7 APPENDICES

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APPENDIX A

Nomenclature and Equations for Calculation of Source Emissions

METCO ENVIRONMENTAL

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)

Symbo	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)

METCO ENVIRONMENTAL

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.

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

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

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

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: 99-95BRM1
JOB NAME: FIRST ENERGY
LOCATION: SHIPPINGPORT, PA
UNIT TESTED: UNIT NUMBER 1B SCRUBBER INLET DUCT

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			09/21/99	09/21/99	09/22/99
BEGIN TIME			1212	1742	0900
END TIME			1450	2008	1118
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	29.21 (742)	29.21 (742)	29.22 (742)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	0.443 (11.3)	0.458 (11.6)	0.374 (9.5)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	47.324 (1.340)	49.408 (1.399)	43.052 (1.219)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	61 (16.00)	61 (16.00)	69 (21.00)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	46.882 (1.328)	48.948 (1.386)	42.012 (1.190)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	78.2	74.4	63.5
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	3.691 (0.105)	3.512 (0.099)	2.997 (0.085)
%M	MOISTURE IN STACK GAS BY VOLUME	%	7.30	6.69	6.66

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

SOURCE EMISSION CALCULATIONS

FIRST ENERGY
SHIPPINGPORT, PA
UNIT NUMBER 1B SCRUBBER INLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.9270	0.9331	0.9334
CO2		%	11.7	12.0	12.6
O2		%	7.1	7.0	6.3
CO		%	0.0	0.0	0.0
N2		%	81.2	81.0	81.1
%EA	EXCESS AIR @ SAMPLING POINT	%	49.2	48.4	41.5
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.16 (30.16)	30.20 (30.20)	30.27 (30.27)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	29.27 (29.27)	29.38 (29.38)	29.45 (29.45)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	0.545 (13.8)	0.559 (14.2)	0.458 (11.6)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	279 (137)	292 (144)	286 (141)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	27.72 (704)	27.73 (704)	27.76 (705)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	2,849 (14.47)	2,900 (14.73)	2,602 (13.22)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	25,447 (16.42)	25,447 (16.42)	25,447 (16.42)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	310,072 (526,812)	312,320 (530,632)	282,877 (480,608)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	503,416 (855,304)	512,405 (870,576)	459,855 (781,294)

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

SOURCE EMISSION CALCULATIONS

FIRST ENERGY
SHIPPINGPORT, PA
UNIT NUMBER 1B SCRUBBER INLET DUCT

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	%	102.4	106.2	100.6
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:	99-95BM1
JOB NAME:	FIRST ENERGY
LOCATION:	SHIPPINGPORT, PA
UNIT TESTED:	UNIT NUMBER 1A STACK

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			09/21/99	09/21/99	09/22/99
BEGIN TIME			1130	1722	0900
END TIME			1510	1959	1133
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	28.91 (734)	28.80 (732)	28.92 (735)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	0.933 (23.7)	0.937 (23.8)	0.883 (22.4)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	65.468 (1.854)	66.047 (1.870)	63.466 (1.797)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	78 (26.00)	79 (26.00)	72 (22.00)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	62.240 (1.762)	62.437 (1.768)	61.030 (1.728)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	239.4	228.8	189.2
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	11.300 (0.320)	10.799 (0.306)	8.930 (0.253)
%M	MOISTURE IN STACK GAS BY VOLUME	%	15.37	14.75	12.76

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

METCO ENVIRONMENTAL

SOURCE EMISSION CALCULATIONS

FIRST ENERGY
SHIPPINGPORT, PA
UNIT NUMBER 1A STACK

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.8463	0.8525	0.8724
CO2		%	11.4	11.7	12.0
O2		%	7.4	7.1	6.8
CO		%	0.0	0.0	0.0
N2		%	81.2	81.2	81.2
%EA	EXCESS AIR @ SAMPLING POINT	%	52.4	49.2	46.2
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.12 (30.12)	30.16 (30.16)	30.19 (30.19)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.26 (28.26)	28.36 (28.36)	28.64 (28.64)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	1.513 (38.4)	1.498 (38.0)	1.383 (35.1)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	125 (52)	127 (53)	125 (52)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	28.78 (731)	28.68 (728)	28.80 (732)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	4,312 (21.90)	4,298 (21.83)	4,093 (20.79)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	40,649 (26.23)	40,649 (26.23)	40,649 (26.23)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	897,621 (1,525,058)	895,070 (1,520,724)	878,919 (1,493,283)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	1,217,127 (2,067,899)	1,213,217 (2,061,256)	1,155,458 (1,963,123)

