	Concentration (µg/m³ (actual,wet))	1.5430E-01	1.5023E-01	<9.2836E-02	**<1.3246E-01**
C_{sd}	Concentration (µg/Nm³ dry)	3.1734E-01	3.0916E-01	<1.9299E-01	**<2.7316E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm³ dry)	3.7701E-01	3.6112E-01	<2.1810E-01	**<3.1874E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm³ dry)	3.7334E-01	3.6019E-01	<2.1848E-01	**<3.1734E-01**
$E_{lb/hr}$	Rate (lb/hr)	1.0620E-04	9.9690E-05	<6.0751E-05	**<8.8880E-05**
$E_{g/s}$	Rate (g/s)	1.3378E-05	1.2559E-05	<7.6532E-06	**<1.1197E-05**
$E_{T/yr}$	Rate (Ton/yr)	4.6515E-04	4.3664E-04	<2.6609E-04	**<3.8929E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.1568E-07	3.0237E-07	<1.8261E-07	**<2.6689E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.2949E-07	3.1788E-07	<1.9282E-07	**<2.8006E-07**

071105 154829
LLL-G

QA/QC
Date 6/13

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

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

Run No.		4	5	6	Average
Date (2005)		Jun 17	Jun 17	Jun 17	
Start Time (approx.)		07:45	10:02	12:20	
Stop Time (approx.)		10:00	12:16	14:34	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9910	1.0093	0.9910	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-9.4000	-9.2000	-9.4000	
A_s	Sample location area (ft^2)	61.3611	61.3611	61.3611	
P_{bar}	Barometric pressure (in. Hg)	29.85	29.85	29.85	29.8500
D_n	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O_2	Oxygen (dry volume %)	9.4000	8.7000	8.4000	8.8333
CO_2	Carbon dioxide (dry volume %)	10.0000	10.6000	11.0000	10.5333
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.6000	80.7000	80.6000	80.6333
V_{lc}	Total Liquid collected (ml)	517.80	519.80	548.00	
V_m	Volume metered, meter conditions (ft^3)	84.7850	79.8900	85.1150	
T_m	*Dry gas meter temperature (°F)*	82.9800	91.1600	97.5400	
T_s	Sample temperature (°F)	298.6000	297.0800	298.6800	298.1200
ΔH	Meter box orifice pressure drop (in. H_2O)	1.4240	1.2380	1.4060	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	24.3728	24.4670	25.7944	24.8781
V_{mstd}	Volume metered, standard (dscf)	81.7659	77.2681	79.9371	79.6570
P_s	Sample gas pressure, absolute (in. Hg)	29.1588	29.1735	29.1588	29.1637
P_v	Vapor pressure, actual (in. Hg)	29.1588	29.1735	29.1588	29.1637
B_{wo}	Moisture measured in sample (% by volume)	22.9632	24.0497	24.3961	23.8030
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B_w	Actual water vapor in gas (% by volume)	22.9632	24.0497	24.3961	23.8030
$\sqrt{\Delta P}$	Velocity head ($\sqrt{in.}$ H_2O)	0.7001	0.6736	0.6846	0.6861
M_d	MW of sample gas, dry (lb/lb-mole)	29.9760	30.0440	30.0960	30.0387
M_s	MW of sample gas, wet (lb/lb-mole)	27.2259	27.1475	27.1450	27.1728
V_s	Velocity of sample (ft/sec)	49.1438	47.2972	48.1303	48.1904
%I	Isokinetic sampling (%)	102.9858	102.3098	104.7619	103.3525
Q_a	Volumetric flow rate, actual (acfm)	180,931	174,133	177,200	177,421
Q_s	Volumetric flow rate, standard (scfm)	122,728	118,413	120,184	120,442
Q_{std}	Volumetric flow rate, dry standard (dscfm)	94,546	89,935	90,864	91,781
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	78,221	78,936	81,712	79,623
Q_a	Volumetric flow rate, actual (act/hr)	10,855,862	10,447,953	10,631,982	10,645,266
Q_s	Volumetric flow rate, standard (sct/hr)	7,363,661	7,104,782	7,211,040	7,226,494
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,672,730	5,396,103	5,451,827	5,506,887
Q_a	Volumetric flow rate, actual (m^3/hr)	307,444	295,892	301,104	301,480
Q_s	Volumetric flow rate, standard (m^3/hr)	208,543	201,212	204,221	204,659
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	160,655	152,821	154,399	155,958
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	132,916	134,131	138,848	135,298
Q_s	Volumetric flow rate, normal (Nm^3/hr)	194,324	187,493	190,297	190,705
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	149,701	142,401	143,872	145,325
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	123,854	124,985	129,381	126,073

Comments:

Average includes 3 runs.

071105 154829

ONL ©

Prepared by Clean Air Engineering, Proprietary Software
SS ISOKINETIC Version 12-2004b

QA/QC
Date 6/13

This Page Intentionally Left Blank

CALIBRATION DATA

C

This Page Intentionally Left Blank

Nozzle Calibration Sheet

Client	Wheelabrator North	Project Number	978
Calibrated by	KRD	Unit	2 FF Outlet
Date	6/16/2005	Runs	1-6

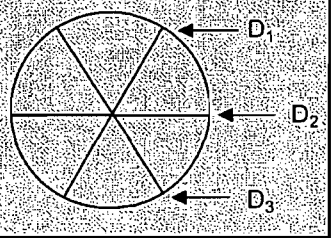
Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
275-1	0.275	0.274	0.275	0.001	0.275
275-2	0.275	0.275	0.275	0.000	0.275

D_1, D_2, D_3 = three nozzle diameter measurements

ΔD = maximum difference between any two diameters

ΔD = 0.004 inches*

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



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

QA/QC_____

Date_____

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-7

Date of Calibration: 3/24/05

Meter Box Y_d: 0.9910

Calibration conducted by: M.V.

Meter Box ΔH@: 1.8492

Signature

Barometric Pressure: 29.28

				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@
0.935	3.00	-1.90	1.0000	0.000	10.000	10.000	438.020	448.276	10.256	66.5	66.5	66.50	92.0	75.0	83.50	10.49	0.9942	1.8635
0.933	3.00	-1.90	1.0000	0.000	10.000	10.000	448.276	458.530	10.254	66.5	66.5	66.50	92.0	75.0	83.50	10.52	0.9944	1.8742
0.384	0.50	-1.10	1.0000	0.000	5.000	5.000	463.132	468.282	5.150	66.5	66.5	66.50	79.0	76.0	77.50	12.76	0.9872	1.8348
0.385	0.50	-1.10	1.0000	0.000	5.000	5.000	468.282	473.449	5.167	66.5	66.5	66.50	79.0	77.0	78.00	12.73	0.9848	1.8228
0.663	1.50	-1.40	1.0000	0.000	10.000	10.000	481.922	492.272	10.350	66.5	66.5	66.50	93.0	77.0	85.00	14.80	0.9929	1.8478
0.662	1.50	-1.40	1.0000	0.000	11.000	11.000	492.272	503.664	11.392	66.5	66.5	66.50	93.0	77.0	85.00	16.30	0.9923	1.8524

Averages: 0.99097 | 1.84924

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)
4.9	5.0			
10.0	10.0			
15.2	15.0			
20.3	20.0			
24.4	24.0			

CleanAir ENGINEERING

Pyrometer Calibration Test Report

Pyrometer No.:	66-7	Office:	Palatine, Il
Calibrated By:	M.V.	Client:	
Date:	3/24/05	Job Number:	

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
50 °F	50 °F
100 °F	100 °F
150 °F	150 °F
200 °F	201 °F
250 °F	251 °F
300 °F	300 °F
350 °F	351 °F
400 °F	400 °F
450 °F	449 °F
500 °F	499 °F
550 °F	550 °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		

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No. 9788 Meter No. 66-7 Orifice C-4

Location N. BROWARD Meter Y_d 0.9910 Orifice K' 0.480

Test Date 6-17-05 Meter $\Delta H_@$ 1.8492 Orifice Cal. Date 12-22-04

Operator M. SPOTO Full Test Cal. Date 3-24-05

Bar. Press. (P_b) 29.85 in. Hg

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.

Run	Elapsed Time (minutes)	Meter Volume (dcf) 690.30	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	~~849.00~~	97	98								
1	5	693.62	94	96	85	1.2	19.5	5.0	3.32	96.3	0.9736	-0.5%
2	10	696.94	94	96	83	1.2	19.5	5.0	3.32	95.0	0.9732	-0.5%
3	15	700.21	84	90	75	1.2	19.5	5.0	3.27	91.0	0.9882	1.0%
										Average Y_i	0.9783	
										Cal. Error	-1.3%	

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 Full Test Calibration

Meter Box No: 66-20

Date of Calibration: 5/24/05

Meter Box Y_d: 1.0093

Calibration conducted by: M.V.

Meter Box ΔH@: 1.7220

Signature

Barometric Pressure: 29.28

				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@
0.981	3.00	-1.80	1.0000	0.000	10.000	10.000	142.823	152.868	10.045	69.0	69.0	69.00	85.0	79.0	82.00	9.95	1.0078	1.6800
0.981	3.00	-1.80	1.0000	0.000	10.000	10.000	152.868	162.929	10.061	69.0	69.0	69.00	85.0	79.0	82.00	9.95	1.0062	1.6800
0.387	0.50	-1.10	1.0000	0.000	5.000	5.000	165.714	170.730	5.016	69.0	69.0	69.00	79.0	78.0	78.50	12.62	1.0106	1.8051
0.386	0.50	-1.10	1.0000	0.000	5.000	5.000	170.730	175.739	5.009	69.0	69.0	69.00	79.0	78.0	78.50	12.64	1.0121	1.8108
0.695	1.50	-1.40	1.0000	0.000	10.000	10.000	179.626	189.664	10.038	69.0	69.0	69.00	83.0	78.0	80.50	14.05	1.0105	1.6780
0.695	1.50	-1.40	1.0000	0.000	10.000	10.000	189.664	199.721	10.057	69.0	69.0	69.00	83.0	78.0	80.50	14.05	1.0086	1.6780

Averages 1.00929 1.72198

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	4.5			
10.0	9.5			
15.0	14.7			
20.0	19.8			
25.0	24.5			

C - 7

CleanAir ENGINEERING

Pyrometer Calibration Test Report

Pyrometer No.:	66-20	Office:	Palatine, Il
Calibrated By:	M.V.	Client:	
Date:	5/24/05	Job Number:	

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
50 °F	50 °F
100 °F	99 °F
150 °F	150 °F
200 °F	201 °F
250 °F	252 °F
300 °F	302 °F
350 °F	351 °F
400 °F	400 °F
450 °F	449 °F
500 °F	499 °F
550 °F	550 °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		

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No. 9708 | Meter No. 66-20 | Orifice C-4

Location N BROWARD | Meter Y_d 1.0093 | Orifice K' 0.480

Test Date 6-17-05 | Meter $\Delta H_@$ 1.7220 | Orifice Cal. Date 12/22/04

Operator M. SPITO | Full Test Cal. Date 5/24/05

Bar. Press. (P_b) 29.85 in. Hg

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.

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	538.50	100	98								
1	5	541.71	100	98	98	1.2	21	5.0	3.21	99.0	1.000	-0.1%
2	10	544.91	100	98	97	1.2	21	5.0	3.20	99.0	1.004	0.3%
3	15	548.12	99	98	98	1.2	21	5.0	3.21	99.0	1.000	-0.1%
										Average Y_i	1.0014	
										Cal. Error	-0.8%	

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

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
QA/QC Results

	Run No.	1	2	3	
	Date (2005)	Jun 16	Jun 16	Jun 16	
	Start Time (approx.)	09:00	11:17	13:35	
	Stop Time (approx.)	11:15	13:32	15:50	
	Total Duration of Test Run (min.)	135	135	135	
	Net Sampling Time (min.)	125	125	125	
	Sampling System Calibration Summary				
	Nozzle ID No:	275-1	275-2	275-1	
D_n	Nozzle Diameter (in):	0.275	0.275	0.275	
	Probe ID No:	M-8-2	M-8-1-65	M-8-2	
C_p	Pitot Coefficient:	0.84	0.84	0.84	
	Meter Box ID. No:	66-7	66-20	66-7	
Y_d	Meter Box Yd - Field Sheet	0.9910	1.0093	0.9910	
	Meter Box Yd - Database	0.9910	1.0093	0.9910	
	Meter Box ΔH@ - Field Sheet	1.8492	1.7220	1.8492	
	Meter Box ΔH@ - Database	1.8492	1.7220	1.8492	
	QA/QC				
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0277	0.0262	0.0268	
	(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)	0.0020	0.0030	0.0020	
	Sample Volume				
	Minimum Volume Required (dscf)	60.00	60.00	60.00	
V_{msld}	Actual Sample Volume (dscf)	82.66	78.11	78.54	
	Alternative Method 5 Post-Test Calibration (EPA ALT-009)				
$\sqrt{\Delta H_{avg}}$	Average of Square Root of ΔH (in. W.C.)	1.215	1.137	1.166	
Y_{qa}	Alternative Meter Calibration Factor	0.9691	1.0036	0.9685	**Average**
	Variation from full-test Y_d (average ≤ ±5%)	-2.2%	-0.6%	-2.3%	**-1.7%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	Actual Variation (%)	102.69	100.71	103.73	
	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	

071305 141213
LLL@

QA/QC RWB
Date 6/13

FIELD DATA

D

This Page Intentionally Left Blank

ORSAT READINGS

TEST LOCATION: FF Outlet PAGE 1 OF 1

Client	Wheelabrator North	Project Number	9708	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	Pompano Beach FL.	Unit	2	
Orsat ID	Servomex 203470/ 203,499	Fuel Type	Refuse	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	29	1	10.2	19.4	9.2		KRO	6/16	1159
		2	10.2	19.4	9.2				
		3	10.2	19.4	9.2				
		Avg	10.2		9.2				
2	29	1	10.3	19.3	9.0		KRO	6/16	1320
		2	10.3	19.3	9.0				
		3	10.3	19.3	9.0				
		Avg	10.3		9.0				
3	29	1	10.6	19.2	8.6		KRO	6/16	1618
		2	10.6	19.2	8.6				
		3	10.6	19.2	8.6				
		Avg	10.6		8.6				
4	29	1	10.0	19.4	9.4		KRO	6/17	1028
		2	10.0	19.4	9.4				
		3	10.0	19.4	9.4				
		Avg	10.0		9.4				
5	29	1	10.6	19.3	8.7		KRO	6/17	1248
		2	10.6	19.3	8.7				
		3	10.6	19.3	8.7				
		Avg	10.6		8.7				
6	29	1	11.0	19.4	8.4		KRO	6/17	1457
		2	11.0	19.4	8.4				
		3	11.0	19.4	8.4				
		Avg	11.0		8.4				

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 resul

Acceptable ranges for Fo:

