Report on Mercury Testing

Wheelabrator North Broward
Unit 1 FF Outlet
Pompano Beach, Florida

Client Reference No: 14200357
CleanAir Project No: 9281-3
Revision 0: July 1, 2003

Wheelabrator North Broward Inc.
A Waste Management Company

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July 7, 2003

CERTIFIED MAIL
#70022030000323872720

Mr. John Moulton
Florida Department of Environmental Protection
400 North Congress Ave., Suite 200
West Palm Beach, FL 33401

Re: Wheelabrator North Broward 0112120-NA-AC
F.A.C. 62-296.416 Quarterly Mercury Stack Testing PSD-FL-112
Second Quarter of 2003, Report Submittal

Dear Ms. Meeker:

As required by F.A.C. 62-296.416, please find enclosed the 2003 second quarter report on mercury stack testing which was conducted on Unit #1.

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

Sincerely,

Paul Grego
Plant Manager

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section CERTIFIED MAIL#70022030000323872690
FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, CERTIFIED MAIL#70022030000323872706
Broward County Department of Planning and Environmental Protection, Air Quality Division CERTIFIED MAIL#70022030000323872713
Chuck Faller (with)
Matt Killeen (without)
Tim Porter (without)
Ray Schauer – MPI - (with)
Jeff Turpin – BCOIWM (without)
File: 3.7.2 (without)
5.1.3.2 (without)

s:/admin/receptionist/070703

WM WASTE MANAGEMENT

Wheelabrator North Broward
Certification by Responsible Official

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.

Signature: Paul Grego Date: 7/7/03

Paul Grego

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Palatine, IL 60067-4975
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REPORT ON MERCURY TESTING

Performed for:
WHEELABRATOR NORTH BROWARD
UNIT 1 FF OUTLET
POMPANO BEACH, FLORIDA

Client Reference No: 14200357
CleanAir Project No: 9281-3
Revision 0: July 1, 2003

To the best of our knowledge, the data presented in this report are accurate, complete and 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 1 Fabric Filter (FF) Outlet on June 5, 2002.

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 (2003) Start Time	Stop Time	Unit	Location	Pollutant	Method	Run No.
June 5						
07:41	09:46	1	FF Outlet	Mercury	EPA 29	1
09:46	11:51	1	FF Outlet	Mercury	EPA 29	2
11:51	13:56	1	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 1 FF Outlet			
Mercruy (µg/dscm @ 7% O_2)	EPA M29	1.9	70

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

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

RESULTS

Table 2-1:
Unit 1 FF Outlet - Mercury

Run No.		1	2	3	Average
Date (2003)		Jun 5	Jun 5	Jun 5	
Start Time (approx.)		07:41	09:46	11:51	
Stop Time (approx.)		09:46	11:51	13:56	
Process Conditions					
R_P	Steam Production Rate - (units/hour)	184.3	183.7	184.2	**184.1**
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 %)	9.3	9.8	9.1	**9.4**
CO_2	Carbon dioxide (dry volume %)	10.1	10.0	10.4	**10.2**
T_s	Sample temperature (°F)	308	306	309	**308**
B_w	Actual water vapor in gas (% by volume)	24.1	24.3	24.3	**24.2**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,116	185,695	181,469	**181,094**
Q_s	Volumetric flow rate, standard (scfm)	117,757	124,375	121,090	**121,074**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	89,357	94,169	91,630	**91,719**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.615	78.038	73.965	**75.539**
%I	Isokinetic sampling (%)	104.5	101.4	101.0	**102.3**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B Prorated (µg)	0.1358	0.2538	0.1539	**0.1812**
$m_{n\text{-}2b}$	Fraction 2B Prorated (µg)	2.6270	2.5806	2.3890	**2.5322**
$m_{n\text{-}3a}$	Fraction 3A Prorated (µg)	<0.2000	<0.2000	<0.2000	**<0.2000**
$m_{n\text{-}3b}$	Fraction 3B Prorated (µg)	<0.6000	<0.7000	<0.6000	**<0.6333**
$m_{n\text{-}3c}$	Fraction 3C Prorated (µg)	0.5137	0.6561	0.9079	**0.6925**
m_n	Total matter corrected for allowable blanks (µg)	3.2765	3.4905	3.4508	**3.4059**
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	9.7E-11	9.9E-11	1.0E-10	**9.9E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.2E-10	1.2E-10	1.2E-10	**1.2E-10**
C_{sd}	Concentration (µg/dscm)	1.6	1.6	1.6	**1.6**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	1.9	2.0	1.9	**1.9**
C_{sd}	Concentration (mg/dscm)	0.0016	0.0016	0.0016	**0.0016**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.0019	0.0020	0.0019	**0.0019**
$E_{lb/hr}$	Rate (lb/hr)	5.2E-04	5.6E-04	5.7E-04	**5.5E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.7E-06	1.8E-06	1.7E-06	**1.7E-06**

RESULTS

Table 2-2:
Quality Assurance and Quality Control

Mercury RPD RESULTS

Run Number	Front half	H2O2/HNO3	Empty Impinger	KMnO4	HCl
Max =	7.4%	3.5%	0.0%	0.0%	4.8%
U1 FF Out R1	0.3%	1.7%	NA	NA	2.5%
U1 FF Out R2	2.5%	2.5%	NA	NA	4.8%
U1 FF Out R3	7.4%	3.5%	NA	NA	2.2%
Field Blank	NA	NA	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA

Mercury Sample Spike and Recovery

Run Number		Front half	H2O2/HNO3	Empty Impinger	KMnO4	HCl
U1 FF Out R3	# 1	109%	101%	81%	90%	97%
	# 2	109%	98%	80%	89%	92%

Run Number		Average Total Catch ug	Front half	H_2O_2/HNO_3	Empty Impinger	$KMnO_4$	HCl
Field Blank	# 1	< 0.6	< 0.1	< 0.3	< 0.2	< 0.6	< 0.4
	# 2		< 0.1	< 0.3	< 0.2	< 0.6	< 0.4
Reagent Blank	# 1	< 0.4	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
	# 2		< 0.1	< 0.3	< 0.2	< 0.4	< 0.4

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 1 FF Outlet as shown in Figure 3-1.

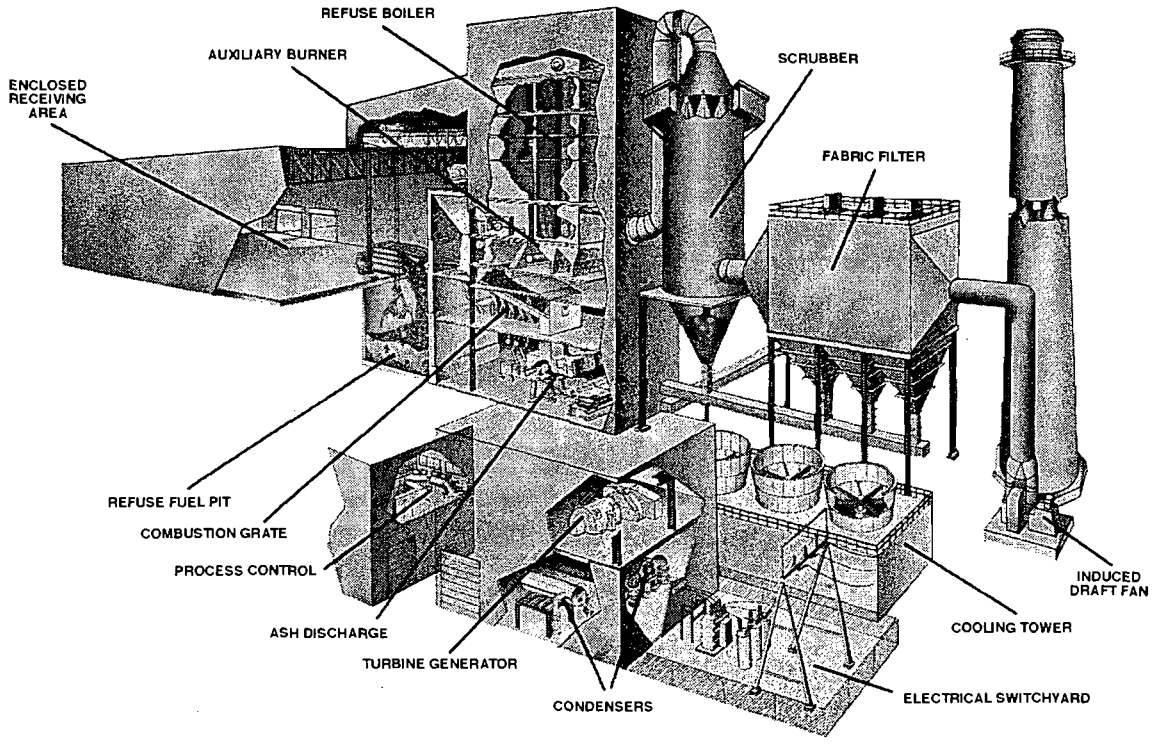


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

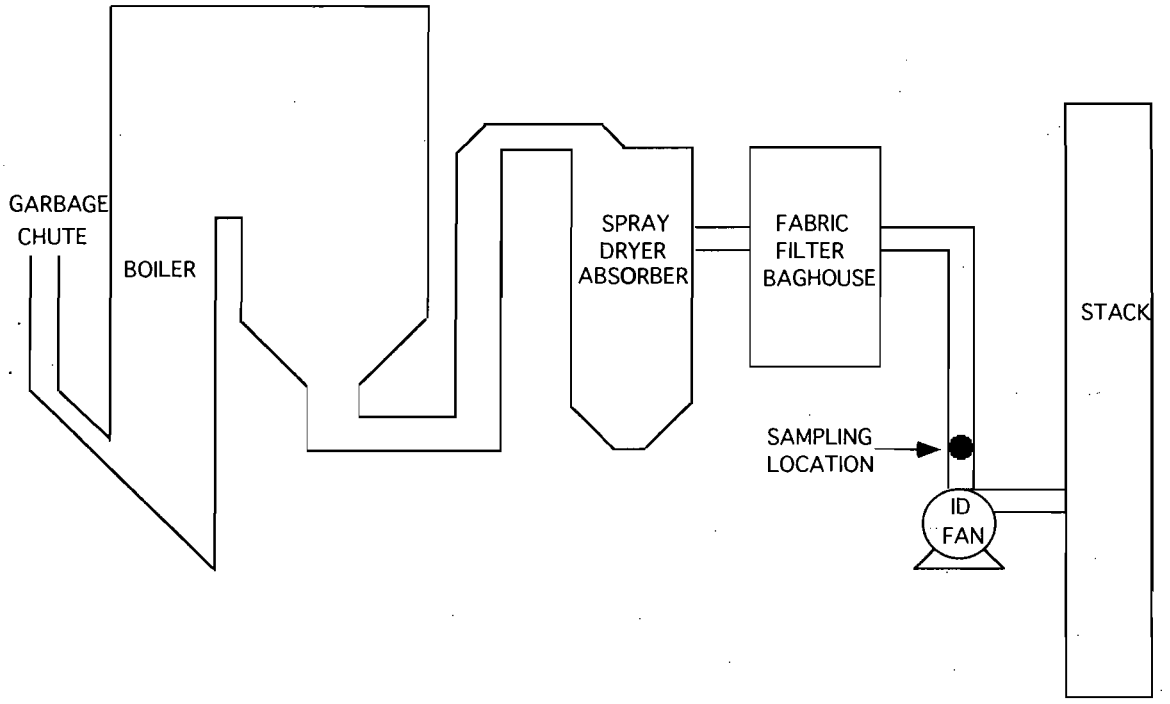


Figure 3-2: Process Schematic

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.

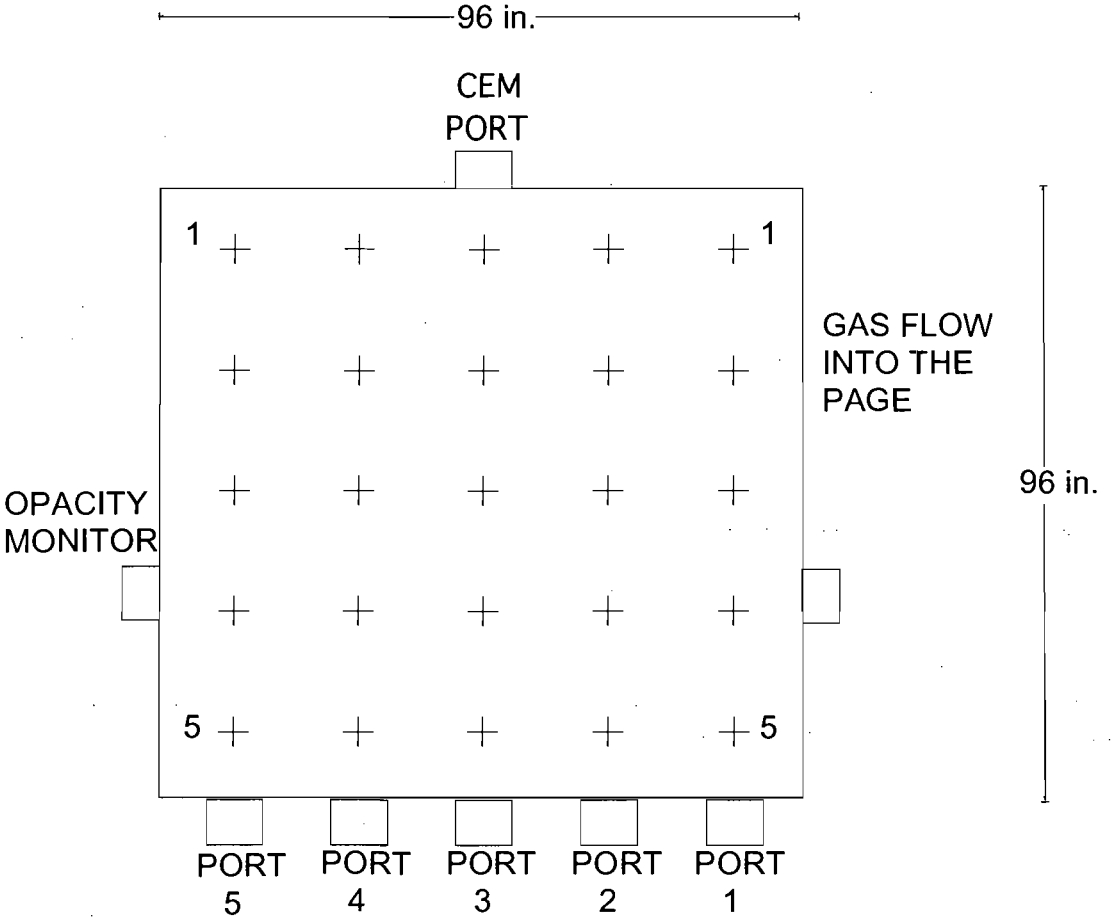
Table 4-2 outlines the sampling point configurations. Figure 4-1 illustrates the sampling points and orientation of sampling ports for the source tested in the program.