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

SOURCE EMISSION CALCULATIONS

FIRST ENERGY
SHIPPINGPORT, PA
UNIT NUMBER 1A STACK

SYMBOL	DESCRIPTION	UNITS			
Tt	NET TIME OF TEST	MINUTES	120	120	120
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.175 (0.004)	0.175 (0.004)	0.175 (0.004)
%I	PERCENT ISOKINETIC	%	98.0	98.6	98.2
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 99-45 BRM 1
Job Name EPRI
Run Number 1
Unit Mansfield Scrubber Inlet 1B
Date 9-21-99
Operator Bass / Brown / Heffley
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 58
Assumed Moisture % 4.5
Probe Length 10'
C Factor 1 to 4 to reference
Initial Leak @ 15.00 "Hg = 0.002 cfm
Final Leak @ 14.00 "Hg = 0.000 cfm

Point	Clock Time	825.305 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 (T_m)	Dry Gas Temp. °F Outlet	Remarks	Aux. Line
D6	~~1130~~ 1216	~~822.800~~	0.70	0.57	0.57	8.00	302	253	262	56	60	60	Thimble # 3 Q-10	250
5	1217	827.98	0.65	0.53	0.53	8.00	308	262	293	53	60	60	Filter # 47-Q 819	262
4	1222	830.42	0.62	0.51	0.51	8.00	277	263	307	53	59	60		287
3	1227	832.35	0.57	0.46	0.46	7.50	277	255	307	52	59	61		290
2	1232	834.27	0.49	0.40	0.40	7.50	270	256	304	52	60	60	225 2 g of HNO₃	306
1	1237	836.11	0.46	0.36	0.36	7.00	270	264	301	52	60	60		310
END	1242	837.836	-	-	-	-	-	-	-	-	-	-	0.384	-
A6	1245	838.22	0.47	0.37	0.37	7.00	305 ~~294~~	294	290	52	60	60		250
5	1250	840.00	0.43	0.35	0.35	6.50	296	304	292	55	59	60		251
4	1255	841.66	0.43	0.35	0.35	6.50	281	279	286	54	60	60		276
3	1300	843.37	0.39	0.32	0.32	6.50	278	255	278	52	61	61		295
2	1305	845.02	0.44	0.36	0.36	7.00	275	260	284	53	60	61		302
1	1310	846.79	0.44	0.36	0.36	7.00	270	278	282	52	62	61	0.428	304
END	1315	848.489	-	-	-	-	-	-	-	-	-	-	Leak check @ 10.00 "Hg 0.002 cfm	-
B6	1335	849.917	0.45	0.37	0.37	8.00	302	281	279	59	61	61	Leak check @ 13.00 "Hg 0.002 cfm	310
5	1340	850.80	0.34	0.24	0.26	7.00	294	295	284	56	62	60	848.917 - 0.002 =	300
4	1345	852.29	0.30	0.25	0.25	6.50	279	288	277	57	61	62		305
3	1350	853.74	0.24	0.20	0.20	6.00	301	292	284	56	62	61		300

Pitot Tube Calibration Factor C_p 0.808
Volume Collected V_m ~~48.155~~ 47.374 ft³
Water Collected V_w 78.2 ml
Time of Test T_t 120 min.
Stack Pressure P_s -20.30 "H₂O

