7 APPENDICES

A. Source Emissions Calculations

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APPENDIX A

Nomenclature and Equations
for
Calculation of Source Emissions

NOMENCLATURE FOR PARTICULATE CALCULATIONS

Symbol	English Units	Metric Units	Description
A_s	in.^{2}	m^2	Stack Area
C_{an}	gr/dscf*	g/dscm*	Particulate - probe, cyclone, and filter
C_{ao}	gr/dscf*	g/dscm*	Particulate - total
C_{at}	gr/CF @ stack conditions	g/m^3	Particulate - probe, cyclone, and filter
C_{au}	gr/CF @ stack conditions	g/m^3	Particulate - total
C_{aw}	lbs/hr	kg/hr	Particulate - probe, cyclone, and filter
C_{ax}	lbs/hr	kg/hr	Particulate - total
C_p			Pitot Tube Calibration Factor
D_n	in.	m	Sampling Nozzle Diameter
%EA			Percent Excess Air at sampling point
g	32.174 ft/sec^2		Acceleration of Gravity
%I			Percent Isokinetic
%M			Percent Moisture in the stack gas by volume
M_d			Mole fraction of dry gas

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

Symbol	English Units	Metric Units	Description
m_f	mg	mg	Particulate - probe, cyclone, and filter
M_{water}	18 lb/lb-mole		Molecular Weight of water
m_t	mg	mg	Particulate - total
MW	lb/lb-mole	g/g-mole	Molecular Weight of stack gas
MW_{air}	28.96 lb/ lb-mole		Molecular Weight of air
MW_d	lb/lb-mole	g/g-mole	Molecular Weight of dry stack gas
P_b	"Hg Absolute	mm Hg	Barometric Pressure
P_m	"H_2O	mm H_2O	Orifice Pressure drop
P_s	"Hg Absolute	mm Hg	Stack Pressure
ΔP	"H_2O	mm H_2O	Velocity Head of stack gas
P_{std}	29.92 "Hg	760 mm Hg	Standard Barometric Pressure
Q_a	ACFM	m^3/hr	Stack Gas Volume at actual stack conditions
Q_s	DSCFM*	dscm/hr*	Stack Gas Volume at 29.92 "Hg, 528°R, dry
R	21.83 "Hg-ft^3/lb-mole°R		Universal Gas Constant
T_m	°F	°C	Average Gas Meter Temperature

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

Symbol	English Units	Metric Units	Description
T_t	min	min	Net time of test
T_s	°F	°C	Stack Temperature
T_{std}	528°R	293°K	Standard Temperature
V_m	ft^3	m^3	Volume of dry gas sampled @ meter conditions
Vm_{std}	dscf*	dscm*	Volume of dry gas sampled @ standard conditions
V_s	fpm	m/sec	Stack velocity @ stack conditions
V_w	ml	ml	Total water collected in impingers and silica gel
Vw_{gas}	scf*	scm*	Volume of water vapor collected @ standard conditions
ρ_{air}	0.0752 lbs/ft^3		Density of Air
ρ_{water}	1 g/ml		Density of Water
ρ_{man}	62.32 lbs/ft^3		Density of Manometer Oil

Standard Conditions: 29.92 "Hg, 68°F (760 mm Hg, 20°C)

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

EXAMPLE CALCULATIONS

1. Volume of dry gas sampled at standard conditions.*

$$Vm_{std} = Vm \left(\frac{T_{std}}{T_m + 460} \right) \left[\frac{P_b + \frac{P_m}{13.6}}{P_{std}} \right]$$

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460} \right] = dscf$$

$$Vm_{std} = dscf \times 0.028317 = dscm$$

2. Volume of water vapor collected at standard conditions.*

$$Vw_{gas} = \frac{(V_w - gms\ SO_2 - gms\ H_2S)\ \rho_{water}\ R\ T_{std}}{P_{std}\ M_{water}\ 453.6}$$

$$Vw_{gas} = 0.0472\ (V_w - gms\ SO_2 - gms\ H_2S) = scf$$

$$Vw_{gas} = scf \times 0.028317 = scm$$

3. Percent moisture in stack gas.

$$\%M = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \%$$

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

4. Mole fraction of dry gas.

$$M_d = \frac{100 - \%M}{100}$$

5. Average molecular weight of dry stack gas.

$$MW_d = \left[\%CO_2 \times \frac{44}{100}\right] + \left[\%O_2 \times \frac{32}{100}\right] + \left[\%N_2 \times \frac{28}{100}\right] + \left[\%CO \times \frac{28}{100}\right] = lb/lb\text{-}mole$$

$$= g/g\text{-}mole$$

6. Molecular weight of stack gas.

$$MW = MW_d \times M_d + 18\ (1 - M_d) = \frac{lb}{lb\text{-}mole} = g/g\text{-}mole$$

7. Percent excess air at sampling point.

$$\%EA = \frac{100\ [\%O_2 - (0.5\ \%CO)]}{0.265\ (\%N_2) - [\%O_2 - (0.5\ \%CO)]}$$

8. Stack Pressure.

$$P_s = P_b + \frac{Stack\ Pressure\ "H_2O}{13.6} = "Hg\ Absolute$$

$$P_s = "Hg\ Abs. \times 25.4 = mm\ Hg$$

9. Stack velocity at stack conditions.

$$V_s = C_p\ 60 \left[\frac{2g \times \rho_{man} \times P_{std} \times MW_{air} \times (T_s + 460) \times \Delta P_s}{12 \times \rho_{air} \times P_s \times MW \times T_{std}} \right]^{1/2}$$

$$V_s = 5{,}123.8\ C_p \left[\frac{(T_s + 460)}{P_s \times MW} \right]^{1/2} \sqrt{\Delta P}\ average = fpm$$

$$V_s = fpm \times 0.00508 = m/\text{sec}$$

10. Dry stack gas volume at standard conditions.*

$$Q_s = \frac{1}{144}\ V_s \times A_s \times M_d \times \frac{T_{std}}{T_s + 460} \times \frac{P_s}{P_{std}}$$

$$Q_s = \frac{0.123\ V_s \times A_s \times M_d \times P_s}{T_s + 460} = DSCFM$$

$$Q_s = DSCFM \times 1.6990 = dscm/hr$$

11. Actual stack gas volume at stack conditions.

$$Q_a = \frac{V_s \times A_s}{144} = ACFM$$

$$Q_a = ACFM \times 1.6990 = m^3/hr$$

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

12. Percent isokinetic.

$$\%I = \frac{Vm_{std} \times (T_s + 460) \times P_{std} \times 100 \times 144\ in^2/ft^2}{M_d \times T_{std} \times P_s \times T_t \times V_s \left(\frac{\pi \times D_n^2}{4}\right)}$$

$$\%I = \frac{1039 \times Vm_{std} \times (T_s + 460)}{M_d \times P_s \times T_t \times V_s \times D_n^2}$$

13. Particulate - probe, cyclone, and filter.

$$C_{an} = \frac{m_f}{Vm_{std}} \times \frac{1\ gr}{64.8\ mg}$$

$$C_{an} = 0.0154 \times \frac{m_f}{Vm_{std}} = gr/dscf*$$

$$C_{an} = gr/dscf \times 2.290 = g/dscm*$$

14. Particulate total.

$$C_{ao} = 0.0154 \times \frac{m_t}{Vm_{std}} = gr/dscf*$$

$$C_{ao} = gr/dscf \times 2.290 = g/dscm*$$

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

15. Particulate - probe, cyclone, and filter at stack conditions.

$$C_{at} = C_{an} \times \frac{P_s}{P_{std}} \times \frac{(T_{std})}{(T_s + 460)} \times M_d$$

$$C_{at} = \frac{17.65 \times C_{an} \times P_s \times M_d}{T_s + 460} = gr/CF$$

$$C_{at} = gr/CF \times 2.290 = g/m^3$$

16. Particulate - total, at stack conditions.

$$C_{au} = \frac{17.65 \times C_{ao} \times P_s \times M_d}{T_s + 460} = gr/CF$$

$$C_{au} = gr/CF \times 2.290 = g/m^3$$

17. Particulate - probe, cyclone, and filter.

$$C_{aw} = C_{an} \times Q_s \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}}$$

$$C_{aw} = 0.00857 \times C_{an} \times Q_s = lbs/hr$$

$$C_{aw} = lbs/hr \times 0.4536 = kg/hr$$

18. Particulate - total.

$$C_{ax} = 0.00857 \times C_{ao} \times Q_s = lbs/hr$$

$$C_{ax} = lbs/hr \times 0.4536 = kg/hr$$

19. Mercury – ug/dscm

ug/dscm = ug ÷ (Vm_{std} x 0.028317m^3/ft^3)

20. Mercury – lbs/10^{12} Btu

lbs/10^{12} Btu = ug ÷ Vm_{std} x (2.205 x 10^{-9} lbs/ug) x F_d x [20.9 ÷ (20.9 – O_2)] x (1.0 x 10^6)

F_d = Oxygen based F factor of 9,780 dscf*/million Btu

* 29.92 "Hg, 68 °F (760 mm Hg, 20 °C)

METCO ENVIRONMENTAL

SOURCE EMISSION SURVEY

JOB NUMBER: 99-158
JOB NAME: THE DETROIT EDISON COMPANY
LOCATION: EAST CHINA, MICHIGAN
UNIT TESTED: UNIT NUMBER 4 PRECIPITATOR INLET DUCT

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			11/03/99	11/03/99	11/04/99
BEGIN TIME			0915	1320	0840
END TIME			1120	1525	1045
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	29.09 (739)	29.16 (741)	29.56 (751)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	0.755 (19.2)	0.761 (19.3)	0.888 (22.6)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	62.265 (1.763)	62.466 (1.769)	66.517 (1.884)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	69 (21.00)	72 (22.00)	71 (22.00)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	60.549 (1.715)	60.548 (1.715)	65.501 (1.855)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	115.1	120.3	115.7
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	5.433 (0.154)	5.678 (0.161)	5.461 (0.155)
%M	MOISTURE IN STACK GAS BY VOLUME	%	8.23	8.57	7.70

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

METCO ENVIRONMENTAL

SOURCE EMISSION CALCULATIONS

THE DETROIT EDISON COMPANY
EAST CHINA, MICHIGAN
UNIT NUMBER 4 PRECIPITATOR INLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.9177	0.9143	0.9230
CO2		%	12.2	12.2	11.8
O2		%	7.4	7.2	8.0
CO		%	0.0	0.0	0.0
N2		%	80.4	80.6	80.2
%EA	EXCESS AIR @ SAMPLING POINT	%	53.2	50.9	60.4
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.25 (30.25)	30.24 (30.24)	30.21 (30.21)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	29.24 (29.24)	29.19 (29.19)	29.27 (29.27)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	0.900 (22.9)	0.928 (23.6)	1.064 (27.0)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	280 (138)	284 (140)	286 (141)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	27.97 (710)	28.04 (712)	28.52 (724)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	3,690 (18.75)	3,766 (19.13)	3,992 (20.28)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	13,225 (8.53)	13,225 (8.53)	13,225 (8.53)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	208,204 (353,739)	211,094 (358,649)	229,141 (389,311)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	338,889 (575,772)	345,832 (587,569)	366,623 (622,892)

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

THE DETROIT EDISON COMPANY
EAST CHINA, MICHIGAN
UNIT NUMBER 4 PRECIPITATOR INLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Tt	NET TIME OF TEST	MINUTES	125	125	125
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.200 (0.005)	0.200 (0.005)	0.200 (0.005)
%I	PERCENT ISOKINETIC	%	98.3	97.0	96.6
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	----	----	----
Mt	PARTICULATE - TOTAL	mg	----	----	----
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	----	----	----
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	----	----	----
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	----	----	----
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	----	----	----
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	----	----	----
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	----	----	----

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

METCO ENVIRONMENTAL

SOURCE EMISSION SURVEY

JOB NUMBER: 99-158
JOB NAME: THE DETROIT EDISON COMPANY
LOCATION: EAST CHINA, MICHIGAN
UNIT TESTED: UNIT NUMBER 4 STACK

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			11/03/99	11/03/99	11/04/99
BEGIN TIME			0915	1320	0840
END TIME			1158	1544	1100
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	28.89 (734)	28.96 (736)	29.36 (746)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	1.091 (27.7)	1.213 (30.8)	1.115 (28.3)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	66.314 (1.878)	70.751 (2.003)	70.622 (2.000)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	57 (14.00)	57 (14.00)	55 (13.00)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	65.586 (1.857)	70.165 (1.987)	71.260 (2.018)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	111.5	133.7	121.9
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	5.263 (0.149)	6.311 (0.179)	5.754 (0.163)
%M	MOISTURE IN STACK GAS BY VOLUME	%	7.43	8.25	7.47

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

THE DETROIT EDISON COMPANY
EAST CHINA, MICHIGAN
UNIT NUMBER 4 STACK

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.9257	0.9175	0.9253
CO2		%	12.0	11.2	11.4
O2		%	7.8	8.4	8.8
CO		%	0.0	0.0	0.0
N2		%	80.2	80.4	79.8
%EA	EXCESS AIR @ SAMPLING POINT	%	58.0	65.1	71.3
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.23 (30.23)	30.13 (30.13)	30.18 (30.18)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	29.32 (29.32)	29.13 (29.13)	29.27 (29.27)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	1.153 (29.3)	1.356 (34.4)	1.258 (32.0)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	279 (137)	288 (142)	286 (141)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	28.69 (729)	28.76 (731)	29.15 (740)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	4,171 (21.19)	4,566 (23.20)	4,356 (22.13)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	20,381 (13.15)	20,381 (13.15)	20,381 (13.15)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	375,774 (638,440)	403,794 (686,046)	394,821 (670,801)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	590,392 (1,003,076)	646,311 (1,098,082)	616,482 (1,047,403)

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

THE DETROIT EDISON COMPANY
EAST CHINA, MICHIGAN
UNIT NUMBER 4 STACK

SYMBOL	DESCRIPTION	UNITS			
Tt	NET TIME OF TEST	MINUTES	120	120	120
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.200 (0.005)	0.200 (0.005)	0.200 (0.005)
%I	PERCENT ISOKINETIC	%	94.7	94.3	97.9
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	----	----	----
Mt	PARTICULATE - TOTAL	mg	----	----	----
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	----	----	----
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	----	----	----
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	----	----	----
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	----	----	----
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	----	----	----
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	----	----	----

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

APPENDIX B

Field Data

METCO ENVIRONMENTAL

Job Number 99-158
Job Name Detroit Edison
Run Number 1
Unit #3 Precipitator Inlet Duct
Date 11-03-99
Operator Bass / Brown / Conway / Hepley
Sample Box No. Hg 1 Meter Box No. 27-2

Hg Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 35
Assumed Moisture % 8
Probe Length 10'
C Factor 1 to 0.23 to reference
Initial Leak @ 15.00 "Hg = 0.003 cfm
Final Leak @ 18.00 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A5	0915	344.002	0.57	0.42	0.42	8.50	284	277	251	35	69	70	259	thimble Q52
4	0920	345.81	0.52	0.38	0.38	7.50	282	254	252	37	69	70	263	filter 47095
3	0925	347.56	0.74	0.54	0.54	9.00	279	255	252	37	69	70	265	int. orsat
2	0930	349.64	0.57	0.42	0.42	8.00	279	254	253	37	68	69	265	EST
1	0935	351.51	0.65	0.48	0.48	8.50	275	283	252	37	68	69	268	
B5	0940	353.39	1.40	1.00	1.00	13.00	286	291	254	34	68	69	269	
4	0945	356.12	1.40	1.00	1.00	12.50	284	278	251	37	69	68	266	
3	0950	358.00	0.94	0.69	0.69	10.00	282	260	252	37	70	68	263	
2	0955	361.42	1.20	0.88	0.88	11.00	277	253	252	38	69	68	261	
1	1000	364.12	1.10	0.81	0.81	11.00	278	253	254	38	70	68	259	
C5	1005	366.52	1.25	0.92	0.92	12.00	291	263	253	38	70	68	258	
4	1010	369.10	1.40	1.00	1.00	13.00	289	267	254	39	70	67	258	
3	1015	371.96	0.96	0.70	0.70	10.50	284	271	253	39	70	67	258	
2	1020	374.37	0.96	0.70	0.70	10.50	~~260~~ 280	260	251	39	70	67	257	
1	1025	376.75	1.20	0.86	0.86	12.00	277	257	252	39	70	67	258	10 to 2.20
D5	1030	379.24	1.10	0.79	0.79	11.50	286	253	251	40	70	67	260	
4	1035	381.64	0.85	0.61	0.61	10.00	282	250	252	40	70	67	258	
3	1040	383.92	0.55	0.39	0.39	8.50	276	252	254	40	70	66	259	

Pitot Tube Calibration Factor C_p 0.808
Volume Collected V_m 62.265 ft^3
Water Collected V_w 115.1 ml
Time of Test T_t 125 min.
Stack Pressure P_s –15.30 "H_2O

Pitot Tube No. M5
Baro. Press. P_b 29.09 "Hg
Probe Tip Dia. D_n 0.200 in.
% CO_2 12.2 % CO 0.0
% O_2 7.4 % N_2 80.4
Area Stack A_s 13225 in^2

Barometer No. 19-1
Total Volume of Leak Checks After Start: – ft^3
V_m = Dry Gas Meter Calibration Factor 60.510 X 1.024

Probe Tip No. TFE1-7

[Dry Gas Meter Reading – ft^3 - (T_t – min. X Leak Rate – cfm)]

R-2

Impinger Box No. Hg 1

Impinger 1	Final Weight	708.8	Water Weight Gain	Impinger 1	75.6
	Initial Weight	633.2	Final 797.0		
	Increase	75.6	Int. 785.8	Impinger 2	19.2
			11.2		
Impinger 2	Final Weight	667.1		Impinger 3	4.9
	Initial Weight	647.9			
	Increase	19.2		Impinger 4	3.9
			V_w =		
Impinger 3	Final Weight	662.3	g SO_2 =	Impinger 5	0.5
	Initial Weight	657.4	V_w =		
	Increase	4.9		Impinger 6	0.3
Impinger 4	Final Weight	755.0		Impinger 7	-0.5
	Initial Weight	751.1		impinger 8	11.2
	Increase	3.9		Total	115.1 = V_w
Impinger 5	Final Weight	763.6	P_b = 29.09	%CO_2 =	12.2
	Initial Weight	763.1	V_m = 62.265	%O_2 =	7.4
	Increase	0.5	V_w = 115.1	%CO =	0.0
			P_m = 0.755	%N_2 =	80.4
Impinger 6	Final Weight	767.2	Avg ΔP = 0.900	A_s =	13225
	Initial Weight	766.9		D_n =	0.200
	Increase	0.3	Avg$\sqrt{\Delta P}$ = 0.937	T_t =	125
			C_p = 0.808		
Impinger 7	Final Weight	769.4	P_s = -15.30 "H_2O		27.97 "Hg
	Initial Weight	769.9	T_m = 69 °F		529 °R
	Increase	-0.5	T_s = 280 °F		740 °R

Moisture Content: %M = 8.23 M_d = 0.9177 MW_d = 30.248 MW = 29.24

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 62.265 \left[\frac{29.09 + \frac{0.755}{13.6}}{69 + 460}\right] = 60.549\ sft^3 = 0.484\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 115.1 = 5.433 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{5.433}{60.549 + 5.433} \times 100 = 8.23\ \%$$

$$V_s = 5123.8 \times 0.808 \sqrt{\frac{740}{29.97 \times 29.24}} \times 0.937 = 3690\ fpm$$

$$\%I = \frac{1{,}039 \times 60.549 \times 740}{27.97 \times 0.9177 \times 3690 \times 125 \times (0.200)^2} = 98.3\ \%$$

ACFM: 338889

SCFM: 208204

%EA: 53.2

Run Number 1

Unit 4B Precipitator Inlet Duct

Date 11-03-99

Hg FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
D2	1045	385.75	0.70	0.62	0.62	10.50	275	260	250	40	69	67	258	
1	1050	387.97	0.85	0.75	0.75	11.50	275	268	251	40	69	67	258	
E5	1055	390.28	0.78	0.69	0.69	11.50	278	252	253	40	69	66	257	
4	1100	392.53	0.60	0.53	0.53	10.00	274	253	252	40	69	67	257	
3	1105	394.76	0.60	1.00	1.00	14.00	277	255	251	40	70	67	257	ID +0 5.2
2	1110	397.60	0.80	1.35	1.35	16.00	277	258	251	40	71	67	257	
1	1115	400.82	0.80	1.35	1.35	16.00	278	262	253	40	72	67	256	
END	1120	404.512	–	–	–	–	–	–	–	–	–	–	–	

METCO ENVIRONMENTAL

Job Number 99.158
Job Name Detroit Edison
Run Number 2
Unit 4 Precipitator Inlet Duct
Date 11/03/99
Operator Bass / Conway / Brown / Hefley
Sample Box No. Hg 3 Meter Box No. 27-2

Hg Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 39
Assumed Moisture % 8.25
Probe Length 10'
C Factor 3 to 0.700 to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 16.00 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
E 5	1320	407.947	0.85	0.64	0.64	8.00	283	254	251	35	70	69	263	thimble Q53
4	1325	410.17	0.65	0.49	0.49	7.00	280	275	253	36	70	69	263	filter 47Q96
3	1330	412.17	0.65	0.49	0.49	7.00	279	279	254	37	70	70	263	int.orsat
2	1335	414.17	0.85	0.64	0.64	8.00	279	267	253	38	71	70	263	EST
1	1340	416.44	0.80	0.60	0.60	7.50	277	263	253	38	71	70	263	
D 5	1345	418.59	1.30	0.97	0.97	10.00	288	253	252	37	72	70	264	
4	1350	421.27	1.10	0.83	0.83	9.50	286	254	252	38	72	70	264	
3	1355	423.88	0.55	0.42	0.42	7.00	281	261	254	38	73	70	264	
2	1400	425.85	0.77	0.58	0.58	7.50	282	266	253	38	73	70	263	
1	1405	428.00	0.95	0.71	0.71	9.00	279	272	254	38	73	70	262	
C 5	1410	430.30	1.25	0.94	0.94	10.00	294	254	253	38	74	70	262	
4	1415	432.97	1.25	0.94	0.94	10.00	293	253	254	38	74	70	261	
3	1420	435.73	1.10	0.83	0.83	10.00	282	260	256	38	75	71	261	~~10 to 2.70~~
2	1425	438.36	0.95	0.85	0.85	10.00	282	272	252	38	75	71	261	10 to 2.70
1	1430	440.99	1.20	1.05	1.05	11.50	283	272	253	39	76	70	261	
B 5	1435	443.73	1.30	1.15	1.15	12.50	296	264	253	39	76	71	262	
4	1440	446.55	1.40	1.25	1.25	13.50	295	263	254	39	76	72	262	
3	1445	449.65	0.98	0.88	0.88	11.50	290	262	252	40	77	72	263	

Pitot Tube Calibration Factor C_p 0.808
Volume Collected V_m 62.466 ft^3
Water Collected V_w 120.3 ml
Time of Test T_t 125 min.
Stack Pressure P_s -15.30 "H_2O

Pitot Tube No. M5
Baro. Press. P_b 29.16 "Hg
Probe Tip Dia. D_n 0.200 in.
% CO_2 12.2 % CO 0.0
% O_2 7.2 % N_2 80.6
Area Stack A_s 13225 in^2

Barometer No. 19-1
Total Volume of Leak Checks After Start: – ft^3
V_m = Dry Gas Meter Calibration Factor 60.706 X 1.029

Probe Tip No. TFE 1-7

[Dry Gas Meter Reading – ft^3 - (T_t – min. X Leak Rate – cfm)]

Impinger Box No. Hg 3

Impinger 1	Final Weight	739.5		Impinger 1	85.1
	Initial Weight	654.4		Impinger 2	14.4
	Increase	85.1		Impinger 3	3.8
Impinger 2	Final Weight	758.3		Impinger 4	4.2
	Initial Weight	743.9		Impinger 5	0.8
	Increase	14.4		Impinger 6	0.8
Impinger 3	Final Weight	752.8		Impinger 7	0.6
	Initial Weight	749.0		Impinger 8	10.6
	Increase	3.8		Total	120.3 = V_w
Impinger 4	Final Weight	752.0			
	Initial Weight	747.8			
	Increase	4.2			
Impinger 5	Final Weight	752.8			
	Initial Weight	752.0			
	Increase	0.8			
Impinger 6	Final Weight	751.9			
	Initial Weight	751.1			
	Increase	0.8			
Impinger 7	Final Weight	756.1			
	Initial Weight	755.5			
	Increase	0.6			

Water Weight Gain

Imp 8
Final 929.0
Int. 918.4
10.6

V_w =
g SO_2 = -
V_w =

P_b =	29.16		$\%CO_2$ =	12.2
V_m =	62.466		$\%O_2$ =	7.2
V_w =	120.3		%CO =	0.0
P_m =	0.761		$\%N_2$ =	80.6
Avg ΔP =	~~0.906~~ 0.928		A_s =	13225
			D_n =	0.200
Avg$\sqrt{\Delta P}$ =	~~0.941~~ 0.954		T_t =	125
C_p =	0.808			
P_s =	-15.30	"H_2O	28.04	"Hg
T_m =	72	°F	532	°R
T_s =	234	°F	744	°R

Moisture Content: %M = 8.57 M_d = 0.9143 MW_d = 30.240 MW = 29.19

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 62.466 \left[\frac{29.16 + \frac{0.761}{13.6}}{72 + 460}\right] = \frac{60.548}{0.484}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 120.3 = 5.678 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{5.678}{60.548 + 5.678}$ x 100 = 8.57 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{744}{28.04 \times 29.19}}$ x $\frac{\cancel{0.941}}{0.954}$ = ~~3714~~ 3766 fpm

%I = $\frac{1{,}039 \times 60.548 \times 744}{28.04 \times 0.9143 \times \cancel{3714}\ 3766 \times 125 \times (0.200)^2}$ = ~~48.3~~ 97.0 %

ACFM: ~~341120~~ 345,832 / 211,094

SCFM: ~~208179~~

%EA: 50.9%

Run Number c

Unit 4 Precip. Inlet Duct

Date 11/03/99

Hg FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B2	1450	452.36	1.10	0.98	0.98	12.00	282	262	253	40	76	72	262	
1	1455	455.21	0.98	0.88	0.88	11.00	278	268	254	41	76	72	262	
A5	1500	457.79	0.60	0.54	0.54	8.50	289	257	253	41	76	72	262	
4	1505	459.96	0.60	0.54	0.54	8.50	286	255	255	40	75	72	262	
3	1510	461.98	0.68	0.61	0.61	9.50	283	282	252	40	75	72	262	
2	1515	464.22	0.65	0.58	0.58	9.50	281	272	254	40	75	72	262	
1	1520	466.43	0.70	0.63	0.63	9.50	280	268	253	40	75	72	263	
END	1525	468.653	–	–	–	–	–	–	–	–	–	–	–	

METCO ENVIRONMENTAL

Job Number 99-158 ✓
Job Name Detroit Edison ✓
Run Number 3 ✓
Unit 4 Precipitator Inlet Duct ✓
Date 11-04-99 ✓
Operator Bass / Brown / Conway / Hefley ✓
Sample Box No. Hg 1 Meter Box No. 27-2 ✓

Hg Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 39
Assumed Moisture % 8.25
Probe Length 10'
C Factor ~~3 to 0.700~~ to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 14.00 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (T_m)	Heated Line °F	Remarks
A5	0840	486.860	0.60	0.49	0.49	6.50	286	266	251	37	71	70	279	thimble Q54
4	0845	488.85	0.60	0.49	0.49	6.50	285	263	253	38	71	71	275	filter 47Q102
3	0850	490.83	0.87	0.71	0.71	7.50	284	259	252	38	71	71	269	int. orsat
2	0855	493.19	0.95	0.78	0.78	8.00	281	264	252	38	71	71	265	EST
1	0900	495.69	0.95	0.78	0.78	8.00	279	265	255	37	71	71	263	C factor
B5	0905	498.10	1.70	1.40	1.40	11.50	292	252	254	37	72	71	261	10 to 2.5
4	0910	501.25	1.65	1.35	1.35	11.50	291	263	254	38	73	70	259	
3	0915	504.54	1.05	0.85	0.85	9.00	290	289	253	38	73	70	258	
2	0920	507.20	1.35	1.10	1.10	10.00	286	283	255	38	73	70	258	
1	0925	510.12	1.10	0.90	0.90	9.50	283	277	254	38	73	70	257	
C5	0930	512.70	1.55	1.25	1.25	11.50	294	267	253	38	72	70	257	
4	0935	515.68	1.55	1.25	1.25	11.50	293	258	255	38	72	70	257	
3	0940	518.80	1.15	0.94	0.94	10.00	287	267	254	39	72	70	257	
2	0945	521.58	1.05	0.85	0.85	10.00	284	274	251	39	72	69	257	
1	0950	524.21	1.30	1.10	1.10	11.50	284	277	250	39	72	69	257	10 to 2.64
D5	0955	526.96	1.30	1.10	1.10	11.50	291	275	252	40	72	69	257	
4	1000	529.74	1.25	1.10	1.10	11.50	291	260	251	40	72	69	257	
3	1005	532.65	0.65	0.56	0.56	8.50	280	255	254	40	72	69	258	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 46.517 ✓ ft^3
Water Collected V_w 115.7 ✓ ml
Time of Test T_t 125 ✓ min.
Stack Pressure P_s -14.20 ✓ "H_2O