Table 4-2:
Sampling Points

Location Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
Unit 1 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 1 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 1 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)

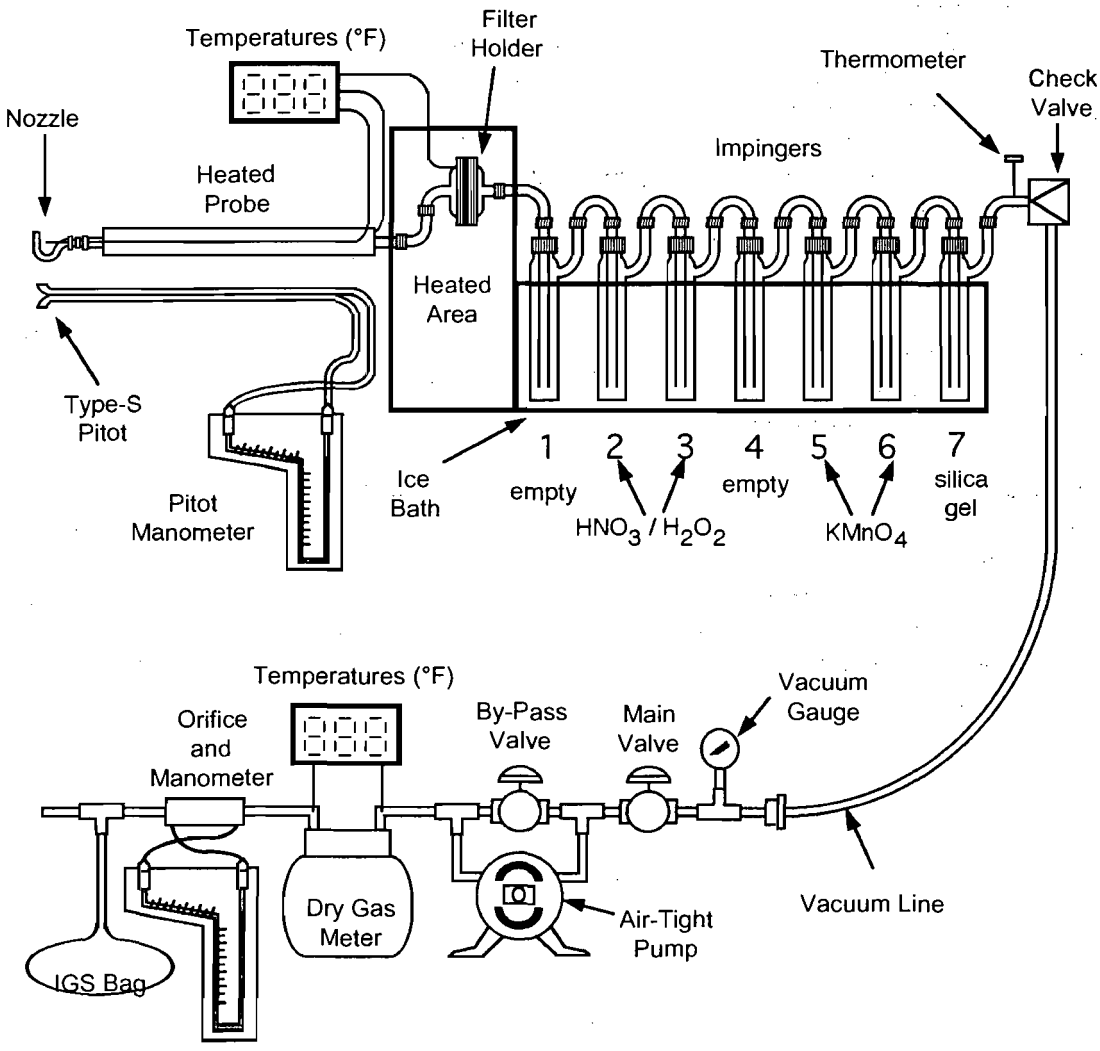
Any liquid collected in the fourth impinger was transferred to a separate polyethylene container, and the impinger was rinsed into the same container with 0.1 Normal nitric acid. The contents of impingers 5 and 6 were collected into an amber glass container. Both impingers 5 and 6 and the connecting 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: 14200357
CleanAir Project No: 9281-3

APPENDIX

SAMPLE CALCULATIONS

A

Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

EPA Method 1-4 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 throughtout. The final table is formatted to an appropriate number of significant figures.

062503 100637

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)	=	503.8	ml
0.04707	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04707	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	23.71	ft^3

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

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

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.90	in. Hg
T_m	= average dry gas meter temperature (°F)	=	86.32	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)		77.90	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9891	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.24	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)	=	74.615	dscf

3. Sample gas pressure (in. Hg)

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

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.90	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-11.00	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)	=	29.09	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)	=	307.80	°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	= temerature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	29.09	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)	=	29.09	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.09	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)	=	74.615	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	23.71	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2412	
		=	24.12	%

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)	=	29.09	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.09	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at		1.0000	
	saturated conditions	=	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	=	0.2412	
B_w	= actual water vapor in gas	=	0.2412	
		=	24.12	%

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 (%)	=	10.1	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.3	%
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 (%)	=	10.1	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.3	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.6	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.98	%

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	=	0.2412	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.98	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)	=	27.09	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.84	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.09	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.09	in. Hg
T_s	= average sample gas temperature (°F)	=	307.80	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.647	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	45.86	ft/sec

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

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

Where:

A_s	= cross sectional area of sampling location (ft²)	=	64.00	ft²
V_s	= sample gas velocity (ft/sec)	=	45.86	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	176,116	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)	=	176,116	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.09	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	307.8	°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)	=	117,757	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	=	0.2412	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	117,757	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,357	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)	=	89,357	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.3	%
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)	=	74,357	dscfm

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft³/min)	=	89,357	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,361,439	dscf/hr

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

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

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft³/min)	=	89,357	dscfm
35.31	= conversion factor (ft^3/m^3)	=	35.31	ft^3/m^3
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m³/hr)	=	151,839	dry std m³/hr

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

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

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m³/hr)	=	151,839	dry std m³/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm³/hr)	=	141,486	dry Nm³/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.274	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2412	
P_s	= absolute sample gas pressure (in. Hg)	=	29.09	in. Hg
T_s	= average sample gas temperature (°F)	=	307.8	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	74.615	dscf
V_s	= sample gas velocity (ft/sec)	=	45.86	ft/sec
θ	= total sampling time (min)	=	125	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
I	= percent of isokinetic sampling (%)	=	104.47	%

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)	=	77.90	dcf
T_m	= average dry gas meter temperature (°F)	=	86.32	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.8341	
P_{bar}	= barometric pressure (in. Hg)	=	29.90	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.242	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.98	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.107	√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	=	0.9828	

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LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

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

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

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

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

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

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

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

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

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

Definitions and Notes

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

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SS Matals-1 Version 10-2002

EPA Method 29 Sample Calculations - Mercury Analytical Result

Sample data taken from Run 1

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

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

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1. Total blank amount (µg)

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

Where:

m_{1b-B}	= mercury amount in blank for Fraction 1b	=	<0.1000	µg
m_{2b-B}	= mercury amount in blank for Fraction 2b	=	<0.3000	µg
m_{3a-B}	= mercury amount in blank for Fraction 3a	=	<0.2000	µg
m_{3b-B}	= mercury amount in blank for Fraction 3b	=	<0.4000	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	=	0.1358	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	2.6270	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.6000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	0.5137	µg
$m_{total-S}$	= total amount of mercury in sample	=	3.2765	µg

3. Allowable blank correction (µg)

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

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

Where:

$m_{total-B}$	= total amount of mercury in blank	=	<1.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	3.2765	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	0.1638	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	=	3.2765	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	3.2765	µg

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

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

Where:

m_n	= total mercury in sample corrected for allowable blank	=	3.2765	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	0.1358	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	2.6270	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.6000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	0.5137	µg
$m_{total-S}$	= total amount of mercury in sample	=	3.2765	µg
m_{n-1b}	= mercury corrected for blank - prorated for Fraction 1b	=	0.1358	µg
m_{n-2b}	= mercury corrected for blank - prorated for Fraction 2b	=	2.6270	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	=	<0.6000	µg
m_{n-3c}	= mercury corrected for blank - prorated for Fraction 3c	=	0.5137	µg

EPA Method 29 Sample Calculations - Mercury Emissions Results

Sample data taken from Run 1

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

062503 100637

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)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= Mercury concentration (lb/dscf)	=	9.6826E-11	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)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= Mercury concentration (µg/dscm)	=	1.5505E+00	µg/dscm

3. Mercury concentration (mg/dscm)

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

Where:

m_n	= Mercury collected in sample (total µg)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	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)	=	1.5505E-03	mg/dscm

4. Mercury concentration (µg/Nm3 dry)

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

Where:

m_n	= Mercury collected in sample (total µg)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	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)	=	1.6640E+00	µg/Nm³ dry

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	9.6826E-11	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.3	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= Mercury concentration corrected to x% oxygen (lb/dscf)	=	1.1636E-10	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	9.6826E-11	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.1	%
C_{sdy}	= Mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	1.1542E-10	lb/dscf @ y%CO_2

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

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

Where:

C_{sd}	= Mercury concentration (lb/dscf)	=	9.6826E-11	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,357	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	176,116	acfm
C_a	= Mercury concentration at actual gas conditions (lb/acf)	=	4.9127E-11	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)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	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)	=	89,357	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= Mercury emission rate (lb/hr)	=	5.1913E-04	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)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,357	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)	=	6.5398E-05	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)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	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)	=	89,357	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)	=	2.2738E-03	Ton/yr

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

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

Where:

m_n	= Mercury collected in sample (total µg)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	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 (%)	=	9.3	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= Mercury emission rate - Fd-based (lb/MMBtu)	=	1.6743E-06	lb/MMBtu

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

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

Where:

m_n	= Mercury collected in sample (total µg)	=	3.2765	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.6147	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 (%)	=	10.1	%
100	= conversion factor	=	100	
E_{Fc}	= Mercury emission rate - Fc-based (lb/MMBtu)	=	1.7506E-06	lb/MMBtu

PARAMETERS	B

Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

USEPA Method 29
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2003)		Jun 5	Jun 5	Jun 5	
Start Time (approx.)		07:41	09:46	11:51	
Stop Time (approx.)		09:46	11:51	13:56	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9891	1.0051	0.9891	
C_p	Pitot tube coefficient	0.84	0.84	0.84	
P_g	Static pressure (in. H_2O)	-11.0000	-11.0000	-11.0000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.90	29.90	29.90	**29.9000**
D_n	Nozzle diameter (in.)	0.2740	0.2770	0.2740	
O_2	Oxygen (dry volume %)	9.3333	9.8000	9.1333	**9.4222**
CO_2	Carbon dioxide (dry volume %)	10.0667	10.0000	10.4000	**10.1556**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.6000	80.2000	80.4667	**80.4222**
V_{lc}	Total Liquid collected (ml)	503.80	531.80	505.20	
V_m	Volume metered, meter conditions (ft^3)	77.9000	81.1250	78.7750	
T_m	Dry gas meter temperature (°F)	86.3200	92.8800	97.3000	
T_s	Sample temperature (°F)	307.8000	306.4800	309.3600	**307.8800**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2416	1.3156	1.2336	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	23.7139	25.0318	23.7798	**24.1752**
V_{mstd}	Volume metered, standard (dscf)	74.6147	78.0379	73.9648	**75.5391**
P_s	Sample gas pressure, absolute (in. Hg)	29.0912	29.0912	29.0912	**29.0912**
P_v	Vapor pressure, actual (in. Hg)	29.0912	29.0912	29.0912	**29.0912**
B_{wo}	Moisture measured in sample (% by volume)	24.1170	24.2863	24.3285	**24.2439**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	24.1170	24.2863	24.3285	**24.2439**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.6471	0.6827	0.6662	**0.6653**
M_d	MW of sample gas, dry (lb/lb-mole)	29.9840	29.9920	30.0293	**30.0018**
M_s	MW of sample gas, wet (lb/lb-mole)	27.0938	27.0796	27.1028	**27.0921**
V_s	Velocity of sample (ft/sec)	45.8637	48.3582	47.2576	**47.1598**
%I	Isokinetic sampling (%)	104.4699	101.4462	100.9910	**102.3024**
Q_a	Volumetric flow rate, actual (acfm)	176,116	185,695	181,469	**181,094**
Q_s	Volumetric flow rate, standard (scfm)	117,757	124,375	121,090	**121,074**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	89,357	94,169	91,630	**91,719**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	74,357	75,200	77,567	**75,708**
Q_a	Volumetric flow rate, actual (acf/hr)	10,566,986	11,141,719	10,888,143	**10,865,616**
Q_s	Volumetric flow rate, standard (scf/hr)	7,065,398	7,462,511	7,265,372	**7,264,427**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,361,439	5,650,143	5,497,817	**5,503,133**
Q_a	Volumetric flow rate, actual (m^3/hr)	299,263	315,540	308,359	**307,721**
Q_s	Volumetric flow rate, standard (m^3/hr)	200,096	211,343	205,760	**205,733**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	151,839	160,015	155,701	**155,852**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	126,351	127,782	131,805	**128,646**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	186,453	196,933	191,731	**191,706**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	141,486	149,105	145,085	**145,226**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,736	119,070	122,818	**119,874**

Comments:

None

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Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2003)		Jun 5	Jun 5	Jun 5	
Start Time (approx.)		07:41	09:46	11:51	
Stop Time (approx.)		09:46	11:51	13:56	
Process Conditions					
R_P	Steam Production Rate - (units/hour)	184.3	183.7	184.2	
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	
Gas Conditions					
O_2	Oxygen (dry volume %)	9.3333	9.8000	9.1333	**9.4222**
CO_2	Carbon dioxide (dry volume %)	10.0667	10.0000	10.4000	**10.1556**
T_s	Sample temperature (°F)	307.8000	306.4800	309.3600	**307.8800**
B_w	Actual water vapor in gas (% by volume)	24.1170	24.2863	24.3285	**24.2439**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,116	185,695	181,469	**181,094**
Q_s	Volumetric flow rate, standard (scfm)	117,757	124,375	121,090	**121,074**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	89,357	94,169	91,630	**91,719**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	74,357	75,200	77,567	**75,708**
Q_a	Volumetric flow rate, actual (acf/hr)	10,566,986	11,141,719	10,888,143	**10,865,616**
Q_s	Volumetric flow rate, standard (scf/hr)	7,065,398	7,462,511	7,265,372	**7,264,427**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,361,439	5,650,143	5,497,817	**5,503,133**
Q_a	Volumetric flow rate, actual (m^3/hr)	299,263	315,540	308,359	**307,721**
Q_s	Volumetric flow rate, standard (m^3/hr)	200,096	211,343	205,760	**205,733**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	151,839	160,015	155,701	**155,852**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	126,351	127,782	131,805	**128,646**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	186,453	196,933	191,731	**191,706**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	141,486	149,105	145,085	**145,226**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,736	119,070	122,818	**119,874**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.6147	78.0379	73.9648	**75.5391**
%I	Isokinetic sampling (%)	104.4699	101.4462	100.9910	**102.3024**
Laboratory Data					
m_{n-1b}	Fraction 1B Prorated (µg)	0.1358	0.2538	0.1539	**0.1812**
m_{n-2b}	Fraction 2B Prorated (µg)	2.6270	2.5806	2.3890	**2.5322**
m_{n-3a}	Fraction 3A Prorated (µg)	<0.2000	<0.2000	<0.2000	**<0.2000**
m_{n-3b}	Fraction 3B Prorated (µg)	<0.6000	<0.7000	<0.6000	**<0.6333**
m_{n-3c}	Fraction 3C Prorated (µg)	0.5137	0.6561	0.9079	**0.6925**
m_n	Total matter corrected for allowable blanks (µg)	3.2765	3.4905	3.4508	**3.4059**
Mercury Results - Total					
C_{ad}	Concentration (lb/dscf)	9.6826E-11	9.8624E-11	1.0287E-10	**9.9442E-11**
C_{ad7}	Concentration @7% O_2 (lb/dscf)	1.1636E-10	1.2350E-10	1.2153E-10	**1.2046E-10**
C_{ad12}	Concentration @12% CO_2 (lb/dscf)	1.1542E-10	1.1835E-10	1.1870E-10	**1.1749E-10**
C_a	Concentration (lb/acf)	4.9127E-11	5.0014E-11	5.1945E-11	**5.0362E-11**
C_{ad}	Concentration (µg/dscm)	1.5505E+00	1.5793E+00	1.6474E+00	**1.5924E+00**
C_{ad7}	Concentration @7% O_2 (µg/dscm)	1.8633E+00	1.9777E+00	1.9461E+00	**1.9290E+00**
C_{ad12}	Concentration @12% CO_2 (µg/dscm)	1.8483E+00	1.8952E+00	1.9008E+00	**1.8815E+00**
C_{ed}	Concentration (mg/dscm)	1.5505E-03	1.5793E-03	1.6474E-03	**1.5924E-03**
C_{ad7}	Concentration @7% O_2 (mg/dscm)	1.8633E-03	1.9777E-03	1.9461E-03	**1.9290E-03**
C_{ad12}	Concentration @12% CO_2 (mg/dscm)	1.8483E-03	1.8952E-03	1.9008E-03	**1.8815E-03**
C_a	Concentration (µg/m^3 (actual,wet))	7.8671E-01	8.0091E-01	8.3183E-01	**8.0648E-01**
C_{ad}	Concentration (µg/Nm^3 dry)	1.6640E+00	1.6949E+00	1.7679E+00	**1.7089E+00**
C_{ad7}	Concentration @7% O_2 (µg/Nm^3 dry)	1.9997E+00	2.1224E+00	2.0885E+00	**2.0702E+00**
C_{ad12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.9836E+00	2.0339E+00	2.0399E+00	**2.0191E+00**
$E_{lb/hr}$	Rate (lb/hr)	5.1913E-04	5.5724E-04	5.6559E-04	**5.4732E-04**
$E_{g/s}$	Rate (g/s)	6.5398E-05	7.0199E-05	7.1251E-05	**6.8949E-05**
$E_{T/yr}$	Rate (Ton/yr)	2.2738E-03	2.4407E-03	2.4773E-03	**2.3973E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.6743E-06	1.7771E-06	1.7487E-06	**1.7334E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.7506E-06	1.7950E-06	1.8003E-06	**1.7819E-06**

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Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2003)		Jun 5	Jun 5	Jun 5	
Start Time (approx.)		07:41	09:46	11:51	
Stop Time (approx.)		09:46	11:51	13:56	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	4.0130E-12	7.1702E-12	4.5881E-12	**5.2571E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	4.8225E-12	8.9789E-12	5.4199E-12	**6.4071E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	4.7837E-12	8.6043E-12	5.2939E-12	**6.2273E-12**
C_a	Concentration (lb/acf)	2.0361E-12	3.6361E-12	2.3167E-12	**2.6630E-12**
C_{sd}	Concentration (µg/dscm)	6.4263E-02	1.1482E-01	7.3472E-02	**8.4185E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	7.7226E-02	1.4378E-01	8.6792E-02	**1.0260E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	7.6605E-02	1.3779E-01	8.4775E-02	**9.9722E-02**
C_{sd}	Concentration (mg/dscm)	6.4263E-05	1.1482E-04	7.3472E-05	**8.4185E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	7.7226E-05	1.4378E-04	8.6792E-05	**1.0260E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	7.6605E-05	1.3779E-04	8.4775E-05	**9.9722E-05**
C_a	Concentration (µg/m^3 (actual,wet))	3.2605E-02	5.8228E-02	3.7098E-02	**4.2644E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	6.8965E-02	1.2322E-01	7.8848E-02	**9.0345E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	8.2877E-02	1.5431E-01	9.3143E-02	**1.1011E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	8.2210E-02	1.4787E-01	9.0978E-02	**1.0702E-01**
$E_{lb/hr}$	Rate (lb/hr)	2.1516E-05	4.0513E-05	2.5224E-05	**2.9084E-05**
$E_{g/s}$	Rate (g/s)	2.7104E-06	5.1036E-06	3.1777E-06	**3.6639E-06**
$E_{T/yr}$	Rate (Ton/yr)	9.4238E-05	1.7745E-04	1.1048E-04	**1.2739E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	6.9394E-08	1.2920E-07	7.7989E-08	**9.2195E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	7.2553E-08	1.3050E-07	8.0291E-08	**9.4447E-08**

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Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2003)		Jun 5	Jun 5	Jun 5	
Start Time (approx.)		07:41	09:46	11:51	
Stop Time (approx.)		09:46	11:51	13:56	
Mercury Results - Impingers 1-3 Solution					
C_{ad}	Concentration (lb/dscf)	7.7634E-11	7.2917E-11	7.1221E-11	**7.3924E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	9.3295E-11	9.1310E-11	8.4133E-11	**8.9579E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	9.2543E-11	8.7500E-11	8.2178E-11	**8.7407E-11**
C_a	Concentration (lb/acf)	3.9389E-11	3.6977E-11	3.5962E-11	**3.7443E-11**
C_{sd}	Concentration (µg/dscm)	1.2432E+00	1.1677E+00	1.1405E+00	**1.1838E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	1.4940E+00	1.4622E+00	1.3473E+00	**1.4345E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	1.4820E+00	1.4012E+00	1.3160E+00	**1.3997E+00**
C_{ad}	Concentration (mg/dscm)	1.2432E-03	1.1677E-03	1.1405E-03	**1.1838E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	1.4940E-03	1.4622E-03	1.3473E-03	**1.4345E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.4820E-03	1.4012E-03	1.3160E-03	**1.3997E-03**
C_a	Concentration (µg/m³ (actual,wet))	6.3077E-01	5.9214E-01	5.7588E-01	**5.9960E-01**
C_{sd}	Concentration (µg/Nm³ dry)	1.3342E+00	1.2531E+00	1.2240E+00	**1.2704E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm³ dry)	1.6033E+00	1.5692E+00	1.4459E+00	**1.5395E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm³ dry)	1.5904E+00	1.5037E+00	1.4123E+00	**1.5021E+00**
$E_{lb/hr}$	Rate (lb/hr)	4.1623E-04	4.1199E-04	3.9156E-04	**4.0659E-04**
$E_{g/s}$	Rate (g/s)	5.2435E-05	5.1901E-05	4.9327E-05	**5.1221E-05**
$E_{T/yr}$	Rate (Ton/yr)	1.8231E-03	1.8045E-03	1.7150E-03	**1.7809E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.3425E-06	1.3139E-06	1.2106E-06	**1.2890E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.4036E-06	1.3271E-06	1.2464E-06	**1.3257E-06**

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Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2003)		Jun 5	Jun 5	Jun 5	
Start Time (approx.)		07:41	09:46	11:51	
Stop Time (approx.)		09:46	11:51	13:56	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.9104E-12	<5.6511E-12	<5.9623E-12	**<5.8413E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.1027E-12	<7.0766E-12	<7.0433E-12	**<7.0742E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.0455E-12	<6.7813E-12	<6.8796E-12	**<6.9021E-12**
C_a	Concentration (lb/acf)	<2.9988E-12	<2.8658E-12	<3.0106E-12	**<2.9584E-12**
C_{sd}	Concentration (µg/dscm)	<9.4646E-02	<9.0494E-02	<9.5478E-02	**<9.3540E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1374E-01	<1.1332E-01	<1.1279E-01	**<1.1328E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.1282E-01	<1.0859E-01	<1.1017E-01	**<1.1053E-01**
C_{sd}	Concentration (mg/dscm)	<9.4646E-05	<9.0494E-05	<9.5478E-05	**<9.3540E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1374E-04	<1.1332E-04	<1.1279E-04	**<1.1328E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.1282E-04	<1.0859E-04	<1.1017E-04	**<1.1053E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<4.8021E-02	<4.5891E-02	<4.8210E-02	**<4.7374E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.0157E-01	<9.7116E-02	<1.0246E-01	**<1.0038E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.2206E-01	<1.2161E-01	<1.2104E-01	**<1.2157E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.2108E-01	<1.1654E-01	<1.1823E-01	**<1.1862E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.1688E-05	<3.1930E-05	<3.2780E-05	**<3.2132E-05**
$E_{g/s}$	Rate (g/s)	<3.9919E-06	<4.0224E-06	<4.1295E-06	**<4.0479E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.3879E-04	<1.3985E-04	<1.4357E-04	**<1.4074E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0220E-07	<1.0183E-07	<1.0135E-07	**<1.0179E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.0686E-07	<1.0285E-07	<1.0434E-07	**<1.0468E-07**

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Date _____

Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

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

Run No.		1	2	3	Average
Date (2003)		Jun 5	Jun 5	Jun 5	
Start Time (approx.)		07:41	09:46	11:51	
Stop Time (approx.)		09:46	11:51	13:56	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.7731E-11	<1.9779E-11	<1.7887E-11	**<1.8466E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<2.1308E-11	<2.4768E-11	<2.1130E-11	**<2.2402E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<2.1136E-11	<2.3735E-11	<2.0639E-11	**<2.1837E-11**
C_s	Concentration (lb/acf)	<8.9963E-12	<1.0030E-11	<9.0317E-12	**<9.3527E-12**
C_{sd}	Concentration (µg/dscm)	<2.8394E-01	<3.1673E-01	<2.8643E-01	**<2.9570E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<3.4122E-01	<3.9663E-01	<3.3837E-01	**<3.5874E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<3.3847E-01	<3.8008E-01	<3.3050E-01	**<3.4968E-01**
C_{sd}	Concentration (mg/dscm)	<2.8394E-04	<3.1673E-04	<2.8643E-04	**<2.9570E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<3.4122E-04	<3.9663E-04	<3.3837E-04	**<3.5874E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<3.3847E-04	<3.8008E-04	<3.3050E-04	**<3.4968E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.4406E-01	<1.6062E-01	<1.4463E-01	**<1.4977E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<3.0471E-01	<3.3991E-01	<3.0739E-01	**<3.1734E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.6618E-01	<4.2565E-01	<3.6312E-01	**<3.8499E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.6324E-01	<4.0789E-01	<3.5468E-01	**<3.7527E-01**
$E_{lb/hr}$	Rate (lb/hr)	<9.5064E-05	<1.1175E-04	<9.8339E-05	**<1.0172E-04**
$E_{g/s}$	Rate (g/s)	<1.1976E-05	<1.4078E-05	<1.2388E-05	**<1.2814E-05**
$E_{T/yr}$	Rate (Ton/yr)	<4.1638E-04	<4.8948E-04	<4.3072E-04	**<4.4553E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<3.0661E-07	<3.5640E-07	<3.0405E-07	**<3.2235E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<3.2057E-07	<3.5998E-07	<3.1302E-07	**<3.3119E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	1.5180E-11	1.8537E-11	2.7066E-11	**2.0261E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.8242E-11	2.3213E-11	3.1973E-11	**2.4476E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.8095E-11	2.2245E-11	3.1230E-11	**2.3857E-11**
C_s	Concentration (lb/acf)	7.7019E-12	9.4005E-12	1.3667E-11	**1.0256E-11**
C_{sd}	Concentration (µg/dscm)	2.4308E-01	2.9685E-01	4.3343E-01	**3.2445E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.9212E-01	3.7173E-01	5.1201E-01	**3.9195E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.8977E-01	3.5622E-01	5.0011E-01	**3.8203E-01**
C_{sd}	Concentration (mg/dscm)	2.4308E-04	2.9685E-04	4.3343E-04	**3.2445E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.9212E-04	3.7173E-04	5.1201E-04	**3.9195E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.8977E-04	3.5622E-04	5.0011E-04	**3.8203E-04**
C_a	Concentration (µg/m^3 (actual,wet))	1.2333E-01	1.5054E-01	2.1885E-01	**1.6424E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	2.6087E-01	3.1857E-01	4.6514E-01	**3.4819E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	3.1349E-01	3.9893E-01	5.4947E-01	**4.2063E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	3.1097E-01	3.8228E-01	5.3670E-01	**4.0998E-01**
$E_{lb/hr}$	Rate (lb/hr)	8.1386E-05	1.0474E-04	1.4880E-04	**1.1164E-04**
$E_{g/s}$	Rate (g/s)	1.0253E-05	1.3195E-05	1.8746E-05	**1.4064E-05**
$E_{T/yr}$	Rate (Ton/yr)	3.5647E-04	4.5875E-04	6.5176E-04	**4.8899E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.6249E-07	3.3403E-07	4.6008E-07	**3.5220E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.7444E-07	3.3738E-07	4.7366E-07	**3.6183E-07**

062503 102220

QA/QC _____
Date _____

CALIBRATION DATA

C

Nozzle Calibration Sheet

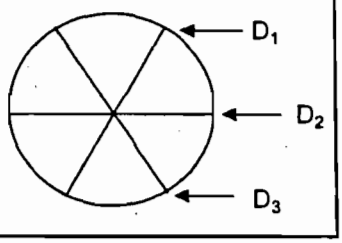
Client Wheelabrator North Broward	Project Number 9281-2
Calibrated by K. O'Halloren	Unit 1 FF Outlet
Date 6/3/2003	Runs 1-6

Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	ΔD_{ave} (inches)
274-1	0.274	0.273	0.275	0.002	0.274
277-1	0.276	0.277	0.277	0.001	0.277

D_1, D_2, D_3 = three nozzle diameter measurements

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

ΔD_{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: 61-11

Date of Calibration: 10/11/02

Meter Box Y_d: 1.0051

Calibration conducted by: R.R.