Pitot Tube No. M-2
Baro. Press. P_b 29.21 "Hg
Probe Tip Dia. D_n 0.200 in.
% CO_2 ~~11.8~~ 11.7 % CO 0.0
% O_2 7.1 % N_2 81.2
Area Stack A_s 25447 in²

Barometer No. 19.2
Probe Tip No. TFE-1-7
Total Volume of Leak Checks After Start: ~~0.004~~ ft³ 0.012
V_m = Dry Gas Meter Calibration Factor ~~46.998~~ 46.802 MB X 1.029

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

R-2

Impinger Box No. HG-1

Impinger 1	Final Weight	775.0		Impinger 1	48.4
	Initial Weight	726.6		Impinger 2	8.8
	Increase	48.4		Impinger 3	1.1
Impinger 2	Final Weight	757.3		Impinger 4	8.5
	Initial Weight	748.5		Impinger 5	0.9
	Increase	8.8		Impinger 6	0.0
Impinger 3	Final Weight	739.5		Impinger 7	-0.2
	Initial Weight	738.4		Impinger 8	10.7
	Increase	1.1		Total	78.2 = V_w
Impinger 4	Final Weight	872.8			
	Initial Weight	870.3			
	Increase	8.5			
Impinger 5	Final Weight	753.6			
	Initial Weight	752.7			
	Increase	0.9			
Impinger 6	Final Weight	653.9			
	Initial Weight	653.9			
	Increase	0.0			
Impinger 7	Final Weight	762.6			
	Initial Weight	762.8			
	Increase	-0.2			

Water Weight Gain

Imp.8 940.0 − 929.3 = 10.7

V_w =

g SO_2 = -

V_w =

P_b =	29.21	%CO_2 =	11.7
V_m =	~~48.455~~ 47.324	%O_2 =	7.1
V_w =	78.2	%CO =	0.0
P_m =	0.443	%N_2 =	81.2
Avg ΔP =	0.545	A_s =	25447
		D_n =	0.200
Avg$\sqrt{\Delta P}$ =	0.721	T_t =	120
C_p =	0.808		
P_s =	-20.30 "H_2O	27.72	"Hg
T_m =	61 °F	521	°R
T_s =	279 °F	~~7309~~ 739	°R

Moisture Content: %M = 7.30 M_d = 0.9270 MW_d = 30.156 MW = 29.27

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 47.324 \left[\frac{29.21 + \frac{0.443}{13.6}}{61 + 460}\right] = 46.882 \text{ sft}^3 \quad 0391 \text{ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 78.2 = 3.691 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.691}{46.882 + 3.691}$ x 100 = 7.30 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{739\ \ \cancel{7309}}{27.72 \times 29.27}}$ x 0.721 = ~~2831~~ 2849 fpm

%I = $\frac{1{,}039 \times 46.882 \times 7309}{27.72 \times 0.9270 \times \cancel{2831}\ 2849 \times 120 \times (0.200)^2}$ = ~~101.8~~ 102.4 %

ACFM: ~~500,341~~ 503,416

SCFM: ~~311,912~~ 310,072

%EA: 49.2

Run Number 1

Unit Mansfield Scrubber Inlet

Date 9-21-99

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	Aux line Remarks
B2	1355	855.06	0.20	0.16	0.16	5.50	274	290	285	54	60	62	325
1	1400	856.32	0.20	0.16	0.16	5.50	272	304	293	54	62	62	~~340~~ 328
END	1405	857.475	-	-	-	-	-	-	-	-	-	-	-
C6	1420	857.475	0.90	0.73	0.73	12.00	~~248~~ 291	278	294	52	62	62	319
5	1425	859.98	0.88	0.72	0.72	10.00	288	290	295	49	64	61	317
4	1430	862.38	0.95	0.78	0.78	11.00	270	273	293	49	62	62	320
3	1435	864.95	0.94	0.77	0.77	11.00	220	258	298	51	62	63	317
2	1440	867.44	0.84	0.68	0.68	10.50	240	258	297	49	62	63	314
1	1445	869.83	0.75	0.62	0.62	9.50	245	257	293	51	63	63	317
END	1450	872.107	-	-	-	-	-	-	-	-	-	-	-