Pitot Tube No. M5 ✓
Baro. Press. P_b 29.56 ✓ "Hg
Probe Tip Dia. D_n 0.200 ✓ in.
% CO_2 11.8 ✓ % CO 0.0 ✓
% O_2 8.0 ✓ % N_2 80.2 ✓
Area Stack A_s 13225 ✓ in^2

Barometer No. 19-1 ✓
Probe Tip No. TFE1-7 ✓
Total Volume of Leak Checks After Start: – ft^3
V_m = Dry Gas Meter Calibration Factor ~~64.642~~ 64.642 X 1.029 ✓

[Dry Gas Meter Reading – ft^3 - (T_t – min. X Leak Rate – cfm)]

Impinger Box No. Hg 1

Impinger 1	Final Weight	720.9
	Initial Weight	635.5
	Increase	85.4
Impinger 2	Final Weight	661.4
	Initial Weight	646.7
	Increase	14.7
Impinger 3	Final Weight	658.6
	Initial Weight	657.0
	Increase	1.6
Impinger 4	Final Weight	751.9
	Initial Weight	748.2
	Increase	3.7
Impinger 5	Final Weight	761.9
	Initial Weight	762.5
	Increase	-0.6
Impinger 6	Final Weight	764.2
	Initial Weight	763.8
	Increase	0.4
Impinger 7	Final Weight	766.5
	Initial Weight	766.9
	Increase	-0.4

Water Weight Gain

Imp 8 Final 807.8
Int. 796.9
Inc. 10.9

V_w =
g SO_2 = -
V_w =

Impinger 1	85.4
Impinger 2	14.7
Impinger 3	1.6
Impinger 4	3.7
Impinger 5	-0.6
Impinger 6	0.4
Impinger 7	-0.4
Impinger 8	10.9
Total	115.7 = V_w

P_b =	29.56		$\%CO_2$ =	11.8
V_m =	66.517		$\%O_2$ =	8.0
V_w =	115.7		%CO =	0.0
P_m =	0.888		$\%N_2$ =	80.2
Avg ΔP =	1.064		A_s =	13225
			D_n =	0.200
Avg$\sqrt{\Delta P}$ =	1.020		T_t =	125
C_p =	0.808			
P_s =	-14.20	"H_2O	28.52	"Hg
T_m =	71	°F	531	°R
T_s =	286	°F	746	°R

Moisture Content: %M = 7.70 M_d = 0.9230 MW_d = 30.208 MW = 29.27

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 66.517 \left[\frac{29.56 + \frac{0.888}{13.6}}{71 + 460}\right] = 65.501\ sft^3 = 0.524\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 115.7 = 5.461 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{5.461}{65.501 + 5.461} \times 100 = 7.70\ \%$$

$$V_s = 5123.8 \times 0.808 \sqrt{\frac{746}{28.52 \times 29.27}} \times 1.020 = \frac{\cancel{4223}\ \cancel{4224}\ \text{MB}}{3992\ \text{fpm}}$$

ACFM: 366623

SCFM: 229141

$$\%I = \frac{1{,}039 \times 65.501 \times 746}{28.52 \times 0.9230 \times 3992 \times 125 \times (0.200)^2} = 96.6\ \%$$

%EA: 60.4

Run Number 9 x 3

Unit 4 Precipitator Inlet Duct

Date 11-04-99

Hg FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
D2	1010	534.88	0.94	0.82	0.82	10.00	281	251	253	40	71	68	258	
1	1015	537.36	0.80	0.69	0.69	10.00	281	255	254	40	71	68	258	
E5	1020	539.61	0.90	0.78	0.78	10.00	286	259	254	40	70	68	258	
4	1025	542.02	0.85	0.74	0.74	10.00	287	251	255	40	71	68	258	
3	1030	544.47	0.60	0.52	0.52	9.00	281	259	254	40	71	68	259	
2	1035	546.56	0.95	0.82	0.82	11.00	281	263	254	41	70	68	259	
1	1040	549.12	0.95	0.82	0.82	11.00	281	266	253	41	70	68	259	
END	1045	551.502	–	–	–	–	–	–	–	–	–	–	–	

METCO ENVIRONMENTAL

Job Number 99-158 ✓
Job Name Detroit Edison ✓
Run Number 1 ✓
Unit Unit 4 Stack ✓
Date 11-3-99 ✓
Operator Lee/Hart/Hafley ✓
Sample Box No. Hg-2 Meter Box No. 29-1 ✓

Hg Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 48
Assumed Moisture % 11%
Probe Length 3'
C Factor 1.03 → 1.05 to reference
Initial Leak @ 18.0 "Hg = 0.000 cfm
Final Leak @ 18.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
A1	0915	783.695	1.00	0.96	0.96	13.0	276	252	250	39	63	52	296	filter 47 Q94
1	0920	786.36	1.10	1.05	1.05	13.5	276	254	252	38	63	52	295	Port Orset
2	0925	789.13	1.25	1.20	1.20	15.0	277	255	254	37	65	50	295	
2	0930	792.11	1.20	1.15	1.15	15.0	277	254	255	37	64	50	292	
3	0935	795.08	1.30	1.20	1.20	15.0	277	256	256	37	64	50	293	
3	0940	798.02	1.30	1.20	1.20	15.0	277	256	257	37	64	50	293	
End	0945	801.027	—	—	—	—	—	—	—	—	—	—	—	leak rate 801.258; 17.0 0.000
B1	0956	801.569	0.94	0.90	0.90	11.5	278	264	258	37	65	50	288	leak rate 801.569; 17.0 0.000
1	1001	804.17	0.94	0.90	0.90	11.5	279	263	258	37	64	50	285	0.542
2	1006	806.84	1.30	1.20	1.20	12.5	279	258	258	37	64	50	282	
2	1011	809.65	1.35	1.25	1.25	13.0	280	251	257	36	64	50	283	
3	1016	812.59	1.30	1.20	1.20	13.0	280	251	258	36	64	51	280	
3	1021	815.54	1.30	1.20	1.20	13.0	280	264	258	37	64	51	281	
End	1026	818.486	—	—	—	—	—	—	—	—	—	—	—	leak rate 818.922; 16.0 0.000
C1	1039	818.937	0.90	0.86	0.86	9.5	273	273	259	37	65	51	283	leak rate 818.939; 16.0 0.000
1	1044	821.18	0.84	0.80	0.80	9.0	277	276	259	37	64	51	281	0.451
2	1049	823.47	1.10	1.05	1.05	10.0	280	274	259	37	63	51	281	
2	1054	826.28	1.10	1.05	1.05	10.0	281	277	260	37	63	51	283	

Pitot Tube Calibration Factor C_p ~~0.804~~ 0.811 ✓ SL
Volume Collected V_m 66.314 ✓ ft^3
Water Collected V_w 111.5 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -2.70 "H_2O

Pitot Tube No. M-7 ✓
Baro. Press. P_b 28.89 "Hg
Probe Tip Dia. D_n ~~0.199~~ 0.200 in. ✓
% CO_2 12.0 ✓ % CO 0 ✓
% O_2 7.8 % N_2 80.2
Area Stack A_s 20,381 ✓ in^2

Barometer No. 19-1 ✓
Total Volume of Leak Checks After Start: 2.785 ✓ ft^3
V_m = Dry Gas Meter Calibration Factor 1.000 ✓ X 66.314
[Dry Gas Meter Reading — ft^3 - (T_t — min. X Leak Rate — cfm)]

Probe Tip No. TFE-27 ✓

Impinger Box No. Hg 2

Impinger 1	Final Weight	810.5		Impinger 1	67.2
	Initial Weight	743.3	Imp 8 Final 851.6		
	Increase	67.2	Int. 839.6	Impinger 2	24.3
			12.0		
Impinger 2	Final Weight	774.5		Impinger 3	3.4
	Initial Weight	750.2			
	Increase	24.3		Impinger 4	4.5
			V_w =		
Impinger 3	Final Weight	730.1	g SO_2 = -	Impinger 5	-0.3
	Initial Weight	726.7	V_w =		
	Increase	3.4		Impinger 6	0.4
Impinger 4	Final Weight	756.5		Impinger 7	0.0
	Initial Weight	752.0		Impinger 8	12.0
	Increase	4.5		Total	111.5 = V_w
Impinger 5	Final Weight	673.6	P_b = 28.89	$\%CO_2$ =	12.0
	Initial Weight	673.9	V_m = 66.314	$\%O_2$ =	7.8
	Increase	-0.3	V_w = 111.5	%CO =	Ø
			P_m = 1.091	$\%N_2$ =	80.2
Impinger 6	Final Weight	752.4	Avg ΔP = 1.153	A_s =	20.381
	Initial Weight	752.0		D_n =	~~0.199~~ 0.200
	Increase	0.4	Avg$\sqrt{\Delta P}$ = 1.071	T_t =	120
			C_p = 0.811		
Impinger 7	Final Weight	682.0	P_s = -2.70 "H_2O		28.69 "Hg
	Initial Weight	682.0	T_m = 57 °F		517 °R
	Increase	0.0	T_s = 279 °F		739 °R

Moisture Content: %M = 7.43 M_d = 0.9257 MW_d = 30.232 MW = 29.32

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 66.314 \left[\frac{28.89 + \frac{1.091}{13.6}}{57 + 460}\right] = 65.586\ sft^3 = 0.547\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 111.5 = 5.263 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{5.263}{65.586 + 5.263} \times 100 = 7.43\ \%$$

$$V_s = 5123.8 \times 0.811 \sqrt{\frac{739}{28.69 \times 29.32}} \times 1.071 = 4171\ fpm$$

ACFM: 590392

SCFM: 375774

$$\%I = \frac{1{,}039 \times 65.586 \times 739}{120 \times 0.9257 \times 28.69 \times 4171 \times \cancel{(0.199)^2}\ 0.200} = \cancel{95.7}\ 94.7\ \%$$

%EA: 58.0

Run Number 1

Unit Unit 4 Stack

Date 11-3-98

Hfs FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line	Remarks
C3	1059	828.72	1.30	1.20	1.20	12.0	281	272	260	37	64	51	280	
3	1104	831.42	1.25	1.20	1.20	12.0	281	274	260	37	63	51	281	
End	1109	834.126	—	—	—	—	—	—	—	—	—	—	—	leak rate 834.446; 16.0 [illegible]
D1	1128	835.918	1.05	1.00	1.00	11.0	280	273	261	37	65	51	286	leak rate 835.918; 16.0 [illegible]
1	1133	838.58	1.00	0.96	0.96	11.0	280	279	261	38	63	51	284	1.792
2	1138	841.29	1.20	1.15	1.15	11.5	282	274	260	38	63	51	283	
2	1143	844.13	1.20	1.15	1.15	11.5	282	268	261	38	63	51	284	
3	1148	847.02	1.25	1.20	1.20	12.0	283	269	261	38	63	51	282	
3	1153	849.96	1.20	1.15	1.15	12.0	283	269	261	38	63	51	283	
End	1258	852.794	—	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-158 ✓
Job Name Detroit Edison ✓
Run Number 2 ✓
Unit Unit 4 Stack ✓
Date 11-3-99 ✓
Operator Hart / Lea / Heller ✓
Sample Box No. Hg-4 Meter Box No. 29-1 ✓

Hg Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 48
Assumed Moisture % 11%
Probe Length 3'
C Factor 2.0 ⇒ 2.30 to reference
Initial Leak @ 15.0 "Hg = 0.000 cfm
Final Leak @ 15.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (T_m)	Heated Line	Remarks
D1	1320	854.379	1.10	0.98	0.98	8.5	285	255	257	49	60	51	270	filter 47 Q 97
1	1325	857.170	1.10	0.98	0.98	8.5	285	255	257	47	60	51	270	
D2	1330	859.81	1.30	~~1.50~~ 1.15	~~1.50~~ 1.15	9.5	286	254	257	45	60	50	272	
2	1335	862.92	1.20	1.10	1.10	10.0	286	253	257	43	60	51	273	
3	1340	866.11	1.40	1.25	1.25	10.0	287	251	257	43	60	51	273	
3	1345	869.30	1.40	1.25	1.25	10.0	287	251	258	43	61	51	270	
End	1350	872.398	—	—	—	—	—	—	—	—	—	—	—	LEAK ✓ 872.610, 15.0 @ 0.000
C1	1357	872.792	1.10	0.98	0.98	8.5	287	251	259	45	63	51	272	LEAK ✓ 872.792, 15.0 @ 0.000
1	1402	875.54	1.10	0.98	0.98	8.5	287	255	259	44	63	51	272	0.394
2	1407	878.32	1.25	1.10	1.10	9.0	288	255	259	44	63	51	270	
2	1412	881.23	1.30	1.15	1.15	9.0	288	258	259	44	63	51	269	
3	1417	884.45	1.50	1.35	1.35	9.5	288	259	260	44	63	51	269	
3	1422	887.15	1.50	1.35	1.35	9.5	288	259	260	44	63	52	270	
End	1427	890.265	—	—	—	—	—	—	—	—	—	—	—	LEAK ✓ 890.462, 15.0 @ 0.000
B1	1437	890.675	1.35	1.20	1.20	9.5	288	263	259	47	66	52	271	LEAK ✓ 890.675, 15.0 @ 0.000
1	1442	893.55	1.35	1.20	1.20	9.5	289	262	258	45	65	52	270	0.410
2	1447	896.47	1.50	1.35	1.35	9.5	289	262	257	44	64	52	270	
2	1452	899.43	1.50	1.35	1.35	9.5	289	263	257	43	64	52	269	

Pitot Tube Calibration Factor C_p 0.811 ✓
Volume Collected V_m 70.751 ✓ ft³
Water Collected V_w 133.7 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -2.70 ✓ "H₂O

Pitot Tube No. M-7 ✓
Baro. Press. P_b 29.96 ✓ "Hg
Probe Tip Dia. D_n ~~0.199~~ 0.203 in. ✓
% CO_2 11.2 ✓ % CO Φ ✓
% O_2 8.4 ✓ % N_2 80.4 ✓
Area Stack A_s 20.357 ✓ in²

Barometer No. 19-1 ✓
Total Volume of Leak Checks After Start: 1.245 ✓ ft³
V_m = Dry Gas Meter Calibration Factor 1.000 ✓ X 70.751

Probe Tip No. TPE-2-7 ✓

[Dry Gas Meter Reading — ft³ - (T_t — min. X Leak Rate — cfm)]

Impinger Box No. Hg 4

Impinger 1	Final Weight	839.2	Imp 8 Final 996.5	Impinger 1	91.0
	Initial Weight	748.2	Int. 983.3	Impinger 2	21.9
	Increase	91.0	13.2	Impinger 3	3.4
Impinger 2	Final Weight	778.5		Impinger 4	4.4
	Initial Weight	756.6			
	Increase	21.9			
Impinger 3	Final Weight	661.1	V_w =	Impinger 5	-0.2
	Initial Weight	657.7	g SO_2 =	Impinger 6	-0.1
	Increase	3.4	V_w =		
Impinger 4	Final Weight	761.7		Impinger 7	0.1
	Initial Weight	757.3		Imp 8	13.2
	Increase	4.4		Total	133.7 = V_w
Impinger 5	Final Weight	757.3	P_b = 28.96	%CO_2 =	11.2
	Initial Weight	757.5	V_m = 70.751	%O_2 =	8.4
	Increase	-0.2	V_w = 133.7	%CO =	0
			P_m = 1.213	%N_2 =	80.4
Impinger 6	Final Weight	762.1	Avg ΔP = 1.356	A_s =	28.381
	Initial Weight	762.2		D_n =	~~0.199~~ 0.200
	Increase	-0.1	Avg$\sqrt{\Delta P}$ = 1.163	T_t =	120
Impinger 7	Final Weight	760.4	C_p = 0.811		
	Initial Weight	760.3	P_s = -2.70 "H_2O		28.76 "Hg
	Increase	0.1	T_m = 57 °F		517 °R
			T_s = 288 °F		748 °R

Moisture Content: %M = 8.25 M_d = 0.9175 MW_d = 30.128 MW = ~~29.127~~ 29.13

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 70.751 \left[\frac{28.96 + \frac{1.213}{13.6}}{57 + 460}\right] = \frac{70.165\ sft^3}{0.585\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 133.7 = 6.311 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{6.311}{70.165 + 6.311} \times 100 = 8.25\ \%$$

$$V_s = 5123.8 \times 0.811 \sqrt{\frac{748}{28.76 \times 29.13}} \times 1.163 = 4566\ fpm$$

ACFM: 646311

SCFM: 403794

$$\%I = \frac{1{,}039 \times 70.165 \times 748}{120 \times 0.9175 \times 28.76 \times 4566 \times (\cancel{0.199})^2\ 0.200} = \cancel{95.2}\ 94.3\ \%$$

%EA: 65.1

Run Number 2

Unit Unit 4 Stack

Date 11-3-99

Hg FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B3	1457	902.41	1.50	1.35	1.35	9.5	289	262	257	43	64	52	269	
3	1502	905.~~95~~ 59	1.50	1.35	1.35	9.5	289	262	257	44	64	52	269	
End	1507	908.258	—	—	—	—	—	—	—	—	—	—	—	Leak ✓ 908.472 15 @ 0.000
A1	1514	908.699	1.30	1.15	1.15	9.0	288	263	258	45	66	52	271	Leak ✓ 908.699 15 @ 0.000
1	1519	911.58	1.30	1.15	1.15	9.0	288	261	258	45	65	52	269	0.441
2	1524	914.48	1.50	1.35	1.35	9.5	288	262	258	44	64	52	268	
2	1529	916.54	1.50	1.35	1.35	9.5	288	264	258	44	64	53	268	
3	1534	920.64	1.50	1.35	1.35	9.5	288	263	258	44	64	53	269	
3	1539	923.55	1.50	1.35	1.35	9.5	288	261	258	45	64	53	271	
End	1544	926.375	—	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-158 ✓
Job Name Detroit Edison ✓
Run Number 3 ✓
Unit Unit 4 Stack ✓
Date 11-4-99 ✓
Operator Hart/Lee/Hefley ✓
Sample Box No. Hg 2 Meter Box No. 29-1

Hg Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 40
Assumed Moisture % 8%
Probe Length 3'
C Factor 2.0 ⇒ 2.5 to reference
Initial Leak @ 15.0 "Hg = 0.000 cfm
Final Leak @ 17.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (T_m)	Heated Line	Remarks
A1	0840	934.338	1.30	1.15	1.15	13.0	279	252	260	49	56	47	270	filter 472101
1	0845	937.45	1.30	1.15	1.15	13.0	280	253	259	44	56	47	271	
2	0850	940.59	1.35	1.20	1.20	14.0	280	253	258	44	56	47	271	
2	0855	943.83	1.35	1.20	1.20	14.0	281	254	258	43	56	47	272	
3	0900	947.07	1.40	1.25	1.25	14.0	282	254	258	44	57	47	272	
3	0905	950.34	1.40	1.25	1.25	14.0	282	253	259	44	58	47	274	
End	0910	953.510	–	–	–	–	–	–	–	–	–	–	–	leak ✓953.703 15" 0.000
B1	0917	953.881	1.25	1.10	1.10	12.0	285	255	260	45	61	47	272	leak ✓953.881 15" 0.000
1	0922	956.97	1.25	1.10	1.10	12.0	285	254	258	45	60	48	272	0.371
2	0927	959.98	1.35	1.20	1.20	14.0	285	254	258	45	60	48	274	
2	0932	962.99	1.35	1.20	1.20	14.0	286	252	259	45	60	48	274	
3	0937	965.95	1.40	1.25	1.25	14.0	286	253	257	45	60	48	273	
3	0942	968.87	1.40	1.25	1.25	14.0	287	253	256	46	61	48	273	
End	0947	971.630	–	–	–	–	–	–	–	–	–	–	–	leak ✓971.819 15" 0.000
C1	0954	972.990	1.10	0.99	0.99	11.0	287	254	255	49	63	49	274	leak ✓972.990 15" 0.000
1	0959	974.79	1.10	0.99	0.99	11.0	288	254	255	46	62	49	272	1.360
2	1004	977.62	1.15	1.00	1.00	12.0	288	255	257	47	62	49	273	
2	1009	980.52	1.15	1.00	1.00	12.0	288	255	257	47	62	48	273	

Pitot Tube Calibration Factor C_p 0.811 ✓
Volume Collected V_m 70.622 ✓ ft^3
Water Collected V_w 121.9 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -2.80 ✓ "H_2O

Pitot Tube No. M-7
Baro. Press. P_b 29.36 "Hg
Probe Tip Dia. D_n ~~0.199~~ 0.205 in.
% CO_2 11.4 ✓ % CO 0 ✓
% O_2 8.8 % N_2 79.8 ✓
Area Stack A_s 20.381 ✓ in^2

Barometer No. 19-1 Probe Tip No. TFE 2-7 ✓
Total Volume of Leak Checks After Start: 1.905 ft^3
V_m = Dry Gas Meter Calibration Factor 1.000 X 70.622

[Dry Gas Meter Reading – ft^3 - (T_t – min. X Leak Rate – cfm)]

R-17

Impinger Box No. Hg 2

			Water Weight Gain		
Impinger 1	Final Weight	825.9	Imp 8 Final 866.9	Impinger 1	80.8
	Initial Weight	~~75~~ 745.1	Int. 851.7	Impinger 2	18.9
	Increase	80.8	15.2	Impinger 3	2.7
Impinger 2	Final Weight	770.0		Impinger 4	4.5
	Initial Weight	751.1			
	Increase	18.9	V_w =	Impinger 5	0.1
Impinger 3	Final Weight	726.2	g SO_2 =	Impinger 6	0.0
	Initial Weight	723.5	V_w =		
	Increase	2.7		Impinger 7	-0.3
Impinger 4	Final Weight	761.1		impinger 8	15.2
	Initial Weight	756.6		Total	~~15~~ 121.9 = V_w
	Increase	4.5			

Impinger 5	Final Weight	664.6	P_b =	29.36	%CO_2 =	~~11.6~~ 11.4	
	Initial Weight	664.5	V_m =	70.622	%O_2 =	8.8	
	Increase	0.1	V_w =	121.9	%CO =	0	
			P_m =	1.115	%N_2 =	79.8	
Impinger 6	Final Weight	749.7	Avg ΔP =	1.258	A_s =	20.381	
	Initial Weight	749.7			D_n =	~~0.199~~ 0.200	
	Increase	0.0	Avg$\sqrt{\Delta P}$ =	1.121	T_t =	120	
			C_p =	0.811			
Impinger 7	Final Weight	682.4	P_s =	-2.810 "H_2O		29.15 "Hg	
	Initial Weight	682.7	T_m =	55 °F		515 °R	
	Increase	-0.3	T_s =	286 °F		746 °R	

Moisture Content: %M = 7.47 M_d = 0.9253 MW_d = 30.176 MW = 29.27

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 70.622 \left[\frac{29.36 + \frac{1.115}{13.6}}{55 + 460}\right] = 71.260 \text{ sft}^3 = 0.594 \text{ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 121.9 = 5.754 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{5.754}{71.260 + 5.754} \times 100 = 7.47\ \%$$

$$V_s = 5123.8 \times 0.811 \sqrt{\frac{746}{29.15 \times 29.27}} \times 1.121 = 4356 \text{ fpm}$$

ACFM: 616482

SCFM: 394821

$$\%I = \frac{1{,}039 \times 71.260 \times 746}{120 \times 0.9253 \times 29.15 \times 4356 \times (\cancel{0.199})^2} = \cancel{98.9}\ \%$$

0.200

97.9

%EA: 71.3

Run Number 3

Unit Unit 4 Stack

Date 11-4-99

Hg FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line	Remarks
C3	1014	983.39	1.25	1.10	1.10	12.0	288	256	257	48	62	50	274	
3	1019	986.29	1.25	1.10	1.10	12.0	289	256	257	48	62	50	274	
End	1024	989.860	—	—	—	—	—	—	—	—	—	—	—	Leak ✓ 989.195 15.0 0.000
D1	1030	989.360	1.10	0.99	0.99	10.5	289	257	256	47	63	51	272	Leak ✓ 989.360 15.0 0.000
1	1035	992.25	1.10	0.99	0.99	10.5	290	257	255	49	64	50	271	0.174
2	1040	995.18	1.20	1.05	1.05	12.0	290	257	255	49	64	50	271	
2	1045	998.12	1.20	1.05	1.05	12.0	290	258	257	49	64	50	272	
3	1050	1001.11	1.25	1.10	1.10	12.5	290	257	256	50	64	50	272	
3	1055	1003.99	1.25	1.10	1.10	12.5	290	257	256	51	65	51	272	
End	1100	1006.865	—	—	—	—	—	—	—	—	—	—	—	

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-158

Job Name Detroit Edison

Sampling Location Inlet duct 4

Date 11-2-99 Time 1315

Stack Height ~~60~~ ft.

Sampling Port Height Above Ground ~~45~~ 50 ft.

	Port A	Port B	Port C	Port D	E	Average
Port & Inside Diameter (in.)	117	117	117	117		117
Port & Wall Thickness (in.)	2	2	2	2	2	2
Inside Stack Diameter (in.)	115	115	115	115	115	115

Sampling Ports are ~~9~~ 11 ft. ~~6~~ 9 in. ~~0.99~~ 1.23 eq. duct stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are 6 ft. 6 in. 0.68 eq. duct stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port A ΔP/T$_s$/α	Port B ΔP/T$_s$/α	Port C ΔP/T$_s$/α	Port D ΔP/T$_s$/α
1			11 1/2	0.49/257/0	0.45/257/-2	0.80/254/0	0.74/257/0
2			34 1/2	0.48/260/2	0.90/261/0	0.78/262/5	0.60/257/0
3			57 1/2	0.63/265/0	0.78/264/-2	0.88/264/0	0.32/257/0
4			80 1/2	0.37/265/0	0.83/262/-2	1.35/270/2	0.83/261/2
5			103 1/2	0.45/267/-5	0.85/279-2	0.87/271/-5	0.92/264/0
6				/ /	/ /	/ /	/ /
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ E /	/ /	/ /	/ /
11				0.49/254/0	/ /	/ /	/ /
12				0.52/254/0	/ /	/ /	/ /
13				0.38/254/0	/ /	/ /	/ /
14				0.47/257/0	/ /	/ /	/ /
15				0.62/249-2	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. M5

C_p = 0.808

P_b = 29.10 "Hg

P_s = -13.50 "H_2O 28.11 "Hg

A_s = 13225 in.^{2}

Average ΔP 0.680

Average ΔP$^{1/2}$ 0.813

Average T_s 262 °F

Average α 1.2 degrees

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-158

Job Name Detroit Edison

Sampling Location Unit 4 Stack

Date 11-2-99 Time 1245

Stack Height 599 ft.

Sampling Port Height Above Ground 195 ft.

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)	163 7/16	163 7/16	163 7/16	163 7/16	163 7/16
Port & Wall Thickness (in.)	2 3/8	2 3/8	2 3/8	2 3/8	2 3/8
Inside Stack Diameter (in.)	~~516 1/4~~ 161 1/16	~~516 1/4~~ 161 1/16	~~516 1/4~~ 161 1/16	~~516 1/4~~ 161 1/16	~~516 1/4~~ 161 1/16

Sampling Ports are 145 ft. — in. (10.80 stack diameters) downstream from disturbance (inlet, constriction, bend, expansion) 161.089

Sampling Ports are 404 ft. — in. (30.10 stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port A ΔP/T_s/α	Port B ΔP/T_s/α	Port C ΔP/T_s/α	Port D ΔP/T_s/α
1	4.4	7.088	7 1/16	0.65/260/0	0.79/228/0	0.58/229/+4	0.56/216/+3
2	14.6	23.519	23 1/2	0.67/257/0	1.10/229/-8	0.85/249/0	0.95/229/-5
3	29.6	47.682	47 11/16	0.68/253/+3	1.20/250/0	0.93/250/-1	1.10/247/-4
4				/ /	/ /	/ /	/ /
5				/ /	/ /	/ /	/ /
6				/ /	/ /	/ /	/ /
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12				/ /	/ /	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15		*Calculated as		/ /	/ /	/ /	/ /
16		half of a 6 point		/ /	/ /	/ /	/ /
17		traverse.		/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. M-2

C_p = 0.808

P_b = 29.02 "Hg

P_s = -1.90 "H_2O 28.88 "Hg

A_s = 20.381 in.²

Average ΔP 0.838

Average $\Delta P^{1/2}$ 0.909

Average T_x 244 °F

Average α 2.3 degrees

METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-158

Job Name: The Detroit Edison Co.