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

QA/QC KRO
Date 6/17

CleanAir. ENGINEERING

Impinger Weight Sheet

Client Wheelabrator North Broward		Unit Name/Location Unit 2 / FF Outlet
Plant Pompano Beach, FL	Job No. 9708	Method 29

Run No. 1	Filter Type Quartz		Sample Box No. 67-56
Date 6/16/2005	Lot No. NA		pH NA
Analyst KRO	Filter No. NA		Rinse 0 mL

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	867.9	543.5	324.4	
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2	776.0	631.6	144.4	QA/QC KRO
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2	572.1	546.0	26.1	Date 6/17
Impinger 4	Empty	442.3	437.9	4.4	
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4	542.4	540.2	2.2	Total Weight (gm)
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4	562.6	563.0	-0.4	501.1
Impinger 7	Silica Gel	674.6	655.7	18.9	520.0

Run No. 2	Filter Type Quartz		Sample Box No. 67-29
Date 6/16/2005	Lot No. NA		pH NA
Analyst KRO	Filter No. NA		Rinse 0 mL

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	779.7	445.0	334.7	
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2	665.6	547.5	118.1	QA/QC KRO
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2	567.0	544.8	22.2	Date 6/17
Impinger 4	Empty	442.8	438.9	3.9	
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4	569.6	568.1	1.5	Total Weight (gm)
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4	533.9	~~532.0~~ 532.5	1.4	481.8
Impinger 7	Silica Gel	676.0	659.3	16.7	498.5

Run No. 3	Filter Type Quartz		Sample Box No. 67-56
Date 6/16/2005	Lot No. NA		pH NA
Analyst KRO	Filter No. NA		Rinse 0 mL

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	915.2	543.8	371.4	
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2	751.0	634.6	116.4	QA/QC KRO
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2	553.3	538.0	15.3	Date 6/17
Impinger 4	Empty	438.1	437.7	0.4	
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4	536.3	539.7	-3.4	Total Weight (gm)
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4	569.3	567.3	2.0	502.1
Impinger 7	Silica Gel	661.7	643.8	17.9	520.0

CleanAir ENGINEERING

QA/QC KRO
Date 6/17

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

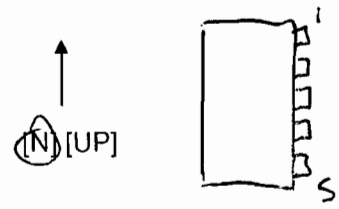
UNIT: 2 **RUN:** 1

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N. BROWARD	Date 6-6-05
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

Meter Box 66-7	Sample Box No. 67-SC
Meter Y_d 0.9910	Meter $\Delta H_@$ 1.8492
K Factor 2.93	Pitot C_p .84
Leak Rate Before .004 (cfm) [Lpm] @ 15 (in. Hg)	
Leak Rate After .002 [cfm] [Lpm] @ 7 (in. Hg)	
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.) 94x94

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow (In) [Out] of page	First point all the way (In) [Out]
-9.1	10		

Amb. Temp. (°F) 81	Bar. Press. 29.85 [in. Hg] [mbar]
Probe I.D. No. M-8-2	
Liner Material GLASS	

Filter No. NA		
Thimble No. NA		
Nozzle Diameter .275	Nozzle I.D.	275-1

Start Time: 900	Stop Time: 1115

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L] 340.365	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
5-1	5	.42	1.25	343.51	303	251	256	63	82	81	3.5	N/A	
2	10	.47	1.40	346.87	300	248	250	51	84	81	4.0		
3	15	.45	1.30	350.14	300	253	252	48	85	81	3.5		
4	20	.45	1.30	353.39	301	248	259	47	86	82	3.5		
5	25	.39	1.15	356.475	300	253	252	47	87	82	3.5		356.550 .075
4-1	30	.47	1.40	359.81	302	252	254	50	87	83	4.0		
2	35	.45	1.30	363.07	301	249	248	46	88	83	3.5		
3	40	.45	1.30	366.31	301	251	254	46	89	84	3.5		
4	45	.45	1.30	369.55	303	252	6260	48	89	84	3.5		
5	50	.39	1.15	372.630	303	252	259	48	88	83	3.5		372.675 .045
3-1	55	.51	1.50	376.20	304	248	254	57	89	85	4.0		
2	60	.49	1.45	379.65	302	248	253	52	91	85	4.0		
3	65	.52	1.50	383.14	302	253	253	52	92	86	4.0		
	Total	17.7491	17.3	85.5350	3922				1137	1080			
	Average	.7100	1.4840		301.4000				88.3000				

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KRO

Date 6/7/7

CleanAir ENGINEERING

TEST LOCATION: FFOUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 2 **OF** 2

UNIT: 2 **RUN:** 1

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N. BROWARD	Date 6-16-05
Meter Operator M. SPOSD	
Probe Operator M. SPOSD	

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
	5					250	250						
4	70	.56	1.65	386.79	302	253	261	55	92	86	4.5	N/A	
5	75	.59	1.75	390.580	302	248	246	56	93	87	4.5		390.630 .050
1	80	.53	1.55	394.17	302	249	256	61	91	87	4.5		
2-2	85	.53	1.55	397.73	301	250	247	56	93	87	4.5		
3	90	.56	1.65	401.39	301	253	255	56	94	88	4.5		
4	95	.59	1.75	405.15	302	250	253	58	96	89	5.0		
5	100	.60	1.75	408.925	301	254	252	59	96	89	5.0		409.010 .085
1-1	105	.56	1.65	412.67	300	249	249	63	94	90	5.0		
2	110	.45	1.30	415.96	300	251	249	61	96	90	4.5		
3	115	.53	1.55	419.44	300	251	256	61	95	90	4.5		
4	120	.60	1.75	423.23	301	248	261	63	96	90	5.0		
5	125	.65	1.90	~~426~~ 427.155	301	252	253	65	98	91	5.0		
	Total	*	19.8		3613				1134	1064			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KBD

Date 6/17

CleanAir ENGINEERING

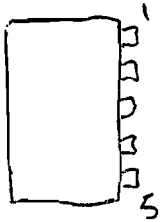
TEST LOCATION: FF OUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 2

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N BROWARD	Date 6-16-05
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

Cross-Section of Test Location



Amb. Temp. (°F) 94	Bar. Press. 29.85 [in. Hg] [mbar]
Probe I.D. No. M-8-1-65	
Liner Material GLASS	

Meter Box 66-20	Sample Box No. 67-29
Meter Y_d 1.0093	Meter $\Delta H_@$ 1.7220
K Factor 2.73	Pitot C_p .84
Leak Rate Before .004 [cfm] [Lpm] @ 15 (in. Hg)	
Leak Rate After .003 [cfm] [Lpm] @ 8 (in. Hg)	
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐

Duct Dimensions (in.) 94 x 94

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.1	10'		

Filter No.	NA		
Thimble No.	NA		
Nozzle Diameter	.275	Nozzle I.D.	275-2

Start Time: 1117	Stop Time: 1332

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft^3] [L]	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
				368.155		250	250						
5-1	5	.44	1.20	371.24	299	250	251	64	93	91	4.0	N/A	
2	10	.44	1.20	374.33	299	250	252	58	94	91	4.0		
3	15	.45	1.25	377.53	299	250	250	52	95	92	4.0		
4	20	.45	1.25	380.74	300	250	252	49	98	93	4.0		
5	25	.38	1.05	383.670	300	250	250	48	98	93	4.0		383.735 .065
4-1	30	.44	1.20	386.85	299	250	253	52	97	94	4.0		2.76 KF
2	35	.44	1.20	389.96	298	250	250	50	99	95	4.0		
3	40	.51	1.40	393.36	300	250	250	54	99	95	4.5		
4	45	.53	1.45	396.87	300	250	250	54	100	96	4.5		
5	50	.51	1.40	400.285	301	250	250	56	101	~~98~~ 96	4.5		400.330 .045
3-1	55	.44	1.20	403.42	299	250	253	60	99	96	4.0		
2	60	.41	1.15	406.49	299	250	250	60	100	96	4.0		
3	65	.41	1.30	~~409.69~~	299	250	250	60	101	96	4.5		
	Total	12.1320	16.25	81.7750	3892				1274	1224			
	Average	.6853	1.2980		299.3600				98.1600				

Sum of square roots:

Circle correct bracketed units on data sheet.

QA/QC KDD

Date 6/17/05

CleanAir ENGINEERING

TEST LOCATION: FF OUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 2 **OF** 2

UNIT: 2 **RUN:** 2

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N BROWARD	Date 6-16-05
Meter Operator M.SPOSD	
Probe Operator M.SPOSD	

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

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

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

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

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [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
						250	250						
4	70	.54	1.50	413.23	301	250	250	62	102	97	5.0	N/A	
5	75	.54	1.50	416.775	301	250	250	62	102	97	5.0		416.865 .090
2-1	80	.42	1.15	419.94	299	249	250	65	99	97	4.0		
2	85	.56	1.55	423.53	298	250	251	58	101	98	5.0		
3	90	.56	1.55	427.12	299	250	251	54	102	98	5.0		
4	95	.54	1.50	430.68	301	250	250	55	102	98	5.0		
5	100	.45	1.25	433.980	300	250	250	57	103	99	4.5		434.040 .060
1-1	105	.55	1.50	437.61	299	250	249	62	102	100	5.0		
2	110	.39	1.10	440.65	298	250	250	56	103	99	4.5		
3	115	.40	1.10	443.67	298	250	249	57	104	99	4.5		
4	120	.46	1.25	446.93	300	250	250	59	104	99	4.5		
5	125	.46	1.25	450.190	298	250	250	60	105	100	4.5		
	Total	*	16.2		3592				1229	1181			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KQ

Date 6/17

CleanAir ENGINEERING

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

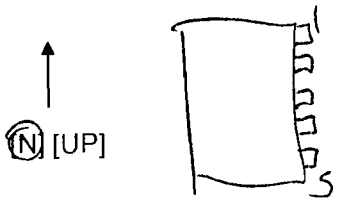
UNIT: 2 **RUN:** 3

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 4708
Plant N. BROWARD	Date 6-16-05
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

Meter Box 66-7	Sample Box No. 67-56
Meter Y_d 0.9910	Meter $\Delta H_@$ 1.8492
K Factor 2.98	Pitot C_p 0.84
Leak Rate Before .004 (cfm) [Lpm] @ 14 (in. Hg)	
Leak Rate After 0.002 (cfm) [Lpm] @ 7 (in. Hg)	
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.) 94 x 94

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow (In) [Out] of page	First point all the way (In) [Out]
-9.2	10		

Amb. Temp. (°F) 96	Bar. Press. 29.85	[in. Hg] [mbar]
Probe I.D. No. ~~RMS~~ M-8-2		
Liner Material GLASS		

Filter No. NA		
Thimble No. NA		
Nozzle Diameter .275	Nozzle I.D.	275-1

Start Time: 1335	Stop Time: 1550

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L] 427.435	Stack Temp. Ts (°F)	ProbeT$_p$ (°F) Set Points 250	Filter T$_f$ (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
5-1	5	.43	1.30	430.72	300	256	251	65	97	96	3.5	N/A	
2	10	.43	1.30	434.01	300	253	250	47	98	97	3.5		
3	15	.43	1.30	437.27	298	253	258	45	100	96	3.5		
4	20	.40	1.20	440.46	300	249	254	47	102	97	3.5		
5	25	.37	1.10	443.520	301	249	248	49	103	98	3.5		443.600 .080
4-1	30	.40	1.20	446.77	299	250	256	56	101	98	3.5		
2	35	.37	1.10	449.84	300	252	257	52	103	99	3.5		
3	40	.37	1.10	452.88	299	249	254	53	103	99	3.5		
4	45	.40	1.20	456.01	302	249	252	54	104	99	3.5		
5	50	.35	1.05	458.950	300	250	252	55	105	99	3.5		459.010 .060
3-1	55	.44	1.30	462.32	300	250	246	63	103	99	3.5		
2	60	.48	1.45	465.77	300	247	253	55	104	99	4.0		
3	65	.46	1.35	469.14	300	252	246	57	105	100			
	Total	16.8652	15.95	83.8150	3899				1328	1276			
	Average	.6746	1.3680		300.3200				98.7400				

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC ICRP

Date 6/16/05

CleanAir ENGINEERING

TEST LOCATION: FF OUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 2 **OF** 2

UNIT: 2 **RUN:** 3

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N BROWARD	Date 6-16-05
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

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
						250	250						
4	70	.44	1.30	472.42	300	247	253	60	102	99	4.0	N/A	
5	75	.40	1.20	475.600	300	249	252	61	102	99	4.0		475.695 .095
2-1	80	.56	1.65	479.35	300	248	241	64	99	97	4.5		
2	85	.50	1.50	482.90	302	247	251	51	99	96	4.5		
3	90	.53	1.60	486.52	300	251	252	50	100	96	4.5		
4	95	.50	1.50	490.05	302	249	254	51	99	96	4.5		
5	100	.50	1.50	493.550	301	251	251	52	98	95	4.5		493.610 .060
1-1	105	.56	1.65	497.17	301	246	251	59	98	95	4.5		
2	110	.39	1.15	500.36	300	247	251	53	97	94	4.0		
3	115	.53	1.60	503.92	300	252	250	56	97	94	4.5		
4	120	.59	1.75	507.67	301	252	250	56	97	93	4.5		
5	125	.62	1.85	511.545	302	250	255	58	98	93	5.0		
	Total	*	18.25		3609				1186	1147			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KRD

Date 6/17

FDS005-General.xls, Feb 2002

CleanAir. ENGINEERING

Impinger Weight Sheet

Client Wheelabrator North Broward		Unit Name/Location Unit 2 / FF Outlet
Plant Pompano Beach, FL	Job No. 9708	Method 29

Run No. 4	Filter Type Quartz		Sample Box No. 67-29
Date 6/17/2005	Lot No. NA		pH NA
Analyst KRO	Filter No. NA		Rinse 0 mL

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	812.8	445.5	367.3	
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2	656.0	543.0	113.0	QA/QC KRO
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2	566.6	548.3	18.3	Date 6/17
Impinger 4	Empty	440.8	439.0	1.0	
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4	533.2	534.5	-1.3	Total Weight (gm)
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4	571.8	569.2	2.6	500.9
Impinger 7	Silica Gel	685.6	668.7	16.9	517.8

Run No. 5	Filter Type Quartz		Sample Box No. 67-56
Date 6/17/2005	Lot No. NA		pH NA
Analyst KRO	Filter No. NA		Rinse 0 mL

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	864.6	543.8	320.8	
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2	779.4	635.5	143.9	QA/QC KRO
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2	566.4	534.6	31.8	Date 6/17
Impinger 4	Empty	444.0	438.3	5.7	
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4	543.1	541.8	1.3	Total Weight (gm)
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4	566.0	566.1	-0.1	503.4
Impinger 7	Silica Gel	676.7	660.3	16.4	519.8