0.812 ft³ non sample

METCO ENVIRONMENTAL

Job Number 99-95BRm1
Job Name EPRI
Run Number 2
Unit Unit 18 Scrubber Inlet Duct
Date 9-21-99
Operator Bass/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 60
Assumed Moisture % 7.5
Probe Length 10'
C Factor 1 to 4 to reference
Initial Leak @ 15.00 "Hg = 0.000 cfm
Final Leak @ 10.00 "Hg = 0.000 cfm

Point	Clock Time	875.943 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 (T_m)	Dry Gas Temp. °F Outlet	Aux. Temp °F	Remarks
C4	1742	~~875.606~~	0.90	0.74	0.74	7.50	302	282	274	57	63	64	261	Filters
5	1747	878.41	0.97	0.80	0.80	8.00	294	284	282	54	62	64	260	47Q20 Backup
4	1752	881.11	0.97	0.80	0.80	8.00	280	288	281	52	63	65	259	Q9 Thimble
3	1757	883.67	0.92	0.75	0.75	8.00	274	287	280	52	61	65	294	
2	1802	886.17	0.84	0.69	0.69	7.50	270	272	284	51	64	63	285	
1	1807	888.54	0.80	0.65	0.65	7.50	269	264	279	50	63	63	280	
END	1812	890.860	–	–	–	–	–	–	–	–	–	–	–	0.740 ~~20~~ ft³
B6	1820	891.60	0.48	0.39	0.39	6.00	290	300	281	53	63	63	294	of Stack
5	1825	893.29	0.48	0.39	0.39	6.00	299	295	280	52	63	63	295	[illegible]
4	1830	894.86	0.29	0.24	0.24	5.50	262	299	285	54	61	63	306	[illegible]
3	1835	896.31	0.25	0.205	0.20	5.00	265	292	284	53	62	62	298	
2	1840	897.72	0.19	0.155	0.15	4.50	286	273	284	55	61	62	305	
1	1845	898.94	0.15	0.12	0.12	4.50	272	291	286	55	61	62	304	
END	1850	899.934	–	–	–	–	–	–	–	–	–	–	–	0.736 ft³
A6	1859	900.67	0.45	0.37	0.37	6.00	300 ~~281~~	284	283	54	60	61	284	of Stack
5	1904	902.51	0.42	0.345	0.35	5.50	298	293	282	51	60	61	275	[illegible]
4	1909	904.18	0.42	0.345	0.35	5.50	302	285	283	52	59	60	270	[illegible]
3	1914	905.90	0.45	0.37	0.37	6.00	309	291	281	52	59	60	271	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 49.408 ✓ ft³
Water Collected V_w 74.4 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -20.10 ✓ "H₂O

Pitot Tube No. M-2 ✓
Baro. Press. P_b 29.21 ✓ "Hg
Probe Tip Dia. D_n 0.200 ✓ in.
% CO_2 12.0 ✓ % CO 0.0
% O_2 7.0 % N_2 81.0
Area Stack A_s 25,447 ✓ in²

Barometer No. 19-2 ✓
Total Volume of Leak Checks After Start: – ft³
V_m = Dry Gas Meter Calibration Factor 48.016 X 1.029 ✓