Location: East China, MI

Date: 11-03-99

Operator: M. Bass

Sample Location: Unit 4 Precipitator Inlet Duct

Analytical Method: EPA Method 3D

Sample Type: Single point or Multi point, Grab or Integrated

Leak Check: Time: 4 min. (min. 4 minutes) Rate: 0.000

Ambient Air Check:

CO_2 - % Vol.	20.9
O_2 - % Vol.	0.0
N_2 - % Vol.	79.1

Run Number 1 Run Time ~~125~~ 0915-1120	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.2	12.2	12.2	12.2
O_2 - % Vol.	7.4	7.4	7.4	7.4
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.4	80.4	80.4	80.4

Fo'' 1.107

Run Number 2 Run Time ~~125~~ 1320-1525	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.2	12.2	12.2	12.2
O_2 - % Vol.	7.2	7.2	7.2	7.2
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.6	80.6	80.6	80.6

Fo'' 1.123

Run Number 3 Run Time ~~125~~ 0840-1045	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.8	11.8	11.8	11.8
O_2 - % Vol.	8.0	8.0	8.0	8.0
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.2	80.2	80.2	80.2

Fo'' 1.093

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METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-158 Sample Location: Unit 4 Stack

Job Name: The Detroit Edison Co. Analytical Method: EPA Method 3b

Location: East China, MI Sample Type: Single point or Multi point; Grab or Integrated

Date: 11-03 99 Leak Check: Time: 4 min. (min. 4 minutes) Rate: 0.000

Operator: M. Bass Ambient Air Check:

CO_2 - % Vol.	20.9
O_2 - % Vol.	0.0
N_2 - % Vol.	79.1

Run Number 1 Run Time ~~120~~ 0915-1158	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.0	12.0	12.0	12.0
O_2 - % Vol.	7.8	7.8	7.8	7.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.2	80.2	80.2	80.2

Fo = 1.083

Run Number 2 Run Time ~~120~~ 1320-1544	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.2	11.2	11.2	11.2
O_2 - % Vol.	8.4	8.4	8.4	8.4
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.4	80.4	80.4	80.4

Fo = 1.134

Run Number 3 Run Time ~~120~~ 0840-1100	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.4	11.4	11.4	11.4
O_2 - % Vol.	8.8	8.8	8.8	8.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	79.8	79.8	79.8	79.8

Fo = 1.041

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APPENDIX C

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #M-2	0.808	10/04/99
Pitot Tube #M-5	0.808	10/04/99
Pitot Tube #M-7	0.811	10/04/99
Probe Tip #TFE-1-7	0.200	10/04/99
Probe Tip #TFE-2-7	0.200	10/05/99
Dry Gas Meter #27-2	1.029	08/13/99
Stack Unit Orifice #27-2		08/14/99
Digital Temperature Indicator #27-2		08/13/99
Dry Gas Meter #29-1	1.000	10/04/99
Stack Unit Orifice #29-1		10/05/99
Digital Temperature Indicator #29-1		10/04/99
Barometer #19-1		10/04/99

APPENDIX C

Post Test

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #M-2	0.810	11/12/99
Pitot Tube #M-5	0.806	11/19/99
Pitot Tube #M-7	0.810	11/22/99
Probe Tip #TFE-1-7	0.199	11/19/99
Probe Tip #TFE-2-7	0.195	11/19/99
Dry Gas Meter #27-2	1.015	11/07/99
Stack Unit Orifice #27-2		11/08/99
Digital Temperature Indicator #27-2		11/07/99
Dry Gas Meter #29-1	1.000	11/22/99
Stack Unit Orifice #29-1		11/22/99
Digital Temperature Indicator #29-1		11/22/99
Barometer #19-1		11/22/99

PITOT TUBE CALIBRATION

Date: 10-4-99

Time: 1030

Pitot No.: M2

T_s: 72 °F

Pitot Dimensions: 3/8" tips

C_{pstd}: 0.990

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	Standard √Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.33	0.574	0.808	0.33	0.574	0.808
20	40	0.34	0.34	0.583	0.51	0.714	0.808	0.51	0.714	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
35	60	0.80	0.80	0.894	1.20	1.095	0.808	1.20	1.095	0.808
41	70	1.00	1.00	1.000	1.50	1.225	0.808	1.50	1.225	0.808
50	80	1.30	1.30	1.140	1.95	1.396	0.808	1.95	1.396	0.808
62	90	1.60	1.60	1.265	2.40	1.549	0.808	2.40	1.549	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
Average							0.808			0.808

Summary of Results:

Normal high side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Normal low side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Calibrator: Jason Brown 274

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 10-4-99

Time: 1330

Pitot No.: M5

T_s: 72 °F

Pitot Dimensions: 3/8" hps

C_{pstd}: 0.990

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	√Standard Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.33	0.574	0.808	0.33	0.574	0.808
20	40	0.34	0.34	0.583	0.51	0.714	0.808	0.51	0.714	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
35	60	0.80	0.80	0.894	1.20	1.095	0.808	1.20	1.095	0.808
41	70	1.00	1.00	1.000	1.50	1.225	0.808	1.50	1.225	0.808
50	80	1.30	1.30	1.140	1.95	1.396	0.808	1.95	1.396	0.808
62	90	1.60	1.60	1.265	2.40	1.549	0.808	2.40	1.549	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
Average							0.808			0.808

Summary of Results:

Normal high side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Normal low side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Calibrator: Jason Brown 274

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 10-4-99

Time: 1430

Pitot No.: M7

T_s: 72 °F

Pitot Dimensions: 3/8" typ

C_{pstd}: 0.990

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	√Standard Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.32	0.566	0.821	0.32	0.566	0.821
20	40	0.34	0.34	0.583	0.50	0.707	0.816	0.50	0.707	0.816
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
35	60	0.80	0.80	0.894	1.20	1.095	0.808	1.20	1.095	0.808
41	70	1.00	1.00	1.000	1.50	1.225	0.808	1.50	1.225	0.808
50	80	1.30	1.30	1.140	1.95	1.396	0.808	1.95	1.396	0.808
62	90	1.60	1.60	1.265	2.40	1.549	0.808	2.40	1.549	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
Average							0.811			0.811

Summary of Results:

Normal high side calibration factor 0.811

variation + 1.23%

variation - 0.37%

Normal low side calibration factor 0.811

variation + 1.23%

variation - 0.37%

Calibrator: Jason Brown 274

Checked By: Jason Conway # 273

METCO ENVIRONMENTAL

✓ AH107

NOZZLE CALIBRATION

Nozzle Set No. TFE-1

Date 10-4-99 Calibrator: JASON BROWN 374

	4	6	7	8	10	12
Reading 1	0.114	0.175	0.199	0.226	0.310	0.362
Reading 2	0.116	0.175	0.198	0.227	0.309	0.363
Reading 3	0.114	0.173	0.199	0.226	0.309	0.363
Reading 4	0.114	0.173	0.200	0.226	0.310	0.362
Reading 5	0.116	0.175	0.200	0.227	0.308	0.364
Reading 6	0.117	0.175	0.200	0.227	0.309	0.364
Reading 7	0.118	0.174	0.202	0.226	0.309	0.364
Reading 8	0.116	0.173	0.200	0.225	0.310	0.363
Reading 9	0.118	0.175	0.200	0.226	0.309	0.363
Reading 10	0.118	0.175	0.199	0.227	0.309	0.363
Average	0.116 ✓	0.174 ✓	0.200 ✓	0.226 ✓	0.309	0.363

	14	—	—	—	—	—
Reading 1	0.430					
Reading 2	0.432					
Reading 3	0.430					
Reading 4	0.430					
Reading 5	0.432					
Reading 6	0.431					
Reading 7	0.432					
Reading 8	0.432					
Reading 9	0.432					
Reading 10	0.431					
Average	0.431 ✓					

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-2

Date 10-5-99 Calibrator: JASON BROWN 274

	4	6	7	8	10	12
Reading 1	0.117	0.175	0.200	0.234	0.308	0.362
Reading 2	0.116	0.175	0.201	0.234	0.309	0.362
Reading 3	0.118	0.177	0.200	0.235	0.312	0.362
Reading 4	0.116	0.176	0.199	0.236	0.311	0.360
Reading 5	0.114	0.174	0.199	0.234	0.312	0.362
Reading 6	0.116	0.174	0.199	0.234	0.311	0.361
Reading 7	0.115	0.175	0.200	0.235	0.312	0.361
Reading 8	0.117	0.175	0.201	0.235	0.308	0.362
Reading 9	0.115	0.176	0.200	0.235	0.312	0.361
Reading 10	0.114	0.176	0.200	0.235	0.310	0.363
Average	0.116	0.175	0.200	0.235	0.311	0.362

	14	—	—	—	—	—
Reading 1	0.434					
Reading 2	0.430					
Reading 3	0.434					
Reading 4	0.432					
Reading 5	0.430					
Reading 6	0.430					
Reading 7	0.434					
Reading 8	0.434					
Reading 9	0.430					
Reading 10	0.433					
Average	0.432					

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 27-2

Date: 8-13-99

ΔH ("H_2O)	C_{DG}
0.5	1.036
1.0	1.023
1.5	1.025
2.0	1.033
3.0	1.034
4.0	1.024
Average	1.029

Variation: + 0.68%

- 0.58%

Calibrator: Shane Lee 261

Checked By: Mike Bass 243

C_{DG} @ 2 liters/min. = 1.033

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Date: 8-13-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 0.5" H.O

P_b: 29.20 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1512	5.315 cf	73 °F	-1.20 "H_2O	312.440 cf	73 °F	73 °F	0.50 "H_2O
Start	1500	0.000 cf	73 °F	-1.20 "H_2O	307.333 cf	72 °F	72 °F	0.50 "H_2O
Avg.	12	5.315 cf	73 °F	-1.20 "H_2O	5.107 cf	73 °F		0.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.315 \left[\frac{29.20 + \frac{-1.20}{13.6}}{73 + 460} \right] \times 1.000\ (C_f) = 5.124 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.107 \left[\frac{29.20 + \frac{0.50}{13.6}}{73 + 460} \right] = 4.944 \text{ dcsf}$$

$$C_{DG} = \frac{5.124}{4.944} = \boxed{1.036}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Date: 8-13-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.0 "H_2O

P_b: 29.20 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading	Temp.	P_m
End	1419	5.168 cf	73 °F	-1.80 "H_2O
Start	1410	0.000 cf	73 °F	-1.80 "H_2O
Avg.	9	5.168 cf	73 °F	-1.80 "H_2O

Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	307.007 cf	73 °F	72 °F	1.00 "H_2O
Start	301.998 cf	72 °F	71 °F	1.00 "H_2O
Avg.	5.009 cf	72 °F		1.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.168 \left[\frac{29.20 + \frac{-1.80}{13.6}}{73 + 460} \right] \times 1.000 \ (C_f) = 4.975 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.009 \left[\frac{29.20 + \frac{1.00}{13.6}}{72 + 460} \right] = 4.865 \text{ dcsf}$$

$$C_{DG} = \frac{4.975}{4.865} = \boxed{1.023}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Date: 8-13-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.5 "H_2O

P_b: 29.20 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1529	10.355 cf	73 °F	-2.20 "H_2O	322.948 cf	77 °F	73 °F	1.50 "H_2O
Start	1515	0.000 cf	73 °F	-2.20 "H_2O	312.925 cf	73 °F	73 °F	1.50 "H_2O
Avg.	14	10.355 cf	73 °F	-2.20 "H_2O	10.023 cf	74 °F		1.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.355 \left[\frac{29.20 + \frac{-2.20}{13.6}}{73 + 460} \right] \times 1.000\ (C_f) = 9.957 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.023 \left[\frac{29.20 + \frac{1.50}{13.6}}{74 + 460} \right] = 9.710 \text{ dcsf}$$

$$C_{DG} = \frac{9.957}{9.710} = \boxed{1.025}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: Shane Lee

Date: 8-13-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 2.0" H.O

P_b: 29.20 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1605	10.514 cf	73 °F	-2.60 "H_2O	343.568 cf	80 °F	76 °F	2.00 "H_2O
Start	1552	0.000 cf	73 °F	-2.60 "H_2O	333.427 cf	77 °F	73 °F	2.00 "H_2O
Avg.	13	10.514 cf	73 °F	-2.60 "H_2O	10.141 cf	77 °F		2.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.514 \left[\frac{29.20 + \frac{-2.60}{13.6}}{73 + 460}\right] \times 1.000\ (C_f) = 10.100 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.141 \left[\frac{29.20 + \frac{2.00}{13.6}}{77 + 460}\right] = 9.782 \text{ dcsf}$$

$$C_{DG} = \frac{10.100}{9.782} = \boxed{1.033}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Date: 8-13-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 30" H_2O

P_b: 29.20 "Hg

Control Module Vacuum: 50 "Hg

Wet Test Meter (No. 3)						Dry Gas Meter				
	Time	Meter Reading	Temp.		P_m	Meter Reading	Temp. In		Temp. Out	P_m
End	1618	11.961	cf	73 °F	-3.60 "H_2O	355.643	cf	83 °F	75 °F	3.00 "H_2O
Start	1607	0.000	cf	73 °F	-3.60 "H_2O	344.157	cf	78 °F	74 °F	3.00 "H_2O
Avg.	11	11.961	cf	73 °F	-3.60 "H_2O	11.486	cf	78 °F		3.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 11.961 \left[\frac{29.20 + \frac{-3.60}{13.6}}{73 + 460}\right] \times 1.000\ (C_f) = 11.461 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 11.486 \left[\frac{29.20 + \frac{3.00}{13.6}}{78 + 460}\right] = 11.086 \text{ dcsf}$$

$$C_{DG} = \frac{11.461}{11.086} = \boxed{1.034}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Date: 8-13-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 4.0" H2O

P_b: 29.20 "Hg

Control Module Vacuum: 5.0 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1630	10.708 cf	73 °F	-4.30 "H_2O	366.588 cf	84 °F	75 °F	4.00 "H_2O
Start	1620	0.000 cf	73 °F	-4.30 "H_2O	356.234 cf	81 °F	75 °F	4.00 "H_2O
Avg.	10	10.708 cf	73 °F	-4.30 "H_2O	10.354 cf	79 °F		4.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.708 \left[\frac{29.20 + \frac{-4.30}{13.6}}{73 + 460}\right] \times 1.000 \ (C_f) = 10.242 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.354 \left[\frac{29.20 + \frac{4.00}{13.6}}{79 + 460}\right] = 10.000 \text{ dcsf}$$

$$C_{DG} = \frac{10.242}{10.000} = \boxed{1.024}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Date: 8-13-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 2.0 l/min.

P_b: 29.20 "Hg

Control Module Vacuum: 5-0 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading	Temp.	P_m
End	1711	2.700 cf	73 °F	-0.20 "H_2O
Start	1636	0.000 cf	73 °F	-0.20 "H_2O
Avg.	35	2.700 cf	73 °F	-0.20 "H_2O

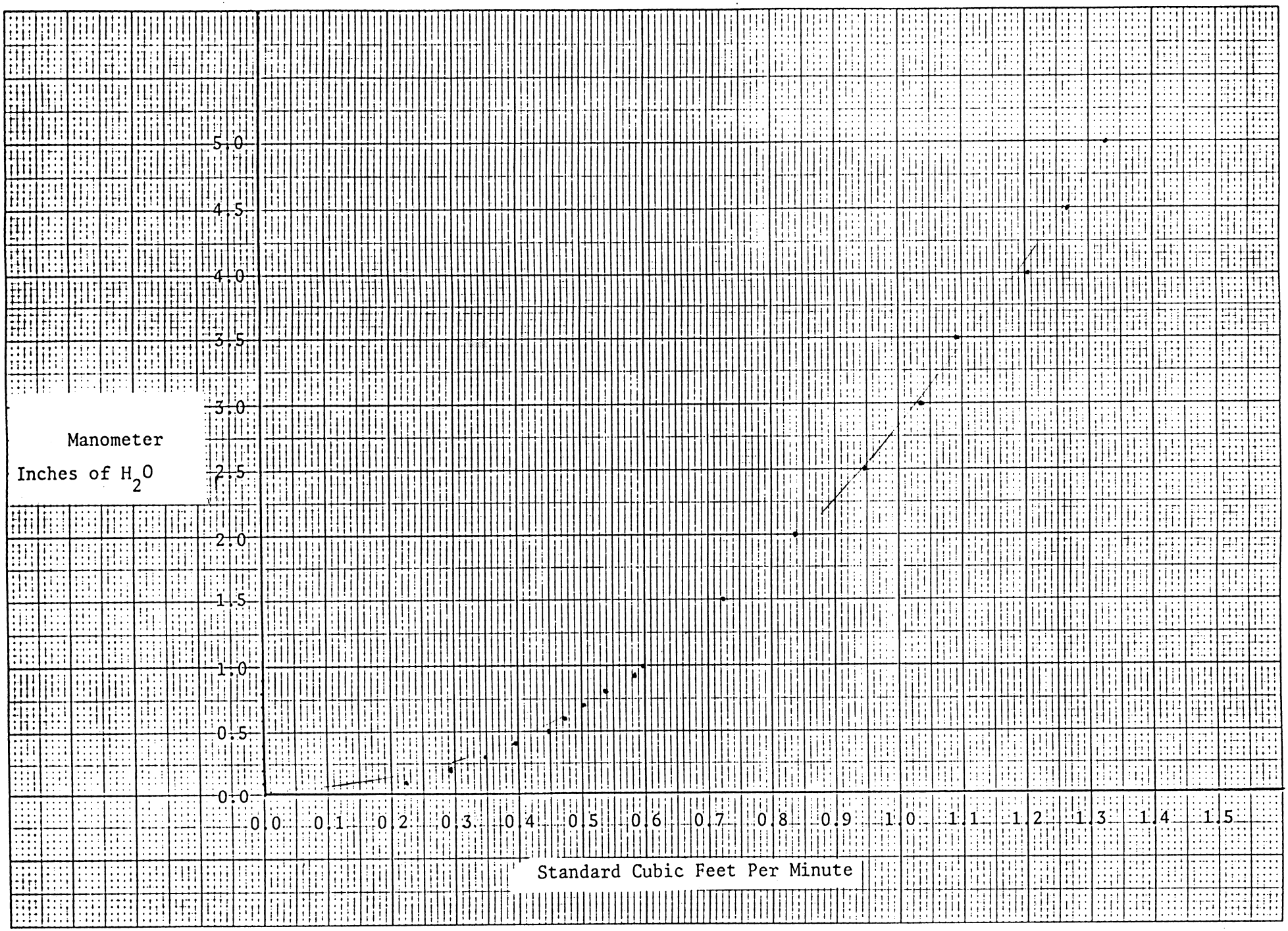
Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	369.641 cf	73 °F	72 °F	0.02 "H_2O
Start	367.018 cf	79 °F	75 °F	0.02 "H_2O
Avg.	2.623 cf	75 °F		0.02 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 2.700 \left[\frac{29.20 + \frac{-0.20}{13.6}}{73 + 460}\right] \times 1.000\ (C_f) = 2.609 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 2.623 \left[\frac{29.20 + \frac{0.02}{13.6}}{75 + 460}\right] = 2.527 \text{ dcsf}$$

$$C_{DG} = \frac{2.609}{2.527} = \boxed{1.033}$$


Manometer
Inches of H_2O
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Standard Cubic Feet Per Minute

METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 27-2

CALIBRATION DATA

Date: 8-13-99

Media	Time	Mercury Temperature (°F)	DTI (°F)
Ambient Air	0944	72	72
Ice Bath	0947	32	33
Boiling Water	0958	212	211
Oven	1003	250	250
Oven	1007	300	300
Oven	1010	350	351
Oven	1014	375	375

Meter Adjusted? Yes _____ No ✓

Calibrator: Shane Lee 261

Checked By: Mike Bass 263

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 29-1

Date: 10-4-99

ΔH ("H_2O)	C_{DG}
0.5	1.000
1.0	1.001
1.5	0.999
2.0	0.995
3.0	0.998
4.0	1.009
Average	1.000

Variation: + 0.90%

- 0.50%

Calibrator: Shane Lee 261

Checked By: Bill Lipley #107

C_{DG} @ 2 liters/min. = 1.017

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Date: 10-4-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 0.5" H_2O

P_b: 29.28 "Hg

Control Module Vacuum: 50 "Hg

Wet Test Meter (No. 3)							Dry Gas Meter				
	Time	Meter Reading		Temp.		P_m	Meter Reading		Temp. In	Temp. Out	P_m
End	1423	5.380	cf	75	°F	-1.10 "H_2O	377.116	cf	75 °F	73 °F	0.50 "H_2O
Start	1409	0.000	cf	75	°F	-1.10 "H_2O	371.767	cf	74 °F	72 °F	0.50 "H_2O
Avg.	14	5.380	cf	75	°F	-1.10 "H_2O	5.349	cf	74 °F		0.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.380 \left[\frac{29.28 + \frac{-1.10}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = \cancel{5.192}\ 5.183 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.349 \left[\frac{29.28 + \frac{0.50}{13.6}}{74 + 460}\right] = 5.183 \text{ dcsf}$$

$$C_{DG} = \frac{\cancel{5.192}\ 5.183}{5.183} = \boxed{\cancel{1.002}\ 1.000}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Date: 10-4-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.0" H_2O

P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

	Wet Test Meter (No. 3)					Dry Gas Meter				
	Time	Meter Reading	Temp.		P_m	Meter Reading	Temp. In	Temp. Out		P_m
End	1436	5.400	cf	75 °F	-1.60 "H_2O	383.463	cf	75 °F	73 °F	1.00 "H_2O
Start	1426	0.000	cf	75 °F	-1.60 "H_2O	378.114	cf	76 °F	73 °F	1.00 "H_2O
Avg.	10	5.400	cf	75 °F	-1.60 "H_2O	5.349	cf	74 °F		1.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.400 \left[\frac{29.28 + \frac{-1.60}{13.6}}{75 + 460}\right] \times 1.000\ (C_t) = 5.195 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.349 \left[\frac{29.28 + \frac{1.00}{13.6}}{74 + 460}\right] = 5.190 \text{ dcsf}$$

$$C_{DG} = \frac{5.195}{5.190} = \boxed{1.001}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Date: 10-4-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.5 " H.O

P_b: 29.28 "Hg

Control Module Vacuum: 50 "Hg

Wet Test Meter (No. 3)						Dry Gas Meter					
	Time	Meter Reading		Temp.		P_m	Meter Reading		Temp. In		Temp. Out		P_m
End	1454	10.668	cf	75	°F	-2.10 "H_2O	384.790	cf	73	°F	74	°F	1.50 "H_2O
Start	1438	0.000	cf	75	°F	-1.90 "H_2O	384.223	cf	77	°F	73	°F	1.50 "H_2O
Avg.	16	10.668	cf	75	°F	-2.00 "H_2O	10.567	cf	74	°F			1.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.668 \left[\frac{29.28 + \frac{-2.00}{13.6}}{75 + 460}\right] \times 1.000 \ (C_f) = 10.253 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.567 \left[\frac{29.28 + \frac{1.50}{13.6}}{74 + 460}\right] = 10.265 \text{ dcsf}$$

$$C_{DG} = \frac{10.253}{10.265} = \boxed{0.999}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Shane Lee

Date: 10-4-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 2.0" H_2O

P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

	Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m		Meter Reading	Temp. In	Temp. Out	P_m
End	1510	11.395 cf	75 °F	-2.40	"H_2O	406.546 cf	70 °F	76 °F	2.00 "H_2O
Start	1456	0.000 cf	75 °F	-2.40	"H_2O	395.246 cf	75 °F	75 °F	2.00 "H_2O
Avg.	14	11.395 cf	75 °F	-2.40	"H_2O	11.300 cf	74 °F		2.00 "H_2O

$$Wet\ Test\ Meter\ Vm_{std} = 17.65 \times 11.395 \left[\frac{29.28 + \frac{-2.40}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = 10.941\ dcsf$$

$$Dry\ Gas\ Meter\ Vm_{std} = 17.65 \times 11.300 \left[\frac{29.28 + \frac{2.00}{13.6}}{74 + 460}\right] = 10.991\ dcsf$$

$$C_{DG} = \frac{10.941}{10.991} = \boxed{0.995}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Date: 10-4-99

Calibrator: Shane Lee

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 30 "H_2O

P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)								Dry Gas Meter					
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temp. In		Temp. Out		P_m	
End	1524	10.800	cf	75	°F	-3.00	"H_2O	417.690	cf	67	°F	77	°F	3.00	"H_2O
Start	1513	0.000	cf	75	°F	-3.00	"H_2O	407.045	cf	75	°F	76	°F	3.00	"H_2O
Avg.	11	10.800	cf	75	°F	-3.00	"H_2O	10.645	cf	74	°F			3.00	"H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.800 \left[\frac{29.28 + \frac{-3.00}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = 10.354 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.645 \left[\frac{29.28 + \frac{3.00}{13.6}}{74 + 460}\right] = \cancel{10.360}\ 10.380 \text{ dcsf}$$

$$C_{DG} = \frac{10.354}{\cancel{10.360}\ 10.380} = \boxed{\cancel{0.999}\ 0.998}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Shane Lee

Date: 10-4-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 4.0" H_2O

P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

	Wet Test Meter (No. 3)						Dry Gas Meter				
	Time	Meter Reading		Temp.		P_m	Meter Reading		Temp. In	Temp. Out	P_m
End	1547	10.947	cf	75	°F	-4.00 "H_2O	430.335	cf	68 °F	77 °F	4.00 "H_2O
Start	1537	0.000	cf	75	°F	-3.80 "H_2O	419.698	cf	78 °F	77 °F	4.00 "H_2O
Avg.	10	10.947	cf	75	°F	-3.90 "H_2O	10.637	cf	75	°F	4.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.947 \left[\frac{29.28 + \frac{-3.90}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = 10.471 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.637 \left[\frac{29.28 + \frac{4.00}{13.6}}{75 + 460}\right] = 10.378 \text{ dcsf}$$

$$C_{DG} = \frac{10.471}{10.378} = \boxed{1.009}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Shane Lee

Date: 10-4-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 2.0 L/min

P_b: 29.28 "Hg

Control Module Vacuum: 50 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading		Temp.		P_m	
End	1622	2.210	cf	75	°F	-0.20	"H_2O
Start	1606	0.000	cf	75	°F	-0.20	"H_2O
Avg.	16	2.210	cf	75	°F	-0.20	"H_2O

Dry Gas Meter

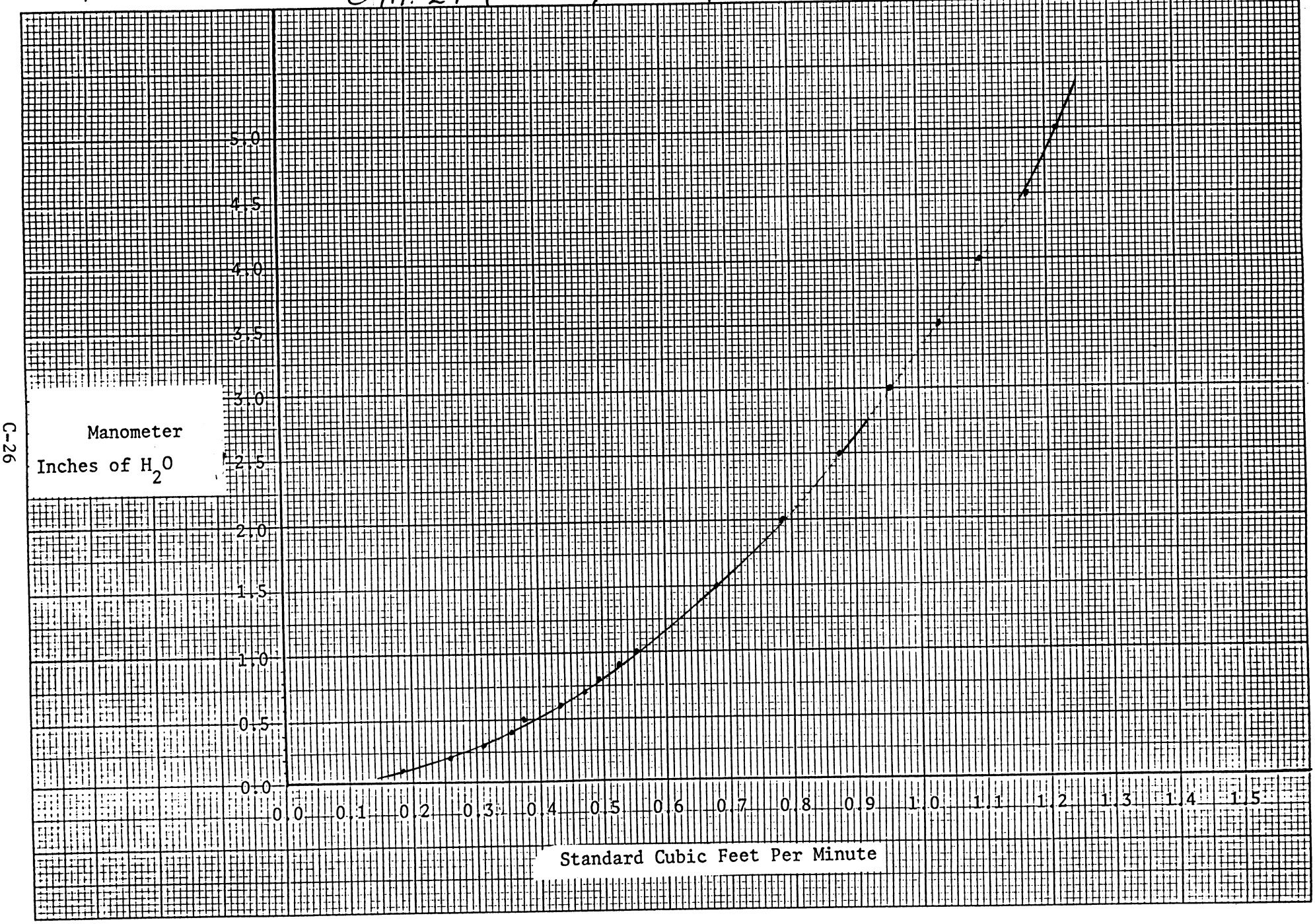
	Meter Reading		Temp. In		Temp. Out		P_m	
End	432.153	cf	81	°F	76	°F	0.01	"H_2O
Start	430.968	cf	78	°F	76	°F	0.01	"H_2O
Avg.	2.185	cf	78	°F			0.01	"H_2O

$$Wet\ Test\ Meter\ Vm_{std} = 17.65 \times 2.210 \left[\frac{29.28 + \frac{-0.20}{13.6}}{75 + 460}\right] \times 1.000\ (C_i) = 2.134\ dcsf$$

$$Dry\ Gas\ Meter\ Vm_{std} = 17.65 \times 2.185 \left[\frac{29.28 + \frac{0.01}{13.6}}{78 + 460}\right] = 2.099\ dcsf$$

$$C_{DG} = \frac{2.134}{2.099} = \boxed{1.017}$$

CM.29-1 10-5-99 JC # 273



METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 29-1

CALIBRATION DATA

Date: 10-4-99

Media	Time	Mercury Temperature (°F)	DTI (°F)
Ambient Air	1330	70	70
Ice Bath	1337	32	32
Boiling Water	1345	212	212
Oven	1353	250	250
Oven	1355	300	301
Oven	1358	350	350
Oven	1359	375	376