Meter Box ΔH@: 1.7561

Signature

Barometric Pressure: 29.49

				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@
0.979	3.00	-1.80	1.0000	0.000	10.000	10.000	459.757	469.722	9.965	71.5	71.5	71.50	85.0	76.0	80.50	10.00	1.0084	1.7103
0.977	3.00	-1.80	1.0000	0.000	10.000	10.000	469.722	479.717	9.995	71.5	71.5	71.50	87.0	77.0	82.00	10.02	1.0081	1.7140
0.385	0.50	-1.20	1.0000	0.000	5.000	5.000	489.962	495.002	5.040	71.5	71.5	71.50	81.0	78.0	79.50	12.70	1.0027	1.8322
0.385	0.50	-1.20	1.0000	0.000	5.000	5.000	495.002	500.049	5.047	71.5	71.5	71.50	81.0	78.0	79.50	12.70	1.0013	1.8322
0.687	1.50	-1.40	1.0000	0.000	10.000	10.000	501.625	511.706	10.081	71.5	71.5	71.50	86.0	79.0	82.50	14.25	1.0052	1.7269
0.687	1.50	-1.40	1.0000	0.000	10.000	10.000	511.706	521.799	10.093	71.5	71.5	71.50	86.0	80.0	83.00	14.24	1.0049	1.7212
																Averages	1.00512	1.75614

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

$$Y_d = (Y_{ds}) \frac{V_{ds}\,T_d + 460\,P_b + P/13.6}{V_d\,T_{ds} + 460\,P_b + H/13.6}$$

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

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

Vacuum Gauge		DGM Thermocouples		
Standard (in.Hg)	Gauge (in.Hg)	Standard (°F)	Inlet (°F)	Outlet (°F)
5.0	5.4			
10.0	10.1			
15.0	15.1			
20.0	20.1			
25.0	25.0			

CleanAir ENGINEERING

Pyrometer Calibration Test Report

Pyrometer No.:	66-11	Office:	Palatine, Il
Calibrated By:	R.R.	Client:	
Date:	10/11/02	Job Number:	

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
50 °F	48 °F
100 °F	98 °F
150 °F	148 °F
200 °F	198 °F
250 °F	249 °F
300 °F	299 °F
350 °F	349 °F
400 °F	399 °F
450 °F	449 °F
500 °F	499 °F
550 F	549 °F
600 °F	599 °F

Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	Omega Engineering;Inc.	Date:	August 28 2003
Report No:	R 044791		

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Meter Box Critical Orifice Post-Test Calibration Data

Project No. 9281-2/9282-2 | Meter No. 61-11 | Orifice L-2

Location North, South Broward | Meter Yd 1.0051 | Orifice K' 0.381

Test Date 6/6/2003 | Meter ΔH@ 1.756 | Orifice Cal. Date 9/9/2002

Operator J. Szafranski | Full Test Cal. Date 10/11/2002

Leak Checks

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

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

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

Barom. Press. (P_b) 29.95 in. Hg

Run	Elapsed Time (minutes) θ	Meter Volume (dcf) V_m	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	626.700	84	82								
1	5	629.240	85	81	82	0.79	22	5.0	2.54	83.0	0.9897	-0.5%
2	10	631.770	85	82	83	0.79	22	5.0	2.53	83.3	0.9932	-0.1%
3	15	634.280	85	82	84	0.79	22	5.0	2.51	83.5	1.0006	0.6%
										Average Y_i	0.9945	
										Cal. Error	-1.1%	

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: 66-6

Date of Calibration: 4/8/03

Meter Box Y_d: 0.9891

Calibration conducted by: M.V.

Meter Box ΔH@: 1.8341

Signature

Barometric Pressure: 29.45

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	In	Out	T_{ds} Avg.	In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
0.942	3.00	-1.80	1.0000	0.000	10.000	10.000	174.125	184.389	10.264	64.0	64.0	64.00	83.0	75.0	79.00	10.53	0.9902	1.8492
0.942	3.00	-1.80	1.0000	0.000	10.000	10.000	184.389	194.663	10.274	64.0	64.0	64.00	83.0	75.0	79.00	10.53	0.9893	1.8492
0.387	0.50	-1.10	1.0000	0.000	5.000	5.000	229.029	234.171	5.142	65.0	65.0	65.00	78.0	76.0	77.00	12.79	0.9906	1.8223
0.387	0.50	-1.10	1.0000	0.000	5.000	5.000	234.171	239.321	5.150	65.0	65.0	65.00	78.0	76.0	77.00	12.77	0.9891	1.8166
0.668	1.50	-1.40	1.0000	0.000	10.000	10.000	251.734	262.029	10.295	66.0	66.0	66.00	82.0	76.0	79.00	14.79	0.9882	1.8346
0.668	1.50	-1.40	1.0000	0.000	11.000	11.000	262.029	273.365	11.336	66.0	66.0	66.00	82.0	76.0	79.00	16.26	0.9872	1.8326

Averages 0.98910 1.83410

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	4.8			
10.0	10.2			
15.0	15.1			
20.0	20.0			
25.0	25.0			

CleanAir ENGINEERING

Pyrometer Calibration Test Report

Pyrometer No.:	66-6	Office:	Palatine, Il
Calibrated By:	M.V.	Client:	
Date:	4/8/03	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	301 °F
350 °F	350 °F
400 °F	399 °F
450 °F	448 °F
500 °F	498 °F
550 °F	548 °F
600 °F	599 °F

Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	Omega Engineering, Inc.	Date:	8/28/03
Report No:	R 044791		

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Meter Box Critical Orifice Post-Test Calibration Data

Project No. 9281-2 /9282-2 | Meter No. 66-6 | Orifice L-2

Location North, South Broward | Meter Yd 0.9891 | Orifice K' 0.381

Test Date 6/6/2003 | Meter ΔH@ 1.8341 | Orifice Cal. Date 9/9/2002

Operator J. Stafranski | Full Test Cal. Date 4/8/2003

Leak Checks

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

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

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

Barom. Press. (P_b) 29.95 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (F)	Meter Temperature Outlet (F)	Ambient Temp. T_{amb} (F)	Orifice ΔH (in. W.C.)	Vacuum (in. Hg)	Net Run Time, Θ (minutes)	Net Meter Volume for Run, V_m (dcf)	Avg Meter Temp for Run, T_m (F)	QSM Calibration Factor, Y_i	Percent Variation, ΔY_i
	0	598.000	93	90								
1	5	600.580	92	90	90	0.80	18	5.0	2.58	91.3	0.9820	0.9%
2	10	603.190	91	90	89	0.80	18	5.0	2.61	90.8	0.9707	-0.2%
3	15	605.810	92	90	90	0.80	18	5.0	2.62	90.8	0.9661	-0.7%
										Average Y_i	0.9729	
										Cal. Error	-1.6%	

Calculations and Specifications

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

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

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

CleanAir ENGINEERING

SAMPLE PROBE CALIBRATION DATA

Probe Type: M5 I.D. number: 67-8-11

Thermocouple Calibration

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

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

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

Geometric Pitot Calibration *diagrams on reverse*

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

If repairs are required, pitot does not meet specification.

"S" Pitot

Measurement				Specification
a1 =	0	a2 =	1	<10 °
b1 =	1	b2 =	0	<5°
γ =	0	θ =	1	
Pa =	0.370	Pb =	0.366	Pa + Pb = A
A =	0.736	Dt =	0.250	

Calculations

z = A sin γ = 0.0000 <0.125"

w = A sin θ = 0.01284533 <0.03125"

Does assembly meet specifications? (YES) / NO

[ ] **Standard Pitot**

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

Does assembly meet specifications? YES / NO

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

If "NO" wind tunnel calibration is required.

Wind Tunnel Pitot Calibration

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

Pitot Side 'A':

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

Pitot Side 'B':

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

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

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

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

If "NO" PITOT MUST BE REPLACED.

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

PROBE Cp = 0.84 Calibrated by: _____ Date: 03-13-03

CleanAir ENGINEERING

SAMPLE PROBE CALIBRATION DATA

Probe Type: 115 I.D. number: 67-8-4

Thermocouple Calibration

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

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

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

Geometric Pitot Calibration *diagrams on reverse*

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

If repairs are required, pitot does not meet specification.

☒ **"S" Pitot**

Measurement				Specification
a1 =	0	a2 =	1	<10 °
b1 =	1	b2 =	0	<5°
γ =	0	θ =	1	
Pa =	.365	Pb =	.3607	Pa + Pb = A
A =	.7332	Dt =	.254	

Calculations

z = A sin γ =	0.0	<0.125"
w = A sin θ =	0.012755	<0.03125"

Does assembly meet specifications? (YES) / NO

☐ **Standard Pitot**

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

Does assembly meet specifications? YES / NO

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

Wind Tunnel Pitot Calibration

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

Pitot Side 'A':

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

Pitot Side 'B':

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

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

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

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

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

PROBE Cp = 0.84 Calibrated by: _____ Date: 1-9-03

CleanAir ENGINEERING

FIELD DATA

D

TEST LOCATION: FF OUTLET

UNIT: 1 **RUN:** 1

Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 1 **OF** 3

Client: WHEELABRATOR	Project No.: 9281-2
Plant: N. BROWARD	Date: 6-5-03
Meter Operator: J. SZAFRANSKI	
Probe Operator: "	

Meter Box No.: 66-6	Sample Box No.: 67-29
Meter Yd: 0.9891	Meter ΔH@: 1.8341
K Factor: 2.95	Pitot Cp: 0.84
Leak Rate Before: .004 (cfm) [Lpm] @ 25 (in.Hg)	
Leak Rate After: .001 (cfm) [Lpm] @ 7 (in.Hg)	
Pitot Leak Check Before: ☒ After: Good ☑ Bad ☐	

Cross-Section of Test Location

Duct Dimensions (in.): 96 x 96

Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-11.0	16		

Amb. Temp. (°F)	Bar. Press. 29.90 [in. Hg] [mbar]
Probe I.D. No.:	67-8-11
Liner Material:	PYREX

Filter No.: NA		
Thimble No.: NA		
Nozzle Diameter: 0.274	Nozzle I.D.:	274-1

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time: 7:41	Stop Time: 9:46

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. (ft³) [L] 354.530	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	5	0.21	0.62	356.78	304	250	251	68	80	80	2	NA	
2	10	0.23	0.68	359.09	306	248	252	65	81	80	2		
3	15	0.32	0.94	361.82	301	250	252	54	82	80	2		
4	20	0.52	1.6	365.25	308	251	252	51	84	81	3		
5	25	0.55	1.6	368.77	309	251	253	53	85	81	3		
2-1	30	0.51	1.5	372.20	299	251	252	52	86	81	3		
2	35	0.39	1.2	375.32	309	255	253	56	87	82	3		
3	40	0.39	1.2	378.35	309	251	253	56	88	83	3		
4	45	0.52	1.5	381.77	310	251	253	58	89	83	3		
5	50	0.55	1.6	385.31	309	252	254	58	91	84	3	↓	
		~~6.3921~~	~~12.34~~	~~307~~	~~306~~				~~1668~~				
	Total	* 16.1772	31.04	77.902	7695				4316				
	Average	0.6471	1.2416		307.8000				86.3200				

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* Sum of square roots.

Circle correct bracketed units on data sheet.

TEST LOCATION: FF OUTLET

Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 2 **OF** 3

UNIT: 1 **RUN:** 1

Client WHEELABRATOR	Project No. 9281-2
Plant N. BROWARD	Date 6-5-03
Meter Operator J. SZAFRANSKI	
Probe Operator "	

Meter Box No.	Sample Box No.
Meter Yd	Meter ΔH@
K Factor	Pitot Cp
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 Press. (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.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. (ft³) [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
3-1	55	0.43	1.3	388.60	310	252	253	61	91	85	3	NA	
2	60	0.35	1.0	391.41	310	253	253	61	91	85	3		
3	65	0.36	1.1	394.34	310	251	253	57	90	85	3		
4	70	0.51	1.5	397.87	310	252	253	53	90	86	3		
5	75	0.52	1.5	401.27	308	252	253	53	90	85	3		
4-1	80	0.40	1.2	404.42	303	252	254	54	90	86	3		
2	85	0.36	1.1	407.40	309	252	253	56	90	86	3		
3	90	0.46	1.3	410.62	309	252	254	57	90	86	3		K' → 2.90
4	95	0.52	1.5	414.04	311	252	254	59	91	87	4		
5	100	0.52	1.5	417.48	310	253	253	59	91	87	4		
		~~13.0226~~	~~25.34~~		~~6154~~				~~3192~~				
	Total	*											
	Average												

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* Sum of square roots.

Circle correct brack units on data sheet.