Probe Tip No. TFE 1 #7

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

Impinger Box No. Hg 3

1013.1
- 217.2
795.9

Impinger 1	Final Weight	~~1013.1~~	Water Weight Gain	Impinger 1	45.5
	Initial Weight	750.4	Imp 8 Final 887.1	Impinger 2	8.5
	Increase	~~62.7~~ 45.5	Int. 877.7	Impinger 3	2.3
Impinger 2	Final Weight	664.9	9.4	Impinger 4	8.0
	Initial Weight	656.4			
	Increase	8.5	V_w =		
Impinger 3	Final Weight	754.0	g SO_2 =	Impinger 5	0.4
	Initial Weight	753.7	V_w =		
	Increase	2.3		Impinger 6	0.3
Impinger 4	Final Weight	767.5		Impinger 7	0.0
	Initial Weight	759.5		Impinger 8	9.4
	Increase	8.0		Total	74.4 = V_w
Impinger 5	Final Weight	757.2	P_b = 29.21	$\%CO_2$ =	12.0
	Initial Weight	756.8	V_m = ~~74.4~~ 49.408	$\%O_2$ =	7.0
	Increase	0.4	V_w = 74.4	%CO =	0.0
			P_m = 0.458	$\%N_2$ =	81.0
Impinger 6	Final Weight	767.0	Avg ΔP = ~~0.729~~ 0.550	A_s =	25447
	Initial Weight	766.7		D_n =	0.200
	Increase	0.3	Avg$\sqrt{\Delta P}$ = 0.729	T_t =	120
Impinger 7	Final Weight	761.8	C_p = 0.809		
	Initial Weight	761.8	P_s = -20.10 H_2O		27.73 "Hg
	Increase	0.0	T_m = 61 °F		~~520~~ 521 °R
			T_s = 292 °F		~~752~~ 752 °R

Moisture Content: %M = ~~6.68~~ 6.69 M_d = ~~0.9332~~ 0.9331 MW_d = 30.200 MW = ~~29.39~~ 29.38 dkm

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 49.408 \left[\frac{29.21 + \frac{0.458}{13.6}}{61 + 460}\right] = \frac{48.448}{\cancel{49.042}}\ sft^3 \quad \frac{\cancel{0.409}}{0.408\ dkm}\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 74.4 = 3.512 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.512}{48.448 + 3.512}$ x 100 = ~~5.68~~ 6.69 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{752}{27.73 \times \cancel{29.39}\ 29.38}}$ x 0.729 = ~~2099~~ 2900 fpm

%I = $\frac{1,039 \times \cancel{49.042}\ 48.448 \times 752}{27.73 \times \cancel{29.39}\ 29.38 \times \cancel{2099}\ 2900 \times 120 \times (0.200)^2}$ = ~~104.4~~ 106.5 %