Run No. 6	Filter Type Quartz		Sample Box No. 67-29
Date 6/17/2005	Lot No. NA		pH NA
Analyst KRO	Filter No. NA		Rinse 0 mL

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	831.0	445.7	385.3	
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2	675.7	546.4	129.3	QA/QC KRO
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2	561.3	544.7	16.6	Date 6/17
Impinger 4	Empty	439.7	439.0	0.7	
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4	567.4	567.2	0.2	Total Weight (gm)
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4	538.8	537.9	0.9	533.0
Impinger 7	Silica Gel	660.5	645.5	15.0	548.0

CleanAir ENGINEERING

QA/QC KRO
Date 6/17

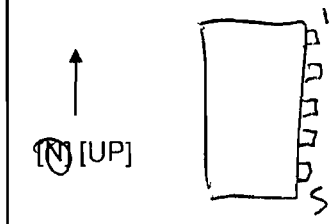
TEST LOCATION: FF OUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 4

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N. BROWARD	Date 6-17-05
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

Cross-Section of Test Location



Amb. Temp. (°F) 80	Bar. Press. 29.85 (in. Hg) [mbar]
Probe I.D. No. M-8-2	
Liner Material GLASS	

Meter Box 66-7	Sample Box No. 67-29	
Meter Y_d 0.9910	Meter $\Delta H_@$ 1.8492	
K Factor 2.9	Pitot C_p .84	
Leak Rate Before .004 (cfm) [Lpm]	@ 16 (in. Hg)	
Leak Rate After .002 [cfm] [Lpm]	@ 7 (in. Hg)	
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐	

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

Duct Dimensions (in.) 94 x 94			
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow (N) [Out] of page	First point all the way (N) [Out]
-9.4	10		

Start Time: 745	Stop Time: 1000

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft^3] [L] 512.000	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp: T_t (°F)	Notes
5-1	5	.47	1.35	515.30	299	250	249	65	79	76	3.5	N/A	
2	10	.51	1.50	518.77	298	253	246	60	79	76	4.0		
3	15	.49	1.40	522.15	298	248	254	57	81	76	4.0		
4	20	.43	1.25	525.35	299	253	254	57	82	77	3.5		
5	25	.40	1.15	528.400	298	248	255	55	83	77	3.5		528.485 .085
4-1	30	.53	1.55	532.01	298	248	250	59	82	77	4.0		
2	35	.53	1.55	535.52	298	251	256	55	83	78	4.0		
3	40	.49	1.40	538.87	297	251	252	56	84	78	4.0		
4	45	.52	1.50	542.37	300	248	256	58	85	79	4.0		
5	50	.49	1.40	545.750	299	254	255	51	86	79	4.0		545.810 .060
3-1	55	.55	1.60	549.41	298	251	253	54	85	80	4.0		
2	60	.52	1.50	552.87	298	251	255	49	86	80	4.0		
3	65	.48	1.40	556.25	298	250	252	50	87	80	4.0		
	Total	17.5018	18.55	84.7850	3878				1082	1013			
	Average	.7001	1.4240		298.6000				82.9800				

Sum of square roots.

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

QA/QC KRJ

Date 6/21/13

CleanAir ENGINEERING

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

UNIT: 2 **RUN:** 4

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 4708
Plant N BROWARD	Date 6-17-05
Meter Operator M.SPOTO	
Probe Operator M.SPOTO	

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
						250	250						
4	70	.46	1.35	559.53	299	252	256	50	87	80	4.0	N/A	
5	75	.44	1.30	562.765	300	253	253	51	88	81	4.0		562.820 .055
2-1	80	.56	1.60	566.39	298	250	259	56	87	82	4.5		
2	85	.52	1.50	569.90	298	250	255	53	88	82	4.5		
3	90	.52	1.50	573.39	298	252	257	55	89	82	4.5		
4	95	.48	1.40	576.77	299	249	250	56	88	82	4.0		
5	100	.45	1.30	580.020	300	253	256	57	89	83	4.0		580.085 .065
1-1	105	.48	1.40	583.47	299	250	258	62	88	84	4.0		.265
2	110	.39	1.15	586.55	298	253	257	57	89	83	4.0		
3	115	.40	1.15	589.61	298	253	253	58	90	84	4.0		
4	120	.62	1.80	593.44	300	253	255	60	90	84	5.0		
5	125	.56	1.60	597.050	300	253	253	61	90	84	4.5		
	Total	*	17.05		3587				1063	991			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KRD

Date 6/17

CleanAir ENGINEERING

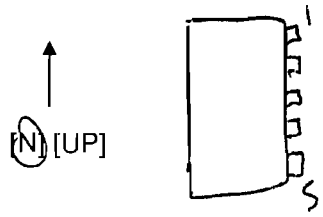
TEST LOCATION: FF OUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 2 **RUN:** 5

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N BROWARD	Date 6-17-05
Meter Operator M. SPOTO	
Probe Operator	

Cross-Section of Test Location



Amb. Temp. (°F) 83	Bar. Press. 29.85 [in. Hg] [mbar]
Probe I.D. No. M-8-1-65	
Liner Material GLASS	

Meter Box 66-20	Sample Box No. 67-56		
Meter Y_d 1.0093	Meter $\Delta H_@$ 1.7220		
K Factor 2.70	Pitot C_p .84		
Leak Rate Before .003 [cfm] [Lpm] @ 15 (in. Hg)			
Leak Rate After .002 [cfm] [Lpm] @ 7 (in. Hg)			
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐		

Filter No. N/A			
Thimble No. N/A			
Nozzle Diameter .275	Nozzle I.D.	275-2	

Duct Dimensions (in.) 94 x 94			
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-9.2	10		

Start Time: 1002	Stop Time: 1216

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L] 450.600	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
5-1	5	.38	1.05	453.49	297	251	250	65	84	83	4.0	N/A	
2	10	.43	1.15	456.53	296	250	250	53	85	83	4.0		
3	15	.43	1.15	459.57	296	250	251	48	87	84	4.0		
4	20	.43	1.15	462.60	297	250	251	47	88	84	4.0		46 [M]
5	25	.37	1.00	465.495	298	250	251	47	88	84	4.0		465.615 .120
4-1 [M]	30	.37	1.00	468.48	297	250	251	51	88	85	4.0		
2	35	.48	1.30	471.69	297	250	250	48	89	86	4.0		
3	40	.48	1.30	474.90	296	250	249	48	91	86	4.0		
4	45	.52	1.40	478.30	298	250	250	48	91	86	4.5		KF 2.74
5	50	.44	1.20	481.490	298	250	251	51	94	88	4.0		481.590 .100
3-1	55	.37	1.00	484.46	297	249	250	55	92	89	4.0		
2	60	.48	1.30	487.74	297	249	250	56	94	89	4.5		
3	65	.48	1.30	491.03	297	250	250	56	96	90	4.5		
	Total	*	15.3	79.8900	3861				1167	1117			
	Average	.6736	1.2380		297.0800				81.1600				

Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC 1620

Date 6/17

CleanAir ENGINEERING

TEST LOCATION: FF OUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 2 **OF** 2

UNIT: 2 **RUN:** 5

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N. BROWARD	Date
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

Cross-Section of Test Location

[N] [UP]

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

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

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

Duct Dimensions (in.)

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft^3] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
4	70	.44	1.20	494.21	298	250	250	57	96	91	4.5	N/A	
5	75	.40	1.10	497.215	298	250	250	58	95	91	4.5		497.285 .070
2-1	80	.52	1.40	500.63	297	250	250	62	94	92	4.5		
2	85	.47	1.30	503.92	296	250	250	60	95	92	4.5		
3	90	.47	1.30	507.20	296	250	250	60	97	93	4.5		
4	95	.52	1.40	510.61	298	250	251	61	96	92	5.0		
5	100	.44	1.20	513.790	298	250	250	63	97	93	4.5		513.875 .085
1-1	105	.49	1.35	517.24	297	250	249	62	95	93	5.0		
2	110	.45	1.25	523.76	297	250	250	54	97	93	5.0		
3	115	.45	1.25	~~527~~ M.S.	296	250	250	53	98	94	5.0		
4	120	.55	1.50	527.37	297	250	250	53	100	94	5.0		
5	125	.52	1.40	530.965	298	250	251	54	101	95	5.0		
	Total	16.8410*	15.65		3566				1161	1113			
	Average	.6736											

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC 6/17

Date 6/20

CleanAir ENGINEERING

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

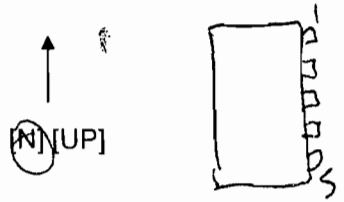
UNIT: 2 **RUN:** 6

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9703
Plant N. BROWARD	Date 6-17-05
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

Meter Box 66-7	Sample Box No.
Meter Y_d 0.9910	Meter $\Delta H_@$ 1.8492
K Factor 2.97	Pitot C_p .84
Leak Rate Before .004 [cfm] [Lpm] @ 15 (in. Hg)	
Leak Rate After .002 [cfm] [Lpm] @ 7 (in. Hg)	
Pitot Leak Check Before: ☑	After: Good ☑ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.)	94 x 94		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-.4	10		

Amb. Temp. (°F) 92	Bar. Press. 29.85 [in. Hg] [mbar]	
Probe I.D. No. ~~S-TYPE~~ M-8-2		
Liner Material GLASS		
Filter No. N/A		
Thimble No. N/A		
Nozzle Diameter .275	Nozzle I.D.	275-1

Start Time: 1220	Stop Time: 1434

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L] 597.440	Stack Temp. Ts (°F)	ProbeT$_p$ (°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	5	.45	1.35	600.76	300	251	254	64	93	91	3.5	N/A	
2	10	.53	1.55	604.29	299	251	248	58	93	90	3.5		
3	15	.50	1.50	607.80	299	254	249	57	94	90	3.5		
4	20	.47	1.40	611.19	299	250	252	54	96	92	3.5		
5	25	.45	1.35	614.510	300	253	252	52	97	92	3.5		614.595 .085
1	30	.54	1.60	618.20	300	248	248	56	97	93	4.0		
2	35	.50	1.50	621.70	299	253	253	51	99	94	4.0		
3	40	.47	1.40	625.14	299	247	250	52	100	95	4.0		
4	45	.45	1.35	628.47	299	249	253	43	101	95	3.5		
5	50	.40	1.20	631.660	299	249	250	40	101	95	3.5		631.710 .050
1	55	.55	1.65	635.37	299	252	250	46	98	94	4.0		
2	60	.43	1.30	638.66	297	253	250	39	102	95	3.5		
3	65	.43	1.30	641.95	299	249	253	38	102	95	3.5		
	Total	17.1145	18.45	85.1150	3888				1273	1211			
	Average	.6846	1.4060		298.68				97.5400				

Sum of square roots.

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

QA/QC KRO

Date 6/17

CleanAir ENGINEERING

TEST LOCATION: FF OUTLET MERCURY **TESTING** **METHOD:** 29 **PAGE** 2 **OF** 2

UNIT: 2 **RUN:** 6

FIELD DATA SHEET

Client WHEELABRATOR	Project No. 9708
Plant N. BROWARD	Date 6-17-05
Meter Operator M. SPOTO	
Probe Operator M. SPOTO	

Cross-Section of Test Location

[N] [UP]

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

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

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

Duct Dimensions (in.)

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

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [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
						250	250						
4	70	.43	1.30	645.21	298	252	248	37	101	95	3.5	N/A	
5	75	.45	1.35	648.590	299	249	253	37	101	96	4.0		648.645 .055
2-1	80	.51	1.50	652.18	299	250	254	44	101	97	4.0		
2	85	.56	1.65	655.85	298	252	256	37	100	96	4.5		
3	90	.51	1.50	659.40	298	253	259	41	102	97	4.5		
4	95	.43	1.30	662.70	298	253	254	41	101	97	4.0		
5	100	.43	1.30	666.005	298	252	248	42	102	98	4.0		666.060 .055
1-1	105	.43	1.30	669.29	297	252	253	50	101	98	4.0		
2	110	.38	1.15	672.44	299	250	254	51	104	99	4.0		
3	115	.40	1.20	675.62	298	252	259	51	104	99	4.0 p.s		3.00 KF
4	120	.54	1.60	679.22	298	253	256	51	103	99	~~4.0~~ 4.5		
5	125	.51	1.55	682.800	299	253	254	52	103	99	4.5		
	Total	*	16.7		3579				1223	1170			
	Average												

* Sum of square roots.

Circle correct bracketed units on data sheet.

QA/QC KPD

Date 6/17

CleanAir ENGINEERING

This Page Intentionally Left Blank

FIELD DATA PRINTOUTS

E

This Page Intentionally Left Blank

USEPA Method 3 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 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	10.2	19.4	9.2	80.6	30.00		
	2	10.2	19.4	9.2	80.6	30.00		
	3	10.2	19.4	9.2	80.6	30.00		
	Avg.	10.20000		9.20000	80.60000	30.00	1.14706	*All measurements in spec.*
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
2	1	10.3	19.3	9.0	80.7	30.01		
	2	10.3	19.3	9.0	80.7	30.01		
	3	10.3	19.3	9.0	80.7	30.01		
	Avg.	10.30000		9.00000	80.70000	30.01	1.15534	*All measurements in spec.*
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
3	1	10.6	19.2	8.6	80.8	30.04		
	2	10.6	19.2	8.6	80.8	30.04		
	3	10.6	19.2	8.6	80.8	30.04		
	Avg.	10.60000		8.60000	80.80000	30.04	1.16038	*All measurements in spec.*
CEM or Other Avg:								☑ Fo value within expected range.