TEST LOCATION: EF OUTLET

UNIT: 1 **RUN:** 1

Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 3 **OF** 3

Client WHEELABRATOR	Project No. 9281-2
Plant N. BROWARD	Date 6-5-03
Meter Operator J. SZAFRANSKI	
Probe Operator "	

Meter Box No.	Sample Box No.	
Meter Yd	Meter ΔH@	
K Factor	Pitot Cp	
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 Press. (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.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. (ft³) [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
5-1	105	0.35	1.0	420.36	303	253	254	62	91	87	3	NA	
2	110	0.35	1.0	423.21	309	254	255	62	90	87	3		
3	115	0.40	1.2	426.08	310	251	254	63	90	87	3		
4	120	0.46	1.3	429.31	308	252	254	63	90	87	3		
5	125	0.43	1.2	432.430	311	252	254	64	90	87	3		
	Total	*											
	Average												

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* Sum of square roots.

Circle correct bracketed units on data sheet.

TEST LOCATION: FF OUTLET

UNIT: 1 **RUN:** 2

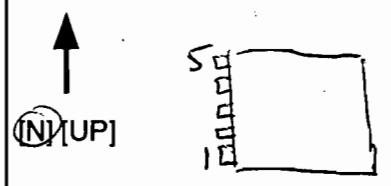
Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 1 **OF** 3

Client: WHEELABRATOR	Project No.: 9281-2
Plant: N. BROWARD	Date: 6-5-03
Meter Operator: J. SZAFRANSKI	
Probe Operator: "	

Meter Box No.: 61-11	Sample Box No.: 67-30
Meter Yd: 1.0051	Meter ΔH@: 1.7561
K Factor: 2.90	Pitot Cp: 0.84
Leak Rate Before: .003 (cfm) [Lpm] @ 15 (in.Hg)	
Leak Rate After: .002 (cfm) [Lpm] @ 8 (in.Hg)	
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.): 96 x 96

Static Press. (in. H_2O)	Port Len. (in.)	Gas Flow (In) [Out] of page	First point all the way (In) [Out]
-1(.0	10	(In) [Out]	

Amb. Temp. (°F): 85	Bar. Press.: 29.90 (in. Hg) [mbar]
Probe I.D. No.: 67-8-4	
Liner Material: PYREX	

Filter No.: NA		
Thimble No.: NA		
Nozzle Diameter: 0.277	Nozzle I.D.: 277-1	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time: 9:46	Stop Time: 11:51

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. (ft³) [L] 461.115	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	5	0.21	0.61	463.54	304	253	249	62	85	85	2	NA	
2	10	0.20	0.58	465.66	304	252	254	59	87	85	2		
3	15	0.36	1.0	468.42	292	251	255	56	87	86	2		
4	20	0.46	1.3	471.66	305	252	254	54	90	86	3		
5	25	0.56	1.6	475.26	305	252	254	58	92	87	4		
2-1	30	0.60	1.7	478.93	303	252	253	60	93	87	5		
2	35	0.48	1.4	482.27	308	253	254	61	94	88	4		
3	40	0.42	1.2	485.38	307	252	253	57	94	88	4		K' 2.74
4	45	0.50	1.4	488.71	308	251	252	54	94	88	4		
5	50	0.55	1.5	492.19	308	251	250	54	95	89	4		
		~~6.1463~~	~~12.29~~	~~26.965~~	~~3050~~				~~1796~~				
	Total	*17.0674	32.89	81.125	7667				4646				
	Average	0.6827	1.3156		306.4800				92.9200				

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* Sum of square roots.

Circle correct brack... units on data sheet.

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TEST LOCATION: FF OUTLET

Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 2 **OF** 3

UNIT: 1 **RUN:** 2

Client WHEELABRATOR	Project No. 9281-2
Plant N BROWARD	Date 6-5-03
Meter Operator J. SZAFRANSKI	
Probe Operator "	

Meter Box No.	Sample Box No.	
Meter Yd	Meter ΔH@	
K Factor	Pitot Cp	
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 Press. (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.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft³] [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
3-1	55	0.50	1.4	495.57	306	251	251	56	96	89	4	NA	
2	60	0.43	1.2	498.70	307	252	255	57	97	89	4		
3	65	0.43	1.2	501.78	308	252	254	57	97	90	4		
4	70	0.53	1.5	505.30	309	252	250	60	98	91	5		
5	75	0.61	1.7	508.98	308	252	251	60	99	91	5		
4-1	80	0.41	1.1	511.96	303	251	250	61	98	91	4		
2	85	0.44	1.2	515.10	308	252	255	62	98	92	4		
3	90	0.46	1.3	518.35	309	252	254	62	99	92	4		
4	95	0.61	1.7	522.04	309	252	253	62	100	93	5		
5	100	0.55	1.5	525.55	309	252	250	63	100	93	5		
		~~13.5284~~	~~2.609~~		~~6126~~				~~3675~~				
	Total	*											
	Average												

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* Sum of square roots.

Circle correct bracketed units on data sheet.

TEST LOCATION: FF OUTLET

UNIT: 1 **RUN:** 2

Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 3 **OF** 3

Client WHEELABRATOR	Project No. 9281-2
Plant N BROWARD	Date 6-5-03
Meter Operator J. SZAFRANSKI	
Probe Operator	

Meter Box No.	Sample Box No.
Meter Yd	Meter ΔH@
K Factor	Pitot Cp
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 Press. (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.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time:	Stop Time:

Traverse Point Number	Min/pt ↓ Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft³] [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
5-1	105	0.45	1.2	528.72	306	252	251	65	100	94	4	NA	
2	110	0.45	1.2	531.82	307	252	253	63	100	94	4		
3	115	0.51	1.4	535.14	308	252	254	64	101	94	4		
4	120	0.56	1.5	538.72	308	252	252	65	100	94	4		
5	125	0.54	1.5	542.240	307	253	252	65	100	94	5		
	Total	*											
	Average												

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* Sum of square roots.

Circle correct brack[illegible] units on data sheet.

TEST LOCATION: FF OUTLET

UNIT: 1 **RUN:** 3

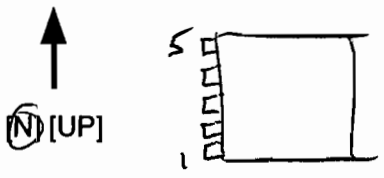
Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 1 **OF** 3

Client: WHEELABRATOR	Project No.: 9281-2
Plant: N BROWARD	Date: 6-5-03
Meter Operator: J. SZAFRANSKI	
Probe Operator:	

Meter Box No.: 66-6	Sample Box No.: 67-29
Meter Yd: 0.9891	Meter ΔH@: 1.8341
K Factor: 2.74	Pitot Cp: 0.84
Leak Rate Before: .002 [cfm] [Lpm] @ 15 (in.Hg)	
Leak Rate After: .003 [cfm] [Lpm] @ 8 (in.Hg)	
Pitot Leak Check Before: ☒	After: Good ☒ Bad ☐

Cross-Section of Test Location



Duct Dimensions (in.): 96 x 96

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

Amb. Temp. (°F)	Bar. Press. 29.90 [in. Hg] [mbar]
Probe I.D. No.	67-8-11
Liner Material	PYREX

Filter No. NA		
Thimble No. NA		
Nozzle Diameter 0.274	Nozzle I.D. 274-1	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time: 11:51	Stop Time: 13:56

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft³] [L] 433.115	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
1-1	5	0.27	0.74	435.66	308	250	251	66	95	92	2	NA	
2	10	0.27	0.74	438.05	305	252	252	65	95	92	2		
3	15	0.34	0.93	440.75	303	251	254	62	96	92	2		
4	20	0.61	1.7	444.41	310	251	253	60	97	93	3		
5	25	0.52	1.4	447.80	310	251	252	61	100	94	3		
2-1	30	0.52	1.4	451.19	306	254	253	63	99	95	3		
2	35	0.42	1.2	454.29	310	255	253	53	101	95	3		
3	40	0.36	0.99	457.15	310	250	253	50	99	95	3		
4	45	0.52	1.4	460.36	312	250	253	51	99	95	3		
5	50	0.63	1.7	464.11	312	250	254	53	100	95	4		
		~~0.6065~~	~~1.62~~		~~3086~~				1919				
	Total	*16.6549	30.84	78.775	7734				4965				
	Average	(0.6662)	(1.2336)		309.3600				97.3000				

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* Sum of square roots.

Circle correct bracketed units on data sheet.

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TEST LOCATION: FF OUTLET

UNIT: 1 **RUN:** 3

Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 2 **OF** 3

Client: WHEELABRATOR	Project No.: 9281-2
Plant: N BRUNSWICK	Date: 6-5-03
Meter Operator: J. SZAFRANSKI	
Probe Operator: "	

Meter Box No.	Sample Box No.
Meter Yd	Meter ΔH@
K Factor	Pitot Cp
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 Press. (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.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. (ft³) [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
3-1	55	0.34	0.93	466.95	305	250	254	55	100	95	3	NA	
2	60	0.44	1.2	470.05	311	251	253	57	99	96	3		
3	65	0.44	1.2	473.16	312	252	254	58	99	96	3		
4	70	0.55	1.5	476.60	311	251	254	60	99	96	4		
5	75	0.57	1.6	480.18	311	252	253	61	99	96	4		
4-1	80	0.40	1.1	483.17	305	253	253	62	100	95	4		
2	85	0.36	0.99	486.07	310	255	254	63	101	96	4		
3	90	0.44	1.2	489.19	311	252	254	63	101	97	4		
4	95	0.44	1.2	492.38	311	252	255	61	101	97	4		
5	100	0.53	1.5	495.87	310	251	254	62	100	97	4		
		~~13.302~~	~~14.62~~		~~1183~~				~~3879~~				
	Total	*											
	Average												

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* Sum of square roots.

Circle correct brack... units on data sheet.

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TEST LOCATION: FF OUTLET

Hg TESTING FIELD DATA SHEET

METHOD: 29 **PAGE** 3 **OF** 3

UNIT: 1 **RUN:** 3

Client: WHEELABRATOR	Project No.: 9281-2
Plant: N BROWARD	Date: 6-5-03
Meter Operator: J. SZAFRANSKI	
Probe Operator: "	

Meter Box No.	Sample Box No.
Meter Yd	Meter ΔH@
K Factor	Pitot Cp
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 Press. (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.	

H_2O [ml] [gm]	Silica Gel (gm)
Total V_{lc}	

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume - V_m Init. Vol. [ft³] [L]	Stack Temp. T_s (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet T_{min} (°F)	DGM Outlet T_{mout} (°F)	Pump Vacuum (in. Hg)	XAD Trap Temp T_t (°F)	Notes
5-1	105	0.30	0.82	498.51	308	253	254	63	100	97	3	NA	
2	110	0.44	1.2	501.65	311	254	254	63	100	97	4	↓	
3	115	0.48	1.3	504.94	311	253	255	64	100	97	4		
4	120	0.54	1.5	508.32	311	253	254	64	101	97	4		
5	125	0.51	1.4	511.890	310	252	253	65	100	97	4	↓	
	Total	*											
	Average												

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

* Sum of square roots.

Circle correct bracketed units on data sheet.

ORSAT READINGS

TEST LOCATION: FF Outlet **PAGE** _____ **OF** _____

Client	Wheelabrator North Broward	Project Number 9281-2	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	Pompano Beach, FL	Unit 1	
Orsat ID	#8	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	10.0%	19.4%	9.4%		KRO	6/5/2003	10:09
		2	10.2%	19.4%	9.2%				
		3	10.0%	19.4%	9.4%				
		Avg.	10.1%	19.4%	9.3%				
2	29	1	10.0%	19.8%	9.8%		KRO	6/5/2003	12:15
		2	10.0%	19.8%	9.8%				
		3	10.0%	19.8%	9.8%				
		Avg.	10.0%	19.8%	9.8%				
3	29	1	10.4%	19.6%	9.2%		KRO	6/5/2003	14:28
		2	10.4%	19.4%	9.0%				
		3	10.4%	19.6%	9.2%				
		Avg.	10.4%	19.5%	9.1%				
4	29	1	10.4%	19.6%	9.2%		KRO	6/5/2003	
		2	10.4%	19.6%	9.2%				
		3	10.4%	19.6%	9.2%				
		Avg.	10.4%	19.6%	9.2%				
5	29	1	9.8%	19.4%	9.6%		KRO	6/6/2003	
		2	9.8%	19.4%	9.6%				
		3	9.8%	19.6%	9.8%				
		Avg.	9.8%	19.5%	9.7%				
6	29	1	9.8%	19.0%	9.2%		KRO	6/6/2003	
		2	9.8%	19.0%	9.2%				
		3	9.8%	19.0%	9.2%				
		Avg.	9.8%	19.0%	9.2%				

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 results.