Meter Adjusted? Yes _____ No ✓

Calibrator: Shane Lee 261

Checked By: Bill Hyfry #101

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 19-1

Date: 10-4-99

Time: 1520

Barometric Pressure @ Addison Airport @ 719 ft.	=	30.210
	-	0.719
Absolute Pressure @ Addison Airport	=	29.491
	+	0.083
Absolute Pressure @ METCO @ 636 ft.	=	29.574
Barometer Reading	=	29.610
Variation	=	0.036

Barometer Adjusted? Yes ✓ No _____

Shane Lee 261

Signature of Calibrator

PITOT TUBE CALIBRATION

Date: 11-12-99 Time: 1500

Pitot No.: M2 T_s: 75 °F

Pitot Dimensions: 3/8" tips C_{pstd}: 0.990

Motor Setting	fps mark	Calibration Standard Start	End	√Standard Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.33	0.574	0.808	0.33	0.574	0.808
20	40	0.34	0.34	0.583	0.51	0.714	0.808	0.51	0.714	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
35	60	0.80	0.80	0.894	1.20	1.095	0.808	1.20	1.095	0.808
41	70	1.00	1.00	1.000	1.45	1.204	0.822	1.45	1.204	0.822
50	80	1.30	1.30	1.140	1.95	1.396	0.808	1.95	1.396	0.808
62	90	1.60	1.60	1.265	2.40	1.549	0.808	2.40	1.549	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
Average							0.810			0.810

Summary of Results:

Normal high side calibration factor 0.810

variation + 1.48%

variation - 0.25%

Normal low side calibration factor 0.810

variation + 1.48%

variation - 0.25%

Calibrator: Jason Brim #274

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 11-19-99 Time: 1500

Pitot No.: M5 T_s: 69 °F

Pitot Dimensions: 3/8" tips C_{pstd}: 0.990

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	√Standard Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.34	0.583	0.796	0.34	0.583	0.796
20	40	0.34	0.34	0.583	0.51	0.714	0.808	0.52	0.721	0.801
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
35	60	0.80	0.80	0.894	1.20	1.095	0.808	1.20	1.095	0.808
41	70	1.00	1.00	1.000	1.50	1.225	0.808	1.50	1.225	0.808
50	80	1.30	1.30	1.140	1.95	1.396	0.808	1.95	1.396	0.808
62	90	1.60	1.60	1.265	2.45	1.565	0.800	2.45	1.565	0.800
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
Average							0.806			0.805

Summary of Results:

Normal high side calibration factor 0.806

variation + 0.25%

variation - -1.2%

Normal low side calibration factor 0.805

variation + 0.37%

variation - -1.2%

Calibrator: Scott Hartz

Checked By: Mike Bass

PITOT TUBE CALIBRATION

Date: 11-22-99

Time: 1000

Pitot No.: m7

T_s: 70 °F

Pitot Dimensions: 3/8" tips

C_{pstd}: 0.990

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	√Standard Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.33	0.574	0.808	0.33	0.574	0.808
20	40	0.34	0.34	0.583	0.51	0.714	0.808	0.51	0.714	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
35	60	0.80	0.80	0.894	1.20	1.095	0.808	1.20	1.095	0.808
41	70	1.00	1.00	1.000	1.45	1.204	0.822	1.45	1.204	0.822
50	80	1.30	1.30	1.140	1.95	1.396	0.808	1.95	1.396	0.808
62	90	1.60	1.60	1.265	2.40	1.549	0.808	2.40	1.549	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
28	50	0.54	0.54	0.735	0.81	0.900	0.808	0.81	0.900	0.808
Average							0.810			0.810

Summary of Results:

Normal high side calibration factor 0.810

variation + 1.48%

variation - 0.25%

Normal low side calibration factor 0.810

variation + 1.48%

variation - 0.25%

Calibrator: Scott Hart #268

Checked By: Jason Conway #273

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-1

Date 11-19-99 Calibrator: Shane Lee 261

	4	6	7	8	10	12
Reading 1	0.117	0.175	0.200	0.234	0.309	0.362
Reading 2	0.116	0.174	0.200	0.232	0.308	0.360
Reading 3	0.118	0.173	0.198	0.236	0.308	0.359
Reading 4	0.118	0.173	0.196	0.235	0.307	0.363
Reading 5	0.120	0.174	0.199	0.235	0.308	0.362
Reading 6	0.119	0.173	0.200	0.235	0.306	0.359
Reading 7	0.117	0.173	0.199	0.234	0.306	0.360
Reading 8	0.116	0.174	0.199	0.236	0.308	0.359
Reading 9	0.117	0.175	0.200	0.235	0.308	0.361
Reading 10	0.118	0.175	0.200	0.236	0.306	0.360
Average	0.118 ✓	0.174 ✓	0.199 ✓	0.235 ✓	0.307 ✓	0.361 ✓

	14	—	—	—	—	—
Reading 1	0.429					
Reading 2	0.429					
Reading 3	0.430					
Reading 4	0.429					
Reading 5	0.431					
Reading 6	0.428					
Reading 7	0.429					
Reading 8	0.429					
Reading 9	0.431					
Reading 10	0.430					
Average	0.430 ✓					

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-2

Date 11-19-99 Calibrator: Mike Bass

	4	6a	7	8	10	12
Reading 1	0.116	0.174	0.193	0.235	0.309	0.363
Reading 2	0.115	0.170	0.195	0.232	0.309	0.362
Reading 3	0.114	0.170	0.195	0.232	0.310	0.363
Reading 4	0.114	0.172	0.194	0.234	0.309	0.363
Reading 5	0.115	0.174	0.197	0.235	0.308	0.361
Reading 6	0.115	0.173	0.196	0.235	0.309	0.361
Reading 7	0.115	0.172	0.197	0.235	0.311	0.362
Reading 8	0.114	0.174	0.195	0.234	0.310	0.362
Reading 9	0.116	0.171	0.196	0.234	0.309	0.363
Reading 10	0.115	0.172	0.195	0.233	0.309	0.363
Average	0.115	0.172	0.195	0.234	0.309	0.362

	14	—	—	—	—	—
Reading 1	0.435					
Reading 2	0.433					
Reading 3	0.434					
Reading 4	0.435					
Reading 5	0.433					
Reading 6	0.434					
Reading 7	0.433					
Reading 8	0.432					
Reading 9	0.433					
Reading 10	0.432					
Average	0.433					

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 27-2

Date: 11-07-99

ΔH ("H_2O)	C_{DG}
0.5	~~1.012~~ 1.015
1.0	1.018
1.5	1.022
2.0	1.019
3.0	1.011
4.0	1.002
Average	1.015

Variation: + 0.69%

- 1.28%

Calibrator: M. Bass

Checked By: [illegible]

C_{DG} @ 2 liters/min. = _____

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: M. Buss

Date: 11-07-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 0.5 " H_2O

P_b: 29.32 "Hg

Control Module Vacuum: 2.00 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading	Temp.	P_m
End	1310	5.015 cf	74 °F	-0.90 "H_2O
Start	1257	0.000 cf	74 °F	-0.90 "H_2O
Avg.	13	5.015 cf	74 °F	-0.900 "H_2O

Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	572.057 cf	77 °F	76 °F	0.50 "H_2O
Start	567.114 cf	76 °F	75 °F	0.50 "H_2O
Avg.	4.943 cf	76 °F	°F	0.500 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.015 \left[\frac{29.32 + \frac{-0.900}{13.6}}{74 + 460}\right] \times 1.000 \ (C_f) = 4.849 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 4.943 \left[\frac{29.32 + \frac{0.500}{13.6}}{76 + 460}\right] = 4.778 \text{ dcsf}$$

$$C_{DG} = \frac{4.849}{4.778} = \boxed{1.015}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: M. Bass

Date: 11-07-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.0" H_2O

P_b: 29.32 "Hg

Control Module Vacuum: 2.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1323	5.122 cf	74 °F	-1.30 "H_2O	572.407 cf	78 °F	77 °F	1.00 "H_2O
Start	1314	0.000 cf	74 °F	-1.30 "H_2O	572.377 cf	77 °F	76 °F	1.00 "H_2O
Avg.	9	5.122 cf	74 °F	-1.300 "H_2O	5.030 cf	77	°F	1.000 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.122 \left[\frac{29.32 + \frac{-1.300}{13.6}}{74 + 460}\right] \times 1.000 \ (C_f) = 4.948 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.030 \left[\frac{29.32 + \frac{1.000}{13.6}}{77 + 460}\right] = 4.859 \text{ dcsf}$$

$$C_{DG} = \frac{4.948}{4.859} = \boxed{1.018}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: M. Bass

Date: 11-07-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.5" H_2O

P_b: 29.32 "Hg

Control Module Vacuum: 2.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1341	10.295 cf	74 °F	-1.60 "H_2O	587.724 cf	82 °F	77 °F	1.50 "H_2O
Start	1326	0.000 cf	74 °F	-1.60 "H_2O	577.653 cf	78 °F	76 °F	1.50 "H_2O
Avg.	15	10.295 cf	74 °F	-1.600 "H_2O	10.071 cf	78 °F		1.500 "H_2O

$$Wet\ Test\ Meter\ Vm_{std} = 17.65 \times 10.295 \left[\frac{29.32 + \frac{-1.600}{13.6}}{74 + 460}\right] \times 1.000\ (C_f) = 9.937\ dcsf$$

$$Dry\ Gas\ Meter\ Vm_{std} = 17.65 \times 10.071 \left[\frac{29.32 + \frac{1.500}{13.6}}{78 + 460}\right] = 9.724\ dcsf$$

$$C_{DG} = \frac{9.937}{9.724} = \boxed{1.022}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: M. Bass

Date: 11-07-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 2.0" H_2O

P_b: 29.32 "Hg

Control Module Vacuum: 2.50 "Hg

	Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m		Meter Reading	Temp. In	Temp. Out	P_m
End	1356	10.300 cf	74 °F	-2.50	"H_2O	598.026 cf	86 °F	78 °F	2.00 "H_2O
Start	1344	0.000 cf	74 °F	-2.50	"H_2O	587.902 cf	81 °F	77 °F	2.00 "H_2O
Avg.	12	10.300 cf	74 °F	-2.500	"H_2O	10.124 cf	81 °F		2.000 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.300 \left[\frac{29.32 + \frac{-2.500}{13.6}}{74 + 460}\right] \times 1.000\,(C_f) = 9.919 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.124 \left[\frac{29.32 + \frac{2.000}{13.6}}{81 + 460}\right] = 9.733 \text{ dcsf}$$

$$C_{DG} = \frac{9.919}{9.733} = \boxed{1.019}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: M. Bass

Date: 11-07-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 3.0" H_2O

P_b: 29.32 "Hg

Control Module Vacuum: 3.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1408	10.330 cf	74 °F	-2.90 "H_2O	608.602 cf	89 °F	79 °F	3.00 "H_2O
Start	1358	0.000 cf	74 °F	-2.90 "H_2O	598.364 cf	85 °F	78 °F	3.00 "H_2O
Avg.	10	10.330 cf ✓	74 °F ✓	-2.900 "H_2O ✓	10.238 cf ✓	83 °F ✓		3.000 "H_2O ✓

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.330 \left[\frac{29.32 + \frac{-2.90}{13.6}}{74 + 460}\right] \times 1.000\ (C_1) = 9.938 \text{ dcsf} \checkmark$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.238 \left[\frac{29.32 + \frac{3.000}{13.6}}{83 + 460}\right] = 9.831 \text{ dcsf} \checkmark$$

$$C_{DG} = \frac{9.938}{9.831} = \boxed{1.011} \checkmark$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: M. Buss

Date: 11-07-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 4.0" H_2O

P_b: 29.32 "Hg

Control Module Vacuum: 3.00 "Hg

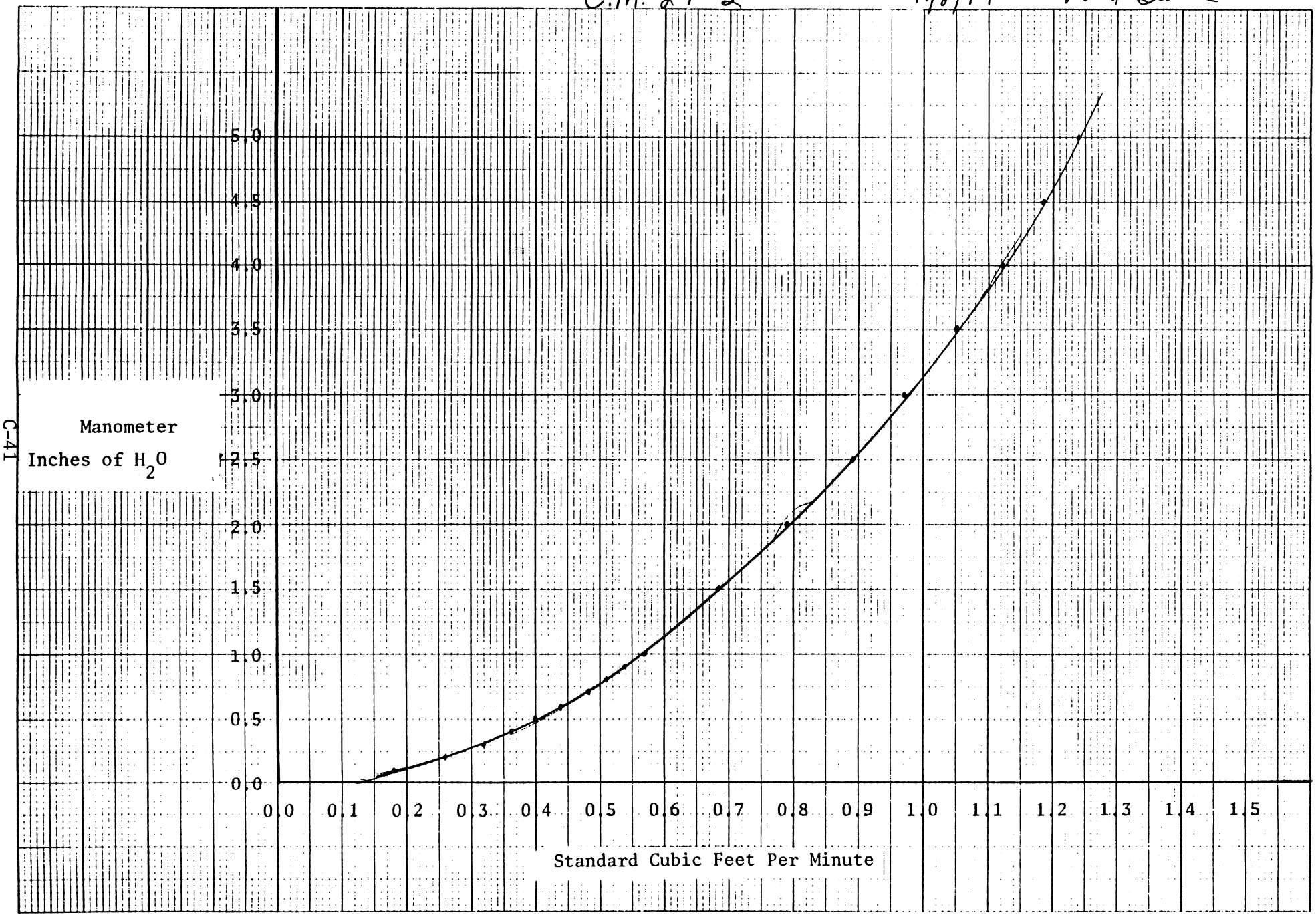
	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1419	10.130 cf	74 °F	-3.70 "H_2O	619.031 cf	91 °F	80 °F	4.00 "H_2O
Start	1410	0.000 cf	74 °F	-3.70 "H_2O	608.926 cf	87 °F	79 °F	4.00 "H_2O
Avg.	9	10.130 cf ✓	74 °F ✓	-3.700 "H_2O ✓	10.105 cf ✓	84 ✓ °F		4.000 "H_2O ✓

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.130 \left[\frac{29.32 + \frac{-3.700}{13.6}}{74 + 460}\right] \times 1000 \quad (C_f) = 9.726 \text{ dcsf} \checkmark$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.105 \left[\frac{29.32 + \frac{4.000}{13.6}}{84 + 460}\right] = 9.709 \text{ dcsf} \checkmark$$

$$C_{DG} = \frac{9.726}{9.709} = \boxed{1.002} \checkmark$$

C.M. 27-2 11/8/99 Mike Basa



METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 27-2

CALIBRATION DATA

Date: 11-07-99

Media	Time	Mercury Temperature (°F)	DTI (°F)
Ambient Air	1248	77	75 ✓
Ice Bath	1250	36	36 ✓
Boiling Water	1300	210	211 ✓
Oven	1302	250	250 ✓
Oven	1304	300	301 ✓
Oven	1306	352	351 ✓
Oven	1308	376	378 ✓

Meter Adjusted? Yes _____ No ✓

Calibrator: Mike Bass

Checked By: Jason Brown

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 29-1

Date: 11-22-99

ΔH ("H_2O)	C_{DG}
0.5	1.005 ✓
1.0	0.999 ✓
1.5	1.003 ✓
2.0	1.000 ✓
3.0	0.994 ✓
4.0	0.999 ✓
Average	1.000 ✓

Variation: + 0.5% ✓

- 0.6% ✓

Calibrator: Jason Conway #273

Checked By: Scott Hart #268

C_{DG} @ 2 liters/min. = 1.013

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-22-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.00" H2O

P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1031	5.004 cf	69 °F	-13 "H_2O	244.777 cf	68 °F	71 °F	1.0 "H_2O
Start	1021	0.000 cf	69 °F	-13 "H_2O	239.786 cf	70 °F	71 °F	1.0 "H_2O
Avg.	10 ✓	5.004 ✓ cf	69 ✓ °F	-13 ✓ "H_2O	4.991 ✓ cf	70 ✓ °F	✓ 1.0	"H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.004 \left[\frac{29.24 + \frac{-13}{13.6}}{69 + 460}\right] \times 1.000 \ (C_1) = 4.866 \checkmark \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 4.991 \left[\frac{29.24 + \frac{1.0}{13.6}}{70 + 460}\right] = 4.872 \checkmark \text{ dcsf}$$

$$C_{DG} = \frac{4.866}{4.872} = \boxed{0.999 \checkmark}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-22-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 1.50 "H2O

P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

Wet Test Meter (No. 3)							Dry Gas Meter				
	Time	Meter Reading		Temp.		P_m	Meter Reading		Temp. In	Temp. Out	P_m
End	1049	10.009	cf	69	°F	-1.6	755.874	cf	65 °F	71 °F	1.50 "H_2O
Start	1034	0.000	cf	69	°F	-1.6	745.977	cf	69 °F	71 °F	1.50 "H_2O
Avg.	15 ✓	10.009 ✓	cf	69 ✓	°F	-1.6 ✓	9.897 ✓	cf	69 ✓	°F ✓	1.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.009 \left[\frac{29.24 + \frac{-1.6}{13.6}}{69 + 460} \right] \times 1.000 \ (C_f) = 9.725 \checkmark \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 9.897 \left[\frac{29.24 + \frac{1.50}{13.6}}{69 + 460} \right] = 9.692 \checkmark \text{ dcsf}$$

$$C_{DG} = \frac{9.725}{9.692} = \boxed{1.003 \checkmark}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29.1

Calibrator: Jason Conway

Date: 11-22-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 1 @ 2.00 "H2O

P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

Wet Test Meter (No. 3)							Dry Gas Meter			
	Time	Meter Reading	Temp.		P_m		Meter Reading	Temp. In	Temp. Out	P_m
End	1103	10.088	cf	69 °F	-20	"H_2O	766.667 cf	69 °F	72 °F	2.0 "H_2O
Start	1051	0.000	cf	69 °F	-20	"H_2O	756.663 cf	68 °F	72 °F	2.0 "H_2O
Avg.	12	10.088	cf	69 °F	-20	"H_2O	10.004 cf	70 °F		2.0 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.088 \left[\frac{29.24 + \frac{-20}{13.6}}{69 + 460}\right] \times 1.000\,(C_f) = 9.792 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.004 \left[\frac{29.24 + \frac{2.0}{13.6}}{70 + 460}\right] = 9.790 \text{ dcsf}$$

$$C_{DG} = \frac{9.792}{9.790} = \boxed{1.000}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-21-99

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } Vm_{std}}{\text{Dry Gas Meter } Vm_{std}}$$

Run No.: 2 @ 4.00 "H2O

P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

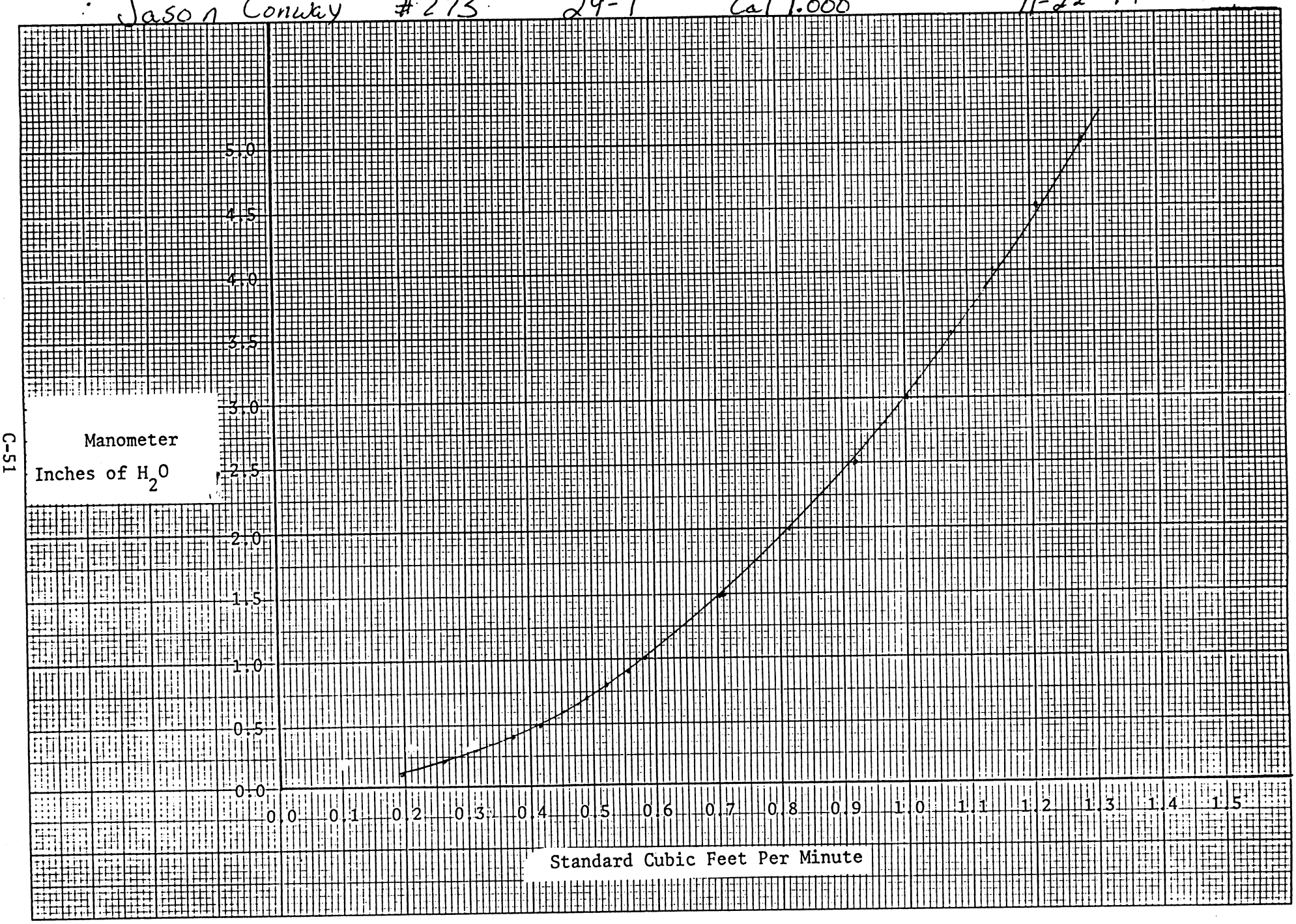
	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1311	10.002 cf	70 °F	-3.8 "H_2O	817.238 cf	68 °F	72 °F	4.0 "H_2O
Start	1302	0.000 cf	70 °F	-3.8 "H_2O	807.425 cf	70 °F	72 °F	4.0 "H_2O
Avg.	9 ✓	10.002 ✓ cf	70 ✓ °F	-3.8 ✓ "H_2O	9.813 ✓ cf	71 ✓ °F		✓ 4.0 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.002 \left[\frac{29.24 + \frac{-3.8}{13.6}}{70 + 460} \right] \times 1.000\,(C_f) = 9.646 \checkmark \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 9.813 \left[\frac{29.24 + \frac{4.0}{13.6}}{71 + 460} \right] = \cancel{9.651} \checkmark \; 9.633 \checkmark \text{ dcsf}$$

$$C_{DG} = \frac{9.646}{9.651} = \boxed{0.999 \checkmark}$$

Jason Conway #273 29-1 Cal 1.000 11-22-99



METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 29-1

CALIBRATION DATA

Date: 11-22-99

Media	Time	Mercury Temperature (°F)	DTI (°F)
Ambient Air	1025	70	70
Ice Bath	1112	35	36
Boiling Water	1050	212	212
Oven	1130	250	251
Oven	1141	300	300
Oven	1153	350	353
Oven	1200	375	375

Meter Adjusted? Yes _____ No ✓

Calibrator: Jason Conway #273

Checked By: Scott Hall #268

APPENDIX D

Analytical Data

TestAmerica
INCORPORATED

January 4, 2000

Doug Saathoff
METCO Environmental
P.O. Box 598
Addison, Texas 75001

DJB 1/5/00

Dear Doug,

Please find included with this letter the analytical report and data package for the St. Clair Power Plant samples submitted to TestAmerica for analysis. The samples were analyzed following the SOP based on the Ontario-Hydro Method.

Case Narrative

TestAmerica received the samples during the week of November 15,1999. All samples were intact when received. Please note the following:

- The Container #2A sample residues were dissolved with concentrated nitric and recombined with Container #2 prior to sample preparation.
- A Container #13 was received with this sample set. The Ontario Hydro Method does not address how to handle Container #13. With the approval of METCO, TestAmerica dissolved the residue with concentrated nitric acid and brought up to a final volume of 50 mL prior to analysis.
- All Matrix Spike sample results had a % Recovery between 75 % and 125 %.
- All other Quality Control Indicators were within acceptance limits.

If you have any questions or need additional information about this data package, please feel free to contact me at 937-294-6856.