ACFM: ~~512,318~~ 512,405

SCFM: ~~312,246~~ 312,200

%EA: 48.4

Run Number 2

Unit Unit 1A Scrubber Inlet Duct

Date 9-21-99

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	Aux. Temp °F	Remarks
A2	1919	907.64	0.40	0.33	0.33	6.00	299	287	282	53	59	60	286	
1	1924	909.32	0.42	0.345	0.35	6.00	290	281	279	51	59	60	301	
END	1929	911.123	—	—	—	—	—	—	—	—	—	—	—	0.727 ft³
D6	1938	911.85	0.65	0.53	0.53	6.50	309	263	277	52	59	59	310	Of Stack
5	1943	913.93	0.70	0.57	0.57	7.00	316	266	277	51	58	59	312	Gas to
4	1948	914.10	0.64	0.52	0.52	6.50	316	283	279	52	60	59	309	[illegible]
3	1953	918.14	0.56	0.46	0.46	7.00	313	286	280	52	58	59	311	
2	1958	920.13	0.56	0.46	0.46	7.00	302	271	279	51	58	59	310	
1	2003	922.05	0.50	0.41	0.41	6.50	295	268	278	53	58	59	315	
END	2008	923.959	—	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number: 99-95 BRM1
Job Name: EPRI
Run Number: 3
Unit: #1B Scrubber Inlet Duct
Date: 9-22-99
Operator: Bass / Brown / 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 ~~72~~ 63
Assumed Moisture % 7
Probe Length 10'
C Factor 1 to 4 to reference
Initial Leak @ 15.00 "Hg = 0.000 cfm
Final Leak @ 11.50 "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	Aux Line °F	Remarks back up filter
D6	0900	934.071	0.54	0.44	0.44	6.50	290	290	277	47	71	71	315	47Q21
5	0905	936.04	0.56	0.46	0.46	6.50	302	285	278	47	70	71	314	thimble Q22
4	0910	938.01	0.56	0.46	0.46	6.50	~~285~~ 30[illegible]	285	274	46	70	71	312	
3	0915	939.95	0.54	0.44	0.44	6.50	296	286	276	47	70	72	311	int. orsat
2	0920	941.92	0.48	0.39	0.39	6.25	286	284	275	46	71	72	309	
1	0925	943.73	0.43	0.35	0.35	6.00	272	280	275	46	70	72	308	
END	0930	945.494	—	—	—	—	—	—	—	—	—	—	—	
A6	0932	945.494	0.40	0.33	0.33	6.00	~~276~~ 289	276	274	47	71	72	308	
5	0937	947.36	0.34	0.28	0.28	6.00	295	280	275	46	70	72	308	
4	0942	948.92	0.34	0.28	0.28	6.00	291	258	283	47	69	72	306	
3	0947	950.46	0.34	0.28	0.28	6.00	288	254	284	47	69	72	305	
2	0952	951.99	0.33	0.27	0.27	6.00	281	250	283	47	71	72	305	0.293 ft³
1	0957	953.46	0.33	0.27	0.27	6.00	278	250	275	48	71	73	304	leak ✓ @ 8.00" Hg = 0.0
END	1002	955.010	—	—	—	—	—	—	—	—	—	—	—	~~955.125~~ leak ✓ @ 8.00" Hg = 0.001
B6	1014	955.303	0.34	0.28	0.28	6.00	286	253	281	51	74	74	300	~~0.293 ft³~~
5	1019	956.89	0.28	0.23	0.23	5.50	287	271	282	49	73	73	294	
4	1024	958.30	0.20	0.16	0.16	5.50	284	283	281	51	69	72	250	
3	1029	959.53	0.18	0.15	0.15	5.00	278	288	286	51	67	71	254	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m ~~43.353~~ 43.052 ft^3
Water Collected V_w 63.5 ml
Time of Test T_t 120 min.
Stack Pressure P_s -19.90 "H_2O

Pitot Tube No. M2 ✓
Baro. Press. P_b 29.22 "Hg
Probe Tip Dia. D_n 0.200 in.
% CO_2 12.6 % CO 0.0
% O_2 6.2 % N_2 81.1
Area Stack A_s 25,447 in^2

Barometer No. 19-2 ✓
Probe Tip No. TFE 1 #7 ✓
Total Volume of Leak Checks After Start: 0.293 ft^3
V_m = Dry Gas Meter Calibration Factor ~~42.132~~ 41.836 X 1029

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

Impinger Box No. Hg-1

			Water Weight Gain		
Impinger 1	Final Weight	772.6	Imp 8 Final 944.4	Impinger 1	41.8
	Initial Weight	~~731.0~~	Int 939.4	Impinger 2	6.3
	Increase	241.6 - 199.8	5.0	Impinger 3	1.3
Impinger 2	Final Weight	756.7		Impinger 4	8.2
	Initial Weight	750.4			
	Increase	6.3			
			V_w =		
Impinger 3	Final Weight	740.0	g SO_2 =	Impinger 5	0.5
	Initial Weight	738.7	V_w =		
	Increase	1.3		Impinger 6	0.2
Impinger 4	Final Weight	770.8		Impinger 7	0.2
	Initial Weight	762.6		Impinger 8	5.0
	Increase	8.2		Total	~~263.3~~ 63.5 = V_w

Impinger 5	Final Weight	753.8	P_b =	29.22	%CO_2 =	12.6	
	Initial Weight	~~753.3~~	V_m =	~~43.353~~ 43.052	%O_2 =	6.3	
	Increase	0.5	V_w =	63.5	%CO =	0.0	
			P_m =	0.374	%N_2 =	81.1	
Impinger 6	Final Weight	652.2	Avg ΔP =	0.458	A_s =	~~35447~~ 25,447 fcm	
	Initial Weight	652.0			D_n =	0.200	
	Increase	0.2	Avg$\sqrt{\Delta P}$ =	0.658	T_t =	120	
			C_p =	0.808			
Impinger 7	Final Weight	750.5	P_s =	-19.90 "H_2O		27.76	"Hg
	Initial Weight	750.3	T_m =	69 °F		529	°R
	Increase	0.2	T_s =	286 °F		746	°R