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_____
Date_____

CleanAir ENGINEERING

Impinger Weight Sheet

Client: Wheelabrator North Broward		Unit Name/Location: 1/FF Outlet	
Plant: Pompano Beach, FL	Job No.: 9281-2	Method: 29	

Run No.: 1	Filter Type: Quartz		Sample Box No.: 67-29
Date: 6/5/2003	Lot No.:		pH:
Analyst: K. O'Halloren	Filter No.: NA		Rinse:

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	717.5	442.7	274.8	
Impinger 2	100 ml 5%HNO3/10%H2O2	739.1	542.1	197.0	QA/QC
Impinger 3	100 ml 5%HNO3/10%H2O2	545.0	531.5	13.5	Date
Impinger 4	Empty	451.5	450.3	1.2	
Impinger 5	100 ml 4%KMnO4/10%H2SO4	535.1	534.8	0.3	Total Weight (gm)
Impinger 6	100 ml 4%KMnO4/10%H2SO4	552.5	553.1	(0.6)	486.2
Impinger 7	Silica Gel	772.2	754.6	17.6	503.8

Run No.: 2	Filter Type: Quartz		Sample Box No.: 67-30
Date: 6/5/2003	Lot No.:		pH:
Analyst: K. O'Halloren	Filter No.: NA		Rinse:

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	706.0	436.6	269.4	
Impinger 2	100 ml 5%HNO3/10%H2O2	773.3	545.0	228.3	QA/QC
Impinger 3	100 ml 5%HNO3/10%H2O2	539.8	523.8	16.0	Date
Impinger 4	Empty	430.0	429.5	0.5	
Impinger 5	100 ml 4%KMnO4/10%H2SO4	529.2	529.5	(0.3)	Total Weight (gm)
Impinger 6	100 ml 4%KMnO4/10%H2SO4	552.3	551.5	0.8	514.7
Impinger 7	Silica Gel	716.3	699.2	17.1	531.8

Run No.: 3	Filter Type: Quartz		Sample Box No.: 67-29
Date: 6/5/2003	Lot No.:		pH:
Analyst: K. O'Halloren	Filter No.: NA		Rinse:

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	Empty	745.0	442.8	302.2	
Impinger 2	100 ml 5%HNO3/10%H2O2	713.9	540.7	173.2	QA/QC
Impinger 3	100 ml 5%HNO3/10%H2O2	543.0	530.5	12.5	Date
Impinger 4	Empty	451.6	450.5	1.1	
Impinger 5	100 ml 4%KMnO4/10%H2SO4	532.4	532.1	0.3	Total Weight (gm)
Impinger 6	100 ml 4%KMnO4/10%H2SO4	555.2	554.4	0.8	490.1
Impinger 7	Silica Gel	718.8	703.7	15.1	505.2

QA/QC_____
Date_____

CleanAir ENGINEERING

FIELD DATA PRINTOUTS

E

Field Data Printout

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

Location: Unit 1 FF Outlet
Test Run: 1
Client: Wheelabrator North Broward, Inc.
Project No: 9281-2
Source Area (ft^2): 64.00000

Test Date: 6/05/03
Start Time: 07:41
Stop Time: 09:46
Leak Rate Before: 0.004 cfm @ 25 "Hg
Leak Rate After: 0.001 cfm @ 7 "Hg

Bar. Press. (in. Hg): 29.90
Static P: -11.0
O_2 (dry volume %): 9.33
CO_2 (dry volume %): 10.07
N_2+CO (dry volume %): 80.60

H_2O (condensate, ml or gm): 486.2
H_2O (silica, g): 17.6
Actual Moisture (%): 24.12

Nozzle ID No: 274-1
Nozzle Diameter (D_n): 0.274
Probe ID No: 67-8-11
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 66-6
Meter ΔH@: 1.83410
Meter Y_d: 0.98910

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			354.53						
1-01	5.0	0.21	0.62	356.78	304	80	80	0.46	2.25	107.3
1-02	10.0	0.23	0.68	359.09	306	81	80	0.48	2.31	105.4
1-03	15.0	0.32	0.94	361.82	301	82	80	0.57	2.73	105.2
1-04	20.0	0.52	1.50	365.25	308	84	81	0.72	3.43	104.0
1-05	25.0	0.55	1.60	368.77	309	85	81	0.74	3.52	103.8
2-01	30.0	0.51	1.50	372.20	299	86	81	0.71	3.43	104.2
2-02	35.0	0.39	1.20	375.32	309	87	82	0.62	3.12	108.8
2-03	40.0	0.39	1.20	378.35	309	88	83	0.62	3.03	105.5
2-04	45.0	0.52	1.50	381.77	310	89	83	0.72	3.42	103.2
2-05	50.0	0.55	1.60	385.31	309	91	84	0.74	3.54	103.5
3-01	55.0	0.43	1.30	388.60	310	91	85	0.66	3.29	108.7
3-02	60.0	0.35	1.00	391.41	310	91	85	0.59	2.81	102.8
3-03	65.0	0.36	1.10	394.34	310	90	85	0.60	2.93	105.8
3-04	70.0	0.51	1.50	397.87	310	90	86	0.71	3.53	107.1
3-05	75.0	0.52	1.50	401.27	308	90	85	0.72	3.40	102.1
4-01	80.0	0.40	1.20	404.42	303	90	86	0.63	3.15	107.4
4-02	85.0	0.36	1.10	407.40	309	90	86	0.60	2.98	107.5
4-03	90.0	0.46	1.30	410.62	309	90	86	0.68	3.22	102.8
4-04	95.0	0.52	1.50	414.04	311	91	87	0.72	3.42	102.7
4-05	100.0	0.52	1.50	417.48	310	91	87	0.72	3.44	103.2
5-01	105.0	0.35	1.00	420.36	303	91	87	0.59	2.88	104.7
5-02	110.0	0.35	1.00	423.21	309	90	87	0.59	2.85	104.1
5-03	115.0	0.40	1.20	426.08	310	90	87	0.63	2.87	98.2
5-04	120.0	0.46	1.30	429.31	308	90	87	0.68	3.23	102.9
5-05	125.0	0.43	1.20	432.43	311	90	87	0.66	3.12	103.0
Final	125.0		1.24160	77.90000	307.80000	86.32000		0.64709	77.90000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6471	1.2416	77.9000	307.8000	86.3200				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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QA/QC _____
Date _____

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 1 FF Outlet
Test Run: 2
Client: Wheelabrator North Broward, Inc.
Project No: 9281-2
Source Area (ft²): 64.00000

Bar. Press. (in. Hg): 29.90
Static P: -11.0
O_2 (dry volume %): 9.80
CO_2 (dry volume %): 10.00
N_2+CO (dry volume %): 80.20

Nozzle ID No: 277-1
Nozzle Diameter (D_n): 0.277
Probe ID No: 67-8-4
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Test Date: 6/05/03
Start Time: 09:46
Stop Time: 11:51
Leak Rate Before: 0.003 cfm @ 15 "Hg
Leak Rate After: 0.002 cfm @ 8 "Hg

H_2O (condensate, ml or gm): 514.7
H_2O (silica, g): 17.1
Actual Moisture (%): 24.29

Meter Box ID. No: 61-11
Meter ΔH@: 1.75610
Meter Y_d: 1.00510

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			461.12						
1-01	5.0	0.21	0.61	463.54	304	85	85	0.46	2.43	114.2*
1-02	10.0	0.20	0.58	465.66	304	87	85	0.45	2.12	102.1
1-03	15.0	0.36	1.00	468.42	298	87	86	0.60	2.76	98.7
1-04	20.0	0.46	1.30	471.66	305	90	86	0.68	3.24	102.8
1-05	25.0	0.56	1.60	475.26	305	92	87	0.75	3.60	103.3
2-01	30.0	0.60	1.70	478.93	303	93	87	0.77	3.67	101.5
2-02	35.0	0.48	1.40	482.27	308	94	88	0.69	3.34	103.4
2-03	40.0	0.42	1.20	485.38	307	94	88	0.65	3.11	102.8
2-04	45.0	0.50	1.40	488.71	308	94	88	0.71	3.33	101.0
2-05	50.0	0.55	1.50	492.18	308	95	89	0.74	3.47	100.2
3-01	55.0	0.50	1.40	495.57	306	96	89	0.71	3.39	102.4
3-02	60.0	0.43	1.20	498.70	307	97	89	0.66	3.13	101.9
3-03	65.0	0.43	1.20	501.78	308	97	90	0.66	3.08	100.2
3-04	70.0	0.53	1.50	505.30	309	98	91	0.73	3.52	103.1
3-05	75.0	0.61	1.70	508.98	308	99	91	0.78	3.68	100.4
4-01	80.0	0.41	1.10	511.96	303	98	91	0.64	2.98	98.8
4-02	85.0	0.44	1.20	515.10	308	98	92	0.66	3.14	100.7
4-03	90.0	0.46	1.30	518.35	309	99	92	0.68	3.25	102.0
4-04	95.0	0.61	1.70	522.04	309	100	93	0.78	3.69	100.4
4-05	100.0	0.55	1.50	525.55	309	100	93	0.74	3.51	100.6
5-01	105.0	0.45	1.20	528.72	306	100	94	0.67	3.17	100.1
5-02	110.0	0.45	1.20	531.82	307	100	94	0.67	3.10	97.9
5-03	115.0	0.51	1.40	535.14	308	101	94	0.71	3.32	98.5
5-04	120.0	0.56	1.50	538.72	308	100	94	0.75	3.58	101.5
5-05	125.0	0.54	1.50	542.24	307	100	94	0.73	3.52	101.6
Final	125.0		1.31560	81.12500	306.48000	92.88000		0.68269	81.12500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6827	1.3156	81.1250	306.4800	92.9200				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☐ Avg. OK				

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QA/QC _____
Date _____

Field Data Printout

Test Method: USEPA Method 29
Analyte: Mercury

Location: Unit 1 FF Outlet
Test Run: 3
Client: Wheelabrator North Broward, Inc.
Project No: 9281-2
Source Area (ft²): 64.00000

Test Date: 6/05/03
Start Time: 11:51
Stop Time: 13:56
Leak Rate Before: 0.002 cfm @ 15 "Hg
Leak Rate After: 0.003 cfm @ 8 "Hg

Bar. Press. (in. Hg): 29.90
Static P: -11.0
O_2 (dry volume %): 9.13
CO_2 (dry volume %): 10.40
N_2+CO (dry volume %): 80.47

H_2O (condensate, ml or gm): 490.1
H_2O (silica, g): 15.1
Actual Moisture (%): 24.33

Nozzle ID No: 274-1
Nozzle Diameter (D_n): 0.274
Probe ID No: 67-8-11
Pitot C_p: 0.84
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 66-6
Meter ΔH@: 1.83410
Meter Y_d: 0.98910

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			433.12						
1-01	5.0	0.27	0.74	435.60	308	95	92	0.52	2.49	102.6
1-02	10.0	0.27	0.74	438.05	305	95	92	0.52	2.45	101.0
1-03	15.0	0.34	0.93	440.75	303	96	92	0.58	2.70	99.0
1-04	20.0	0.61	1.70	444.41	310	97	93	0.78	3.66	100.6
1-05	25.0	0.52	1.40	447.80	310	100	94	0.72	3.39	100.5
2-01	30.0	0.52	1.40	451.19	306	99	95	0.72	3.39	100.3
2-02	35.0	0.42	1.20	454.29	310	101	95	0.65	3.10	102.0
2-03	40.0	0.36	0.99	457.15	310	99	95	0.60	2.86	101.8
2-04	45.0	0.52	1.40	460.36	312	99	95	0.72	3.21	95.3
2-05	50.0	0.63	1.70	464.11	312	100	95	0.79	3.75	101.1
3-01	55.0	0.34	0.93	466.95	305	100	95	0.58	2.84	103.6
3-02	60.0	0.44	1.20	470.05	311	99	96	0.66	3.10	99.8
3-03	65.0	0.44	1.20	473.16	312	99	96	0.66	3.11	100.2
3-04	70.0	0.55	1.50	476.60	311	99	96	0.74	3.44	99.2
3-05	75.0	0.57	1.60	480.18	311	99	96	0.75	3.58	101.4
4-01	80.0	0.40	1.10	483.17	305	100	95	0.63	2.99	100.6
4-02	85.0	0.36	0.99	486.07	310	101	96	0.60	2.90	103.0
4-03	90.0	0.44	1.20	489.19	311	101	97	0.66	3.12	100.2
4-04	95.0	0.44	1.20	492.38	311	101	97	0.66	3.19	102.5
4-05	100.0	0.53	1.50	495.87	310	100	97	0.73	3.49	102.2
5-01	105.0	0.30	0.82	498.51	308	100	97	0.55	2.64	102.5
5-02	110.0	0.44	1.20	501.65	311	100	97	0.66	3.14	101.0
5-03	115.0	0.48	1.30	504.94	311	100	97	0.69	3.29	101.3
5-04	120.0	0.54	1.50	508.32	311	101	97	0.73	3.38	98.1
5-05	125.0	0.51	1.40	511.89	310	100	97	0.71	3.57	106.6
Final	125.0		1.23360	78.77500	309.36000	97.30000		0.66619	78.77500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages		0.6662	1.2336	78.7750	309.3600	97.3000				
		☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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QA/QC _____
Date _____

LABORATORY DATA

F

Wheelabrator North Broward, Inc.
Clean Air Project No: 9281-2
Unit 1 FF Outlet

USEPA Method 29
Mercury (Hg) Laboratory Parameters

Blank Analysis		
m_{1b-B}	Fraction 1B Blank (µg)	<0.1000
m_{2b-B}	Fraction 2B Blank (µg)	<0.3000
m_{3a-B}	Fraction 3A Blank (µg)	<0.2000
m_{3b-B}	Fraction 3B Blank (µg)	<0.4000
m_{3c-B}	Fraction 3C Blank (µg)	<0.4000
$m_{total-B}$	Total Blank Amount (µg)	<1.4000

Run No.		**1**	**2**	**3**
Date (2003)		Jun 5	Jun 5	Jun 5
Start Time (approx.)		07:41	09:46	11:51
Stop Time (approx.)		09:46	11:51	13:56
Sample Analysis				
m_{1b-S}	Fraction 1B Sample (µg)	0.1358	0.2538	0.1539
m_{2b-S}	Fraction 2B Sample (µg)	2.6270	2.5806	2.3890
m_{3a-S}	Fraction 3A Sample (µg)	<0.2000	<0.2000	<0.2000
m_{3b-S}	Fraction 3B Sample (µg)	<0.6000	<0.7000	<0.6000
m_{3c-S}	Fraction 3C Sample (µg)	0.5137	0.6561	0.9079
$m_{total-S}$	Total Sample Amount (µg)	3.2765	3.4905	3.4508
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)	3.2765	3.4905	3.4508
Sample Corrected for Blank - Prorated Fractions				
m_{n-1b}	Fraction 1B Prorated (µg)	0.1358	0.2538	0.1539
m_{n-2b}	Fraction 2B Prorated (µg)	2.6270	2.5806	2.3890
m_{n-3a}	Fraction 3A Prorated (µg)	<0.2000	<0.2000	<0.2000
m_{n-3b}	Fraction 3B Prorated (µg)	<0.6000	<0.7000	<0.6000
m_{n-3c}	Fraction 3C Prorated (µg)	0.5137	0.6561	0.9079

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QA/QC _____
Date _____

Project 9281

TOTAL ug CATCH

Run Number		Average Total Catch ug	Front half	$H2O2/HNO_3$	Empty Impinger	$KMnO_4$	HCl
U1 FF Out R1	# 1	3.276	0.136	2.649	< 0.2	< 0.6	0.507
	# 2		0.136	2.605	< 0.2	< 0.6	0.520
U1 FF Out R2	# 1	3.490	0.251	2.612	< 0.2	< 0.7	0.672
	# 2		0.257	2.549	< 0.2	< 0.7	0.640
U1 FF Out R3	# 1	3.451	0.160	2.430	< 0.2	< 0.6	0.918
	# 2		0.148	2.348	< 0.2	< 0.6	0.898
Field Blank	# 1	< 0.6	< 0.1	< 0.3	< 0.2	< 0.6	< 0.4
	# 2		< 0.1	< 0.3	< 0.2	< 0.6	< 0.4
Reagent Blank	# 1	< 0.4	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
	# 2		< 0.1	< 0.3	< 0.2	< 0.4	< 0.4

Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 9281

Mercury

EPA Method 29 Analysis

Analytical Report
1832

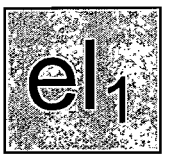
Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX:910-792-6853 e1lab@hotmail.com

I have reviewed the following data for completeness, accuracy, adherence to method protocol, and compliance with quality assurance guidelines.