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

071105 155225
LLL 0

QA/OC
Date 6/13

USEPA Method 4 Laboratory Data

Location: Unit 2 FF Outlet
Client: Wheelabrator North Broward, Inc.
Project No: 9708

Test Method: USEPA Method 29
Analyte: Mercury

Test Run: 1

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	867.9	543.5	324.4
Impinger 2	5%HNO3/10%H2O2	776.0	631.6	144.4
Impinger 3	5%HNO3/10%H2O2	572.1	546.0	26.1
Impinger 4	Empty	442.3	437.9	4.4
Impinger 5	4%KMnO4/10%H2SO4	542.4	540.2	2.2
Impinger 6	4%KMnO4/10%H2SO4	562.6	563.0	-0.4
Impinger 7	Silica Gel	674.6	655.7	18.9
Impinger 8				
	Rinse:		(ml or gm)	

	Field Data Check
501.1 Liquid (gm)	
0.0 less rinse (gm)	
501.1 Net Liquid (gm)	501.1 ☑ QA/QC OK
+ 18.9 Silica Gel (gm)	18.9 ☑ QA/QC OK
520.0 Total Vlc (gm)	520.0 ☑ QA/QC OK

Test Run: 2

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	779.7	445.0	334.7
Impinger 2	5%HNO3/10%H2O2	665.6	547.5	118.1
Impinger 3	5%HNO3/10%H2O2	567.0	544.8	22.2
Impinger 4	Empty	442.8	438.9	3.9
Impinger 5	4%KMnO4/10%H2SO4	569.6	568.1	1.5
Impinger 6	4%KMnO4/10%H2SO4	533.9	532.5	1.4
Impinger 7	Silica Gel	676.0	659.3	16.7
Impinger 8				
	Rinse:		(ml or gm)	

	Field Data Check
481.8 Liquid (gm)	
0.0 less rinse (gm)	
481.8 Net Liquid (gm)	481.8 ☑ QA/QC OK
+ 16.7 Silica Gel (gm)	16.7 ☑ QA/QC OK
498.5 Total Vlc (gm)	498.5 ☑ QA/QC OK

Test Run: 3

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	915.2	543.8	371.4
Impinger 2	5%HNO3/10%H2O2	751.0	634.6	116.4
Impinger 3	5%HNO3/10%H2O2	553.3	538.0	15.3
Impinger 4	Empty	438.1	437.7	0.4
Impinger 5	4%KMnO4/10%H2SO4	536.3	539.7	-3.4
Impinger 6	4%KMnO4/10%H2SO4	569.3	567.3	2.0
Impinger 7	Silica Gel	681.7	643.8	17.9
Impinger 8				
	Rinse:		(ml or gm)	

	Field Data Check
502.1 Liquid (gm)	
0.0 less rinse (gm)	
502.1 Net Liquid (gm)	502.1 ☑ QA/QC OK
+ 17.9 Silica Gel (gm)	17.9 ☑ QA/QC OK
520.0 Total Vlc (gm)	520.0 ☑ 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

071105 155225

QA/QC Date 6/13

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 FF Outlet
Test Run: 1
Client: Wheelabrator North Broward, Inc.
Project No: 9708
Source Area (ft^2): 61.36111

Bar. Press. (in. Hg): 29.85
Static P: -9.1
O_2 (dry volume %): 9.20
CO_2 (dry volume %): 10.20
N_2+CO (dry volume %): 80.60

Nozzle ID No: 275-1
Nozzle Diameter (D_n): 0.275
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 6/16/05
Start Time: 09:00
Stop Time: 11:15
Leak Rate Before: 0.004 cfm @ 15 "Hg
Leak Rate After: 0.002 cfm @ 7 "Hg

H_2O (condensate, ml or gm): 501.1
H_2O (silica, g): 18.9
Actual Moisture (%): 22.85

Meter Box ID. No: 66-7
Meter ΔH@: 1.84920
Meter Y_d: 0.99100

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			340.365						
5-01	5.0	0.42	1.25	343.510	303	82	81	0.65	3.14	103.6
5-02	10.0	0.47	1.40	346.870	300	84	81	0.69	3.36	104.2
5-03	15.0	0.45	1.30	350.140	300	85	81	0.67	3.27	103.6
5-04	20.0	0.45	1.30	353.390	301	86	82	0.67	3.25	102.8
5-05	25.0	0.39	1.15	356.475	300	87	82	0.62	3.09	104.6
LEAK CHECK	25.0			356.550						
4-01	30.0	0.47	1.40	359.810	302	87	83	0.69	3.26	100.8
4-02	35.0	0.45	1.30	363.070	301	88	83	0.67	3.26	102.8
4-03	40.0	0.45	1.30	366.310	301	89	84	0.67	3.24	102.0
4-04	45.0	0.45	1.30	369.550	303	89	84	0.67	3.24	102.1
4-05	50.0	0.39	1.15	372.630	303	88	83	0.62	3.08	104.5
LEAK CHECK	50.0			372.675						
3-01	55.0	0.51	1.50	376.200	304	89	85	0.71	3.52	104.4
3-02	60.0	0.49	1.45	379.650	302	91	65	0.70	3.45	103.9
3-03	65.0	0.52	1.50	383.140	302	92	86	0.72	3.49	101.9
3-04	70.0	0.56	1.65	386.790	302	92	86	0.75	3.65	102.7
3-05	75.0	0.59	1.75	390.580	302	93	67	0.77	3.79	103.7
LEAK CHECK	75.0			390.630						
2-01	80.0	0.54	1.55	394.170	302	91	87	0.73	3.54	101.8
2-02	85.0	0.53	1.55	397.730	301	93	87	0.73	3.56	102.7
2-03	90.0	0.56	1.65	401.390	301	94	88	0.75	3.66	102.5
2-04	95.0	0.59	1.75	405.150	302	96	89	0.77	3.76	102.5
2-05	100.0	0.60	1.75	408.925	301	96	89	0.77	3.78	101.9
LEAK CHECK	100.0			409.010						
1-01	105.0	0.56	1.65	412.670	300	94	90	0.75	3.66	102.3
1-02	110.0	0.45	1.30	415.960	300	96	90	0.67	3.29	102.3
1-03	115.0	0.53	1.55	419.440	300	95	90	0.73	3.48	99.9
1-04	120.0	0.60	1.75	423.230	301	96	90	0.77	3.79	102.2
1-05	125.0	0.65	1.90	427.155	301	98	91	0.81	3.92	101.5
Final	125.0		1.48400	86.53500	301.40000	88.30000		0.71013	86.53500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7100	1.4840	85.5350	301.4000	88.3000				
		☑ Avg. OK	☑ Avg. OK	☐ Avg. OK	☑ Avg. OK	☑ Avg. OK				

071105 155225

Prepared by Clean Air Engineering Proprietary Software
S3 tSOKINETIC Version 12-2004b

QA/QC _____
Date 6/13

Field Data Printout

Test Method: USEPA Method 29

Analyte: Mercury

Location: Unit 2 FF Outlet

Test Run: 2

Client: Wheelabrator North Broward, Inc.

Project No: 9708

Source Area (ft²): 61.36111

Test Date: 6/16/05

Start Time: 11:17

Stop Time: 13:32

Leak Rate Before: 0.004 cfm @ 15 "Hg

Leak Rate After: 0.003 cfm @ 8 "Hg

Bar. Press. (in. Hg): 29.85

Static P: -9.1

O_2 (dry volume %): 9.00

CO_2 (dry volume %): 10.30

N_2+CO (dry volume %): 80.70

H_2O (condensate, ml or gm): 481.8

H_2O (silica, g): 16.7

Actual Moisture (%): 23.10

Nozzle ID No: 275-2

Nozzle Diameter (D_n): 0.275

Probe ID No: M-8-1-65

Pitot C_p: 0.84

Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 66-20

Meter $\Delta H@$: 1.72200

Meter Y_d: 1.00930

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			368.155						
5-01	5.0	0.44	1.20	371.240	299	93	91	0.66	3.09	99.2
5-02	10.0	0.44	1.20	374.330	299	94	91	0.66	3.09	99.2
5-03	15.0	0.45	1.25	377.530	299	95	92	0.67	3.20	101.5
5-04	20.0	0.45	1.25	380.740	300	98	93	0.67	3.21	101.5
5-05	25.0	0.38	1.05	383.670	300	98	93	0.62	2.93	100.7
LEAK CHECK	25.0			383.735						
4-01	30.0	0.44	1.20	386.850	299	97	94	0.66	3.12	99.5
4-02	35.0	0.44	1.20	389.960	298	99	95	0.66	3.11	99.0
4-03	40.0	0.51	1.40	393.360	300	99	95	0.71	3.40	100.7
4-04	45.0	0.53	1.45	396.870	300	100	96	0.73	3.51	101.8
4-05	50.0	0.51	1.40	400.285	301	101	96	0.71	3.42	101.0
LEAK CHECK	50.0			400.330						
3-01	55.0	0.44	1.20	403.420	299	99	96	0.66	3.09	98.4
3-02	60.0	0.41	1.15	406.490	299	100	96	0.64	3.07	101.1
3-03	65.0	0.47	1.30	409.690	299	101	96	0.69	3.20	98.4
3-04	70.0	0.54	1.50	413.230	301	102	97	0.73	3.54	101.6
3-05	75.0	0.54	1.50	416.775	301	102	97	0.73	3.54	101.7
LEAK CHECK	75.0			416.865						
2-01	80.0	0.42	1.15	419.940	299	99	97	0.65	3.07	100.1
2-02	85.0	0.56	1.55	423.530	298	101	98	0.75	3.59	101.0
2-03	90.0	0.56	1.55	427.120	299	102	98	0.75	3.59	100.9
2-04	95.0	0.54	1.50	430.680	301	102	98	0.73	3.56	102.0
2-05	100.0	0.45	1.25	433.980	300	103	99	0.67	3.30	103.3
LEAK CHECK	100.0			434.040						
1-01	105.0	0.55	1.50	437.610	299	102	100	0.74	3.57	101.1
1-02	110.0	0.39	1.10	440.650	298	103	99	0.62	3.04	102.0
1-03	115.0	0.40	1.10	443.670	298	104	99	0.63	3.02	100.0
1-04	120.0	0.46	1.25	446.930	300	104	99	0.68	3.26	100.8
1-05	125.0	0.46	1.25	450.190	298	105	100	0.68	3.26	100.5
Final	125.0		1.29800	81.77500	299.36000	98.16000		0.68528	81.77500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6853	1.2980	81.7750	299.3600	98.1600				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

071105 155225

Prepared by Clean Air Engineering Proprietary Software
5S ISOKINETIC Version 12-2004b

QA/QC Date 6/17/05

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 FF Outlet
Test Run: 3
Client: Wheelabrator North Broward, Inc.
Project No: 9708
Source Area (ft²): 61.36111

Bar. Press. (in. Hg): 29.85
Static P: -9.2
O_2 (dry volume %): 8.60
CO_2 (dry volume %): 10.60
N_2+CO (dry volume %): 80.80

H_2O (condensate, ml or gm): 502.1
H_2O (silica, g): 17.9
Actual Moisture (%): 23.76

Nozzle ID No: 275-1
Nozzle Diameter (D_n): 0.275
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 66-7
Meter ΔH@: 1.84920
Meter Y_d: 0.99100

Test Date: 6/16/05
Start Time: 13:35
Stop Time: 15:50
Leak Rate Before: 0.004 cfm @ 14 "Hg
Leak Rate After: 0.002 cfm @ 7 "Hg

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			427.435						
5-01	5.0	0.43	1.30	430.720	300	97	96	0.66	3.29	104.9
5-02	10.0	0.43	1.30	434.010	300	98	97	0.66	3.29	104.9
5-03	15.0	0.43	1.30	437.270	298	100	96	0.66	3.26	103.7
5-04	20.0	0.40	1.20	440.460	300	102	97	0.63	3.19	105.1
5-05	25.0	0.37	1.10	443.520	301	103	98	0.61	3.06	104.7
LEAK CHECK	25.0			443.600						
4-01	30.0	0.40	1.20	446.770	299	101	98	0.63	3.17	104.3
4-02	35.0	0.37	1.10	449.840	300	103	99	0.61	3.07	104.8
4-03	40.0	0.37	1.10	452.880	299	103	99	0.61	3.04	103.7
4-04	45.0	0.40	1.20	456.010	302	104	99	0.63	3.13	102.9
4-05	50.0	0.35	1.05	458.950	300	105	99	0.59	2.94	103.0
LEAK CHECK	50.0			459.010						
3-01	55.0	0.44	1.30	462.320	300	103	99	0.66	3.31	103.7
3-02	60.0	0.48	1.45	465.770	300	104	99	0.69	3.45	103.4
3-03	65.0	0.46	1.35	469.140	300	105	100	0.68	3.37	103.0
3-04	70.0	0.44	1.30	472.420	300	102	99	0.66	3.28	102.8
3-05	75.0	0.40	1.20	475.600	300	102	99	0.63	3.18	104.6
LEAK CHECK	75.0			475.695						
2-01	80.0	0.56	1.65	479.350	300	99	97	0.75	3.66	102.1
2-02	85.0	0.50	1.50	482.900	302	99	96	0.71	3.55	105.2
2-03	90.0	0.53	1.60	486.520	300	100	96	0.73	3.62	104.0
2-04	95.0	0.50	1.50	490.050	302	99	96	0.71	3.53	104.6
2-05	100.0	0.50	1.50	493.550	301	98	95	0.71	3.50	103.8
LEAK CHECK	100.0			493.610						
1-01	105.0	0.56	1.65	497.170	301	98	95	0.75	3.56	99.8
1-02	110.0	0.39	1.15	500.360	300	97	94	0.62	3.19	107.2
1-03	115.0	0.53	1.60	503.920	300	97	94	0.73	3.56	102.7
1-04	120.0	0.59	1.75	507.670	301	97	93	0.77	3.75	102.7
1-05	125.0	0.62	1.85	511.545	302	98	93	0.79	3.88	103.6
Final	125.0		1.36800	83.81500	300.32000	98.74000		0.67461	83.81500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6746	1.3680	83.8150	300.3200	98.7400				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

071105 155225

QA/QC _____
Date 6/13

USEPA Method 3 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 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	10.0	19.4	9.4	80.6	29.98		
	2	10.0	19.4	9.4	80.6	29.98		
	3	10.0	19.4	9.4	80.6	29.98		
	Avg.	10.00000		9.40000	80.60000	29.98	1.15000	*All measurements in spec.*
CEM or Other Avg:								☑ 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	10.6	19.3	8.7	80.7	30.04		
	2	10.6	19.3	8.7	80.7	30.04		
	3	10.6	19.3	8.7	80.7	30.04		
	Avg.	10.60000		8.70000	80.70000	30.04	1.15094	*All measurements in spec.*
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
6	1	11.0	19.4	8.4	80.6	30.10		
	2	11.0	19.4	8.4	80.6	30.10		
	3	11.0	19.4	8.4	80.6	30.10		
	Avg.	11.00000		8.40000	80.60000	30.10	1.13636	*All measurements in spec.*
CEM or Other Avg:								☑ Fo value within expected range.