Sincerely,

James A. Davis

James A. Davis
QA Coordinator

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

TestAmerica
INCORPORATED

Sample ID: The Detroit Edison Company
St. Clair Power Plant
East China Michigan

Hg Analysis
Ontario Hydro Method

Summary Report

	Unit 4 Stack Run 1	Unit 4 Stack Run 2	Unit 4 Stack Run 3	Unit 4 Precipitator Inlet Duct Run 1	Unit 4 Precipitator Inlet Duct Run 2	Unit 4 Precipitator Inlet Duct Run 3
Particle Bound Hg (ug)	0.00	0.00	0.00	3.27	3.78	1.32
Oxidized Hg (ug)	1.84	1.93	1.82	2.97	2.80	2.60
Elemental Hg (ug)	4.10	5.20	7.16	2.55	1.84	5.74
Total Hg (ug)	5.94	7.13	8.98	8.79	8.42	9.66

	Unit 4 Stack Blank Train	Unit 4 Precipitator Inlet Duct Blank Train
Particle Bound Hg (ug)	0.00	0.00
Oxidized Hg (ug)	0.00	0.00
Elemental Hg (ug)	0.00	0.00
Total Hg (ug)	0.00	0.00

	Reagent Blanks
Container # 7 (ug/L)	<0.2
Container # 8 (ug/L)	<2.0
Container # 9 (ug/L)	<4.0
Container # 10 (ug/L)	<2.0
Container # 11 (ug/L)	<0.2
Container # 12A (ug)	---
Container # 12B (ug)	<0.010
Container #13 (ug/L)	<0.067

Corrected Page 1/17/00

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

TestAmerica
INCORPORATED

Sample ID: The Detroit Edison Company
St. Clair Power Plant
East China Michigan

Hg Analysis
Ontario Hydro Method

Duplicate Summary Report

	Unit 4 Stack Run 1	Unit 4 Stack Run 2	Unit 4 Stack Run 3	Unit 4 Precipitator Inlet Duct Run 1	Unit 4 Precipitator Inlet Duct Run 2	Unit 4 Precipitator Inlet Duct Run 3
Particle Bound Hg (ug)	0.00	0.00	0.00	3.22	3.81	1.32
Oxidized Hg (ug)	1.84	1.96	1.84	3.06	2.76	2.59
Elemental Hg (ug)	4.11	5.10	7.11	2.55	1.89	5.74
Total Hg (ug)	5.95	7.06	8.95	8.83	8.46	9.65

	Unit 4 Stack Blank Train	Unit 4 Precipitator Inlet Duct Blank Train
Particle Bound Hg (ug)	0.00	0.00
Oxidized Hg (ug)	0.00	0.00
Elemental Hg (ug)	0.00	0.00
Total Hg (ug)	0.00	0.00

	Reagent Blanks
Container # 7 (ug/L)	<0.2
Container # 8 (ug/L)	<2.0
Container # 9 (ug/L)	<4.0
Container # 10 (ug/L)	<2.0
Container # 11 (ug/L)	<0.2
Container # 12A (ug)	---
Container # 12B (ug)	<0.010
Container #13 (ug/L)	<0.067

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

TestAmerica
INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Stack Run 1

Hg Analysis
Ontario Hydro Method

Collected On: 11/03/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A	Q94	12/16/99	12/17/99	jpp	<0.010	<0.010	0	<0.010	0	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2DE-1	12/10/99	12/13/99	jpp	<0.320	<0.320	0	---	---	ug		*1
Container # 3	3DE-3	12/10/99	12/13/99	jpp	1.84	1.84	<1.0	---	---	ug		
Container # 4	4DE-3	12/13/99	12/13/99	jpp	<0.660	<0.660	0	---	---	ug		
Container # 5	5DE-3	12/14/99	12/14/99	jpp	4.10	4.11	<1.0	---	---	ug		

Particle Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **1.84**
(Containers 3)

Elemental Hg (ug) **4.10**
(Containers 4 and 5)

Total Hg (ug) **5.94**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **1.84**
(Containers 3)

Dup. Elemental Hg (ug) **4.11**
(Containers 4 and 5)

Dup. Total Hg (ug) **5.95**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 - Container #2A was combined with Container #2 prior to sample preparation.

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

TestAmerica
INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Stack Run 2

Hg Analysis
Ontario Hydro Method

Collected On: 11/03/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A	Q97	12/16/99	12/17/99	jpp	<0.010	<0.010	0	---	---	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2DE-3	12/10/99	12/13/99	jpp	<0.112	<0.112	0	---	---	ug		*1
Container # 3	3DE-5	12/10/99	12/13/99	jpp	1.93	1.96	1.2	---	---	ug		
Container # 4	4DE-5	12/13/99	12/13/99	jpp	<0.720	<0.720	0	---	---	ug		
Container # 5	5DE-5	12/14/99	12/14/99	jpp	5.20	5.10	1.9	5.00	3.9	ug		

Particle Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **1.93**
(Containers 3)

Elemental Hg (ug) **5.20**
(Containers 4 and 5)

Total Hg (ug) **7.13**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **1.96**
(Containers 3)

Dup. Elemental Hg (ug) **5.10**
(Containers 4 and 5)

Dup. Total Hg (ug) **7.06**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 - Container #2A was combined with Container #2 prior to sample preparation.

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

TestAmerica
INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Stack Run 3

Hg Analysis
Ontario Hydro Method

Collected On: 11/04/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A	Q101	12/16/99	12/17/99	jpp	<0.010	<0.010	0	---	---	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2DE-5	12/10/99	12/13/99	jpp	<0.220	<0.220	0	---	---	ug		*1
Container # 3	3DE-7	12/10/99	12/13/99	jpp	1.82	1.84	~~<1.0~~	---	---	ug		
Container # 4	4DE-7	12/13/99	12/13/99	jpp	<0.580	<0.580	0	---	---	ug		
Container # 5	5DE-7	12/14/99	12/14/99	jpp	7.16	7.11	<1.0	---	---	ug		

Particle Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **1.82**
(Containers 3)

Elemental Hg (ug) **7.16**
(Containers 4 and 5)

Total Hg (ug) **8.98**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **1.84**
(Containers 3)

Dup. Elemental Hg (ug) **7.11**
(Containers 4 and 5)

Dup. Total Hg (ug) **8.95**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 - Container #2A was combined with Container #2 prior to sample preparation.

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TestAmerica
INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Precipitator Inlet Duct Run 1

Hg Analysis
Ontario Hydro Method

Collected On: 11/03/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A	Q52	12/16/99	12/17/99	jpp	3.27	3.22	1.4	---	---	ug		
Container # 1B	Q95	12/16/99	12/17/99	jpp	<0.010	<0.010	0	---	---	ug		
Container # 2	2DE-2	12/10/99	12/13/99	jpp	<0.124	<0.124	0	<0.0124	0	ug		*1
Container # 3	3DE-4	12/10/99	12/13/99	jpp	2.97	3.06	3	3.08	3.4	ug		
Container # 4	4DE-4	12/13/99	12/13/99	jpp	<0.700	<0.700	0	---	---	ug		
Container # 5	5DE-4	12/14/99	12/14/99	jpp	2.55	2.55	0	---	---	ug		

Particle Bound Hg (ug) **3.27**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **2.97**
(Containers 3)

Elemental Hg (ug) **2.55**
(Containers 4 and 5)

Total Hg (ug) **8.79**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **3.22**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **3.06**
(Containers 3)

Dup. Elemental Hg (ug) **2.55**
(Containers 4 and 5)

Dup. Total Hg (ug) **8.83**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 - Container #2A was combined with Container #2 prior to sample preparation.

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INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Precipitator Inlet Duct Run 2

Hg Analysis
Ontario Hydro Method

Collected On: 11/03/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A	Q53	12/16/99	12/17/99	jpp	3.78	3.81	<1.0	---	---	ug		
Container # 1B	Q96	12/16/99	12/17/99	jpp	<0.010	<0.010	0	---	---	ug		
Container # 2	2DE-4	12/10/99	12/13/99	jpp	<0.114	<0.114	0	---	---	ug		*1
Container # 3	3DE-6	12/10/99	12/13/99	jpp	2.80	2.76	~~1.1~~ 1.4	---	---	ug		
Container # 4	4DE-6	12/13/99	12/13/99	jpp	<0.680	<0.680	0	---	---	ug		
Container # 5	5DE-6	12/14/99	12/14/99	jpp	1.84	1.89	~~3.8~~ 2.7	---	---	ug		

Particle Bound Hg (ug) **3.78**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **2.80**
(Containers 3)

Elemental Hg (ug) **1.84**
(Containers 4 and 5)

Total Hg (ug) **8.42**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **3.81**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **2.76**
(Containers 3)

Dup. Elemental Hg (ug) **1.89**
(Containers 4 and 5)

Dup. Total Hg (ug) **8.46**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 - Container #2A was combined with Container #2 prior to sample preparation.

Corrected Page 1/17/00

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TestAmerica
INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Precipitator Inlet Duct Run 3

Hg Analysis
Ontario Hydro Method

Collected On: 11/04/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A	Q54	12/16/99	12/17/99	jpp	1.32	1.32	<1.0	1.30	~~2.0~~ 1.5	ug		
Container # 1B	Q102	12/16/99	12/17/99	jpp	<0.010	<0.010	0	---	---	ug		
Container # 2	2DE-6	12/10/99	12/13/99	jpp	<0.180	<0.180	0	---	---	ug		*1
Container # 3	3DE-8	12/10/99	12/13/99	jpp	2.60	2.59	<1.0	---	---	ug		
Container # 4	4DE-8	12/13/99	12/13/99	jpp	<0.720	<0.720	0	---	---	ug		
Container # 5	5DE-8	12/14/99	12/14/99	jpp	5.74	5.74	0.0	---	---	ug		

Particle Bound Hg (ug) **1.32**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **2.60**
(Containers 3)

Elemental Hg (ug) **5.74**
(Containers 4 and 5)

Total Hg (ug) **9.66**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **1.32**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **2.59**
(Containers 3)

Dup. Elemental Hg (ug) **5.74**
(Containers 4 and 5)

Dup. Total Hg (ug) **9.65**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 - Container #2A was combined with Container #2 prior to sample preparation.

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TestAmerica
INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Stack Blank Train

Hg Analysis
Ontario Hydro Method

Collected On: 11/04/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A		Not Provided		jpp	---	---	---	---	---	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2		Not Provided		jpp	---	---	---	---	---	ug		
Container # 3	3DE-1	12/10/99	12/13/99	jpp	<0.860	<0.860	0	---	---	ug		
Container # 4	4DE-1	12/13/99	12/13/99	jpp	<0.620	<0.620	0	---	---	ug		
Container # 5	5DE-1	12/14/99	12/14/99	jpp	<0.860	<0.860	0	---	---	ug		

Particle Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **0.00**
(Containers 3)

Elemental Hg (ug) **0.00**
(Containers 4 and 5)

Total Hg (ug) **0.0**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **0.00**
(Containers 3)

Dup. Elemental Hg (ug) **0.00**
(Containers 4 and 5)

Dup. Total Hg (ug) **0.0**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

TestAmerica
INCORPORATED

Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Unit 4 Precipitator Inlet Duct Blank Train

Hg Analysis
Ontario Hydro Method

Collected On: 11/03/99
Collected By: METCO

Container # 1A - Main Filter
Container # 1B - Backup Filter
Container # 2 - 0.1 N HNO3 Rinse
Container # 3 - KCl Impingers (1,2,3)/10 %HNO3 Rinse
Container # 4 - HNO3/H2O2 Impinger (4)/0.1 N HNO3 Rinse
Container # 5 - H2SO4/KMnO4 Impinger (5,6,7)/0.1 N HNO3 Rinse

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 1A		Not Provided		jpp	---	---	---	---	---	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2		Not Provided		jpp	---	---	---	---	---	ug		
Container # 3	3DE-2	12/10/99	12/13/99	jpp	<0.890	<0.890	0	---	---	ug		
Container # 4	4DE-2	12/13/99	12/13/99	jpp	<0.680	<0.680	0	<0.680	0	ug		
Container # 5	5DE-2	12/14/99	12/14/99	jpp	<0.970	<0.970	0	---	---	ug		

Particle Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **0.00**
(Containers 3)

Elemental Hg (ug) **0.00**
(Containers 4 and 5)

Total Hg (ug) **0.0**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.00**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **0.00**
(Containers 3)

Dup. Elemental Hg (ug) **0.00**
(Containers 4 and 5)

Dup. Total Hg (ug) **0.0**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

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TestAmerica
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Sample ID: **The Detroit Edison Company**
St. Clair Power Plant
East China Michigan
Reagent Blanks

Hg Analysis
Ontario Hydro Method

Collected On: 11/03/99
Collected By: METCO

Container # 7 - 0.1 N HNO_3 Blank
Container # 8 - 1 N KCl Blank
Container # 9 - 5 % HNO_3/10 % H_2O_2 Blank
Container # 10 - H_2SO_4-/$KMnO_4$ Blank
Container # 11 - 10 % Hydroxylamine Sulfate/Sodium Chloride Blank
Container # 12 - Filter Blank
Container # 13 - Acetone Blank

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 7	RBDE-7	---	12/13/99	jpp	<0.2	<0.2	0	---	---	ug/L		
Container # 8	RBDE-8	12/10/99	12/13/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 9	RBDE-9	12/13/99	12/13/99	jpp	<4.0	<4.0	0	---	---	ug/L		
Container # 10	RBDE-10	12/14/99	12/14/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 11	RBDE-11	---	12/13/99	jpp	<0.2	<0.2	0	---	---	ug/L		
Container # 12A		Not Needed		jpp	---	---	---	---	---	ug		*1
Container # 12B	Q98	12/16/99	12/17/99	jpp	<0.010	<0.010	0	---	---	ug		
Container # 13	RBDE-13	12/16/99	12/17/99	jpp	<0.067	<0.067	0	---	---	ug/L		*2

Notes:
*1 It was not neceassy to analyze a thimble blank as only the particulate matter was digested.
*2 Container #13 is not mentioned in the Ontario Hydro Method. As approved by METCO, TestAmerica redissolved with several aliquots of concentrated nitric acid and diluted to a final volume of 50 mL prior to analysis.

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TestAmerica
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Mercury Sample Train Receipt

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON CO.
ST. CLAIR POWER PLANT
E. CHINA, MI

Location ID/Run #
UNIT # 4
STACK
RUN #1

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☑ 2 (1)	155 + 5 + – = 160.	2DE-1	2A ADDED
☑ 3 (2)	500 + 200 + – = 700.	3DE3A+3B	
☑ 4 (1)	165 + – + – = 165.	4DE-3	
☑ 5 (1)	460 + – + – = 460.	5DE-3	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A ( )	Q94		
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: DAP 11/4/00

Date: _____

TestAmerica

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON Co.
ST CLAIR POWER PLANT
E. CHINA, MI

Location ID/Run #
UNIT #4
PRECIP INLET
RUN #1

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☑ 2 (1)	54 + 8 + – = 62.	2 DE-2	2A ADDED
☑ 3 (2)	480 + 215 + – = 695.	3 DE-4A+4B	
☑ 4 (1)	175 + – + – = 175.	4 DE-4	
☑ 5 (1)	500 + – + – = 500.	5 DE-4	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A ( )	Q52		
☑ 1B ( )	Q95		
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: DRP 1/4/00

Date: _____

TestAmerica

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON Co.
ST CLAIR POWER PLANT
E. CHINA, MI

Location ID/Run #
UNIT #4
STACK
RUN #2

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☑ 2 (1)	48 + 8 + – = 56.	2DE-3	2A ADDED
☑ 3 (L)	430 + 340 + – = 770.	3DE-SA+SB	
☑ 4 (1)	180 + – + – = 180.	4DE-S	
☑ 5 (1)	500 + – + – = 500.	5DE-S	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A ( )	Q97		
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: DBO 1/4/00

Date: _____

TestAmerica

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON CO.
ST. CLAIR POWER PLANT
E. CHINA, MI

Location ID/Run #
UNIT #4
PRECIP INLET
RUN #2

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☑ 2 (1)	49 + 8 + ___ = 57.	2 DE-4	2A ADDED
☑ 3 (2)	450 + 320 + – = 770.	3DE-6A+6B	
☑ 4 (1)	170 + – + – = 170.	4DE-6	
☑ 5 (1)	490 + – + – = 490.	5DE-6	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A ( )	Q 53		
☑ 1B ( )	Q 96		
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: DBP 1/4/00

Date: _____

TestAmerica

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON Co.
ST. CLAIR POWER PLANT
E. CHINA, MI

Location ID/Run #
UNIT #4
STACK
RUN #3

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☑ 2 (1)	107 + 5 + – = 112.	2DE-5	2A ADDED
☑ 3 (2)	425 + 250 + – = 675.	3DE-7A+7B	
☑ 4 (1)	140 + – + – = 140.	4DE-7	
☑ 5 (1)	465 + – + – = 465.	5DE-7	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A ( )	Q101		
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: DBP 11/4/00

Date: _____

TestAmerica

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON CO.
ST. CLAIR POWER PLANT
E. CHINA, MI

Location ID/Run #
UNIT #4
PRECIP INLET
RUN #3

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☑ 2 (1)	84 + 8 + – = 92.	2DE-6	2A ADDED
☑ 3 (2)	470 + 240 + – = 710.	3DE-8A+8B	
☑ 4 (1)	180 + – + – = 180.	4DE-8	
☑ 5 (1)	500 + – + – = 500.	5DE-8	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A ( )	QS4		
☑ 1B ( )	Q102		
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: MP 1/4/00

Date: _____

TestAmerica

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON Co.
ST. CLAIR POWER PLANT
E. CHINA, MI

Location ID/Run #
UNIT #4
PRECIP INLET

BLANK TRAIN

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☒ 3 (1)	450 + – + – = 450.	3 DE-2	
☒ 4 (1)	170 + – + – = 170.	4 DE-2	
☒ 5 (1)	485 + – + – = 485.	5 DE-2	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: [illegible] 1/4/00

Date: _____

TestAmerica

Mercury Sample Train Receipt Record

Client ID
DETROIT EDISON
ST- CLAIR POWERPLANT
E. CHINA, MI

Location ID/Run #
UNIT 4 STACK
BLANK TRAIN

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☑ 3 (1)	430 + – + – = 430.	3DE-1	
☑ 4 (1)	155 + – + – = 155.	4DE-1	
☑ 5 (1)	420 + – + – = 420.	5DE-1	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: Volumes taken by SGS

Checked By: BBP 1/4/00

Date: _____

TestAmerica

TestAmerica
INCORPORATED

Sample Preparation Batch Sheets

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

~~DET~~

BIG BROWN FAIRFIELD, TX. 2, 3, 8

DETROIT ED. E. CHINA, MI

AQUEOUS MERCURY BATCH SHEET

analyst: JB date: 12/10/99 WATER BATH: start mid end

temp:

standard reference #: 65-41-17

time:

icv reference #: 65-41-18

mL	sample # / client		prep info
	BLK DE		5mL-50.0
	MS		
	MSD		
160	2DE 1	160	
62	2DE 2 TRP	62	
56	2DE 3 SPK	56	
57	2DE 4	57	
110	2DE 5	HO 115	
90	2DE 6	92	
430	3DE 1	430	
445	3DE 2	450	
700	3DE 3	700	
695	3DE 4 TRP	695	
770	3DE 5 SPK	770	
770	3DE 6	770	
675	3DE 7	675	
710	3DE 8	710	
51	12BDE 8	51	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

comments:

H_2SO_4 - 65-38-9
HNO_3 65-45-13
$KMnO_4$ 65-44-18
$K_2S_2O_8$ 65-43-12
65-47-7
65-47-8

E. CHINA, MI
DETROIT EDISON

AQUEOUS MERCURY BATCH SHEET

analyst: SS/ date: 12-12-99 WATER BATH: start mid end

temp:

standard reference #: 65-41-17

time:

icv reference #: 65-41-18

	sample # / client	prep info
	BLANK	2.5 mL
	MS	
	MSD	
155	4OE-1	
170	4OE-2 TRP	
165	4OE-3 SPK	
175	4OE-4	
180	4OE-5	
170	4OE-6	
145	4OE-7	
180	4OE-8	
52	RBOE-9	
50	RBOE-7	
103	RBOE-11	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

comments: HCl - 65-45-15 / $KMnO_8$ = 65-46-15 / HYDROX. HCl = 65-41-3
$SnCl_2$ - 65-47-8

AQUEOUS MERCURY BATCH SHEET

analyst: SGS/ DRP date: 12-14-99 WATER BATH: start mid end

temp: _____

standard reference #: 65-41-17

time: _____

icv reference #: 65-41-18

	sample # / client	prep info
	BLANK	
	MS	
	MSD	
430	50E-1	
485	50E-2	
465	50E-3	
500	50E-4	
500	50E-5 TRP	
485	50E-6 SPK	
465	50E-7	
495	50E-8	
48	RR50E-10	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

comments: HYDROXY HCl = 65-41-2

SnCl2 - 65-47-18

E. CHINA, MI
DETROIT EDISON FILTERS

NONAQUEOUS MERCURY BATCH SHEET

Analyst: JBP Date: 12/16/99 Water Bath: start mid end

Standard Reference: Analyzed 12/17/99 temp: _____

ICV Reference: _____ date: _____

A#	Sample # / Client	Weight	MS	MSD
12	BLK			
11	NIST 1633B	0.5177		
10	47Q98 (BLK)			
9	47Q94 TRP			
8	47Q97 SPIK			
7	47Q101			
6	Q52	0.5785		
5	47Q95			
4	Q53	0.5100		
3	47Q96			
2	Q54 TRP	0.5960		
1	47Q102 SPIK			

MB

ICV

MS

MSD

RPD

FLAG

HF-65-27-17
HCl-65-46-1
HNO_3-65-48-14
Boric Acid-65-48-16
$SnCl_2$-65-49-8
STD- ~~65-41-7~~ 65-41-17
ICV 65-41-18

SECONDARY DATA CHECK: analyst:
date:

Comments: _____

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 16:20:58  13 Dec 1999
Folder: DEC99B      Seq: 126                     Print: On
User:               Batch:            Id: CK2        Cuv: 1 29 Gas:    0.23 LPM
State: Idle                                        Xmit: Off Autosampler: On
```

```
AUTOSAMPLER:. Rack entry   Rack 121399A
cuv Id        Extended id          Weight Volume Macro check Help
 1 ico                              1.0000 1.0000
 2 ce blk                           1.0000 1.0000
 3 ce blk cuv                       1.0000 1.0000
 4 Zoe1                             1.0000 1.0000
 5 Zoe1 cuv                         1.0000 1.0000
 6 Zoe2                             1.0000 1.0000
 7 Zoe2 cuv                         1.0000 1.0000
 8 Zoe2 tro                         1.0000 1.0000
 9 Zoe3                             1.0000 1.0000
10 Zoe3 cuv                         1.0000 1.0000
11 Zoe3 sok                         1.0000 1.0000
12 Zoe4                             1.0000 1.0000
13 Zoe4 cuv                         1.0000 1.0000
14 Zoe5                             1.0000 1.0000
15 Zoe5 cuv                         1.0000 1.0000
                                                                    PgDn
```

```
Cuv 1  ID: ico                                  Cell entry. Ins to switch
                                                              125 6  12
```

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 20:17:36  12 Dec 1999
Folder: 060998      Seq: 214                        Print: On
User:               Saton:            Id: ccv        Cup: 1 41 Gas:    4.22 LPM
State: Idle                                          Emit: Off Autosampler: On
```

```
AUTOSAMPLER:  Rack entry   Rack 121399a
Cup Id          Extended Id          Weight Volume Macro check Help
 1 ccc                                1.0000 1.0000
 2 ce4blk                             1.0000 1.0000
 3 ce4blk                             1.0000 1.0000
 4 4ce1                               1.0000 1.0000
 5 4ce1 cup                           1.0000 1.0000
 6 4ce2                               1.0000 1.0000
 7 4ce2 cup                           1.0000 1.0000
 8 4ce2 trp                           1.0000 1.0000
 9 4ce3                               1.0000 1.0000
10 4ce3 cup                           1.0000 1.0000
11 4ce3 scx                           1.0000 1.0000
12 4ce4                               1.0000 1.0000
13 4ce4 cup                           1.0000 1.0000
14 4ce5                               1.0000 1.0000
15 4ce5 cup                           1.0000 1.0000
                                                                    Page
```

```
Cup 1   ID: ccc                                  Call entry, Ins to switch
                                                                 LPS =   12
```

Protocol: SYSTEST

Rev: 3.001 Time: 20:18:33 13 Dec 1999

Folder: DEC99B Seq: 214 Print: On

User: Batch: Id: ccv Cuo: 1 41 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack empty Rack 1213999a Equ

Cuo Id	Extended Id	Weight	Volume	Macro	Creat	Help
16 4des		1.0000	1.0000			
17 4des cuo		1.0000	1.0000			
18 4des7		1.0000	1.0000			
19 4des7 cuo		1.0000	1.0000			
20 4des8		1.0000	1.0000			
21 4des8 cuo		1.0000	1.0000			
22 rode9		1.0000	1.0000			
23 rode9 cuo		1.0000	1.0000			
24 ccc		1.0000	1.0000			
25 ccv		1.0000	1.0000			
26 rode7		1.0000	1.0000			
27 rode7 cuo		1.0000	1.0000			
28 rode11		1.0000	1.0000			
29 rode11 cuo		1.0000	1.0000			
30 4ffblk		1.0000	1.0000			

EqDn

Cuo 16 ID: 4des Cell entry, line to switch

12F = 12

Protocol: SYSTEST

Rev: 3.001 Time: 20:18:58 13 Dec 1999

Folder: DED99B Seq: 214 Print: On

User: Batch: Id: ccv Cuc: 1 41 Gas: 0.33 LPM

State: Idle Amb: Off Autosampler: On

AUTOSAMPLER: Rack empty Rack 121399a Pcuc

cuc Id	Extended Id	weight	Volume	Macro	check	Help
31 4ff6lk cuc		1.0000	1.0000			
32 4ff1		1.0000	1.0000			
33 4ff1 cuc		1.0000	1.0000			
34 4ff2		1.0000	1.0000			
35 4ff2 cuc		1.0000	1.0000			
36 4ff3		1.0000	1.0000			
37 4ff3 cuc		1.0000	1.0000			
38 4ff3 tro		1.0000	1.0000			
39 4ff4		1.0000	1.0000			
40 4ff4 cuc		1.0000	1.0000			
41 4ff4 sok		1.0000	1.0000			
42 4ff5		1.0000	1.0000			
43 4ff5 cuc		1.0000	1.0000			
44 4ff6		1.0000	1.0000			

Cuc 31 ID: 4ff6lk cuc Cell empty, ire no switch

ID # 12

*** Standard: 1 Rep: 1 Seq: 119 15:48:31 13 Dec 1999 HG

Hg .000 ug/L -278
Ave. Int. = -278 S. D. = 0

*** Standard: 2 Rep: 1 Seq: 120 15:50:53 13 Dec 1999 HG

Hg .200 ug/L 10435
Ave. Int. = 10435 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 121 15:53:16 13 Dec 1999 HG

Hg .500 ug/L 26994
Ave. Int. = 26994 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 122 15:55:38 13 Dec 1999 HG

Hg 1.00 ug/L 53326
Ave. Int. = 53326 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 123 15:58:00 13 Dec 1999 HG

Hg 2.00 ug/L 108501
Ave. Int. = 108501 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 124 16:10:25 13 Dec 1999 HG

Hg 3.00 ug/L 158504
Ave. Int. = 158504 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 16:13:39 13 Dec 1999

Folder: DEC99B Seq: 125 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 29 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

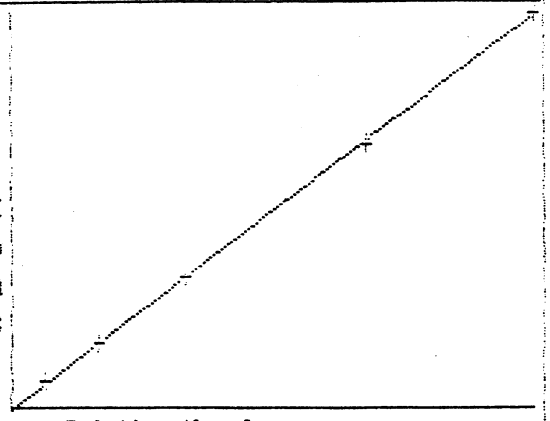
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear	
S1	.000	-.008	-.008	Quadratic	
S2	.200	.193	-.007	WtdLinear	
S3	.500	.504	.004		C
S4	1.00	.999	-.001	Accept	o
S5	2.00	2.04	.036		n
S6	3.00	2.98	-.025	StdAdd	c

A .0000000 r .999852

B 1.87897e-5 C -2.83157e-3



Relative Absorbance

	Mean	%RSD	
S1	-278	0	-278
S2	10435	0	10435
S3	26994	0	26994
S4	53326	0	53326
S5	108501	0	108501
S6	158504	0	158504

33?