Quality assurance review by Bruce Hawks

Bruce Hawks 6/24/03

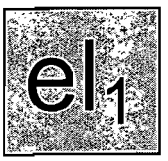
SUMMARY OF RESULTS



Summary of North Broward Mercury Analysis

Run Number		Average Total Catch, µg	Front half µg	H_2O_2 /HNO_3 µg	Empty Impinger µg	$KMnO_4$ µg	HCl µg
U1 FF Out R1	# 1	3.28	0.14	2.65	< 0.2	< 0.6	0.51
	# 2		0.14	2.60	< 0.2	< 0.6	0.52
U1 FF Out R2	# 1	3.49	0.25	2.61	< 0.2	< 0.7	0.67
	# 2		0.26	2.55	< 0.2	< 0.7	0.64
U1 FF Out R3	# 1	3.45	0.16	2.43	< 0.2	< 0.6	0.92
	# 2		0.15	2.35	< 0.2	< 0.6	0.90
Field Blank	# 1	< 0.6	< 0.1	< 0.3	< 0.2	< 0.6	< 0.4
	# 2		< 0.1	< 0.3	< 0.2	< 0.6	< 0.4
Reagent Blank	# 1	< 0.4	< 0.1	< 0.3	< 0.2	< 0.4	< 0.4
	# 2		< 0.1	< 0.3	< 0.2	< 0.4	< 0.4

ANALYTICAL NARRATIVE



Element One Analytical Narrative

Client	Clean Air Engineering	Element One #:	1832
Client ID:	9281	Analyst:	IJJ, KJJ
Date Received	6/11/03	Method:	M29
Analytes	Hg	Dates Analyzed	6/16, 19, & 24/03

Summary of Analysis

The 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 0.001 µg/ml.

Analysis QA/QC

Duplicate analyses relative percent difference (RPD) and spike sample recovery data are summarized on the following pages. 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.

Mercury Duplicate Analysis RPD

Run Number	Front half	H_2O_2/HNO_3	Empty Imp	$KMnO_4$	HCl
U1 FF Out R1	0.3%	1.7%	NA	NA	2.5%
U1 FF Out R2	2.5%	2.5%	NA	NA	4.8%
U1 FF Out R3	7.4%	3.5%	NA	NA	2.2%
Field Blank	NA	NA	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA

Mercury Spike Recoveries

Run Number		Front half	H_2O_2/HNO_3	Empty Imp	KMnO4	HCl
U1 FF Out R3	# 1	109%	101%	81%	90%	97%
	# 2	109%	98%	80%	89%	92%

SAMPLE CUSTODY

CHAIN OF CUSTODY FORM

CLIENT: Wheelabrator North Broward
PLANT: Same
PROJECT MANAGER: Scott Brown
PROJECT NO.: 9281
DEPT.: 66

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

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Ken O'Hallen	6/6/2003 13:00				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
				e1832	6/11/03 0935

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC 28403

PO Number:

This form was completed by:
Scott Brown
Signature Date

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

CHAIN OF CUSTODY FORM

CLIENT: Wheelabrator North Broward | PROJECT NO.: 9281
PLANT: Same | DEPT.: 66
PROJECT MANAGER: Scott Brown

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

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Ken Hallen	6/6/2003 13:00				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
					6/6/03 0935

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC 28403

PO Number:

This form was completed by:

Scott Brown
Signature | Date

e1832

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

CHAIN OF CUSTODY FORM

CLIENT: Wheelabrator North Broward
PLANT: Same
PROJECT MANAGER: Scott Brown
PROJECT NO.: 9281
DEPT.: 68

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

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Kemp Hallen 6/6/2003	13:00				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
				[signature] e1832	6/6/03 0935

Special Handling Instructions

Forwarding Lab: Element One
Wilmington, NC 28403

PO Number:

This form was completed by:

Scott Brown

Signature Date

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

CHAIN OF CUSTODY FORM

CLIENT: Wheelabrator North Broward
PLANT: Pompano Beach, FL
PROJECT MANAGER: Scott Brown
PROJECT NO.: 9281-2
DEPT.: 66

CLEANAIR LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Hg				ADDITIONAL INFORMATION
	NA	Reagent Blank	6/5	3 Quartz Filters	1	NA	X				
	NA	Reagent Blank	6/5	0.1N HNO_3	1	300	X				
	NA	Reagent Blank	6/5	DI H_2O	1	100	X				
	NA	Reagent Blank	6/5	5% HNO_3 / 10% H_2O_2	1	~~300~~ 200 (250)	X				
	NA	Reagent Blank	6/5	4% $KMnO_4$ / 10% H_2SO_4	1	100	X				
	NA	Reagent Blank	6/5	8 N HCl / DI H_2O	1	225	X				
	Field Blank	Unit 1 FF Outlet		Filter	1		X				
	Field Blank	↓		Imp 1,2,3 + 0.1N HNO_3 Rinse	1		X				
	Field Blank			Imp 4 + 0.1N HNO_3 Rinse	1		X				
	Field Blank			Imp 5,6 $KMnO_4$ + H_2O Rinse	1		X				
	Field Blank			Imp 5,6 HCl Rinse	1		X				
	Field Blank	↓		Front Half 0.1N HNO_3 Rinse	1		X				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time
Ken O'Halloran	6/6/2003 13:00				
Courier:	Date / Time	Relinquished by: (Signature)	Date / Time	Received for Analysis by:	Date / Time
				[signature]	6/11/03 0935

Special Handling Instructions

Forwarding Lab: Element One Wilmington, NC 28403

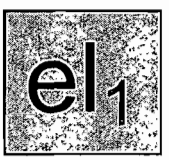
PO Number:

This form was completed by: Kevin O'Halloren

Signature: Ken O'Halloran Date: 6/6/2003

CleanAir ENGINEERING
e1832
500 West Wood Street
Palatine, IL 60067
(800) 627-0033 ph
(847) 991-3385 fax
www.cleanair.com

ANALYTICAL DATA



elementOne **AIR TESTING SAMPLE SUBMISSION FORM** Lab ID # **e1832**

Client ID/PO#: 9281		Date Received: 6/11/03	Page: 1 of 1
Customer: Clean Air		Results Requested: 6/25/03	Time Rec:
Address:		Contact: Scott Brown	Rec by: BGH
		Email:	Via:
		Phone:	Fax:
HNO_3 Lot: 1102100	HF Lot: 5101122	HCl Lot: 4102080	
Volume Marked (Y) / N	Volume Loss Y / (N) / ?	pH < 2.0 (Y) / N	Ref. Method: 29

	Sample Identification		Sample Identification
1	North Broward Run 1	7	North Broward Run 4
2	North Broward Run 2	8	North Broward Run 5
3	North Broward Run 3	9	North Broward Run 6
4	North Broward Run 3 Spike		
5	Field Blank		
6	Reagent Blank		

Elements to Analyze: **Hg – Only analyze sample 1-6; Archive Sample 7-9**

	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	104ml	100ml	800ml	—	—	104ml	200ml	560ml	600ml	230ml	400ml
2	92ml	↓	820ml	—	—	102ml	↓	610ml	700ml	215ml	↓
3/4	100ml		830ml	—	—	104ml		570ml	600ml	235ml	
5	110ml		300ml	—	—	101ml		585ml	↓	225ml	
6	100ml	↓	290ml	—	—	200ml	↓	100ml KMnO4 35ml DI	Calculate as 400ml	225ml	↓
7											
8											
9											

Comments:

Mercury Perkin-Elmer AAWinLab

ID #	Sample_ID	Sam_Date	Sam_Time	Mean_Sig	Mean_ST	Mean_SA	Units	Wt	Dilu
1	Calib Blank	6/17/2003	12:48:25	0.000534			mg/L		
2	STD1=.100ug	6/17/2003	12:49:26	0.014085			mg/L		
3	STD2=.200ug	6/17/2003	12:50:28	0.027796			mg/L		
4	STD3=.300ug	6/17/2003	12:51:34	0.040923			mg/L		
5	STD4=.400ug	6/17/2003	12:52:38	0.056473			mg/L		
6	STD5=.500ug	6/17/2003	12:53:43	0.069552			mg/L		
7	Reagent Blank	6/17/2003	12:55:15	-0.000048	-0.00034	-0.00034	mg/L		
8	0.010 = DL	6/17/2003	12:56:23	0.001281	0.00917	0.00917	mg/L		
9	0.200 = QC STD 2	6/17/2003	12:57:28	0.027683	0.198509	0.198509	mg/L		
10	0.200 = QC STD 3	6/17/2003	12:58:32	0.027609	0.197977	0.197977	mg/L		
11	0.020 = DL	6/17/2003	12:59:39	0.002734	0.019576	0.019576	mg/L		
12	REAGENT BLANK	6/17/2003	13:00:43	-9.03E-05	-0.00065	-0.00065	mg/L		
13	1832-B-001	6/17/2003	13:28:02	0.000209	0.001495	0.089703	mg/L	10	600
14	1832-B-002	6/17/2003	13:29:34	0.00013	0.000934	0.065376	mg/L	10	700
15	1832-B-003	6/17/2003	13:31:09	0.000136	0.000976	0.058538	mg/L	10	600
16	1832-B-004-SPK	6/17/2003	13:32:43	0.024964	0.17898	10.73879	mg/L	10	600
17	1832-B-005	6/17/2003	13:34:16	0.000176	0.001258	0.075471	mg/L	10	600
18	1832-B-006	6/17/2003	13:35:49	0.000162	0.00116	0.046404	mg/L	10	400
19	0.010 = DL	6/17/2003	13:36:54	0.001437	0.010287	0.010287	mg/L	10	400
20	0.200 = QC STD 2	6/17/2003	13:37:59	0.027912	0.200151	0.200151	mg/L	10	400
21	REAGENT BLANK	6/17/2003	13:39:05	0.000105	0.00075	0.00075	mg/L	10	400
22	1832-A-001	6/17/2003	13:46:46	1.82E-05	0.00013	0.002599	mg/L	10	200
23	1832-A-002	6/17/2003	13:48:18	0.000175	0.001249	0.024988	mg/L	10	200
24	1832-A-003	6/17/2003	13:49:47	6.72E-05	0.000481	0.009626	mg/L	10	200
25	1832-A-004-SPK	6/17/2003	13:51:16	0.022524	0.161458	3.229151	mg/L	10	200
26	1832-A-005	6/17/2003	13:52:47	3.12E-05	0.000223	0.004464	mg/L	10	200
27	1832-A-006	6/17/2003	13:54:17	0.000141	0.001011	0.020222	mg/L	10	200
28	0.010 = DL	6/17/2003	13:55:21	0.001309	0.00937	0.00937	mg/L	10	200
29	0.200 = QC STD 2	6/17/2003	13:56:29	0.028285	0.202832	0.202832	mg/L	10	200
30	REAGENT BLANK	6/17/2003	13:57:31	0.000113	0.000808	0.000808	mg/L	10	200
31	1832-BH-001	6/17/2003	14:26:45	0.004586	0.032838	2.627031	mg/L	10	800
32	1832-BH-002	6/17/2003	14:28:16	0.004396	0.031471	2.58063	mg/L	10	820
33	1832-BH-003	6/17/2003	14:29:48	0.00402	0.028784	2.389036	mg/L	10	830
34	1832-BH-004-SPK	6/17/2003	14:31:23	0.031698	0.227356	18.87056	mg/L	10	830
35	0.010 = DL	6/17/2003	14:32:28	0.001353	0.009684	0.009684	mg/L	10	830
36	0.200 = QC STD 2	6/17/2003	14:33:33	0.028058	0.201196	0.201196	mg/L	10	830
37	REAGENT BLANK	6/17/2003	14:34:35	2.65E-05	0.00019	0.00019	mg/L	10	830
38	1832-BH-005	6/17/2003	14:36:07	0.000478	0.003418	0.102537	mg/L	10	300
39	1832-BH-006	6/17/2003	14:37:41	0.0004	0.002863	0.083031	mg/L	10	290
40	0.010 = DL	6/17/2003	14:38:49	0.00143	0.010233	0.010233	mg/L	10	290
41	0.200 = QC STD 3	6/17/2003	14:39:54	0.028272	0.202736	0.202736	mg/L	10	290
42	0.020 = DL	6/17/2003	14:40:59	0.002937	0.021025	0.021025	mg/L	10	290
43	REAGENT BLANK	6/17/2003	14:42:02	-9.95E-05	-0.00071	-0.00071	mg/L	10	290
44	Calib Blank	6/19/2003	9:05:31	0.000443			mg/L		
45	STD1=.100ug	6/19/2003	9:06:32	0.014004			mg/L		
46	STD2=.200ug	6/19/2003	9:07:34	0.027399			mg/L		