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

071105 155225
ONLO

QA/QC RWK
Date 6/13

USEPA Method 4 Laboratory Data

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 FF Outlet
Client: Wheelabrator North Broward, Inc.
Project No: 9708

Test Run: 4

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	812.8	445.5	367.3
Impinger 2	5%HNO3/10%H2O2	656.0	543.0	113.0
Impinger 3	5%HNO3/10%H2O2	566.6	548.3	18.3
Impinger 4	Empty	440.0	439.0	1.0
Impinger 5	4%KMnO4/10%H2SO4	533.2	534.5	-1.3
Impinger 6	4%KMnO4/10%H2SO4	571.8	569.2	2.6
Impinger 7	Silica Gel	685.6	668.7	16.9
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
500.9	Liquid (gm)		
0.0	less rinse (gm)		
500.9	Net Liquid (gm)	500.9	☑ QA/QC OK
+ 16.9	Silica Gel (gm)	16.9	☑ QA/QC OK
517.8	Total Vlc (gm)	517.8	☑ QA/QC OK

Test Run: 5

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	864.6	543.8	320.8
Impinger 2	5%HNO3/10%H2O2	779.4	635.5	143.9
Impinger 3	5%HNO3/10%H2O2	566.4	534.6	31.8
Impinger 4	Empty	444.0	438.3	5.7
Impinger 5	4%KMnO4/10%H2SO4	543.1	541.8	1.3
Impinger 6	4%KMnO4/10%H2SO4	566.0	566.1	-0.1
Impinger 7	Silica Gel	676.7	660.3	16.4
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
503.4	Liquid (gm)		
0.0	less rinse (gm)		
503.4	Net Liquid (gm)	503.4	☑ QA/QC OK
+ 16.4	Silica Gel (gm)	16.4	☑ QA/QC OK
519.8	Total Vlc (gm)	519.8	☑ QA/QC OK

Test Run: 6

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	831.0	445.7	385.3
Impinger 2	5%HNO3/10%H2O2	675.7	546.4	129.3
Impinger 3	5%HNO3/10%H2O2	561.3	544.7	16.6
Impinger 4	Empty	439.7	439.0	0.7
Impinger 5	4%KMnO4/10%H2SO4	567.4	567.2	0.2
Impinger 6	4%KMnO4/10%H2SO4	538.8	537.9	0.9
Impinger 7	Silica Gel	660.5	645.5	15.0
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
533.0	Liquid (gm)		
0.0	less rinse (gm)		
533.0	Net Liquid (gm)	533.0	☑ QA/QC OK
+ 15.0	Silica Gel (gm)	15.0	☑ QA/QC OK
548.0	Total Vlc (gm)	548.0	☑ 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

071105 155225
ONLO

QA/QC Date 6/7/13

Field Data Printout

Test Method: USEPA Method 29

Analyte: Mercury

Location: Unit 2 FF Outlet
Test Run: 4
Client: Wheelabrator North Broward, Inc.
Project No: 9708
Source Area (ft²): 61.36111

Test Date: 6/17/05
Start Time: 07:45
Stop Time: 10:00
Leak Rate Before: 0.004 cfm @ 16 "Hg
Leak Rate After: 0.002 cfm @ 7 "Hg

Bar. Press. (in. Hg): 29.85
Static P: -9.4
O_2 (dry volume %): 9.40
CO_2 (dry volume %): 10.00
N_2+CO (dry volume %): 80.60

H_2O (condensate, ml or gm): 500.9
H_2O (silica, g): 16.9
Actual Moisture (%): 22.96

Nozzle ID No: 275-1
Nozzle Diameter (D_n): 0.275
Probe ID No: M-8-2
Pitot C_p: 0.84
Pilot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 66-7
Meter ΔH@: 1.84920
Meter Y_d: 0.99100

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			512.000						
5-01	5.0	0.47	1.35	515.300	299	79	76	0.69	3.30	103.4
5-02	10.0	0.51	1.50	518.770	298	79	76	0.71	3.47	104.3
5-03	15.0	0.49	1.40	522.150	298	81	76	0.70	3.38	103.5
5-04	20.0	0.43	1.25	525.350	299	82	77	0.66	3.20	104.4
5-05	25.0	0.40	1.15	528.400	298	83	77	0.63	3.05	103.0
LEAK CHECK	25.0			528.485						
4-01	30.0	0.53	1.55	532.010	298	82	77	0.73	3.52	103.6
4-02	35.0	0.53	1.55	535.520	298	83	78	0.73	3.51	103.0
4-03	40.0	0.49	1.40	538.870	297	84	78	0.70	3.35	102.0
4-04	45.0	0.52	1.50	542.370	300	85	79	0.72	3.50	103.5
4-05	50.0	0.49	1.40	545.750	299	86	79	0.70	3.38	102.8
LEAK CHECK	50.0			545.810						
3-01	55.0	0.55	1.60	549.410	298	85	80	0.74	3.60	103.3
3-02	60.0	0.52	1.50	552.870	298	86	80	0.72	3.46	102.0
3-03	65.0	0.48	1.40	556.250	298	87	80	0.69	3.38	103.6
3-04	70.0	0.46	1.35	559.530	299	87	80	0.68	3.28	102.7
3-05	75.0	0.44	1.30	562.765	300	88	81	0.66	3.24	103.5
LEAK CHECK	75.0			562.820						
2-01	80.0	0.56	1.60	566.390	298	87	82	0.75	3.57	101.1
2-02	85.0	0.52	1.50	569.900	298	88	82	0.72	3.51	103.1
2-03	90.0	0.52	1.50	573.390	298	89	82	0.72	3.49	102.4
2-04	95.0	0.48	1.40	576.770	299	88	82	0.69	3.38	103.4
2-05	100.0	0.45	1.30	580.020	300	89	83	0.67	3.25	102.5
LEAK CHECK	100.0			580.085						
1-01	105.0	0.48	1.40	583.470	299	88	84	0.69	3.38	103.3
1-02	110.0	0.39	1.15	586.550	298	89	83	0.62	3.08	104.2
1-03	115.0	0.40	1.15	589.610	298	90	84	0.63	3.06	102.0
1-04	120.0	0.62	1.80	593.440	300	90	84	0.79	3.83	102.8
1-05	125.0	0.56	1.60	597.050	300	90	84	0.75	3.61	101.9
Final	125.0		1.42400	84.78500	298.60000	82.98000		0.70007	84.78500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.7001	1.4240	84.7850	298.6000	82.9800				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

071105 155225

Prepared by Clean Air Engineering Proprietary Software
5S ISOKINETIC Version 12-2004b

QA/QC
Date 6/23

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 2 FF Outlet
Test Run: 5
Client: Wheelabrator North Broward, Inc.
Project No: 9708
Source Area (ft²): 61.36111

Test Date: 6/17/05
Start Time: 10:02
Stop Time: 12:16
Leak Rate Before: 0.003 cfm @ 15 "Hg
Leak Rate After: 0.002 cfm @ 7 "Hg

Bar. Press. (in. Hg): 29.85
Static P: -9.2
O_2 (dry volume %): 8.70
CO_2 (dry volume %): 10.60
N_2+CO (dry volume %): 80.70

H_2O (condensate, ml or gm): 503.4
H_2O (silica, g): 16.4
Actual Moisture (%): 24.05

Nozzle ID No: 275-2
Nozzle Diameter (D_n): 0.275
Probe ID No: M-8-1-65
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 66-20
Meter ΔH@: 1.72200
Meter Y_d: 1.00930

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			450.600						
5-01	5.0	0.38	1.05	453.490	297	84	83	0.62	2.89	102.5
5-02	10.0	0.43	1.15	456.530	296	85	83	0.66	3.04	101.2
5-03	15.0	0.43	1.15	459.570	296	87	84	0.66	3.04	100.9
5-04	20.0	0.43	1.15	462.600	297	88	84	0.66	3.03	100.6
5-05	25.0	0.37	1.00	465.495	298	88	84	0.61	2.89	103.6
LEAK CHECK	25.0			465.615						
4-01	30.0	0.37	1.00	468.480	297	88	85	0.61	2.87	102.4
4-02	35.0	0.46	1.30	471.690	297	89	86	0.69	3.21	100.6
4-03	40.0	0.46	1.30	474.900	296	91	86	0.69	3.21	100.4
4-04	45.0	0.52	1.40	478.300	298	91	86	0.72	3.40	102.3
4-05	50.0	0.44	1.20	481.490	298	94	88	0.66	3.19	103.8
LEAK CHECK	50.0			481.590						
3-01	55.0	0.37	1.00	484.460	297	92	69	0.61	2.87	101.8
3-02	60.0	0.48	1.30	487.740	297	94	89	0.69	3.28	102.1
3-03	65.0	0.48	1.30	491.030	297	96	90	0.69	3.29	102.1
3-04	70.0	0.44	1.20	494.210	298	96	91	0.66	3.18	103.0
3-05	75.0	0.40	1.10	497.215	298	95	91	0.63	3.01	102.2
LEAK CHECK	75.0			497.285						
2-01	80.0	0.52	1.40	500.630	297	94	92	0.72	3.34	99.7
2-02	85.0	0.47	1.30	503.920	296	95	92	0.69	3.29	103.0
2-03	90.0	0.47	1.30	507.200	296	97	93	0.69	3.28	102.4
2-04	95.0	0.52	1.40	510.610	298	96	92	0.72	3.41	101.6
2-05	100.0	0.44	1.20	513.790	298	97	93	0.66	3.18	102.7
LEAK CHECK	100.0			513.875						
1-01	105.0	0.49	1.35	517.240	297	95	93	0.70	3.37	103.2
1-02	110.0	0.45	1.25	523.760	297	97	93	0.67	6.52	208.2*
1-03	115.0	0.45	1.25	523.760	296	98	94	0.67	0.00	0.0*
1-04	120.0	0.55	1.50	527.370	297	100	94	0.74	3.61	103.9
1-05	125.0	0.52	1.40	530.865	298	101	95	0.72	3.50	103.4
Final	125.0		1.23600	79.89000	297.08000	91.16000		0.67364	79.89000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6736	1.2380	79.8900	297.0800	91.1600				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

071105 155225

Prepared by Clean Air Engineering Proprietary Software
SS ISOKINETIC Version 12-2004b

QA/QC Date 6/23

Field Data Printout

Test Method: USEPA Method 29

Analyte: Mercury

Location: Unit 2 FF Outlet
Test Run: 6
Client: Wheelabrator North Broward, Inc.
Project No: 9708
Source Area (ft²): 61.36111

Bar. Press. (in. Hg): 29.85
Static P: -9.4
O_2 (dry volume %): 8.40
CO_2 (dry volume %): 11.00
N_2+CO (dry volume %): 80.60

Nozzle ID No: 275-1
Nozzle Diameter (D_n): 0.275
Probe ID No: M-8-2
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 6/17/05
Start Time: 12:20
Stop Time: 14:34
Leak Rate Before: 0.004 cfm @ 15 "Hg
Leak Rate After: 0.002 cfm @ 7 "Hg

H_2O (condensate, ml or gm): 533.0
H_2O (silica, g): 15.0
Actual Moisture (%): 24.40

Meter Box ID. No: 66-7
Meter ΔH@: 1.84920
Meter Y_d: 0.99100

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			597.440						
5-01	5.0	0.45	1.35	600.760	300	93	91	0.67	3.32	105.4
5-02	10.0	0.53	1.55	604.290	299	93	90	0.73	3.53	103.3
5-03	15.0	0.50	1.50	607.800	299	94	90	0.71	3.51	105.7
5-04	20.0	0.47	1.40	611.190	299	96	92	0.69	3.39	104.8
5-05	25.0	0.45	1.35	614.510	300	97	92	0.67	3.32	104.9
LEAK CHECK	25.0			614.595						
4-01	30.0	0.54	1.60	618.200	300	97	93	0.73	3.61	104.0
4-02	35.0	0.50	1.50	621.700	299	99	94	0.71	3.50	104.5
4-03	40.0	0.47	1.40	625.140	299	100	95	0.69	3.44	105.7
4-04	45.0	0.45	1.35	628.470	299	101	95	0.67	3.33	104.5
4-05	50.0	0.40	1.20	631.660	299	101	95	0.63	3.19	106.1
LEAK CHECK	50.0			631.710						
3-01	55.0	0.55	1.65	635.370	299	98	94	0.74	3.66	104.3
3-02	60.0	0.43	1.30	638.660	297	102	95	0.66	3.29	105.4
3-03	65.0	0.43	1.30	641.950	299	102	95	0.66	3.29	105.5
3-04	70.0	0.43	1.30	645.210	298	101	95	0.66	3.26	104.6
3-05	75.0	0.45	1.35	648.590	299	101	96	0.67	3.38	106.0
LEAK CHECK	75.0			648.645						
2-01	80.0	0.51	1.50	652.180	299	101	97	0.71	3.53	104.0
2-02	85.0	0.56	1.65	655.850	298	100	96	0.75	3.67	103.2
2-03	90.0	0.51	1.50	659.400	298	102	97	0.71	3.55	104.3
2-04	95.0	0.43	1.30	662.700	298	101	97	0.66	3.30	105.7
2-05	100.0	0.43	1.30	666.005	298	102	98	0.66	3.30	105.6
LEAK CHECK	100.0			666.060						
1-01	105.0	0.43	1.30	669.290	297	101	98	0.66	3.23	103.3
1-02	110.0	0.38	1.15	672.440	299	104	99	0.62	3.15	106.8
1-03	115.0	0.40	1.20	675.620	298	104	99	0.63	3.18	105.1
1-04	120.0	0.54	1.60	679.220	298	103	99	0.73	3.60	102.6
1-05	125.0	0.51	1.55	682.800	299	103	99	0.71	3.58	105.0
Final	125.0		1.40600	85.11500	298.68000	97.54000		0.68458	85.11500	

25 points sampled

QC-Check: Field Averages	Sq.Rt.ΔP				
	0.6846	1.4060	85.1150	298.6800	97.5400
	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK

071105 155225

QA/QC Date 6/17/05

LABORATORY DATA

F

This Page Intentionally Left Blank

Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 9708

Mercury

EPA Method 29 Analysis

Analytical Report
5360

el1

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 5360
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

Melissa Lawrence, QA Officer
June 30,2005

Report Reviewed and Finalized By:

Ken Smith, Laboratory Director
June 30,2005

el$_1$

SUMMARY OF RESULTS

el$_1$

This Page Intentionally Left Blank

Wheelabrator North Broward, Inc.
Clean Air Project No: 9708
Unit 2 FF Outlet

USEPA Method 29
Mercury (Hg) Laboratory Parameters

Blank Analysis				
m_{1b-B}	Fraction 1B Blank (µg)	<0.1000		
m_{2b-B}	Fraction 2B Blank (µg)	<0.3000		
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)		Jun 16	Jun 16	Jun 16
Start Time (approx.)		09:00	11:17	13:35
Stop Time (approx.)		11:15	13:32	15:50
Sample Analysis				
m_{1b-S}	Fraction 1B Sample (µg)	<0.1000	<0.1000	<0.1000
m_{2b-S}	Fraction 2B Sample (µg)	42.8082	85.7627	44.9403
m_{3a-S}	Fraction 3A Sample (µg)	<0.2000	0.2031	<0.2000
m_{3b-S}	Fraction 3B Sample (µg)	<0.7000	<0.7000	<0.7000
m_{3c-S}	Fraction 3C Sample (µg)	0.6922	0.6373	<0.4000
$m_{total-S}$	Total Sample Amount (µg)	43.5004	86.6031	44.9403
Allowable Blank				
$m_{T-B-allow}$	Total Allowable Blank (µg)	0.0000	0.0000	0.0000
Sample Corrected for Blank				
m_n	Total Sample Amount (µg)	43.5004	86.6031	44.9403
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)	42.8082	85.7627	44.9403
m_{n-3a}	Fraction 3A Prorated (µg)	<0.2000	0.2031	<0.2000
m_{n-3b}	Fraction 3B Prorated (µg)	<0.7000	<0.7000	<0.7000
m_{n-3c}	Fraction 3C Prorated (µg)	0.6922	0.6373	<0.4000

071305 141652
G

QA/QC
Date 6/13

Summary of Analysis

Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front half µg	H_2O_2 /HNO_3 µg	Empty Impinger µg	$KMnO_4$ µg	HCl µg
U2 FF Outlet R1	#1	43.5	< 0.1	42.6	< 0.2	< 0.7	0.69
	#2		< 0.1	43.0	< 0.2	< 0.7	0.69
U2 FF Outlet R2	#1	86.6	< 0.1	85.6	0.21	< 0.7	0.63
	#2		< 0.1	85.9	0.20	< 0.7	0.64
U2 FF Outlet R3	#1	44.9	< 0.1	44.7	< 0.2	< 0.7	< 0.4
	#2		< 0.1	45.2	< 0.2	< 0.7	< 0.4
U2 FF Outlet FB	#1	< 0.7	< 0.1	< 0.3	< 0.2	< 0.7	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.7	< 0.4
Reagent Blank (16th)	#1	< 0.4	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
Reagent Blank (17th)	#1	< 0.4				< 0.4	
	#2					< 0.4	

ANALYTICAL NARRATIVE

This Page Intentionally Left Blank

Element One Analytical Narrative

Client:	Clean Air Engineering	Element One #:	5360
Client ID:	North Broward	Analyst:	CML, IJJ
Method:	M29	Dates Received:	6/20/05
Analytes:	Hg	Dates Analyzed:	6/24-29/05

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.