New calibration coefficients stored 149 2 5

Line	Conc.	Units	SD/RSD	1	2	3	4	5

*** Check Standard: 2 CK2 Sec: 125 16:15:37 13 Dec 1999 H6

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		102.	.623	.604	ug/L	.000

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: ico					Seq: 125	16:22:59 13 Dec 1999 HG			
Hg	-.007	ug/L	.000	-.007					<0.2 µg/L
*** Sample ID: ce blk					Seq: 127	16:25:17 13 Dec 1999 HG			
Hg	.004	ug/L	.000	.004					<0.2 µg/L
*** Sample ID: ce blk dup					Seq: 128	16:27:35 13 Dec 1999 HG			RPD = <1.0%
Hg	.004	ug/L	.000	.004					<0.2 µg/L
*** Sample ID: Zoe1					Seq: 129	16:29:53 13 Dec 1999 HG			
Hg	.004	ug/L	.000	.004					<0.32 µg
*** Sample ID: Zoe1 dup					Seq: 130	16:32:11 13 Dec 1999 HG			RPD = <1.0%
Hg	.004	ug/L	.000	.004					<0.32 µg
*** Sample ID: Zoe2					Seq: 131	16:34:29 13 Dec 1999 HG			
Hg	.025	ug/L	.000	.025					<0.124 µg
*** Sample ID: Zoe2 dup					Seq: 132	16:36:47 13 Dec 1999 HG			RPD = <1.0%
Hg	.024	ug/L	.000	.024					<0.124 µg
*** Sample ID: Zoe2 trc					Seq: 133	16:39:05 13 Dec 1999 HG			RPD = <1.0%
Hg	.025	ug/L	.000	.025					<0.124 µg
*** Sample ID: Zoe3					Seq: 134	16:41:23 13 Dec 1999 HG			
Hg	.013	ug/L	.000	.013					<0.112 µg
*** Sample ID: Zoe3 dup					Seq: 135	16:43:41 13 Dec 1999 HG			RPD = <1.0%
Hg	.012	ug/L	.000	.012					<0.112 µg
*** Sample ID: Zoe3 spk					Seq: 136	16:45:59 13 Dec 1999 HG			
Hg	1.04	ug/L	.000	1.04		TV=1.0			104%
*** Sample ID: Zoe4					Seq: 137	16:48:16 13 Dec 1999 HG			
Hg	.113	ug/L	.000	.113					<0.114 µg

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 2de4 dup					Seq: 138	16:50:33 13 Dec 1999 HG		RPD = <1.0%
Hg	.118	ug/L	.000	.118			<0.114µg	
*** Sample ID: 2de5					Seq: 139	16:52:50 13 Dec 1999 HG		
Hg	.010	ug/L	.000	.010			<0.220µg	
*** Sample ID: 2de5 dup					Seq: 140	16:55:08 13 Dec 1999 HG		RPD = <1.0%
Hg	.010	ug/L	.000	.010			<0.220µg	
*** Sample ID: 2de6					Seq: 141	16:57:26 13 Dec 1999 HG		
Hg	.027	ug/L	.000	.027			<0.180µg	
*** Sample ID: 2de6 dup					Seq: 142	16:59:44 13 Dec 1999 HG		RPD = <1.0%
Hg	.027	ug/L	.000	.027			<0.180µg	
*** Sample ID: 3de1					Seq: 143	17:02:02 13 Dec 1999 HG		
Hg	.012	ug/L	.000	.012			<0.860µg	
*** Sample ID: 3de1 dup					Seq: 144	17:04:20 13 Dec 1999 HG		RPD = <1.0%
Hg	.007	ug/L	.000	.007			<0.860µg	
*** Sample ID: 3de2					Seq: 145	17:06:38 13 Dec 1999 HG		
Hg	.005	ug/L	.000	.005			<0.890µg	
*** Sample ID: 3de2 dup					Seq: 146	17:08:56 13 Dec 1999 HG		RPD = <1.0%
Hg	.005	ug/L	.000	.005			<0.890µg	
*** Sample ID: 3de3					Seq: 147	17:11:14 13 Dec 1999 HG		
Hg	.263	ug/L	.000	.263			1.84µg	
*** Sample ID: 3de3 dup					Seq: 148	17:13:32 13 Dec 1999 HG		RPD = <1.0%
Hg	.263	ug/L	.000	.263			1.84µg	
*** Sample ID: ccb					Seq: 149	17:15:50 13 Dec 1999 HG		
Hg	-.005	ug/L	.000	-.005			<0.2µg/L	

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: ccv					Seq: 150	17:16:08 13 Dec 1999 HG		
Hg	1.98	ug/L	.000	1.98		TV = 2.0	99%	
*** Sample ID: Ice4					Seq: 151	17:20:31 13 Dec 1999 HG		
Hg	.428	ug/L	.000	.428			2.97 µg	
*** Sample ID: Ice4 dup					Seq: 152	17:23:50 13 Dec 1999 HG	RPD = 3.0%	
Hg	.441	ug/L	.000	.441			3.06 µg	
*** Sample ID: Ice4 trp					Seq: 153	17:25:09 13 Dec 1999 HG	RPD = 3.4%	
Hg	.443	ug/L	.000	.443			3.08 µg	
*** Sample ID: Ice5					Seq: 154	17:27:29 13 Dec 1999 HG		
Hg	.251	ug/L	.000	.251			1.93 µg	
*** Sample ID: Ice5 dup					Seq: 155	17:29:49 13 Dec 1999 HG	RPD = 1.2%	
Hg	.254	ug/L	.000	.254			1.96 µg	
*** Sample ID: Ice5 ecx					Seq: 156	17:32:08 13 Dec 1999 HG		
Hg	1.30	ug/L	.000	1.30		TV = 1.0	105%	
*** Sample ID: Ice6					Seq: 157	17:34:29 13 Dec 1999 HG		
Hg	.363	ug/L	.000	.363			2.80 µg	
*** Sample ID: Ice6 dup					Seq: 158	17:36:48 13 Dec 1999 HG	RPD = 1.1%	
Hg	.359	ug/L	.000	.359			2.76 µg	
*** Sample ID: Ice7					Seq: 159	17:39:08 13 Dec 1999 HG		
Hg	.270	ug/L	.000	.270			1.82 µg	
*** Sample ID: Ice7 dup					Seq: 160	17:41:26 13 Dec 1999 HG	RPD = <1.0%	
Hg	.272	ug/L	.000	.272			1.84 µg	
*** Sample ID: Ice8					Seq: 161	17:43:46 13 Dec 1999 HG		
Hg	.362	ug/L	.000	.362			2.60 µg	

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 3ce8 dup					Seq: 162	17:46:08 13 Dec 1999 HG		RPD=<1.0%
Hg	.365	ug/L	.000	.365			2.59 µg	
*** Sample ID: rcce8					Seq: 163	17:48:29 13 Dec 1999 HG		
Hg	.003	ug/L	.000	.003			<2.0 µg/L	
*** Sample ID: rcce8 dup					Seq: 164	17:50:48 13 Dec 1999 HG		RPD=<1.0%
Hg	.005	ug/L	.000	.005			<2.0 µg/L	
*** Sample ID: ccb					Seq: 165	17:53:09 13 Dec 1999 HG		
Hg	-.005	ug/L	.000	-.005			<0.20 µg/L	
*** Sample ID: ccv					Seq: 166	17:55:30 13 Dec 1999 HG		
Hg	1.97	ug/L	.000	1.97			+V=2.0	99%

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: icc					Seq: 214	20:20:33 13 Dec 1999 HG		
Hg	-.005	ug/L	.000	-.005		<0.20 µg/L		
*** Sample ID: ce4blk					Seq: 215	20:22:53 13 Dec 1999 HG		
Hg	.010	ug/L	.000	.010		<0.2 µg/L		
*** Sample ID: ce4blk					Seq: 216	20:25:11 13 Dec 1999 HG		
Hg	.009	ug/L	.000	.009		<0.20 µg/L		
*** Sample ID: 4de1					Seq: 217	20:27:29 13 Dec 1999 HG		
Hg	.016	ug/L	.000	.016		<0.620 µg		
*** Sample ID: 4de1 dup					Seq: 218	20:29:46 13 Dec 1999 HG	RPD = <1.0%	
Hg	.016	ug/L	.000	.016		<0.620 µg		
*** Sample ID: 4de2					Seq: 219	20:32:04 13 Dec 1999 HG		
Hg	.018	ug/L	.000	.018		<0.680 µg		
*** Sample ID: 4de2 dup					Seq: 220	20:34:22 13 Dec 1999 HG	RPD = <1.0%	
Hg	.018	ug/L	.000	.018		<0.680 µg		
*** Sample ID: 4de2 tro					Seq: 221	20:36:40 13 Dec 1999 HG	RPD = <1.0%	
Hg	.019	ug/L	.000	.019		<0.680 µg		
*** Sample ID: 4de3					Seq: 222	20:38:58 13 Dec 1999 HG		
Hg	.037	ug/L	.000	.037		<0.660 µg		
*** Sample ID: 4de3 dup					Seq: 223	20:41:16 13 Dec 1999 HG	RPD = <1.0%	
Hg	.036	ug/L	.000	.036		<0.660 µg		
*** Sample ID: 4de3 spk					Seq: 224	20:43:34 13 Dec 1999 HG		
Hg	.996	ug/L	.000	.996		TV = 1.0 100%		
*** Sample ID: 4de4					Seq: 225	20:45:52 13 Dec 1999 HG		
Hg	.015	ug/L	.000	.015		<0.70 µg		

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 4de4 dup					Seq: 224	20:48:09 13 Dec 1999 HG		RPD = <1.0%
Hg	.020	ug/L	.000	.020			<0.70 µg	
*** Sample ID: 4de5					Seq: 227	20:50:26 13 Dec 1999 HG		
Hg	.034	ug/L	.000	.034			<0.720 µg	
*** Sample ID: 4de5 dup					Seq: 228	20:52:44 13 Dec 1999 HG		RPD = <1.0%
Hg	.036	ug/L	.000	.036			<0.720 µg	
*** Sample ID: 4de6					Seq: 229	20:55:02 13 Dec 1999 HG		
Hg	.023	ug/L	.000	.023			<0.680 µg	
*** Sample ID: 4de6 dup					Seq: 230	20:57:20 13 Dec 1999 HG		RPD = <1.0%
Hg	.022	ug/L	.000	.022			<0.680 µg	
*** Sample ID: 4de7					Seq: 231	20:59:38 13 Dec 1999 HG		
Hg	.068	ug/L	.000	.068			<0.580 µg	
*** Sample ID: 4de7 dup					Seq: 232	21:01:56 13 Dec 1999 HG		RPD = <1.0%
Hg	.065	ug/L	.000	.065			<0.580 µg	
*** Sample ID: 4de8					Seq: 233	21:04:14 13 Dec 1999 HG		
Hg	.033	ug/L	.000	.033			<0.720 µg	
*** Sample ID: 4de8 dup					Seq: 234	21:06:33 13 Dec 1999 HG		RPD = 4.0%
Hg	.032	ug/L	.000	.032			<0.720 µg	
*** Sample ID: rcde9					Seq: 235	21:08:50 13 Dec 1999 HG		
Hg	.016	ug/L	.000	.016			<4.0 µg/L	
*** Sample ID: rcde9 dup					Seq: 236	21:11:08 13 Dec 1999 HG		RPD = <1.0%
Hg	.016	ug/L	.000	.016			<4.0 µg/L	
*** Sample ID: ccc					Seq: 237	21:13:26 13 Dec 1999 HG		
Hg	-.006	ug/L	.000	-.006			<0.200 µg/L	

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: ccv					Seq: 238	21:15:45 13 Dec 1999 HG		
Hg	1.89	ug/L	.000	1.89		TV=2.0 95%		
*** Sample ID: rcoe7					Seq: 239	21:18:16 13 Dec 1999 HG		
Hg	-.020	ug/L	.000	-.020		<0.2 ug/L ~~<2.0 ug/L~~ RM 12/30/ac		
*** Sample ID: rcoe7 dup					Seq: 240	21:20:35 13 Dec 1999 HG	RPD=<1.0%	
Hg	-.005	ug/L	.000	-.006		<0.2 ug/L ~~<2.0 ug/L~~ RM 12/30/ac		
*** Sample ID: rcoe11					Seq: 241	21:22:54 13 Dec 1999 HG		
Hg	.005	ug/L	.000	.005		<0.2 ug/L ~~<2.0 ug/L~~ RM 12/30/ac		
*** Sample ID: rcoe11 dup					Seq: 242	21:25:13 13 Dec 1999 HG	RPD=<1.0%	
Hg	.004	ug/L	.000	.004		<0.2 ug/L ~~<2.0 ug/L~~ RM 12/30/ac		
*** Sample ID: 4ffblk					Seq: 243	21:27:32 13 Dec 1999 HG		
Hg	.006	ug/L	.000	.006				
*** Sample ID: 4ffblk dup					Seq: 244	21:29:51 13 Dec 1999 HG		
Hg	.007	ug/L	.000	.007				
*** Sample ID: 4ff1					Seq: 245	21:32:10 13 Dec 1999 HG		
Hg	.022	ug/L	.000	.022				
*** Sample ID: 4ff1 dup					Seq: 246	21:34:29 13 Dec 1999 HG		
Hg	.023	ug/L	.000	.022				
*** Sample ID: 4ff2					Seq: 247	21:36:49 13 Dec 1999 HG		
Hg	.022	ug/L	.000	.022				
*** Sample ID: 4ff2 dup					Seq: 248	21:39:09 13 Dec 1999 HG		
Hg	.022	ug/L	.000	.022				
*** Sample ID: 4ff3					Seq: 249	21:41:29 13 Dec 1999 HG		
Hg	.022	ug/L	.000	.022				

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 4ff3 dup					Seq: 250	21:43:49 13 Dec 1999		-6
Hg	.329	ug/L	.000	.329				
*** Sample ID: 4ff3 tro					Seq: 251	21:46:09 13 Dec 1999		-6
Hg	.330	ug/L	.000	.330				
*** Sample ID: 4ff4					Seq: 252	21:46:30 13 Dec 1999		-6
Hg	.137	ug/L	.000	.137				
*** Sample ID: 4ff4 dup					Seq: 253	21:50:51 13 Dec 1999		-6
Hg	.134	ug/L	.000	.134				
*** Sample ID: 4ff4 spk					Seq: 254	21:53:12 13 Dec 1999		-6
Hg	1.17	ug/L	.000	1.17				
*** Sample ID: 4ff5					Seq: 255	21:55:34 13 Dec 1999		-6
Hg	.571	ug/L	.000	.571				
*** Sample ID: 4ff5 dup					Seq: 256	21:57:56 13 Dec 1999		-6
Hg	.575	ug/L	.000	.575				
*** Sample ID: 4ff6					Seq: 257	22:00:17 13 Dec 1999		-6
Hg	.266	ug/L	.000	.266				

12/14/99 Analytical Run

*** Standard: 1 Rep: 1 Seq: 316 18:29:09 14 Dec 1999 HG

Hg .000 ug/L 131
Ave. Int. = 131 S. D. = 0

Folder: DEC99B Page 161
19:11:31 14 Dec 1999 Protocol: SYSTEST

Line	Conc.	units	SD/RSD	1	2	3	4	5

*** Standard: 2 Rep: 1 Seq: 317 18:31:31 14 Dec 1999 HG

Hg .200 ug/L 10518
Ave. Int. = 10518 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 318 18:33:53 14 Dec 1999 HG

Hg .500 ug/L 23827
Ave. Int. = 23827 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 319 18:36:15 14 Dec 1999 HG

Hg 1.00 ug/L -98
Ave. Int. = -98 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 320 18:38:38 14 Dec 1999 HG

Hg 2.00 ug/L 102590
Ave. Int. = 102590 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 321 18:41:04 14 Dec 1999 HG

Hg 1.00 ug/L 51720
Ave. Int. = 51720 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 322 18:43:28 14 Dec 1999 HG

Hg 3.00 ug/L 152254
Ave. Int. = 152254 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 18:44:05 14 Dec 1999

Folder: DEC99B Seq: 323 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 29 Gas: 8.23 LPM

State: Idle Xmit: Off Autosampler: On

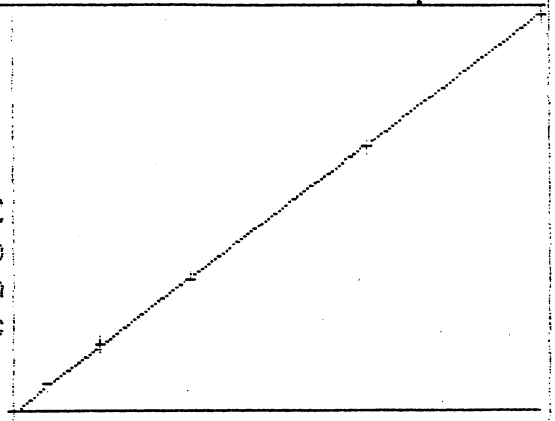
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear	
S1	.000	-.007	-.007	Quadratic	
S2	.200	.198	-.002	WtdLinear	
S3	.500	.499	-.001		C
S4	1.00	1.01	.009	Accept	o
S5	2.00	2.01	.011		n
S6	3.00	2.99	-.010	StdAdd	c

A .0000000 r .999973

B 1.96985e-5 C -9.52672e-3



Relative Absorbance

	Mean	%RSD	
S1	131	0	131
S2	10518	0	10518
S3	25827	0	25827
S4	51720	0	51720
S5	102580	0	102580
S6	152254	0	152254

33?

New calibration coefficients stored 149 2 5

Protocol: SYSTEST

Rev: 3.001 Time: 18:46:31 14 Dec 1999

Folder: DEC99B Seq: 333 Print: On

User: Batch: Id: StocPad1 Qu: 1 29 Seq: 0.33 PM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 1214996

Qu	Id	Extended Id	Weight	Volume	Macro	Check	Help
1	100		1.0000	1.0000			
2	Soe1k		1.0000	1.0000			
3	Soe1kdup		1.0000	1.0000			
4	Soe1		1.0000	1.0000			
5	Soe1 dup		1.0000	1.0000			
6	Soe2		1.0000	1.0000			
7	Soe2 dup		1.0000	1.0000			
8	Soe3		1.0000	1.0000			
9	Soe3 dup		1.0000	1.0000			
10	Soe4		1.0000	1.0000			
11	Soe4 dup		1.0000	1.0000			
12	Soe5		1.0000	1.0000			
13	Soe5 dup		1.0000	1.0000			
14	Soe5 trp		1.0000	1.0000			
15	Soe6		1.0000	1.0000			

Page

Qu 1 Id: 100 Call entry, Ins to exit

149 5 12

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 15:46:36  14 Dec 1999
Folder: DEC998      Seq: 323                        Print: On
User:               Batch:              Id: Sto6Rec1   Cuv: 1 29 Gas:    0.23 LPM
State: Idle                                            Amit: Off Autosampler: On

AUTOSAMPLER:  Rack entry   Rack 1214996                                      Page
cuv Id          Extended id          Weight Volume Macro check Help
16 Sae6 cuv                          1.0000 1.0000
17 Sae6 cuv                          1.0000 1.0000
18 Sae7                              1.0000 1.0000
19 Sae7 cuv                          1.0000 1.0000
20 Sae8                              1.0000 1.0000
21 Sae8 cuv                          1.0000 1.0000
22 rcce10                            1.0000 1.0000
23 rcce10cuv                         1.0000 1.0000
24 ccc                               1.0000 1.0000
25 ccv                               1.0000 1.0000
26                                   1.0000 1.0000
27                                   1.0000 1.0000
28                                   1.0000 1.0000
29                                   1.0000 1.0000
30                                   1.0000 1.0000
                                                                            Page