ID #	Sig 1	Std_U 1	Smp_U 1	Sig 2	Std_U 2	Smp_U 2
1	0.0005335					
2	0.01408514					
3	0.02779602					
4	0.04092301					
5	0.05647348					
6	0.06955246					
7	-0.0000753	-0.0005396	-0.0005396	-0.0000206	-0.0001477	-0.0001477
8	0.00128101	0.00916968	0.00916968			
9	0.02768342	0.19850877	0.19850877			
10	0.02760936	0.19797674	0.19797674			
11	0.00273449	0.01957578	0.01957578			
12	-0.0000903	-0.0006465	-0.0006465			
13	0.00020787	0.00148786	0.08927194	0.00020987	0.0015022	0.0901337
14	0.0001579	0.00113025	0.07911777	0.00010305	0.0007376	0.0516334
15	0.00018375	0.00131527	0.07891631	0.00008885	0.000636	0.03816
16	0.02498496	0.1791269	10.7476142	0.024944	0.1788328	10.729966
17	0.00013001	0.00093059	0.05583587	0.00022145	0.0015851	0.0951061
18	0.00013435	0.00096168	0.03846722	0.0001898	0.0013585	0.0543407
19	0.00143714	0.01028739	0.01028739			
20	0.02791198	0.20015072	0.20015072			
21	0.00010471	0.0007495	0.0007495			
22	0.0000747	0.00053468	0.01069379	-0.0000383	-0.0002748	-0.0054967
23	0.0002082	0.00149023	0.02980465	0.0001409	0.0010085	0.0201704
24	0.00007223	0.000517	0.01034	0.00006226	0.0004456	0.0089126
25	0.02269532	0.16268684	3.25373695	0.02235283	0.1602282	3.204564
26	-0.0000285	-0.0002042	-0.0040849	0.00009089	0.0006506	0.0130122
27	0.00016653	0.00119197	0.02383954	0.00011598	0.0008302	0.0166037
28	0.00130898	0.00936989	0.00936989			
29	0.02828522	0.20283219	0.20283219			
30	0.00011281	0.00080751	0.00080751			
31	0.00462553	0.03311752	2.64940202	0.00454744	0.0325583	2.6046606
32	0.00444957	0.03185732	2.61230058	0.00434171	0.0310849	2.5489593
33	0.00408975	0.02928041	2.43027476	0.00395099	0.0282867	2.3477979
34	0.0320886	0.23016415	19.1036246	0.03130727	0.2245482	18.6375
35	0.00135286	0.00968403	0.00968403			
36	0.02805752	0.20119628	0.20119628			
37	0.00002653	0.00018992	0.00018992			
38	0.00049456	0.00353998	0.10619957	0.00046045	0.0032958	0.0988745
39	0.00038044	0.00272311	0.07897025	0.00041956	0.0030031	0.0870911
40	0.00142951	0.01023272	0.01023272			
41	0.02827185	0.20273608	0.20273608			
42	0.00293686	0.02102474	0.02102474			
43	-0.0000995	-0.0007122	-0.0007122			
44	0.00044291					
45	0.01400434					
46	0.02739905					

Mercury Perkin-Elmer AAWinLab

ID #	Sample_ID	Sam_Date	Sam_Time	Mean_Sig	Mean_ST	Mean_SA	Units	Wt	Dilu
47	STD3=.300ug	6/19/2003	9:08:37	0.040599			mg/L		
48	STD4=.400ug	6/19/2003	9:09:41	0.055286			mg/L		
49	STD5=.500ug	6/19/2003	9:10:49	0.071994			mg/L		
50	Reagent Blank	6/19/2003	9:12:21	1.99E-05	0.000146	0.000146	mg/L		
51	0.010 = DL	6/19/2003	9:13:25	0.001352	0.009919	0.009919	mg/L		
52	0.200 = QC STD 2	6/19/2003	9:14:30	0.027658	0.200351	0.200351	mg/L		
53	0.200 = QC STD 3	6/19/2003	9:15:34	0.02805	0.203149	0.203149	mg/L		
54	0.020 = DL	6/19/2003	9:16:40	0.002796	0.020491	0.020491	mg/L		
55	REAGENT BLANK	6/19/2003	9:17:47	9.9E-07	7.31E-06	7.31E-06	mg/L		
56	1832-FH-BLK	6/19/2003	10:08:49	-6.2E-06	-4.6E-05	-0.00046	mg/L	10	100
57	1832-FH-BLK-SPK	6/19/2003	10:10:20	0.027946	0.202407	5.060171	mg/L	4	100
58	0.010 = DL	6/19/2003	10:11:24	0.001413	0.010365	0.010365	mg/L	4	100
59	0.200 = QC STD 2	6/19/2003	10:12:29	0.028223	0.20439	0.20439	mg/L	4	100
60	REAGENT BLANK	6/19/2003	10:13:31	1.17E-05	8.6E-05	8.6E-05	mg/L	4	100
61	1832-FH-001	6/19/2003	10:22:47	0.001852	0.01358	0.135796	mg/L	10	100
62	1832-FH-002	6/19/2003	10:24:21	0.003464	0.025376	0.253763	mg/L	10	100
63	1832-FH-003	6/19/2003	10:25:59	0.002099	0.01539	0.153903	mg/L	10	100
64	1832-FH-004-SPK	6/19/2003	10:27:34	0.03226	0.233183	2.33183	mg/L	10	100
65	1832-FH-005	6/19/2003	10:29:05	0.000178	0.001307	0.013069	mg/L	10	100
66	0.010 = DL	6/19/2003	10:30:07	0.001474	0.01081	0.01081	mg/L	10	100
67	0.200 = QC STD 2	6/19/2003	10:31:12	0.027989	0.202719	0.202719	mg/L	10	100
68	REAGENT BLANK	6/19/2003	10:32:15	6.27E-05	0.00046	0.00046	mg/L	10	100
69	1832-FH-006	6/19/2003	10:33:47	6.06E-05	0.000445	0.004446	mg/L	10	100
70	0.010 = DL	6/19/2003	10:48:30	0.001446	0.010605	0.010605	mg/L	10	600
71	0.200 = QC STD 2	6/19/2003	10:49:38	0.028028	0.202999	0.202999	mg/L	10	600
72	REAGENT BLANK	6/19/2003	10:50:40	0.000173	0.001269	0.001269	mg/L	10	600
73	1832-C-001	6/19/2003	11:12:02	0.001751	0.012842	0.513667	mg/L	10	400
74	1832-C-002	6/19/2003	11:13:36	0.002237	0.016401	0.656059	mg/L	10	400
75	1832-C-003	6/19/2003	11:15:07	0.003209	0.023513	0.940531	mg/L	10	400
76	1832-C-004-SPK	6/19/2003	11:16:39	0.002967	0.021744	0.869755	mg/L	10	400
77	1832-C-005	6/19/2003	11:18:12	0.000653	0.00479	0.191588	mg/L	10	400
78	1832-C-006	6/19/2003	11:19:45	0.000511	0.003747	0.149883	mg/L	10	400
79	0.010 = DL	6/19/2003	11:25:29	0.001396	0.010241	0.010241	mg/L	2	1
80	0.200 = QC STD 2	6/19/2003	11:26:33	0.028962	0.209668	0.209668	mg/L	2	1
81	Reagent Blank	6/19/2003	11:29:12	8.88E-05	0.000652	0.000652	mg/L	2	1
82	Calib Blank	6/24/2003	14:47:28	0.000988			mg/L		
83	STD1=.100ug	6/24/2003	14:48:28	0.015011			mg/L		
84	STD2=.200ug	6/24/2003	14:49:30	0.030386			mg/L		
85	STD3=.300ug	6/24/2003	14:50:34	0.047784			mg/L		
86	STD4=.400ug	6/24/2003	14:51:38	0.062101			mg/L		
87	STD5=.500ug	6/24/2003	14:52:46	0.076884			mg/L		
88	Reagent Blank	6/24/2003	14:54:18	-2.84E-05	-0.00019	-0.00019	mg/L		
89	0.010 = DL	6/24/2003	14:55:21	0.001437	0.009515	0.009515	mg/L		
90	0.200 = QC STD 2	6/24/2003	14:56:26	0.029446	0.192504	0.192504	mg/L		
91	0.200 = QC STD 3	6/24/2003	14:57:31	0.030379	0.198523	0.198523	mg/L		
92	0.020 = DL	6/24/2003	14:58:37	0.002926	0.019359	0.019359	mg/L		

ID #	Sig 1	Std_U 1	Smp_U 1	Sig 2	Std_U 2	Smp_U 2
47	0.04059904					
[redacted]	0.05528628					
[redacted]	0.07199438					
50	-0.0000562	-0.0004125	-0.0004125	0.00009596	0.0007042	0.0007042
51	0.00135247	0.00991903	0.00991903			
52	0.02765815	0.200351	0.200351			
53	0.02804954	0.20314895	0.20314895			
54	0.00279584	0.02049078	0.02049078			
55	0.00000099	0.00000731	0.00000731			
56	-0.0000195	-0.0001437	-0.0014377	0.00000714	5.242E-05	0.0005243
57	0.02821795	0.20435264	5.10881606	0.02767355	0.2004611	5.0115267
58	0.00141334	0.01036521	0.01036521			
59	0.0282232	0.20439013	0.20439013			
60	0.00001172	0.00008602	0.00008602			
61	0.00185489	0.01360059	0.13600593	0.00184915	0.0135585	0.1355854
62	0.00342039	0.02506069	0.25060692	0.0035067	0.025692	0.2569199
63	0.00217708	0.01596049	0.15960495	0.00202137	0.0148201	0.148201
64	0.03227267	0.23327465	2.33274655	0.03224693	0.2330914	2.3309136
65	0.00021606	0.00158548	0.01585487	0.00014013	0.0010283	0.0102832
66	0.00147403	0.01080998	0.01080998			
67	0.02798942	0.20271929	0.20271929			
[redacted]	0.00006274	0.00046042	0.00046042			
69	0.00004434	0.00032541	0.00325414	0.00007683	0.0005638	0.0056383
70	0.00144604	0.01060484	0.01060484			
71	0.02802849	0.20299853	0.20299853			
72	0.00017291	0.00126887	0.00126887			
73	0.00172959	0.01268261	0.50730472	0.00177301	0.0130007	0.5200289
74	0.00229133	0.01679723	0.67188948	0.00218325	0.0160057	0.6402286
75	0.00322883	0.02365929	0.94637175	0.00318891	0.0233672	0.9346898
76	0.0029797	0.02183634	0.8734539	0.00295443	0.0216514	0.8660558
77	0.00064089	0.00470187	0.18807502	0.00066483	0.0048775	0.1951011
78	0.00051825	0.00380241	0.15209662	0.00050317	0.0036918	0.1476703
79	0.00139641	0.01024111	0.01024111			
80	0.02896195	0.20966772	0.20966772			
81	0.00009548	0.0007007	0.0007007	0.00008216	0.000603	0.000603
82	0.0009882					
83	0.01501071					
84	0.03038553					
85	0.0477837					
86	0.06210067					
87	0.07688407					
[redacted]	-0.0000451	-0.0002991	-0.0002991	-0.0000116	-0.0000774	-0.0000774
89	0.00143737	0.00951503	0.00951503			
90	0.02944586	0.19250358	0.19250358			
91	0.03037921	0.19852329	0.19852329			
92	0.00292638	0.01935901	0.01935901			

Mercury Perkin-Elmer AAWinLab

ID #	Sample_ID	Sam_Date	Sam_Time	Mean_Sig	Mean_ST	Mean_SA	Units	Wt	Dilu
93	REAGENT BLANK	6/24/2003	14:59:44	0.000143	0.00095	0.00095	mg/L		
94	1832-C-003	6/24/2003	15:04:14	0.003432	0.022698	0.907907	mg/L	10	400
95	1832-C-004-SPK	6/24/2003	15:05:46	0.03243	0.211733	8.469327	mg/L	10	400
96	0.010 = DL	6/24/2003	15:16:13	0.001604	0.01062	0.01062	mg/L	10	500
97	0.200 = QC STD 2	6/24/2003	15:17:18	0.028714	0.187778	0.187778	mg/L	10	500
98	REAGENT BLANK	6/24/2003	15:18:20	5.91E-05	0.000391	0.000391	mg/L	10	500

ID #	Sig 1	Std_U 1	Smp_U 1	Sig 2	Std_U 2	Smp_U 2
93	0.00014338	0.00094972	0.00094972			
[illegible]	0.00346886	0.02294213	0.91768542	0.00339483	0.0224532	0.8981291
[illegible]	0.03310248	0.21605862	8.64234489	0.03175816	0.2074077	8.2963084
96	0.00160447	0.0106204	0.0106204			
97	0.02871362	0.18777752	0.18777752			
98	0.00005909	0.0003914	0.0003914			

OPERATING DATA

G

Plant Name: NBWD

General Average Report

Reporting Period: 06/05/2003 to 06/05/2003

Site Name: UNIT1

Data Averaging Type: 15m

Time of Report: 06/09/03 08:32

Rolling Average Interval: 1

Date	Time	STMRPT_1 (KLB/HR)
06/05/03	00:00	170.7
	00:15	175.1
	00:30	176.7
	00:45	176.7
	01:00	178.3
	01:15	182.7
	01:30	181.6
	01:45	170.5
	02:00	176.2
	02:15	181.7
	02:30	185.7
	02:45	187.3
	03:00	183.6
	03:15	184.0
	03:30	184.7
	03:45	185.7
	04:00	185.2
	04:15	185.8
	04:30	185.1
	04:45	184.2
	05:00	181.4
	05:15	178.6
	05:30	148.8
	05:45	165.9
	06:00	181.2
	06:15	186.6
	06:30	187.4
	06:45	185.8
	07:00	183.5
	07:15	180.5
	07:30	184.6
	07:45	185.9
	08:00	184.4
	08:15	184.4
	08:30	186.4
	08:45	182.8
	09:00	183.2
	09:15	184.2
	09:30	184.4
	09:45	183.3
	10:00	183.2
	10:15	184.6
	10:30	185.6
	10:45	184.7
	11:00	181.6
	11:15	182.9
	11:30	184.1
	11:45	182.8
	12:00	184.7
	12:15	184.3

Run 1

Run 2

General Average Report

Reporting Period: 06/05/2003 to 06/05/2003

Site Name: UNIT1

Time of Report: 06/09/03 08:32

Data Averaging Type: 15m

Rolling Average Interval: 1

Date	Time	STMRPT_1 (KLB/HR)
06/05/03	12:30	184.6
	12:45	183.6
	13:00	184.3
	13:15	185.4
	13:30	184.3
	13:45	184.0
	14:00	182.7
	14:15	185.1
	14:30	186.1
	14:45	185.4
	15:00	183.4
	15:15	183.2
	15:30	181.7
	15:45	184.7
	16:00	185.0
	16:15	183.1
	16:30	183.0
	16:45	174.6
	17:00	172.3
	17:15	182.2
	17:30	183.9
	17:45	183.9
	18:00	182.8
	18:15	184.2
	18:30	183.5
	18:45	178.9
	19:00	181.0
	19:15	182.2
	19:30	184.4
	19:45	183.2
	20:00	184.7
	20:15	185.3
	20:30	181.1
	20:45	159.0
	21:00	164.1
	21:15	162.1
	21:30	165.2
	21:45	173.3
	22:00	177.1
	22:15	178.3
	22:30	182.0
	22:45	181.4
	23:00	181.9
	23:15	184.2
	23:30	184.5
	23:45	185.4

Run 3

Average =	181.2
Geometric Avg. =	181.1
Maximum =	187.4
Minimum =	148.8
Possible Values =	96
Included Values =	96
Total =	17399.8

* - excluded values (missing, OOC, invalid, suspect)

< - missing