This Page Intentionally Left Blank

QUALITY CONTROL SUMMARY

el$_1$

This Page Intentionally Left Blank

Summary of Quality Control Data

Mercury Duplicate Analysis RPD

Run Number	Front half	H_2O_2/HNO_3	Empty Imp	$KMnO_4$	HCl
U2 FF Outlet R1	NA	0.8%	NA	NA	0.5%
U2 FF Outlet R2	NA	0.3%	2.1%	NA	1.2%
U2 FF Outlet R3	NA	1.2%	NA	NA	NA
U2 FF Outlet FB	NA	NA	NA	NA	NA
Reagent Blank (16th)	NA	NA	NA	NA	NA
Reagent Blank (17th)				NA	

Mercury Spike Recoveries

Run Number		Front half	H2O2/HNO4	Empty Impinger	KMnO4	HCl
U2 FF Outlet R3	#1	117%	89%	77%	99%	95%
	#2	117%	91%	77%	101%	96%

This Page Intentionally Left Blank

SAMPLE CUSTODY

el$_1$

This Page Intentionally Left Blank

5360

CHAIN OF CUSTODY FORM

66-9708-02

CLIENT Wheelabrator North Broward
PLANT Pompano Beach, FL
PROJECT MANAGER Scott Brown
PROJECT NO. 9706
DEPT. 66

COPY

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	Be, Cd, Pb	Archive		ADDITIONAL INFORMATION
	1	Unit 2 FF Outlet	16-Jun	Filter	1	N/A	X				
	1	Unit 2 FF Outlet	16-Jun	Front-Half 0.1N HNO3 Rinse	1	111	X				
	1	Unit 2 FF Outlet	16-Jun	Imp. 1,2,3 + 0.1N HNO3 Rinse	1	870	X				
	1	Unit 2 FF Outlet	16-Jun	Imp. 4 + 0.1N HNO3 Rinse	1	105	X				
	1	Unit 2 FF Outlet	16-Jun	Imp. 5,6 KMnO4+H2O Rinse	1	615	X				
	1	Unit 2 FF Outlet	16-Jun	Imp. 5,6 HCl Rinse	1	226	X				
	2	Unit 2 FF Outlet	16-Jun	Filter	1	N/A	X				
	2	Unit 2 FF Outlet	16-Jun	Front-Half 0.1N HNO3 Rinse	1	112	X				
	2	Unit 2 FF Outlet	16-Jun	Imp. 1,2,3 + 0.1N HNO3 Rinse	1	817	X				
	2	Unit 2 FF Outlet	16-Jun	Imp. 4 + 0.1N HNO3 Rinse	1	95	X				
	2	Unit 2 FF Outlet	16-Jun	Imp. 5,6 KMnO4+H2O Rinse	1	617	X				
	2	Unit 2 FF Outlet	16-Jun	Imp. 5,6 HCl Rinse	1	226	X				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Ken Hall	6/17/2005 1700				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
				Chris L	6/20/05 0930

Special Handling Instructions

Forwarding Lab: Element One, Inc.
5022-C Wrightsville Ave.
Wilmington, NC 28403
PO Number:

This form was completed by:
Kevin O'Halloren
Signature Date
Ken Hall 6/17/2005

FedEx

CleanAir ENGINEERING

LDS001A_1-COC Palatine_M2E, Jul 2002

500 West Wood Street
Palatine, IL 60067

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

5360

CHAIN OF CUSTODY FORM

66-9708-03

CLIENT Wheelabrator North Broward
PLANT Pompano Beach, FL
PROJECT MANAGER Scott Brown
PROJECT NO. 9706
DEPT. 66

COPY

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	Be, Cd, Pb	Archive		ADDITIONAL INFORMATION
	3	Unit 2 FF Outlet	16-Jun	Filter	1	N/A	X				
	3	Unit 2 FF Outlet	16-Jun	Front-Half 0.1N HNO3 Rinse	1	116	X				
	3	Unit 2 FF Outlet	16-Jun	Imp. 1,2,3 + 0.1N HNO3 Rinse	1	842	X				
	3	Unit 2 FF Outlet	16-Jun	Imp. 4 + 0.1N HNO3 Rinse	1	99	X				
	3	Unit 2 FF Outlet	16-Jun	Imp. 5,6 KMnO4+H2O Rinse	1	610	X				
	3	Unit 2 FF Outlet	16-Jun	Imp. 5,6 HCl Rinse	1	228	X				
	4	Unit 2 FF Outlet	17-Jun	Filter	1	N/A			X		
	4	Unit 2 FF Outlet	17-Jun	Front-Half 0.1N HNO3 Rinse	1	105			X		
	4	Unit 2 FF Outlet	17-Jun	Imp. 1,2,3 + 0.1N HNO3 Rinse	1	827			X		
	4	Unit 2 FF Outlet	17-Jun	Imp. 4 + 0.1N HNO3 Rinse	1	100			X		
	4	Unit 2 FF Outlet	17-Jun	Imp. 5,6 KMnO4+H2O Rinse	1	616			X		
	4	Unit 2 FF Outlet	17-Jun	Imp. 5,6 HCl Rinse	1	225			X		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
[signature]	6/17/2005 17:20				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
				[signature]	6.20.05/0930

Fed Ex

Special Handling Instructions

Forwarding Lab: Element One, Inc.
5022-C Wrightsville Ave.
Wilmington, NC 28403
P'O Number:

This form was completed by: Kevin O'Halloren
Signature [signature] Date 6/17/2005

CleanAir ENGINEERING

LDS001A_1-COC Palatine_M25, Jul 2002

500 West Wood Street
Palatine, IL 60067

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

5360

CHAIN OF CUSTODY FORM

66-9708-04

CLIENT Wheelabrator North Broward
PLANT Pompano Beach, FL
PROJECT MANAGER Scott Brown
PROJECT NO. 9706
DEPT. 66

COPY

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	Be, Cd, Pb	Archive		ADDITIONAL INFORMATION
	5	Unit 2 FF Outlet	17-Jun	Filter	1	N/A		X			
	5	Unit 2 FF Outlet	17-Jun	Front-Half 0.1N HNO3 Rinse	1	124		X			
	5	Unit 2 FF Outlet	17-Jun	Imp. 1,2,3 + 0.1N HNO3 Rinse	1	824		X			
	5	Unit 2 FF Outlet	17-Jun	Imp. 4 + 0.1N HNO3 Rinse	1	105		X			
	5	Unit 2 FF Outlet	17-Jun	Imp. 5,6 KMnO4+H2O Rinse	1	622		X			
	5	Unit 2 FF Outlet	17-Jun	Imp. 5,6 HCl Rinse	1	226		X			
	6	Unit 2 FF Outlet	17-Jun	Filter	1	N/A		X			
	6	Unit 2 FF Outlet	17-Jun	Front-Half 0.1N HNO3 Rinse	1	87		X			
	6	Unit 2 FF Outlet	17-Jun	Imp. 1,2,3 + 0.1N HNO3 Rinse	1	852		X			
	6	Unit 2 FF Outlet	17-Jun	Imp. 4 + 0.1N HNO3 Rinse	1	105		X			
	6	Unit 2 FF Outlet	17-Jun	Imp. 5,6 KMnO4+H2O Rinse	1	616		X			
	6	Unit 2 FF Outlet	17-Jun	Imp. 5,6 HCl Rinse	1	224		X			

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
	6/17/2005 1700				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
					6.20.05 0930

Special Handling Instructions

Forwarding Lab: Element One, Inc.
5022-C Wrightsville Ave.
Wilmington, NC 28403
PO Number:

This form was completed by: Kevin O'Halloren
Signature
Date 6/17/2005

Fed Ex

CleanAir ENGINEERING

LDS001A_1-COC Palatine_M26, Jul 2002

500 West Wood Street
Palatine, IL 60067

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

5360

CHAIN OF CUSTODY FORM

66-9708-01

CLIENT Wheelabrator North Broward
PLANT Pompano Beach, FL
PROJECT MANAGER Scott Brown
PROJECT NO. 9706
DEPT. 66

COPY

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg	Be, Cd, Pb	Archive		ADDITIONAL INFORMATION
	N/A	Reagent Blank	16-Jun	Filter x 3	1	N/A	X				
	N/A	Reagent Blank	16-Jun	0.1N HNO3	1	300	X				
	N/A	Reagent Blank	16-Jun	DI H2O	1	200	X				
	N/A	Reagent Blank	16-Jun	5% HNO3 / 10% H2O2	1	300	X				
	N/A	Reagent Blank	16-Jun	4% KMNO4 / 10% H2SO4	1	100	X				
	N/A	Reagent Blank	17-Jun	4% KMNO4 / 10% H2SO4	1	100	X				
	N/A	Reagent Blank	16-Jun	8N HCl	1	225	X				
	N/A	Field Blank	16-Jun	Filter	1	N/A	X				
	N/A	Field Blank	16-Jun	Front-Half 0.1N HNO3 Rinse	1	118	X				
	N/A	Field Blank	16-Jun	Imp. 1,2,3 + 0.1N HNO3 Rinse	1	335	X				
	N/A	Field Blank	16-Jun	Imp. 4 + 0.1N HNO3 Rinse	1	104	X				
	N/A	Field Blank	16-Jun	Imp. 5,6 KMnO4+H2O Rinse	1	609	X				
	N/A	Field Blank	16-Jun	Imp. 5,6 HCl Rinse	1	228	X				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Kevin O'Halloren	6/17/2005				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
					6.20.05/0930

Special Handling Instructions

Forwarding Lab: Element One, Inc.
5022-C Wrightsville Ave.
Wilmington, NC 28403
PO Number:

This form was completed by:
Kevin O'Halloren
Signature Kevin O'Halloren Date 6/17/2005

FedEx

CleanAir ENGINEERING

LDS001A_1-COC Falstine_M26, Jul 2002

500 West Wood Street
Palatine, IL 60067

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

ANALYTICAL DATA

el$_1$

This Page Intentionally Left Blank

elementOne AIR TESTING SAMPLE SUBMISSION FORM Lab ID # 5360

DUE DATE: 7.5.05

Project ID/ Number: Wheelabrator N. & S. Broward 9706

Client: **Clean Air IL**	Date / Time Received: 6.20.05 / 0930

HNO_3 Lot: 110420	HF Lot: 5104060	HCl Lot: 410490	**Ref. Method:**
Volume Marked (Y) / N	Volume Loss Y (N) ?	pH < 2.0 (Y) / N	**29**

	Sample Identification		Sample Identification
1	U1 FF Outlet R 1	7	U2 FF Outlet R 1
2	U1 FF Outlet R 2	8	U2 FF Outlet R 2
3	U1 FF Outlet R 3	9	U2 FF Outlet R 3
4	U1 FF Outlet R3 Spike	10	U2 FF Outlet R3 Spike
5	U1 FF Outlet FB	11	U2 FF Outlet FB
6	Reagent Blank	12	Reagent Blank

Analyses Requested Samples 1-12 Hg

	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	124	100	860	—	—	104	200	590	700	225	400
2	130	"	850	—	—	98	"	580	"	226	"
3/4	108	"	840	—	—	99	"	580	"	230	"
5	122	"	350	—	—	100	"	585	"	232	"
6	100	"	290	—	—	200	"	100 KMnO4 / 33 $Di H_2O$	400	225	"
7	114	"	860	—	—	106	"	585	700	226	"
8	116	"	810	—	—	95	"	598	"	225	"
9/10	120	"	840	—	—	100	"	595	"	230	"
11	126	"	320	—	—	104	"	585	"	230	"
12	100	"	290	—	—	200	"	100 KMnO4 / 33 $Di H_2O$	400	225	"

Comments:

6B(15th) 100 KMnO4 / 33 Di FV: 400 ml

12B(17th) 100 KMnO4 / 33 Di FV: 400 ml

Element One, Inc. Form 118 - Revision 6.0

Sample Submission by PS

6/22/2005 2:45:40 PM

elementOne AIR TESTING SAMPLE SUBMISSION FORM Lab ID # 5360

DUE DATE: 7.5.05

Project ID/ Number: Wheelabrator N. & S. Broward 9706

Client: **Clean Air IL**	Date / Time Received: 6.20.05 / 0930

HNO_3 Lot:	HF Lot:	HCl Lot:	**Ref. Method:**
Volume Marked Y / N	Volume Loss Y / N / ?	pH < 2.0 Y / N	**29**

	Sample Identification		Sample Identification
13	U1 FF Outlet R 4 ARCHIVE	17	U2 FF Outlet R 4 ARCHIVE
14	U1 FF Outlet R 5 ARCHIVE	18	U2 FF Outlet R 5 ARCHIVE
15	U1 FF Outlet R 6 ARCHIVE	19	U2 FF Outlet R 6 ARCHIVE
16	U1 FF Outlet R 6 ARCHIVE Spike	20	U2 FF Outlet R 6 ARCHIVE Spike

Analyses Requested Samples 13-20 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
13											
14											
15/16											
17											
18											
19/20											

Comments:

Element One, Inc. Form 118 - Revision 6.0

Sample Submission by PLS

6/22/2005 3:39:48 PM

elementOne

Method 29 Microwave Worksheet

Lab ID # e5360

Client: CAE

Date Digested: 6·27·05 Initials: IJJ 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			
5360·1	FH·Filter	N/A	Full				
2							
3/4							
5							
6							
7							
8							
9/10							
11							
12							