Cuv is ID: Sae6 cuv                          Cell entry, line to enter
                                                                  149 F   12
```

Line	Conc.	Units	SD/RSD	1	2	3	4	5

*** Check Standard: 2 ppb Seq: 323 18:48:01 14 Dec 1999 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		102.	.616	.604	ug/L	.000

*** Sample ID: 1cb Seq: 324 18:50:22 14 Dec 1999 HG

Hg -.016 ug/L .000 -.016 <0.20µg/L

*** Sample ID: 5oeblk Seq: 325 18:52:39 14 Dec 1999 HG

Hg -.007 ug/L .000 -.007 <0.20 µg/L

*** Sample ID: 5oeblkdup Seq: 326 18:54:57 14 Dec 1999 HG RPD = <1.00%

Hg -.009 ug/L .000 -.009 <0.20µg/L

*** Sample ID: 5oe1 Seq: 327 18:57:15 14 Dec 1999 HG

Hg .021 ug/L .000 .021 <0.860 µg

*** Sample ID: 5oe1 dup Seq: 328 18:59:32 14 Dec 1999 HG RPD = <1.00%

Hg .015 ug/L .000 .015 <0.860µg

*** Sample ID: 5oe2 Seq: 329 19:01:51 14 Dec 1999 HG

Hg .037 ug/L .000 .037 <0.97µg

*** Sample ID: 5oe2 dup Seq: 330 19:04:09 14 Dec 1999 HG RPD = <1.00%

Hg .036 ug/L .000 .036 <0.97µg

*** Sample ID: 5oe3 Seq: 331 19:06:27 14 Dec 1999 HG

Hg .380 ug/L .000 .380 4.10µg

*** Sample ID: 5oe3 dup Seq: 332 19:08:46 14 Dec 1999 HG RPD = <1.00%

Hg .385 ug/L .000 .385 4.11µg

*** Sample ID: 5oe4 Seq: 333 19:11:05 14 Dec 1999 HG

Hg .505 ug/L .000 .505 2.55µg

*** Sample ID: 5oe4 dup Seq: 334 19:13:24 14 Dec 1999 HG RPD = <1.00%

Hg .509 ug/L .000 .509 2.55 µg

19:43:28 14 Dec 1999 Protocol: SYSTEST

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: ccb					Seq: 347	19:43:28 14 Dec 1999 -0		
Hg	-.010	ug/L	.000	-.010		<0.20 ug/L		
*** Sample ID: ccv					Seq: 348	19:45:48 14 Dec 1999 -0		
Hg	1.99	ug/L	.000	1.99		TV = 2.00		
						99%		

12/17/99 Analytical Run

*** Standard: 1 Rep: 1 Seq: 637 15:59:34 17 Dec 1999 HG

Hg .000 ug/L 67
Ave. Int. = 67 S. D. = 0

Folder: DED998 Page 154
16:01:56 17 Dec 1999 Protocol: SYSTEST

Line	Conc.	Units	SD/RSD	1	2	3	4	5

*** Standard: 2 Rep: 1 Seq: 638 16:01:56 17 Dec 1999 HG

Hg .200 ug/L 9410
Ave. Int. = 9410 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 639 16:04:18 17 Dec 1999 HG

Hg .500 ug/L 23447
Ave. Int. = 23447 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 640 16:06:41 17 Dec 1999 HG

Hg 1.00 ug/L 47543
Ave. Int. = 47543 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 641 16:09:04 17 Dec 1999 HG

Hg 2.00 ug/L 92910
Ave. Int. = 92910 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 642 16:11:55 17 Dec 1999 HG

Hg 3.00 ug/L 134427
Ave. Int. = 134427 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 16:19:53 17 Dec 1999

Folder: DEC99B Seq: 643 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 29 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

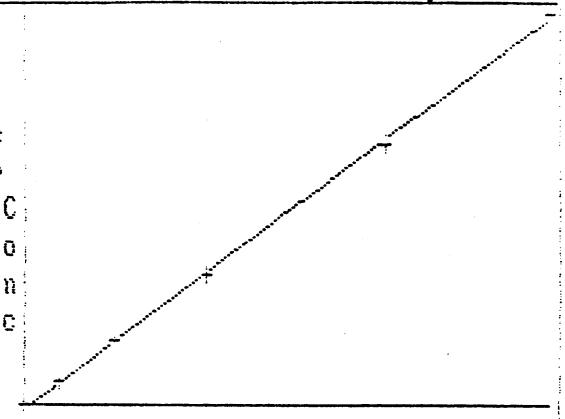
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted
S1	.000	-.020	-.020	LiNear
S2	.200	.187	-.013	Quadratic
S3	.500	.498	-.002	WtdLinear
S4	1.00	1.03	.033	Accept
S5	2.00	2.04	.040	
S6	3.00	2.96	-.038	StdAdd

A .0000000 r .999649

B 2.21950e-5 C -2.19523e-2



Relative Absorbance

	Mean	%RSD	
S1	67	0	67
S2	9410	0	9410
S3	23447	0	23447
S4	47543	0	47543
S5	92910	0	92910
S6	134427	0	134427

33?

New calibration coefficients stored 149 2 5

Line	Conc.	Units	SD/RSD	1	2	3	4	5

*** Check Standard: 2 CK2 Seq: 643 16:44:23 17 Dec 1999 HS

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		101.	.610	.604	ug/L	.000

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: rode13					Seq:	580	18:22:35 17 Dec 1999 HG	
Hg	-.030	ug/L	.000	-.030			rmp 1/4/00 ~~<2.0 ug/L~~ <0.067 ug/L	
*** Sample ID: rbpe13 duc					Seq:	581	18:24:54 17 Dec 1999 HG	RPD = <1.0%
Hg	-.024	ug/L	.000	-.024			rmp 1/4/00 ~~<2.0 ug/L~~ <0.067 ug/L	
*** Sample ID: ccb					Seq:	582	18:27:14 17 Dec 1999 HG	
Hg	-.022	ug/L	.000	-.022			<0.200 ug/L	
*** Sample ID: ccv					Seq:	583	18:29:34 17 Dec 1999 HG	
Hg	2.02	ug/L	.000	2.02			TV = 2.0 101%	

METCO Particulate Analysis

METCO Environmental

Particulate Analysis Summary

Job Number 99-158

Job Name Detroit Edison

Location E. China, Mi.

Date Analysis Completed 11-11-99

Unit Tested St. Clair Unit #4 Stack

Run No.	1	2	3		
Particulate on Filter (mg)	0	0	0.3		
Particulate in Front Wash (mg)*	4.9	3.1	3.4		
MF (mg)	4.9	3.1	3.7		
Particulate in Impinger #1 (mg)**					
MT (mg)					

DPS 1112

M. Ganter
Analyst

* Less Acetone Residue

** Less Ammonium Sulfate

METCO Environmental

Particulate Analysis EPA Method 5

Stack Filters

Job Number 99-158

Job Name Detroit Edison

Location E. China, Mi.

Unit Tested St. Clair Unit #4 Stack

Desiccator Time In	11/8				
Desiccator Time Out	1351 11/10	1028 11/11			

Run No. 1	Filter No. 47Q94				
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1068	0.1068	✓		

Filter & Particulate Average (g) 0.1068

Initial Filter Weight (g) 0.1077

Total Particulate (mg) 0

Run No. 2	Filter No. 47Q97 loose pieces of filter present				
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1091	0.1093	✓		

Filter & Particulate Average (g) 0.1092

Initial Filter Weight (g) 0.1097

Total Particulate (mg) 0

Run No. 3	Filter No. 47Q101				
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1062	0.1064	✓		

Filter & Particulate Average (g) 0.1063

Initial Filter Weight (g) 0.1060

Total Particulate (mg) 0.3

MG

Analyst

METCO Environmental

Particulate Analysis EPA Method 5

Front Wash ambient evap.

Job Number 99-158 Location E. China, Mi.

Job Name Detroit Edison Unit Tested St. Clair Unit #4 Inlet

Desiccator Time In	11/9 815				
Desiccator Time Out	11/10 1455	11/11 1150			

Run No. 1	Volume (ml) 171				
Final Weight (g)	118.7868	118.7872	✓		
Initial Weight (g)	118.7056	118.7056			
Particulate Weight (g)	0.0812	0.0816	✓		

Particulate Average (mg) 81.4 ✓
Less Acetone Blank (mg) 1.4 ✓
Total Particulate (mg) 80.0 ✓

Run No. 2	Volume (ml) 130				
Final Weight (g)	124.2905	124.2908	✓		
Initial Weight (g)	124.1758	124.1758			
Particulate Weight (g)	0.1147	0.1150	✓		

Particulate Average (mg) 114.9 ✓
Less Acetone Blank (mg) 1.0 ✓
Total Particulate (mg) 113.9 ✓

Run No. 3	Volume (ml) 180				
Final Weight (g)	131.5025	131.5021	✓		
Initial Weight (g)	131.4550	131.4550			
Particulate Weight (g)	0.0475	0.0471	✓		

Particulate Average (mg) 47.3 ✓
Less Acetone Blank (mg) 1.4 ✓
Total Particulate (mg) 45.9 ✓

Acetone Blank	Volume (ml) 150				
Final Weight (g)	167.9585	167.9584	✓		
Initial Weight (g)	167.9550	167.9550			
Difference (g)	0.0035	0.0034	✓		

Average (mg) 3.5 ✓
* mg/l 23.3 ✓

* Note: If greater than 7.9 mg/l, use 7.9 mg/l.

MH
Analyst

METCO Environmental

Particulate Analysis EPA Method 17

Thimbles and Backup Filters

Job Number 99-158 Location E. China, Mi.

Job Name Detroit Edison Unit Tested Unit # 4 Inlet

Desiccator Time In	11/8 1500				
Desiccator Time Out	11/10	1000 11/11			

Run No. 1	Thimble No. Q52		Filter No. 47 Q95		
Thimble Final Weight (g)	8.6350	8.6352	✓		
Thimble Initial Weight (g)	3.3878	3.3878			
Particulate (g)	5.2472	5.2474	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1056	0.1057	✓		

Filter and Particulate Average (g) 0.1057

Initial Filter Weight (g) 0.1087

Filter Particulate Average (mg) 0

Thimble Particulate Average (mg) 5,247.3

Total Particulate (mg) 5,247.3

Run No. 2	Thimble No. Q53		Filter No. 47 Q 96		
Thimble Final Weight (g)	7.5544	7.5540	✓		
Thimble Initial Weight (g)	2.9922	2.9922			
Particulate (g)	4.5622	4.5618	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1050	0.1052	✓		

Filter and Particulate Average (g) 0.1051

Initial Filter Weight (g) 0.1079

Filter Particulate Average (mg) 0

Thimble Particulate Average (mg) 4,562.0

Total Particulate (mg) 4,562.0

Run No. 3	Thimble No. Q54		Filter No. 47Q 102		
Thimble Final Weight (g)	7.8728	7.8726	✓		
Thimble Initial Weight (g)	3.3099	3.3099			
Particulate (g)	4.5629	4.5627			
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1041	0.1036	✓		

Filter and Particulate Average (g) 0.1039

Initial Filter Weight (g) 0.1068

Filter Particulate Average (mg) 0

Thimble Particulate Average (mg) 4,562.8

Total Particulate (mg) 4,562.8

MK

Analyst

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

ANALYTICAL REPORT

Client: METCO Environmental

Report to: Doug Saathoff
METCO Environmental
P. O. Box 598
Addison TX 75001

Project: 188261
Received: 19-NOV-99
Reported: 16-DEC-99

PURCHASE ORDER: 99-158-18

Project Description: Unit No 4 Detroit Edison
BTU, Ash, Sulfur, Chloride

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Run 1 Coal Composite (Test #1, SCU #4, KRH)						
Lab Sample: 1383831						
sampled: 04-NOV-99						
Moisture, Total	22.6		%	D 3302	23-NOV-99	GLB
SHORT PROX - COAL						
Ash	5.73	7.40	%	D 3174	08-DEC-99	VJO
Sulfur	0.73	0.94	%	D 4239	08-DEC-99	VJO
Heating Value	9630	12430	BTU/lb	D 3286	02-DEC-99	VJO
Chloride, Total	0.03	0.04	%	E776/300.0	14-DEC-99	DRK
Run 2 Coal Composite (Test #2, SCU #4, KRH)						
Lab Sample: 1383832						
sampled: 04-NOV-99						
Moisture, Total	23.3		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	4.88	6.36	%	D 3174	08-DEC-99	VJO
Sulfur	0.74	0.96	%	D 4239	08-DEC-99	VJO
Heating Value	9720	12670	BTU/lb	D 3286	02-DEC-99	VJO
Chloride, Total	0.02	0.03	%	E776/300.0	14-DEC-99	DRK
Run 3 Coal Comp @ lab - 10 grabs (SCPPU #4, T3-1 - T3-10)						
Lab Sample: 1383833						
sampled: 05-NOV-99						
Moisture, Total	22.9		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	4.81	6.24	%	D 3174	08-DEC-99	VJO
Sulfur	0.74	0.96	%	D 4239	08-DEC-99	VJO
Heating Value	9700	12580	BTU/lb	D 3286	02-DEC-99	VJO

PHILIP
ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0
• AIHA ACCREDITATION NO. 100439
• NY DOH 10903
• PA DER 06-353
• NJ DEP 77678

Client: METCO Environmental
Project: 188261

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Run 3 Coal Comp @ lab - 10 grabs (SCPPU #4, T3-1 - T3-10)						
Lab Sample: 1383833 - continued						
Chloride, Total	0.02	0.03	%	E776/300.0	14-DEC-99	DRK

< Indicates less than the limit of quantitation.

Philip Analytical Services
Quality Assurance Protocol

PAS Sample#: All Projects Listed

Client Name: Metco

PAS Project #: 188425,188261,188422,188423

Job ID :

Units: %, BTU/lb

O1 SUMMARY FORM

Sample # & Parameter	Matrix Spike				Matrix Spike Duplicate				Laboratory Control Sample		
	Sample Conc.	Spike Conc.	Matrix Spike Conc.	Matrix Spike Recovery	Matrix Spike Dup Conc.	Matrix Spike Dup Recovery	Precision RPD	Method Blank	Spikes Conc.	Found Conc.	Recovery

Sample # & Parameter	Matrix Spike				Duplicate			Laboratory Control Sample			Method Blank	Detection Limits
	Sample Conc.	Spike Conc.	Matrix Spike Conc.	Matrix Spike Recovery	Sample Conc.	Sample Duplicate Conc.	Precision RPD	Spikes Conc.	Found Conc.	Recovery		
1383833-Ash					5.24	5.28	0.80	11.8	11.7	99	N/A	0.01
1384773-Sulfur					2.58	2.56	0.77	1.78	1.77	99	N/A	0.01
1384773-Heating Value					11271	11279	0.10	13350	13410	100	N/A	50
1383833-Chlorine					0.02	0.02	0	2.00	1.87	94	0.01	0.01

Matrix Spike	75 - 125
Laboratory Control Sample	80 - 120
Duplicate	0 - 20

PHILIP
ANALYTICAL SERVICES

Chain of Custody Record

4418 Pottsville Pike Reading, PA 19605
phone: (610) 921-8833 fax: (610) 921-9667

Sample Container Information												
Bottle Type (G P IH)												
# of Containers												
Preserved? (Y/N)												

Report Results To:
PO # 99-158-18 Job ID Unit No 4 Detroit Edison
Name Doug Saathoff
Company METCO Environmental
Mailing Address P.O. Box 598
City Addison State TX ZIP 75025
Telephone # 9729317127 Fax # 9729318398

Send Invoice To:
Name Same Telephone #
Company Dept.
Mailing Address
City State ZIP
Credit Card # Exp. Date

Analysis Requested

188261

Page 1 of 1

~~PAS Quote#~~ → actual Sample ID nao 11/9/99

Sampled by:	Air Vol. (L or min)	Matrix Type	Date Sampled	Time Sampled	Btu	Ash	Sulfur	Chloride	Comments/Hazards/ Location Details
1. Run 1 Coal Composite			11/4						Test #1, SCU #4, KRH
2 Run 2 Coal Composite			11/4						test #2 " "
3 Run 3 Coal (10 Grabs)*			11/5						SCPPU #4, T 3-1
4									3-2
5 *see att. instructions									3-3
6									3-4
7									3-5
8									3-6
9									3-7
10									3-8
									3-9
									3-10

SAMPLE DESCRIPTION

Special Instructions (including Data Deliverables and Turn Around Time):
See attached

Samples relinquished to shipper or courier by: Douglas Saathoff	Date 11/18/99	Time 1530	
Samples received by:	Date	Time	

Samples Relinquished by:	Samples Relinquished to:	Date	Time
Samples Relinquished by:	Samples Relinquished to Laboratory: Greenawald	Date 11/19/99	Time 0950

Method of Shipment/Delivery: UPS FED-EX PAS Courier Client drop off Other

Samples Rec'd. on Ice? (Y N n/a) Temp. Blank — Sample Temp. —
Samples rec'd intact? (Y N) Custody seals intact? (Y N n/a) ID on samples match COC? (Y N) → See comments nao
VOC Samples have zero headspace? (Y N n/a) Samples properly preserved? (Y N n/a)

Notes:

TestAmerica
INCORPORATED

ample ID: The Detroit Edison Company
St. Clair Power Plant
East China Michigan
Coal Samples

Hg Analysis
ASTM D6414-99

ollected On: 11/03/99 for Run 1 and Run 2, 11/04/99 for Run 3 Composite
Collected By: METCO

	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Units	Dry Weight (%)	Flags	Notes
un 1 Composite	12/20/99	12/24/99	jpp	0.060	0.061	<1.0	ug/g	83.1		
un 2 Composite	12/20/99	12/24/99	jpp	0.055	0.054	2.3	ug/g	82.6		
Run 3 Composite	12/20/99	12/24/99	jpp	0.069	0.068	<1.0	ug/g	83.7		

otes:

3601 SOUTH DIXIE DRIVE / DAYTON, OH 45439 / 937-294-6856 / FAX: 937-294-7816

Sample Receipt Record

Chain of Custody Provided? Yes ☐ No ☒ Job #: _____

If no Chain of Custody is provided, the following section should be completed.

Client: METCO
Received by: James A Davi Date: 12/6/99 Time: 9 AM
Samples Shipped UPS FEDEX US Mail Other _____
Custody Seal(s) Intact ~~Yes ☐ No ☐~~
Containers Provided by TestAmerica Yes ☐ No ☒
Cooler Temperature _____ °C Ice Ambient Cool Packs

Deviations Noted

- None ☐
- Insufficient Volume ☐
- Samples Broken ☐
- Incorrect Containers/ Preservatives ☐
- Volatile Headspace ☐
- Holding Time Exceeeded upon receipt ☐
- Insufficient sample information ☐
- COC and sample labels disagree ☐

Comments

FROM PHILIP ANAL.
COAL FROM:
OWENSVILLE, EAST CHINA, COLSTRIP
WEST TERRE HAUTE, STEVENSON,
SHIPPINGPORT, STRATTON, BREMOND
PADUCAH, LAWRENCE, FAIRFIELD

Other _____ Initials _____ Date _____

Issues to Clarify with Client

Corrective Action

Client Contacted by: N/A Date: N/A

TestAmerica INCORPORATED

xa xe

PHILIP
ANALYTICAL SERVICES

Chain of Custody Record

4418 Pottsville Pike Reading, PA 19605
phone: (610) 921-8833 fax: (610) 921-9667

Report Results To:

PO# 99-158-1B Job ID Unit No 7 Detroit Edison
Name Doug Saathoff
Company METCO Environmental
Mailing Address P.O. Box 598
City Addison State TX ZIP 75025
Telephone # 972 931 7127 Fax # 972 931 5398

Send Invoice To:

Name Same Telephone #
Company Dept.
Mailing Address
City State ZIP
Credit Card # Exp. Date

Page 1 of 1
PAS Quote#

Analysis Requested

Sample Container Information												
Bottle Type (G P H)												
# of Containers												
Preserved? (Y/N)												

	SAMPLE DESCRIPTION (Sampled by:)	Air Vol. (L or min)	Matrix Type	Date Sampled	Time Sampled	Btu	Ash	Sulfur	Chloride	Comments/Hazards/ Location Details
1	Run 1 Coal Composite			11/4						
2	Run 2 Coal Composite			11/4						
3	Run 3 Coal (10 Grabs)*			11/5						
4										
5	* see atd. instructions									
6										
7										
8										
9										
10										

Special Instructions (including Data Deliverables and Turn Around Time):
See attached

Samples relinquished to shipper or courier by: Doug Saathoff Date 11/18/99 Time 1530
Samples received by: Date Time

Samples Relinquished by: Samples Relinquished to: Date Time
Samples Relinquished by: Samples Relinquished to Laboratory: Date Time

Method of Shipment/Delivery: UPS FED-EX PAS Courier Client drop off Other

Samples Rec'd. on Ice? (Y N n/a) Temp. Blank ____ Sample Temp. ____
Samples rec'd intact?(Y N) . Custody seals intact?(Y N n/a) ID on samples match COC?(Y N)
VOC Samples have zero headspace?(Y N n/a) Samples properly preserved? (Y N n/a)

Notes:

NONAQUEOUS MERCURY BATCH SHEET

Analyst: JRP Date: 12/20/09 12/24/09 Water Bath: start mid end

Standard Reference: 65-417 temp:

ICV Reference: 65-41-18 date:

% DDW		Sample # / Client	Weight	MS	MSD
83.1	3	1383831 Detroit Edison	1.0083 g		
82.6	4	1383832	1.0242 g		
83.7	5	1383833	1.0469 g		MB
95.1	6	1384792 [redacted]	1.0235 g		
94.1	7	1384793	1.0080 g		
96.0	8	1384794	1.0522 g		
93.7	9	1384812 TRP [redacted]	1.0296 g		ICV
93.7	10	1384813 SPK	1.0235 g		
94.5	11	1384814	1.0070 g		
95.3	12	1384777 [redacted]	1.0644 g		
95.4	13	1384778	1.0445 g		MS
95.5	14	1384779	1.0288 g		
98.2	15	1384806 [redacted]	1.6170 g		
98.9	16	1384807	1.0099 g		
98.9	17	1384808	1.0222 g		MSD
90.3	18	1384771 [redacted]	1.0139 g		
89.8	19	1384772 TRP	1.0105 g		
90.1	20	1384773 SPK	1.0365 g		
	2	NIST 1630 A	1.0390 g	=0.077 mg/kg	RPD
	1	Blank			

HNO3 65-48-14

HCl 65-46-1

KMnO4 - 65-33-1

~~SnCl2 65-50-6~~

SnCl2 - 66-31-19

FLAG

SECONDARY DATA CHECK: analyst:
date:

Comments: V_F = 50 mL NIST 1630A = 0.106 ± ~~0.023~~ 0.032 mg/kg JRP

Protocol: SYSTEST

Rev: 2.04 Time: 17:5.74 24 Dec 1988

Folder: TEMP01 Lec: 247 Print: On

User: Batch: Inj: 20/ Cuvt: 1 Of Gas: 0.22 LPM

Stage: Idle Unit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 1224PS2

cup Id	Expanded id	Weight	Volume	Macro check Help
1 tcm		1.0000	1.0000	
2 tlk		1.0000	1.0000	
3 clk cup		1.0000	1.0000	
4 nistleBk		1.0000	1.0000	
5 nist cup		1.0000	1.0000	
6 SS1 ~~1.5~~ NODIL		1.0000	1.0000	
7 SS1 cup		1.0000	1.0000	
8 SS2		1.0000	1.0000	
9 SS2 cup		1.0000	1.0000	
10 SS3		1.0000	1.0000	
11 SS3 cup		1.0000	1.0000	
12 TP2		1.0000	1.0000	
13 TP2 cup		1.0000	1.0000	
14 TP1		1.0000	1.0000	
15 TP1 cup		1.0000	1.0000	

Cup 1 ID: cup Call entry, Ins to enter

LOP = 12

```
Protocol: SYSTEST
                    Rev: 1.0001    Time: 17:53:0[illegible]   [illegible]
Falcon: DEC99C      Bas: 343                    Print: On
Lean:               Batch:              Inj: 100          Dwl: 1 DF Bas:    0.23 LPM
State: Idle                                                 Unit: Off Autosampler: On

AUTOSAMPLER:  Rack entry   Rack 1234999a  Range  1-44 Clear sel Unsc exit    Equc
Equ Id        Expanded id          Weight Volume Macro Check rule
16 TP4                             1.0000 1.0000
17 TP4 dup                         1.0000 1.0000
18 B12                             1.0000 1.0000
19 B12 dup                         1.0000 1.0000
20 B12 trp                         1.0000 1.0000
21 B13                             1.0000 1.0000
22 B13 dup                         1.0000 1.0000
23 B13 spk                         1.0000 1.0000
24 ccc                             1.0000 1.0000
25 ccv                             1.0000 1.0000
26 B14                             1.0000 1.0000
27 B14 dup                         1.0000 1.0000
28 777                             1.0000 1.0000
29 777 dup                         1.0000 1.0000
30 778                             1.0000 1.0000
                                                                              Fqln:

                                                Column error, line to enter
                                                                   Sel: F  I
```

Protocol: SYSTEST

Rev: 2.001 Time: 17:53:07 28 Dec 1995

Folder: [illegible] Seq: [illegible] Print: On

User: Setup: Id: [illegible] Cuv: 1 Of Seq: 0.20-1.94

State: Idle Unit: Off Autosampler: On

AUTOSAMPLER:	Rack entry	Rack [illegible]	Range	1-AU	Clear set	Proc entry	Flus
cuv Id	Extension Id	Weight	Volume	Macro	Check	Help	
01 [illegible] cuv		1.0000	1.0000				
02 [illegible]		1.0000	1.0000				
03 [illegible] cuv		1.0000	1.0000				
04 806		1.0000	1.0000				
05 806 cuv		1.0000	1.0000				
06 807		1.0000	1.0000				
07 807 cuv		1.0000	1.0000				
08 808		1.0000	1.0000				
09 808 cuv		1.0000	1.0000				
40 771		1.0000	1.0000				
41 771 cuv		1.0000	1.0000				
42 772		1.0000	1.0000				
43 772 cuv		1.0000	1.0000				
44 772 tro		1.0000	1.0000				

Enter

Enter entry, [illegible]

Id: [illegible]

*** Standard: 1 Rep: 1 Seq: 292 15:35:21 24 Dec 1999 HG

Hg .000 ug/L 172
Ave. Int. = 172 S. D. = 0

15:37:43 24 Dec 1999 Folder: DEC99C
Protocol: SYSTEST

Line	Conc.	Units	SD/RSD	1	2	3	4	5

*** Standard: 2 Rep: 1 Seq: 293 15:37:43 24 Dec 1999 HG

Hg .200 ug/L 8051
Ave. Int. = 8051 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 294 15:40:05 24 Dec 1999 HG

Hg .500 ug/L 20347
Ave. Int. = 20347 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 295 15:42:27 24 Dec 1999 HG

Hg 1.00 ug/L 40126
Ave. Int. = 40126 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 296 15:44:54 24 Dec 1999 HG

Hg 2.00 ug/L 81928
Ave. Int. = 81928 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 297 15:47:23 24 Dec 1999 HG

Hg 3.00 ug/L 120049
Ave. Int. = 120049 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 15:48:16 24 Dec 1999

Folder: DEC99C Seq: 298 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 29 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

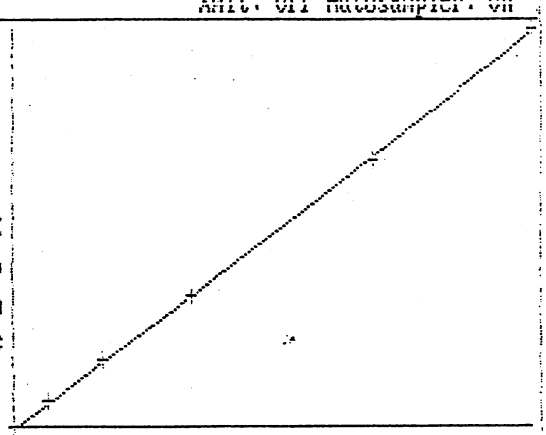
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear	
S1	.000	-.001	-.001	Quadratic	
S2	.200	.195	-.005	UtdLinear	
S3	.500	.501	.001		C
S4	1.00	.993	-.007	Accept	o
S5	2.00	2.03	.032		n
S6	3.00	2.98	-.019	StdAdd	c

A .0000000 r .999889

B 2.48732e-5 C -5.41651e-3



Relative Absorbance

	Mean	%RSD	
S1	172	0	172
S2	8051	0	8051
S3	20347	0	20347
S4	40126	0	40126
S5	81928	0	81928
S6	120849	0	120849

33?

New calibration coefficients stored 149 2 5

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: 792					Seq: 355	18:25:04 24 Dec 1999 -6			
Hg	1.02	ug/L	.000	1.02					0.052 µg/g
*** Sample ID: 792 dup					Seq: 356	18:27:24 24 Dec 1999 -6			RPD = <1.0%
Hg	1.02	ug/L	.000	1.02					0.052 µg/g
*** Sample ID: 793					Seq: 357	18:29:44 24 Dec 1999 -6			
Hg	.844	ug/L	.000	.844					0.044 µg/g
*** Sample ID: 793 dup					Seq: 358	18:32:03 24 Dec 1999 -6			RPD = 1.6%
Hg	.858	ug/L	.000	.858					0.045 µg/g
*** Sample ID: 794					Seq: 359	18:34:22 24 Dec 1999 -6			
Hg	.947	ug/L	.000	.947					0.047 µg/g
*** Sample ID: 794 dup					Seq: 360	18:36:41 24 Dec 1999 -6			RPD = <1.0%
Hg	.950	ug/L	.000	.950					0.047 µg/g ~~0.048 µg/g~~ MB 12/28/99
*** Sample ID: 812					Seq: 361	18:39:01 24 Dec 1999 -6			
Hg	1.21	ug/L	.000	1.21					0.063 µg/g
*** Sample ID: 812 dup					Seq: 362	18:41:19 24 Dec 1999 -6			RPD = <1.0%
Hg	1.20	ug/L	.000	1.20					0.062 µg/g
*** Sample ID: 813					Seq: 363	18:43:38 24 Dec 1999 -6			RPD = 2.5%
Hg	1.18	ug/L	.000	1.18					0.061 µg/g
*** Sample ID: 813					Seq: 364	18:45:57 24 Dec 1999 -6			
Hg	1.28	ug/L	.000	1.28					0.066 µg/g
*** Sample ID: 813 dup					Seq: 365	18:48:21 24 Dec 1999 -6			RPD = 2.4%
Hg	1.29	ug/L	.000	1.29					0.067 µg/g
*** Sample ID: 812 ecx					Seq: 366	18:50:41 24 Dec 1999 -6			
Hg	[illegible]	ug/L	.000	1.15					FV = 1.2 1.0 MB 12/28/99 90%

Line	Conc.	Units	SD/RSD	1	2	3	4	5	6
Hg	1.35	ug/L	.000	1.35					
*** Sample ID: 8B7 dup				Seq: [illegible]	19:23:52 24 Dec 1999 -6				
Hg	1.41	ug/L	.000	1.41					
*** Sample ID: 8B8				Seq: [illegible]	19:24:24 24 Dec 1999 -6				
Hg	1.37	ug/L	.000	1.37					
*** Sample ID: 8B8 dup				Seq: [illegible]	19:25:51 24 Dec 1999 -6				
Hg	1.36	ug/L	.000	1.36					
*** Sample ID: 771				Seq: [illegible]	19:21:18 24 Dec 1999 -6				
Hg	1.19	ug/L	.000	1.19					
*** Sample ID: 771 dup				Seq: [illegible]	19:22:45 24 Dec 1999 -6				
Hg	1.21	ug/L	.000	1.21					
*** Sample ID: 772				Seq: [illegible]	19:26:09 24 Dec 1999 -6				
Hg	1.22	ug/L	.000	1.22					
*** Sample ID: 772 dup				Seq: [illegible]	19:32:22 24 Dec 1999 -6				
Hg	1.24	ug/L	.000	1.24					
*** Sample ID: 772 rep				Seq: [illegible]	19:40:54 24 Dec 1999 -6				
Hg	1.27	ug/L	.000	1.27					
*** Sample ID: 773				Seq: [illegible]	19:44:42 24 Dec 1999 -6				
Hg	1.31	ug/L	.000	1.31					
*** Sample ID: 773 dup				Seq: [illegible]	19:47:41 24 Dec 1999 -6				
Hg	1.30	ug/L	.000	1.30					
*** Sample ID: 774 dup				Seq: [illegible]	19:49:22 24 Dec 1999 -6				
Hg	1.28	ug/L	.000	1.28					

0.120 µg/g
RPD = 1.2%
0.121 µg/g
0.117 µg/g
RPD = <1.0%
0.117 µg/g
0.065 µg/g
RPD = 1.7%
0.066 µg/g
~~0.067~~
0.068 µg/g
RPD = <1.0%
0.068 µg/g
RPD = 3.2%
0.070 µg/g
0.070 µg/g
RPD = <1.0%
0.069 µg/g
97%

Folder: DEC99C
17:51:45 24 Dec 1999 Protocol: SYSTEST

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: ccc				Seq: 271	17:51:45 24 Dec 1999 Hg:			
Hg	-.025	ug/L	.000	-.025				
*** Sample ID: ccv				Seq: 272	17:54:03 24 Dec 1999 Hg			
Hg	2.05	ug/L	.000	2.05				

<0.2 µg/L

TV=2.0

103%

Dry Weight(DW)/Total Volatile Solids (TVS) Notebook # 6

Sample Number/ Test (DW/TVS)	1384792	1384793	1384794	1383831	1383831	1383832
Client/Pan #	LAWRENCE 17 R1	18 R2	R3	MICHIGAN 20 R1	21 dup R1	22 R2
Wt of Pan + Sample	8.9951	9.26[illegible]	8.5994	9.1860	10.0610	8.7108
Wt after Drying	8.5997	8.[illegible]743	8.2963	7.7995	8.5274	7.3689
Wt of Pan or Wt After Ignition	0.9808	0.9770	0.9805	0.9772	0.9776	0.9794
Difference	7.6189	7.7973	7.3158	6.8223	7.5498	6.3895
Sample amount g	8.[illegible]143	8.2842	7.6189	8.2088	9.0834	7.7314
Result	[illegible] %	94.1 %	96.0 %	83.1 %	83.1 %	82.6 %

Sample Number/ Test (DW/TVS)	1384833	13[illegible]	[illegible]	[illegible]	1384796	[illegible]97
Client/Pan #	MICHIGAN 23 R3	LACHGNE 24 R1	25 R2	26 R3	BMP HG 27 R1	28 R2
Wt of Pan + Sample	11.1414	8.6880	8.6140	8.60[illegible]	6.3006	9.2582
Wt after Drying	9.4832	7.4730	7.7521	7.[illegible]1375	6.3018	9.2572
Wt of Pan or Wt After Ignition	0.9827	0.9800	0.97[illegible]8	0.9789	0.9820	0.9842
Difference	8.5005	6.4930	[illegible].7743	6.7586	5.3198	8.2730
Sample amount g	10.1587	7.70[illegible]0	7.6362	7.6236	5.3186	8.2740
Result	83.7 %	8[illegible] %	[illegible] %	88.7 %	100.0 %	[illegible] %

Sample Number/ Test (DW/TVS)	[illegible]	[illegible]	[illegible]	[illegible]2
Client/Pan #	BMP HG 29 R3	CINERGY 30 R1	31 dup R1	3[illegible] R2
Wt of Pan + Sample	8.2005	9.0194	8.79[illegible]5	7.3404
Wt after Drying	8.1950	8.3329	[illegible]9414	6.6936
Wt of Pan or Wt After Ignition	0.9863	0.9[illegible]0	0.9868	0.9865
Difference	7.2087	7.[illegible]489	6.9546	5.7071
Sample amount g	7.214[illegible]	8.0354	7.8057	6.3539
Result	9[illegible] %	[illegible] %	89.[illegible] %	89.5 %

Batch Number —
TVS -
DW - 3395

Note:
METCO COALS
- CONTD -

TestAmerica INCORPORATED

Analyst: RP Date: 12/21/99

APPENDIX E

Unit Operational Data

Enertec NTDAHS®
Average Values Report
01/19/00 10:51

Company: Detroit Edison
Plant:
City/St:
Source: STACK4

TEST 1

Period Start: 11/03/99 09:00
Period End: 11/03/99 12:00
Validation Type: 5/5 min
Averaging Period: 5 min
Type: Block Avg

Period Start	Average CO2 %	Average FLOW_kscfh kscfh	Average MW_LOAD MW	Average NOx ppm	Average OPACITY %	Average SO2 ppm	Average STACK_TEMP DEGF
11/03/99 09:00	11.02	27930.7	157.2	304.9	2.7	483.1	270.9
11/03/99 09:05	11.15	28117.2	156.9	309.0	2.7	482.6	271.3
11/03/99 09:10	11.13	28057.5	156.9	314.3	2.7	484.8	271.4
11/03/99 09:15	11.34	27697.5	157.0	316.1	3.3	486.5	271.3
11/03/99 09:20	11.42	27892.2	157.0	315.6	2.9	487.7	271.5
11/03/99 09:25	11.50	27841.5	157.3	316.3	2.6	496.7	271.5
11/03/99 09:30	11.44	27775.8	157.3	315.1	2.3	489.8	271.7
11/03/99 09:35	11.41	27807.0	157.0	313.2	2.6	486.2	271.7
11/03/99 09:40	11.47	27660.9	157.2	313.5	2.9	485.1	271.8
11/03/99 09:45	11.58	27628.2	157.7	310.9	2.8	494.3	271.8
11/03/99 09:50	N/A	27662.8	157.8	N/A	2.7	N/A	272.0
11/03/99 09:55	11.18	27871.2	158.2	300.4	2.8	489.0	272.4
11/03/99 10:00	11.24	28053.0	157.8	302.0	2.7	497.8	272.7
11/03/99 10:05	11.38	27994.3	157.5	314.8	3.3	506.0	273.0
11/03/99 10:10	11.39	27960.6	157.3	315.1	2.8	503.1	273.4
11/03/99 10:15	11.32	30129.0	157.2	314.1	2.7	497.2	273.9
11/03/99 10:20	11.39	28181.9	157.3	317.1	2.9	496.8	273.7
11/03/99 10:25	11.35	28021.2	157.5	314.8	2.8	496.5	273.7
11/03/99 10:30	11.38	27904.2	157.2	312.2	3.3	496.4	273.8
11/03/99 10:35	11.42	27928.4	157.2	312.5	2.8	497.9	273.9
11/03/99 10:40	11.51	27825.6	157.1	311.3	2.8	498.5	273.9
11/03/99 10:45	11.67	28144.2	157.0	313.1	2.7	507.8	274.1
11/03/99 10:50	N/A	28175.7	157.1	N/A	2.7	N/A	274.2
11/03/99 10:55	11.14	27905.1	157.7	306.1	3.1	477.7	274.3
11/03/99 11:00	11.18	27718.2	157.7	304.0	2.6	496.4	274.7
11/03/99 11:05	11.38	28113.2	157.4	303.9	2.7	498.7	274.8
11/03/99 11:10	11.30	28026.3	156.9	308.7	2.2	490.3	275.1
11/03/99 11:15	11.47	27946.2	156.9	308.9	1.8	495.8	275.1
11/03/99 11:20	11.50	27869.8	157.1	316.6	2.3	490.6	275.1
11/03/99 11:25	11.77	27766.2	157.7	315.2	1.7	500.5	275.3
11/03/99 11:30	11.53	27644.1	157.7	308.9	1.5	499.8	275.4
11/03/99 11:35	11.49	28099.5	157.6	307.2	1.6	506.7	275.7
11/03/99 11:40	11.47	27742.5	157.5	309.3	1.6	500.4	276.0
11/03/99 11:45	11.46	27646.5	157.3	304.6	2.3	501.7	276.1
11/03/99 11:50	N/A	27621.9	157.4	N/A	1.8	N/A	276.3
11/03/99 11:55	11.35	27798.0	157.5	296.9	1.5	496.2	276.4
11/03/99 12:00	11.46	27612.6	157.2	306.0	1.4	499.6	276.5
Final Average*	**11.39**	**27939.8**	**157.3**	**310.4**	**2.5**	**494.6**	**273.7**
Maximum*	11.77	30129.0	158.2	317.1	3.3	507.8	276.5
Minimum*	11.02	27612.6	156.9	296.9	1.4	477.7	270.9

Does not include Invalid Averaging Periods ("N/A")

Enertec NTDAHS®
Average Values Report
01/19/00 10:56

Company: Detroit Edison
Plant:
City/St:
Source: STACK4

TEST 2

Period Start: 11/03/99 13:20
Period End: 11/03/99 15:45
Validation Type: 5/5 min
Averaging Period: 5 min
Type: Block Avg

Period Start	Average CO2 %	Average FLOW_kscfh kscfh	Average MW_LOAD MW	Average NOx ppm	Average OPACITY %	Average SO2 ppm	Average STACK_TEMP DEGF
11/03/99 13:20	11.52	28002.6	157.2	304.6	1.4	514.7	279.4
11/03/99 13:25	11.41	27882.6	157.3	313.8	1.7	511.2	279.6
11/03/99 13:30	11.59	27989.4	157.1	308.2	1.5	517.1	279.9
11/03/99 13:35	11.63	27937.4	157.0	316.4	1.8	514.4	280.0
11/03/99 13:40	11.49	27701.7	157.1	308.9	1.8	510.3	280.2
11/03/99 13:45	11.54	27689.1	157.1	311.7	1.7	505.0	280.5
11/03/99 13:50	N/A	27920.6	157.2	N/A	2.6	N/A	280.7
11/03/99 13:55	11.09	27968.1	157.1	303.2	2.2	489.3	280.7
11/03/99 14:00	11.64	27716.4	157.3	313.9	2.3	502.4	281.1
11/03/99 14:05	11.48	27828.4	157.1	309.1	2.2	501.5	281.1
11/03/99 14:10	11.53	27621.0	157.0	311.1	2.5	494.9	281.1
11/03/99 14:15	11.64	27738.6	157.2	310.6	2.7	499.3	281.5
11/03/99 14:20	11.52	28123.0	157.2	308.2	2.5	494.9	281.5
11/03/99 14:25	11.50	27838.8	157.2	311.9	2.7	492.1	281.6
11/03/99 14:30	11.57	27891.0	157.1	311.0	2.7	491.1	281.7
11/03/99 14:35	11.76	27807.9	157.0	315.5	2.6	496.4	282.0
11/03/99 14:40	11.60	27881.1	157.2	314.4	3.1	492.0	282.1
11/03/99 14:45	11.59	27775.2	157.2	313.6	2.7	482.7	282.0
11/03/99 14:50	N/A	27680.3	157.3	N/A	2.8	N/A	281.8
11/03/99 14:55	11.12	28260.6	157.3	305.0	2.8	458.3	282.0
11/03/99 15:00	11.52	27577.8	157.9	310.0	3.1	467.0	281.8
11/03/99 15:05	11.74	27762.5	157.8	310.4	2.9	480.1	281.9
11/03/99 15:10	11.58	28075.5	157.6	312.5	2.6	473.4	281.8
11/03/99 15:15	11.54	27977.7	158.0	314.5	2.6	463.3	281.8
11/03/99 15:20	11.56	28022.4	158.2	313.0	2.8	462.0	281.7
11/03/99 15:25	11.52	28023.3	158.1	308.3	2.8	463.5	282.0
11/03/99 15:30	11.66	27926.7	158.1	312.6	3.4	468.4	282.1
11/03/99 15:35	11.88	27930.7	158.4	309.5	2.7	480.0	282.1
11/03/99 15:40	11.63	28131.3	158.4	306.1	2.6	482.7	282.2
11/03/99 15:45	11.44	27975.1	158.1	308.5	2.7	470.1	282.4
Final Average*	**11.55**	**27888.6**	**157.4**	**310.6**	**2.5**	**488.5**	**281.3**
Maximum*	11.88	28260.6	158.4	316.4	3.4	517.1	282.4
Minimum*	11.09	27577.8	157.0	303.2	1.4	458.3	279.4

*Does not include Invalid Averaging Periods ("N/A")

Subject: [Fwd: Operating Data Hg Test - SC4]
Date: Wed, 17 Nov 1999 14:39:15 -0500
From: Thomas A Batts <battst@dteenergy.com>
To: Mark J Mullen <mullenm@dteenergy.com>

Mark Tests 1, 2, & 3 are for Metco. Use the same coal rate for all three tests. These are very rough numbers and I hesitate to carry out even one decimal point but they are the best I can come up with. Will you be forwarding this data with the CEMS data they need?

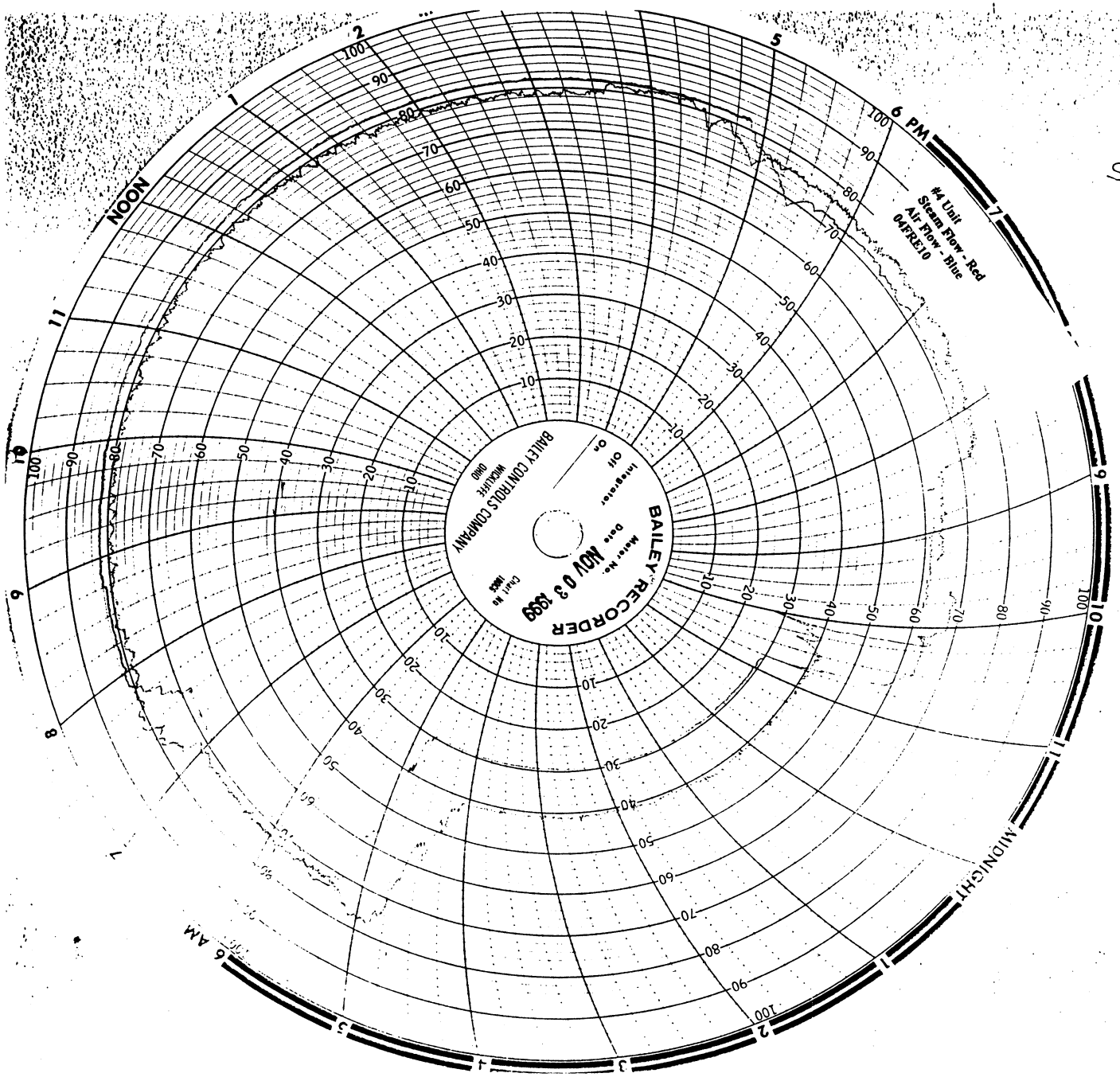
-------- Original Message --------
Subject: Operating Data Hg Test - SC4
Date: Wed, 17 Nov 1999 14:36:59 -0500
From: Thomas A Batts <battst@dteenergy.com>
To: Matthew S Beemer <beemerm@dteenergy.com>

Matt,

I have some operating data for the hg test. These numbers are best estimates using strip chart data for steam flow. Tons of coal/hr is based on a string drop test done on 11/4/99..

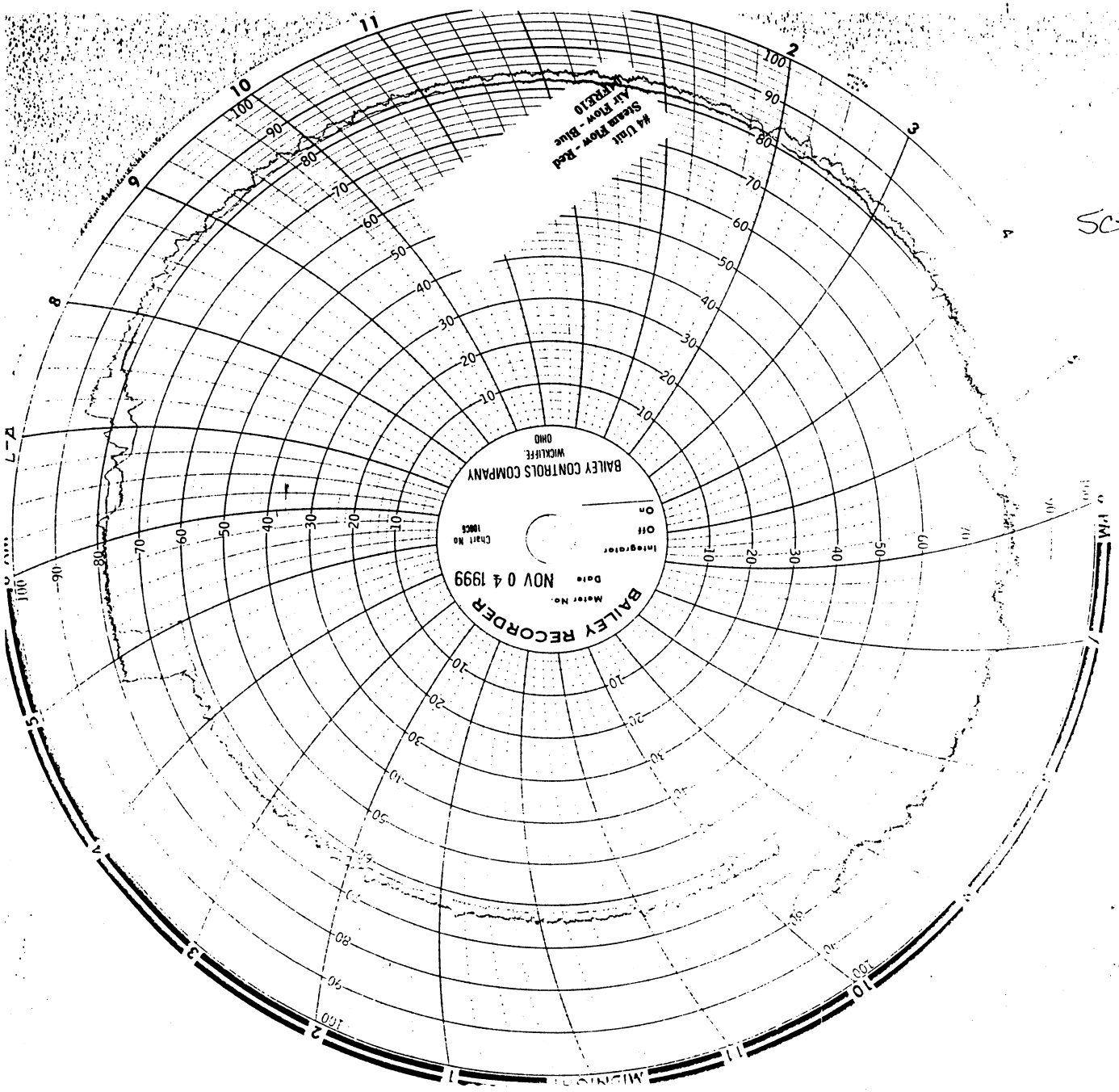
Test #1 - avg steam flow 1150.3 Klb/hr
Test #2 - avg steam flow 1151.4 Klb/hr
Test #3 - avg steam flow 1152.6 Klb/hr
Test #4 - avg steam flow 1144.3 Klb/hr
Test #5 - avg steam flow 1140.5 Klb/hr
Test #6 - avg steam flow 1122.6 Klb/hr
Test #7 - avg steam flow 1118.1 Klb/hr

Coal rate is 93.6 tons/hr



SCPP UNIT 4 11/03/99

STEAM FLOW - Scale 0-100 = 0 - 1,400 KM/HR



SCPP UNIT #4 11/04/99

Steam flow - Scale 0-100 = 0-1,400 K#/hr

APPENDIX F

Chain of Custody Records

Job# 99-158 Unit Tested Unit 4 Precipitator Inlet Duct **CHAIN OF CUSTODY RECORD** Page # 11

Facility Name/Location
~~St.~~ Detroit Edison Co.
St. Clair Power Plant
East China, MI

Collected By/Company
METCO

Unit 4 Precipitator Inlet Duct Run 1 ~~Unit~~ SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS (Specific Compounds/Methods)
Analyze according to the Ontario Hydro method																				
Container 1 filter	11/3/99	1235	X				II	BH		X							X			thimble Q52 filter 47 Q95 Ship to METCO for weight
Container 2 0.1 N HNO_3 rinse	11/3/99	1238	X				I	BH									X			
Container 3 10% HNO_3 rinse Imp. 1,2,3	11/3/99	1251	X				II	BH									X			
Container 4 0.1 N HNO_3 rinse Imp. 4	11/3/99	1305	X				I	BH									X			
Container 5 0.1 N HNO_3 rinse Imp. 5,6,7	11/3/99	1326	X				I	BH									X			used hydroxylamine - sulfate / sodium chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Joann Brown	11-5-99	11:47	Joann Brown	11-6-99	2300	John Pellegrini	11/8/99	1336
Analyzed by:	Date:	Time:	Data Reviewed by:	Date:	Time:	Remarks: filter part. @ Metco	M. Banter 11-11-99	

Ship to: ~~METCO~~ TestAmerica 11/12 Fed X → TA

METCO ENVIRONMENTAL

Job# 77-150 Unit Tested 4 Precipitator Inlet Duct

CHAIN OF CUSTODY RECORD

Page # _____

Facility Name/Location
Detroit Edison Co.
St. Clair Power Plant
East China, MI

Collected By/Company
METCO

Unit 4 Precipitator Inlet Duct Run 2 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS (Specific Compounds/Methods)
																				Analyzed according to Ontario-Hydro method
Container 1 filter	11/03/99	1606	X				11	BN		X							X			thimble Q53 filter 47Q96 ship ~~filter~~ to METCO for weight
Container 2 0.1 N HNO_3 rinse	11/03/99	1608	X				1	BN									X			
Container 3 10% HNO_3 rinse Imp. 1,2,3	11/03/99	1616	X				11	BN									X			
Container 4 0.1 N HNO_3 rinse Imp. 4	11/03/99	1619	X				1	BN									X			
Container 5 0.1 N HNO_3 rinse Imp. 5,6,7	11/03/99	1632	X				1	BN									X			

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jann Brom	11-5-99	11:47	Jann Brom	11-6-99	2300	John Pellegrino	11/8/99	1330
Analyzed by:	Date:	Time:	Data Reviewed by:	Date:	Time:	Remarks: filter partic @ Metco	M. Hunter 11-11-99	

Ship to: Test America 11/12 FedX → TA DPB

METCO ENVIRONMENTAL

Job# 99-150 Unit Tested Unit 4 Stack

CHAIN OF CUSTODY RECORD

Facility Name/Location
The Detroit Edison Company
St. Clair Power Plant
East China, MI

Collected By/Company
METCO

Unit 4 Stack Run 3 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS (Specific Compounds/Methods)
																				Analyzed according to Ontario-Hydro method.
Container 1 filter	11/04/99	1251	X				I	MB		X							X			filter ship to METCO for weight
Container 2 0.1 N HNO_3 rinse	11/04/99	1253	X				I	MB									X			
Container 3 10% HNO_3 rinse Imp. 1,2,3	11/04/99	1303	X				II										X			
Container 4 0.1 N HNO_3 rinse Imp. 4	11/04/99	1305	X				I										X			
Container 5 0.1 N HNO_3 rinse Imp. 5,6,7	11/04/99	1318	X				I										X			used hydroxylamine sulfate - sodium chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jason Brown	11-5-99	11:48	Jason Brown	11-6-99	2300	John Pellegrini	11/8/99	1330
Analyzed by:	Date:	Time:	Data Reviewed by:	Date:	Time:	Remarks: part. by Metco M. Hunter 11/11/99		

Ship to: TestAmerica 11/12 Fed X → TA

METCO ENVIRONMENTAL

Job# 99-158 Unit Tested 4 Precipitator Inlet Duct

CHAIN OF CUSTODY RECORD

Facility Name/Location
Detroit Edison Co.
St. Clair Power Plant
East Michigan, MI

Collected By/Company
METCO

Unit 4 Precipitator Inlet Blank Train SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS (Specific Compounds/Methods)
																				Analyze according to the Ontario-Hydro Method
Container 3 10% HNO_3 rinse Imp. 1,2,3	11/03/99	1511	✓				1										X			Containers 1,2,2a not recovered
Container 4 0.1 N HNO_3 rinse Imp. 4	11/03/99	1514	X				1										X			
Container 5 0.1 N HNO_3 rinse Imp. 5,6,7	11/03/99	1523	X				1										X			Used Hydroxylamine sulfate sodium chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jam Brown	11-5-99	11:47	Jam Brown	11-6-99	2300	John Pellegrine	11/8/99	1330
Analyzed by:	Date:	Time:	Data Reviewed by: JRM	Date:	Time:	Remarks:		

Ship to: Test America 11/12 Fed X → TA DB

METCO ENVIRONMENTAL

Job# 99-158 Unit Tested Unit 4

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
The Detroit Edison Company
St. Clair Power Plant
E. China, Michigan

Collected By/Company
METCO Environmental

Reagent Blanks SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS (Specific Compounds/Methods)
																				Analyze according to the Ontario Hydro Method.
Container 7 0.1 N HNO_3 Blank	11/3/99	1015	X				I	BH									X			Vol. = 50 ml
Container 8 1 M KCl Blank	11/3/99	1016	X				I	BH									X			Vol. = 50 ml
Container 9 5% HNO_3 - 10% H_2O_2 Blank	11/3/99	1017	X				I	BH									X			Vol. = 52 ml
Container 10 $KMnO_4$ - H_2SO_4 Blank	11/3/99	1018	X				I	BH									X			Vol. = 50 ml
Container 11 $NH_2OH \cdot H_2SO_4$ Blank	11/3/99	1019	X				I	BH									X			Vol. = 100 ml.
Container 12 Filter Blank	11/3/99	1025	X				IV	BH									X			Thimbles: Q55, Q56, Q57 Filters: 47Q98, 47Q99, 47Q100

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jann Brown	11-5-99	11:48	Jann Brown	11-6-99	2300	John Pellegrini	11/8/99	1330
Analyzed by:	Date:	Time:	Data Reviewed by: JRM	Date:	Time:	Remarks:		

Ship to: TestAmerica Fed X 11/12 → TA RAS

METCO ENVIRONMENTAL

APPENDIX G

Resumes

BILLY J. MULLINS, JR.; President

Education	Post Graduate Study Environmental Engineering at Southern Methodist University; Dallas, Texas 1970. M.S. 1969, New York University; New York, New York, in Civil Engineering (Air Resources). B.S. 1968, Texas Tech University; Lubbock, Texas, in Civil Engr. (Water Resources). Studies in Engineering at U.S. Naval Academy; Annapolis, Maryland, 1963-1964.
Professional Training Courses	Attended Short Course on Air Pollution Engineering at the University of Texas at Austin, February 1970. Attended four-week management course presented by the American Management Association, 1976.
Certification	Registered Professional Engineer Certified Visible Emissions Evaluator Licensed Private Pilot (Multi-Engine-Land, Instrument) Diplomat in the American Academy of Environmental Engineers Inductee into the Stack Sampling Hall of Fame Certified as Qualified Environmental Professional (QEP)
Professional Memberships	**Air & Waste Management Association** - Past Chairman, Past Vice Chairman, and Past Board of Directors of North Texas Chapter and Southwest Section; Past Chairman, Consultants Committee; Past Chairman, Source Measurement Committee **Source Evaluation Society** - Past President, Past Board of Directors **American Management Association**

MULLINS

Publications

Authored "Real World Experience with USEPA's New Sampling and Analytical Methods for Conducting Risk Burn," - May 1998.

Co-authored "Sulfur Compound Emissions of the Petroleum Production Industry," December 1974.

Co-authored "Field Procedure for Stabilizing Hydrogen Sulfide Samples to be Analyzed Using Modified Methylene Blue Technique," presented at the Conference on Ambient Air Quality Measurements, Austin, Texas, March 1975.

Co-authored "Atmospheric Emissions Survey of the Sour Gas Industry," October 1975.

Co-authored "Technique for Insuring the Validity of Samples for High Concentrations of Sulfur Dioxide Using the EPA Method 5 Sampling Train," presented at the Third National Conference on Energy and the Environment, College Corner, Ohio, September 1975.

Teaching Experience

Conducted training seminars on sampling methods periodically since 1974 to present.

Conducted a one-day seminar on Part 75 Testing over ten times in 1993 and 1994.

Served as a lecturer in the Environmental Protection Agency's training course number 450, "Source Sampling for Particulate Pollutants," for two years from January 1974 to October 1975 and in March, 1992.

Conducted a two-day training course entitled "Technical Assistance in Source Sampling" at Iowa State University, Ames, Iowa, for the Environmental Protection Agency, October 1974.

MULLINS

Teaching Experience (Cont'd)

Conducted EPA's training course number 450, "Source Sampling for Particulate Pollutants," for the EPA at Research Triangle Park, North Carolina, September 1975.

Conducted a two-day short course entitled "Performing and Observing Source Sampling" at Dallas, Texas; July 1976, May 1977, October 1977, November 1987 and November 1988; at Lake Charles, Louisiana, May 1977; at Casper, Wyoming, May 1977; and at Point Comfort, Texas, November 1992.

Served as a lecturer in the Environmental Protection Agency's two-day seminar entitled "Asphalt Industry Environmental Solutions," presented in Dallas, Texas, on March 21 and 22, 1979.

Conducted a two-day short course entitled "Performing and Observing Source Sampling" in Phoenix, Arizona in August, 1990 for the State of Arizona, Department of Environmental Quality; in Lincoln, Nebraska, in March 1980 for the State of Nebraska, Air Quality Control Division.

Technical Experience

Directed and performed stack sampling on over 2000 sources of which over 500 were sampled simultaneously using more than one sampling train at several points in the flue gas stream; 1972-present.

Directed and performed over 200 short-term ambient air studies using mobile sampling vans and various ambient air sampling equipment; 1972-present.

Designed, directed and operated over 20 permanent ambient air networks of various size and duration for a variety of parameters; 1972-present.

Designed surface and underground drainage systems for residential subdivisions, public works projects, and shopping centers; 1969-1972.

MULLINS

Designed several residential subdivisions including lot layout, street design, drainage design, and utility design; 1969-1972.

Research Projects

Supervised and conducted a study made by the Hawaiian Sugar Planters' Association to characterize the emissions for several bagasse-fired boilers. April-May 1976.

Supervised and conducted a study made by the Rio Grande Valley Sugar Growers, Inc. to determine the area affected by the burning of sugarcane fields prior to harvesting. November 1974-April 1975.

Supervised and conducted a study by a lightweight aggregate manufacturer to develop a material balance around the process through sampling and analysis of several parameters. November 1973.

Conducted a study in New York City to attempt to develop a correlation in the ambient air between carbon dioxide and sulfur dioxide to provide a tool for predicting air pollution episodes. January-May 1969.

Related Projects

Served as Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Santa Barbara, California, 1985.

Served as Session Chairman at the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Hershey, Pennsylvania, 1984; in San Diego, California, 1993; and in Palm Coast, Florida, 1994.

BILLY L. HEFLEY; Project Supervisor II

Education	B.S. 1991, East Central University; Ada, Oklahoma, in Environmental Science with a concentration in Environmental Management.
Professional Training Course	Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1993. Also attended an 8-hour refresher course January 1994, February 1995, and January 1996. Attended 8-hour Safe Hazardous Materials Transportation Training Program (HM-126F and HM-181) Dallas, Texas, October 1994. Attended Bill Mullins' Performing and Observing Source Sampling Short Course; Dallas, Texas, January 1995.
Certification	Certified Stable Emissions Evaluator
Technical Experience	Participated in the sampling of over 150 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1992-present. Participated in an auditing program for a permanent eight-station sulfur dioxide ambient air network in East Texas. 1992-1993. Participated in a semi-monthly ambient air monitoring survey for organic compounds at a petrochemical facility located in South Texas. 1993.

HEFLEY

Thoroughly trained in all EPA testing procedures, 1991 - Present

Experienced in the analysis of commercial calibration gas cylinders for CO_2, O_2, NO_x, and SO_2.

Experienced with calibration techniques for all field testing equipment.

Thoroughly trained in the operation and routine maintenance of the following:

Thermo Environmental Model 10AR Oxides of Nitrogen Analyzer

Thermo Environmental Model 48 Carbon Monoxide Analyzer

Teledyne Model 326 Oxygen Analyzer

Western Research Model 721A Sulfur Dioxide Analyzer

Anarad Model AR880 Oxides of Nitrogen Analyzer

Anarad Model AR23 Oxygen Analyzer

Anarad Model AR30C2 Sulfur Dioxide Analyzer

Anarad Model AR50-C Carbon Dioxide Analyzer

SHANE LEE; Environmental Technician II

Education	B. S. - Environmental Science-Biology, December 20, 1997; Sul Ross State University; Alpine, Texas.
Technical Experience	Participated in the sampling of over 50 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1998-Present.

MICHAEL BASS; Environmental Technician II

Education	B. S. Geography, August 1998; Texas A&M University, College Station, Texas
Technical Experience	Participated in the sampling of over 50 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1998-Present.

SCOTT HART; Environmental Technician I

Education	Associate Degree-Environmental Science, March 1999; Texas State Technical College, Breckenridge, Texas
Technical Experience	Participated in the sampling of over 25 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA procedures, 1999-Present.

JASON BROWN; Environmental Technician I

Education	B. S. in Zoology, 1995; University of Oklahoma, Norman, Oklahoma.
Technical Experience	Participated in the sampling of over 25 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1999-Present.