* Hg Only

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	6/24/2005	14:51:54	0.00042108			µg			0.00042108					
STD1=.004ug	6/24/2005	14:52:57	0.00088937			µg			0.00088937					
STD2=.04ug	6/24/2005	14:54:01	0.00920425			µg			0.00920425					
STD3=.08ug	6/24/2005	14:55:07	0.01835605			µg			0.01835605					
STD4=.12ug	6/24/2005	14:56:13	0.02742005			µg			0.02742005					
STD5=.16ug	6/24/2005	14:57:20	0.03691414			µg			0.03691414					
STD6=.2ug	6/24/2005	14:58:28	0.04662736			µg			0.04682736					
Reagent Blank	6/24/2005	15:00:04	0.00001631	0.00007247	0.00007247	µg			0.00000083	0.00000368	0.00000368	0.0000318	0.00014126	0.00014126
0.004 = DL	6/24/2005	15:01:09	0.00094125	0.00417738	0.00417738	µg			0.00094125	0.00417738	0.00417738			
0.080 = QC STD 2	6/24/2005	15:02:16	0.01955928	0.08561984	0.08561984	µg			0.01955928	0.08561984	0.08561984			
0.080 = QC STD 3	6/24/2005	15:03:23	0.01939214	0.08489862	0.08489862	µg			0.01939214	0.08489862	0.08489862			
REAGENT BLANK	6/24/2005	15:04:27	-0.0000064	-0.0000284	-0.0000284	µg			-0.0000064	-0.0000284	-0.0000284			
0.004 = DL	6/24/2005	15:40:40	0.00093344	0.00414274	0.00414274	µg	4	100	0.00093344	0.00414274	0.00414274			
0.080 = QC STD 2	6/24/2005	15:41:47	0.02002833	0.08764295	0.08764295	µg	4	100	0.02002833	0.08764295	0.08764295			
REAGENT BLANK	6/24/2005	15:42:51	0.00001251	0.00005559	0.00005559	µg	4	100	0.00001251	0.00005559	0.00005559			
5360-A-1	6/24/2005	15:50:49	0.00048372	0.00214754	0.10737709	µg	4	200	0.00050188	0.00222814	0.11140742	0.00046556	0.00206693	0.10334676
5360-A-2	6/24/2005	15:52:22	0.00036981	0.00164197	0.08209878	µg	4	200	0.00037283	0.00165539	0.08276961	0.00036679	0.00162855	0.08142795
5360-A-4-SPK	6/24/2005	15:55:28	0.02025509	0.08862043	4.43102187	µg	4	200	0.02012568	0.08806267	4.4031337	0.02038449	0.0891782	4.45891004
5360-A-5	6/24/2005	15:57:02	0.00034982	0.00155321	0.07766059	µg	4	200	0.00035431	0.00157316	0.07865822	0.00034532	0.00153325	0.07666296
5360-A-6	6/24/2005	15:58:36	0.00039701	0.00176271	0.08813553	µg	4	200	0.00037881	0.00168192	0.08409609	0.00041521	0.00184349	0.09217497
0.004 = DL	6/24/2005	15:59:41	0.00095071	0.00421933	0.00421933	µg	4	200	0.00095071	0.00421933	0.00421933			
0.080 = QC STD 2	6/24/2005	16:00:48	0.02016118	0.08821569	0.08821569	µg	4	200	0.02016118	0.08821569	0.08821569			
Calib Blank	6/24/2005	16:04:36	0.00041449			µg	4	200	0.00041449					
STD1=.004ug	6/24/2005	16:05:39	0.00096284			µg	4	200	0.00096284					
STD2=.04ug	6/24/2005	16:06:43	0.00972594			µg	4	200	0.00972594					
STD3=.08ug	6/24/2005	16:07:48	0.01952647			µg	4	200	0.01952647					
STD4=.12ug	6/24/2005	16:08:55	0.02940984			µg	4	200	0.02940984					
STD5=.16ug	6/24/2005	16:10:02	0.03918802			µg	4	200	0.03918802					
STD6=.2ug	6/24/2005	16:11:10	0.04929624			µg	4	200	0.04929624					
Reagent Blank	6/24/2005	16:13:17	0.00009057	0.00037532	0.00037532	µg	4	200	0.00014388	0.00059621	0.00059621	0.00003726	0.00015444	0.00015444
0.004 = DL	6/24/2005	16:14:22	0.00101897	0.00422007	0.00422007	µg	4	200	0.00101897	0.00422007	0.00422007			
0.080 = QC STD 2	6/24/2005	16:15:30	0.0205528	0.08428898	0.08428898	µg	4	200	0.0205528	0.08428898	0.08428898			
0.080 = QC STD 3	6/24/2005	16:16:36	0.02050491	0.08409434	0.08409434	µg	4	200	0.02050491	0.08409434	0.08409434			
REAGENT BLANK	6/24/2005	16:17:40	-0.0000794	-0.0003293	-0.0003293	µg	4	200	-0.0000794	-0.0003293	-0.0003293			
5360-A-3	6/24/2005	16:19:13	0.00086599	0.00358683	0.17934151	µg	4	200	0.00086742	0.00359274	0.17963715	0.00086456	0.00358091	0.17904586
5360-A-7	6/24/2005	16:20:47	0.00044542	0.00184536	0.09226801	µg	4	200	0.00042108	0.00174454	0.08722712	0.00046976	0.00194617	0.09730889
5360-A-8	6/24/2005	16:22:22	0.00098071	0.00406171	0.20308588	µg	4	200	0.00099115	0.00410492	0.20524639	0.00097027	0.0040185	0.20092537
5360-A-9	6/24/2005	16:23:58	0.00026256	0.00108791	0.05439581	µg	4	200	0.00026113	0.00108195	0.05409773	0.000264	0.00109387	0.05469389
5360-A-10-SPK	6/24/2005	16:25:34	0.01496318	0.06152014	3.07600724	µg	4	200	0.01490879	0.0612981	3.064905	0.01501757	0.06174218	3.08710947
5360-A-11	6/24/2005	16:27:11	0.00016348	0.00067742	0.03387107	µg	4	200	0.00016502	0.00068381	0.0341907	0.00016194	0.00067102	0.03355145
5360-A-12	6/24/2005	16:28:48	0.00034918	0.00144671	0.0723359	µg	4	200	0.00034255	0.00141923	0.07096181	0.00035581	0.00147419	0.07370999
0.004 = DL	6/24/2005	16:34:52	0.00101833	0.00421744	0.00421744	µg		1	0.00101833	0.00421744	0.00421744			
0.080 = QC STD 2	6/24/2005	16:35:59	0.02053157	0.08420268	0.08420268	µg		1	0.02053157	0.08420268	0.08420268			
REAGENT BLANK	6/24/2005	16:37:03	0.00002276	0.00009435	0.00009435	µg		1	0.00002276	0.00009435	0.00009435			
Calib Blank	6/28/2005	7:49:00	0.00075715			µg			0.00075715					
STD1=.004ug	6/28/2005	7:50:03	0.00107132			µg			0.00107132					
STD2=.04ug	6/28/2005	7:51:07	0.0124289			µg			0.0124289					
STD3=.08ug	6/28/2005	7:52:12	0.024829			µg			0.024829					
STD4=.12ug	6/28/2005	7:53:18	0.03618067			µg			0.03618067					
STD5=.16ug	6/28/2005	7:54:25	0.04959669			µg			0.04959669					
STD6=.2ug	6/28/2005	7:55:33	0.06248917			µg			0.06246917					
Reagent Blank	6/28/2005	7:57:09	0.00003013	0.0001044	0.0001044	µg			0.00003465	0.00012004	0.00012004	0.00002562	0.00008876	0.00008876
0.004 = DL	6/28/2005	7:58:15	0.00109802	0.00379744	0.00379744	µg			0.00109802	0.00379744	0.00379744			
0.080 = QC STD 2	6/28/2005	7:59:22	0.02361655	0.07891502	0.07891502	µg			0.02361655	0.07891502	0.07891502			
0.080 = QC STD 3	6/28/2005	8:00:28	0.02511622	0.08373765	0.08373765	µg			0.02511622	0.08373765	0.08373765			
REAGENT BLANK	6/28/2005	8:01:33	0.00000265	0.00000918	0.00000918	µg			0.00000265	0.00000918	0.00000918			
5360-BH-5	6/28/2005	8:09:26	-0.0001241	-0.0004303	-0.0376553	µg	4	350	-0.0000672	-0.000233	-0.0203887	-0.0001811	-0.0006276	-0.0549219
5360-BH-6	6/28/2005	8:11:04	-0.0003317	-0.0011497	-0.0833572	µg	4	290	-0.0003346	-0.0011599	-0.0840942	-0.0003287	-0.0011395	-0.0826201
5360-BH-7	6/28/2005	8:12:42	0.06312002	0.19910798	42.808217	µg	4	860	0.06283547	0.19829066	42.6324931	0.06340458	0.1999253	42.9839409
0.004 = DL	6/28/2005	8:18:34	0.001165	0.00402867	0.00402867	µg	4	840	0.001165	0.00402867	0.00402867			
0.080 = QC STD 2	6/28/2005	8:19:41	0.02378209	0.07944842	0.07944842	µg	4	840	0.02378209	0.07944842	0.07944842			
REAGENT BLANK	6/28/2005	8:20:45	-0.0000104	-0.000036	-0.000036	µg	4	840	-0.0000104	-0.000036	-0.000036			
5360-BH-11	6/28/2005	8:22:18	0.00083313	0.00288252	0.23060223	µg	4	320	0.0008384	0.00290071	0.23205745	0.00082787	0.00286433	0.229147
5360-BH-12	6/28/2005	8:23:52	-0.0002597	-0.0009002	-0.0652713	µg	4	290	-0.0002668	-0.0009247	-0.0670477	-0.0002527	-0.0008757	-0.0634949
5360-B-1	6/28/2005	8:25:26	-0.0002732	-0.000947	-0.1657261	µg	4	700	-0.0002594	-0.0008992	-0.1573612	-0.000287	-0.0009948	-0.1740911
5360-B-2	6/28/2005	8:27:01	-0.000263	-0.0009117	-0.1595577	µg	4	700	-0.0002631	-0.000912	-0.159607	-0.0002629	-0.0009114	-0.1595084
5360-B-3	6/28/2005	8:28:36	-0.0002551	-0.0008841	-0.1547285	µg	4	700	-0.0002579	-0.0008938	-0.1564172	-0.0002523	-0.0008745	-0.1530399
5360-B-4-SPK	6/28/2005	8:30:11	0.01847396	0.0622112	10.8869605	µg	4	700	0.01835475	0.06182097	10.8186702	0.01859317	0.06260143	10.9552509
5360-B-5	6/28/2005	8:31:48	-0.0002792	-0.0009677	-0.1693642	µg	4	700	-0.0002653	-0.0009195	-0.1609206	-0.0002931	-0.001016	-0.1778079
5360-B-6 (14th)	6/28/2005	8:33:24	-0.0002832	-0.0009817	-0.0981763	µg	4	400	-0.0002864	-0.0009927	-0.0992799	-0.00028	-0.0009707	-0.0970726
5360-B-6 (15th)	6/28/2005	8:35:01	-0.0001741	-0.0006033	-0.0603343	µg	4	400	-0.0001838	-0.0006372	-0.0637215	-0.0001643	-0.0005694	-0.0569472
5360-B-7	6/28/2005	8:36:38	0.00001817	0.00006294	0.01101602	µg	4	700	0.00002498	0.00008655	0.01514655	0.00001135	0.00003934	0.00688549
0.004 = DL	6/28/2005	8:37:45	0.00117451	0.0040615	0.0040615	µg	4	700	0.00117451	0.0040615	0.0040615			
0.080 = QC STD 2	6/28/2005	8:38:52	0.02410693	0.08049436	0.08049436	µg	4	700	0.02410693	0.08049436	0.08049436			

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
REAGENT BLANK	6/28/2005	8:39:56	-0.0000658	-0.0002281	-0.0002281	µg	4	700	-0.0000658	-0.0002281	-0.0002281			
5360-B-8	6/28/2005	8:41:31	-0.0002163	-0.0007498	-0.1312278	µg	4	700	-0.0002175	-0.0007537	-0.1319143	-0.0002152	-0.0007459	-0.1305414
5360-B-11	6/28/2005	8:46:24	-0.0002812	-0.0009747	-0.1705853	µg	4	700	-0.0002858	-0.0009906	-0.1733554	-0.0002766	-0.0009589	-0.1678151
5360-B-12 (16th)	6/28/2005	8:47:56	-0.0002141	-0.0007422	-0.0742208	µg	4	400	-0.0002166	-0.0007508	-0.0750894	-0.0002116	-0.0007335	-0.0733522
5360-B-12 (17th)	6/28/2005	8:49:28	-0.0002263	-0.0007845	-0.0784552	µg	4	400	-0.0002312	-0.0008014	-0.0801413	-0.0002215	-0.0007676	-0.0767691
5360-C-1	6/28/2005	8:51:01	0.00303626	0.01046917	1.04691781	µg	4	400	0.00303206	0.01045476	1.0454766	0.00304046	0.01048359	1.04835903
5360-C-2	6/28/2005	8:52:34	0.0033622	0.01158716	1.15871688	µg	4	400	0.00334828	0.01153946	1.15394611	0.00337611	0.01163487	1.16348765
5360-C-3	6/28/2005	8:54:08	0.00236257	0.00815477	0.81547715	µg	4	400	0.00236067	0.00814823	0.81482386	0.00236447	0.0081613	0.81613045
5360-C-4-SPK	6/28/2005	8:55:43	0.02548284	0.08491332	8.49133277	µg	4	400	0.02545761	0.08483245	8.48324597	0.02550807	0.08499419	8.49941958
0.004 = DL	6/28/2005	8:56:49	0.00118503	0.00409781	0.00409781	µg	4	400	0.00118503	0.00409781	0.00409781			
0.080 = QC STD 2	6/28/2005	8:57:56	0.02389768	0.07982074	0.07982074	µg	4	400	0.02389768	0.07982074	0.07982074			
REAGENT BLANK	6/28/2005	8:59:00	0.00004599	0.00015933	0.00015933	µg	4	400	0.00004599	0.00015933	0.00015933			
5360-C-5	6/28/2005	9:00:34	-0.0001532	-0.0005311	-0.0531146	µg	4	400	-0.0001671	-0.0005793	-0.0579328	-0.0001393	-0.0004829	-0.0482963
5360-C-6	6/28/2005	9:02:09	-0.0001858	-0.0006441	-0.0644147	µg	4	400	-0.0002006	-0.0006953	-0.0695374	-0.0001711	-0.0005929	-0.059292
5360-C-7	6/28/2005	9:03:45	0.00200432	0.00692208	0.69220804	µg	4	400	0.00199967	0.00690605	0.69060513	0.00200898	0.0069381	0.69381095
5360-C-8	6/28/2005	9:05:20	0.00184482	0.00637278	0.63727891	µg	4	400	0.00183338	0.00633339	0.63333945	0.00185625	0.00641218	0.64121838
5360-C-9	6/28/2005	9:06:57	0.00098988	0.003424	0.34240043	µg	4	400	0.00098318	0.00340088	0.34008819	0.00099657	0.00344712	0.34471267
5360-C-10-SPK	6/28/2005	9:08:35	0.02288012	0.07653882	7.65388294	µg	4	400	0.02282235	0.07635222	7.63522282	0.02293789	0.07672543	7.67254307
5360-C-11	6/28/2005	9:10:13	-0.000176	-0.0006099	-0.0609948	µg	4	400	-0.0001755	-0.0006082	-0.0608244	-0.0001765	-0.0006116	-0.0611652
5360-C-12	6/28/2005	9:11:51	-0.0002513	-0.0008709	-0.0870941	µg	4	400	-0.000244	-0.0008457	-0.0845726	-0.0002585	-0.0008961	-0.0896156
0.004 = DL	6/28/2005	9:16:08	0.00118002	0.0040805	0.0040805	µg	4	500	0.00118002	0.0040805	0.0040805			
0.080 = QC STD 2	6/28/2005	9:17:15	0.02373498	0.07929664	0.07929664	µg	4	500	0.02373498	0.07929664	0.07929684			
REAGENT BLANK	6/28/2005	9:18:18	0.00004435	0.00015364	0.00015364	µg	4	500	0.00004435	0.00015364	0.00015364			
0.004 = DL	6/28/2005	9:54:04	0.00119477	0.00413142	0.00413142	µg		40	0.00119477	0.00413142	0.00413142			
0.080 = QC STD 3	6/28/2005	9:55:12	0.02526666	0.08422025	0.08422025	µg		40	0.02526666	0.08422025	0.08422025			
REAGENT BLANK	6/28/2005	9:56:16	0.00005679	0.00019674	0.00019674	µg		40	0.00005679	0.00019674	0.00019674			
Calib Blank	6/28/2005	13:35:06	0.00080773			µg		840	0.00080773					
STD1=.004ug	6/28/2005	13:36:09	0.00111364			µg		840	0.00111364					
STD2=.04ug	6/28/2005	13:37:13	0.01219216			µg		840	0.01219216					
STD3=.08ug	6/28/2005	13:38:19	0.02490193			µg		840	0.02490193					
STD4=.12ug	6/28/2005	13:39:25	0.03693647			µg		840	0.03693647					
STD5=.16ug	6/28/2005	13:40:32	0.04984976			µg		840	0.04984976					
STD6=.2ug	6/28/2005	13:41:40	0.06165088			µg		840	0.06165088					
Reagent Blank	6/28/2005	13:48:19	0.0000678	0.00023177	0.00023177	µg		840	0.0000725	0.00024783	0.00024783	0.0000631	0.00021571	0.00021571
0.004 = DL	6/28/2005	13:49:24	0.00117329	0.0040049	0.0040049	µg		840	0.00117329	0.0040049	0.0040049			
0.080 = QC STD 2	6/28/2005	13:50:30	0.02372488	0.07876283	0.07876283	µg		840	0.02372488	0.07876283	0.07876283			
0.080 = QC STD 3	6/28/2005	13:51:36	0.02553704	0.08459263	0.08459263	µg		840	0.02553704	0.08459263	0.08459263			
REAGENT BLANK	6/28/2005	13:52:41	0.00001349	0.00004612	0.00004612	µg		840	0.00001349	0.00004612	0.00004612			
5360-BH-1	6/28/2005	14:00:45	0.03727297	0.1217362	52.3465677	µg	2	860	0.03731163	0.12185684	52.3984444	0.03723431	0.12161556	52.2946911
5360-BH-2	6/28/2005	14:02:17	0.03500803	0.11464915	48.7258897	µg	2	850	0.03493439	0.1144181	48.6276931	0.03508167	0.1148802	48.8240884
5360-BH-3	6/28/2005	14:03:49	0.02544572	0.0842994	70.8115025	µg	1	840	0.02533303	0.08393761	70.5075947	0.0255584	0.0846612	71.1154103
5360-BH-4-SPK	6/28/2005	14:05:21	0.0497372	0.16006028	134.450626	µg	1	840	0.04962695	0.15972624	134.170047	0.04984746	0.16039429	134.731205
5360-BH-8	6/28/2005	14:06:54	0.03222239	0.10587991	85.7627302	µg	1	810	0.03217665	0.10573546	85.6457238	0.03226812	0.10602436	85.8797367
5380-BH-9	6/28/2005	14:08:27	0.03257743	0.10700071	44.9402993	µg	2	840	0.03236705	0.10633676	44.6614426	0.03278782	0.10766465	45.219156
0.004 = DL	6/28/2005	14:09:33	0.00122033	0.00416523	0.00416523	µg	2	840	0.00122033	0.00416523	0.00416523			
0.080 = QC STD 2	6/28/2005	14:10:40	0.02360082	0.07836277	0.07836277	µg	2	840	0.02360082	0.07836277	0.07836277			
REAGENT BLANK	6/28/2005	14:11:44	0.00002385	0.00008154	0.00008154	µg	2	840	0.00002385	0.00008154	0.00008154			
5360-BH-10-SPK	6/28/2005	14:13:17	0.05603732	0.17900627	75.1826338	µg	2	840	0.05581736	0.17834967	74.9068643	0.05625727	0.17966286	75.4584034
5360-B-9	6/28/2005	14:14:51	-0.0000177	-0.0000606	-0.0106058	µg	4	700	0.00003347	0.00011441	0.02002329	-0.0000689	-0.0002356	-0.0412349
5360-B-10-SPK	6/28/2005	14:16:26	0.02409333	0.07995015	13.9912778	µg	4	700	0.02395128	0.07949256	13.9111985	0.02423539	0.08040775	14.0713572
0.004 = DL	6/28/2005	14:17:32	0.00116492	0.00397637	0.00397637	µg	4	700	0.00116492	0.00397637	0.00397637			
0.080 = QC STD 3	6/28/2005	14:18:39	0.02570948	0.08514604	0.08514604	µg	4	700	0.02570948	0.08514604	0.08514604			
REAGENT BLANK	6/28/2005	14:19:44	0.00011483	0.00039249	0.00039249	µg	4	700	0.00011483	0.00039249	0.00039249			
Calib Blank	6/29/2005	12:23:42	0.00070335			µg			0.00070335					
STD1=.004ug	6/29/2005	12:24:45	0.00094476			µg			0.00094476					
STD2=.04ug	6/29/2005	12:25:49	0.01028618			µg			0.01028618					
STD3=.08ug	6/29/2005	12:26:55	0.02081195			µg			0.02081195					
STD4=.12ug	6/29/2005	12:28:01	0.03068466			µg			0.03068466					
STD5=.16ug	6/29/2005	12:29:08	0.04170342			µg			0.04170342					
STD6=.2ug	6/29/2005	12:30:15	0.05187034			µg			0.05187034					
Reagent Blank	6/29/2005	12:31:51	0.00005835	0.00023649	0.00023649	µg			0.00018483	0.00074919	0.00074919	-0.0000681	-0.0002762	-0.0002762
0.004 = DL	6/29/2005	12:32:56	0.00097655	0.00395418	0.00395418	µg			0.00097655	0.00395418	0.00395418			
0.080 = QC STD 2	6/29/2005	12:34:03	0.0197404	0.07802668	0.07802668	µg			0.0197404	0.07802668	0.07802668			
0.080 = QC STD 3	6/29/2005	12:35:09	0.02070454	0.08173751	0.08173751	µg			0.02070454	0.08173751	0.08173751			
REAGENT BLANK	6/29/2005	12:36:14	0.00003934	0.00015951	0.00015951	µg			0.00003934	0.00015951	0.00015951			
5360/5374-FH-BLK	6/29/2005	12:37:47	0.00029619	0.00120037	0.03000945	µg	4	100	0.00023141	0.00093794	0.02344864	0.00036097	0.00146281	0.03657026
5360/5374-FH-BLK-S	6/29/2005	12:39:20	0.01689024	0.0670035	4.18771883	µg	1.6	100	0.0169222	0.06712756	4.19547284	0.01685828	0.06687943	4.17996481
5360-FH-1	6/29/2005	12:48:59	0.00026784	0.00108553	0.02713839	µg	4	100	0.00026159	0.00106019	0.02650498	0.00027409	0.00111087	0.0277718
5360-FH-2	6/29/2005	12:50:36	0.000518	0.00209872	0.05246813	µg	4	100	0.00053256	0.00215766	0.05394156	0.00050345	0.00203978	0.05099469
5360-FH-3	6/29/2005	12:52:08	0.00025877	0.00104877	0.02621929	µg	4	100	0.00030303	0.00122811	0.03070276	0.0002145	0.00086943	0.02173583
0.004 = DL	6/29/2005	12:53:13	0.00099407	0.00402503	0.00402503	µg	4	100	0.00099407	0.00402503	0.00402503			
0.080 = QC STD 2	6/29/2005	12:54:20	0.01980681	0.07828254	0.07828254	µg	4	100	0.01980681	0.07828254	0.07828254			
REAGENT BLANK	6/29/2005	12:55:24	-0.0001519	-0.0006159	-0.0006159	µg	4	100	-0.0001519	-0.0006159	-0.0006159			
5360-FH-4-SPK	6/29/2005	12:56:57	0.02358162	0.09275719	2.31892981	µg	4	100	0.0235584	0.09266861	2.3167153	0.02360483	0.09284577	2.32114432

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
5360-FH-5	6/29/2005	12:58:30	0.00014937	0.00060546	0.01513667	µg	4	100	0.000218	0.0008836	0.02209002	0.00008074	0.00032733	0.00818332
5360-FH-6	6/29/2005	13:00:05	0.00014087	0.00057104	0.01427622	µg	4	100	0.00012695	0.00051461	0.01286539	0.0001548	0.00062748	0.01568705
5360-FH-7	6/29/2005	13:01:39	0.00020958	0.00084945	0.02123632	µg	4	100	0.0002517	0.00102012	0.02550321	0.00016745	0.00067877	0.01696943
5360-FH-8	6/29/2005	13:03:14	0.00020273	0.00082169	0.02054248	µg	4	100	0.00024566	0.00099568	0.02489209	0.00015979	0.00064771	0.01619287
5360-FH-9	6/29/2005	13:04:50	0.00006178	0.00025047	0.00626192	µg	4	100	0.00004631	0.00018775	0.00469383	0.00007726	0.0003132	0.00783001
5360-FH-10-SPK	6/29/2005	13:06:26	0.02379096	0.09355586	2.33889663	µg	4	100	0.02372905	0.09331973	2.33299328	0.02385287	0.09379199	2.34479998
5360-FH-11	6/29/2005	13:08:02	0.00007497	0.00030391	0.00759781	µg	4	100	0.00000938	0.00003806	0.00095167	0.00014055	0.00056975	0.01424395
5360-FH-12	6/29/2005	13:09:39	0.00021995	0.00089151	0.02228793	µg	4	100	0.00021596	0.00087532	0.02188308	0.00022395	0.00090771	0.02269278
0.004 = DL	6/29/2005	13:12:24	0.00103064	0.00417289	0.00417289	µg	4	100	0.00103064	0.00417289	0.00417289			
0.080 = QC STD 2	6/29/2005	13:13:31	0.02007822	0.07932791	0.07932791	µg	4	100	0.02007822	0.07932791	0.07932791			
REAGENT BLANK	6/29/2005	13:14:34	-0.0000449	-0.0001822	-0.0001822	µg	4	100	-0.0000449	-0.0001622	-0.0001822			
0.004 = DL	6/29/2005	13:58:13	0.0010123	0.00409874	0.00409874	µg	4	400	0.0010123	0.00409874	0.00409874			
0.080 = QC STD 3	6/29/2005	13:59:19	0.02120444	0.08365796	0.08365796	µg	4	400	0.02120444	0.08365796	0.08365796			
REAGENT BLANK	6/29/2005	14:00:23	0.00003599	0.00014592	0.00014592	µg	4	400	0.00003599	0.00014592	0.00014592			

OPERATING DATA

G

This Page Intentionally Left Blank

RUN 2, UNIT 2
6-16-05

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 16-06-05
Start Time: 11:17
End Time: 13:32

	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	489.16	309.97	33.56	27.76	5.80	26.70	292.29	5.77	-10.53
Unit 2	502.50	309.88	39.07	32.58	6.49	22.94	296.98	6.08	-9.54
Unit 3	483.50	309.67	35.57	29.76	5.80	31.41	299.79	5.22	-5.90

	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	191.21	878.13	830.24	82.83	-0.30	268.79	1068.99	7.11	184.04
Unit 2	192.16	885.77	835.67	75.83	-0.29	269.25	1172.78	6.47	183.84
Unit 3	156.59	879.31	815.33	70.05	-0.29	276.98	1070.98	5.16	148.17

G - 4

Run 1, Unit 2
6-16-05

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 16-06-05
Start Time: 09:00
End Time: 11:15

	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	489.71	309.98	34.15	27.41	6.74	26.24	291.85	6.01	-11.14
Unit 2	505.71	310.05	41.24	33.56	7.69	21.69	297.14	6.09	-9.69
Unit 3	507.29	309.97	45.82	36.72	9.10	19.63	301.49	6.27	-6.60

	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	191.21	881.40	828.87	83.61	-0.29	273.07	1068.71	5.85	184.49
Unit 2	191.67	889.68	834.12	75.45	-0.29	273.46	1162.29	6.22	183.88
Unit 3	192.87	889.79	828.95	84.07	-0.29	280.91	1152.70	9.90	184.35

G - 3

Run 3, Unit 2

6-16-05

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 16-06-05
Start Time: 13:35
End Time: 15:50

	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	487.19	309.99	32.16	26.57	5.59	27.90	292.02	5.63	-10.06
Unit 2	500.30	310.04	38.07	32.00	6.07	23.51	296.74	5.97	-9.09
Unit 3	500.88	310.32	43.06	37.64	5.41	21.04	301.65	6.16	-6.73

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.36	881.51	830.28	82.22	-0.09	271.39	1079.83	4.26	183.59
Unit 2	191.95	888.16	834.68	75.87	-0.10	271.87	1180.37	5.19	183.85
Unit 3	188.91	887.18	826.65	77.74	-0.10	279.34	1169.37	6.43	180.62

CONTROL ROOM STACK TEST LOG

Date: 6/16/05

Unit	Test	Run #	Start Time	End Time	Slurry S.G.
2	Mercury	1	0900	1115	
2	"	2	1117	1332	
2	"	3	1335	1550	