Moisture Content: %M = ~~6.62~~ 6.66 M_d = ~~0.9338~~ 0.9334 MW_d = 30.268 MW = ~~29.46~~ 29.45

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times \cancel{43.353}\ 43.052 \left[\frac{29.22 + \frac{0.374}{13.6}}{69 + 460}\right] = \cancel{42.306}\ 42.012\ sft^3 = \cancel{0.353}\ 0.350\ scfm\ fcm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 63.5 = 2.997 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{2.997}{42.306 + 2.997}$ x 100 = ~~6.62~~ % 6.66

V_s = 5123.8 x 0.808 $\sqrt{\frac{746}{27.76 \times \cancel{29.46}\ 29.45}}$ x 0.658 = 2602 fpm

ACFM: ~~640,457~~ 459,855 fcm

SCFM: ~~344,209~~ 282,877 fcm

%I = $\frac{1{,}039 \times \cancel{42.306}\ 42.012 \times 746}{27.76 \times \cancel{0.9338}\ 0.9334 \times 2602 \times 120 \times (0.200)^2}$ = ~~101.3~~ 100.6 %

%EA: 41.5

Run Number 99-15BR11 3

Unit # 1AB Scrubber Inlet Duct

Date 9-22-99

Ing 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	Aux Line °F	Remarks
B2	1034	960.84	0.16	0.13	0.13	5.00	278	282	286	51	64	69	281	
1	1039	961.80	0.16	0.13	0.13	5.00	271	277	284	51	63	68	287	
END	1044	962.906	–	–	–	–	–	–	–	–	–	–	–	
C6	1048	962.906	0.72	0.58	0.58	8.00	275	278	289	49 62	62 ~~60~~	66	295	
5	1053	965.02	0.76	0.62	0.62	8.50	268	280	289	51	61	65	300	
4	1058	967.27	0.85	0.70	0.70	9.00	296	260	288	47	60	64	301	
3	1103	969.63	0.78	0.64	0.64	8.50	296	266	289	47	61	63	290	
2	1108	971.93	0.70	0.57	0.57	8.50	294	271	282	47	61	63	261	
1	1113	974.10	0.66	0.54	0.54	8.00	290	265	288	47	61	62	278	
END	1118	976.203	–	–	–	–	–	–	–	–	–	–	–	
														Blank Train
														0740
														0715

METCO ENVIRONMENTAL

Job Number 99-95 BRM 1
Job Name CPRI
Run Number 1
Unit Bruce Mansfield Unit 1A Stack
Date 9-21-99
Operator Lee / Conway / Hefley
Sample Box No. Hg 4 Meter Box No. 8-2

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 78
Assumed Moisture % 16%
Probe Length 8'
C Factor 6.0 ⇒ 10.0 to reference
Initial Leak @ 17.0 "Hg = 0.000 cfm
Final Leak @ 10.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O 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	Remarks
D 1	1130	593.387	1.40	0.85	0.85	3.5	120	265	268	66	73	73	Multi-point
1	~~1235~~ 1220	595.74	1.40	0.85	0.85	3.5	120	270	269	59	74	73	Entr orsat
2	1225	598.32	1.75	1.05	1.05	3.5	123	267	270	56	76	73	pump off @ 1131
2	1230	601.10	1.70	1.05	1.05	3.5	126	263	270	55	78	73	pump on @ 1216
3	1235	603.98	1.60	0.98	0.98	3.5	124	264	271	55	80	73	
3	1240	606.69	1.65	0.99	0.99	3.5	126	261	273	55	81	73	
End	1245	609.350	—	—	—	—	—	—	—	—	—	—	leak ✓ to 609.573; 11.0 @ 0.000
C 1	1309	609.687	1.20	0.74	0.74	3.5	121	244	252	67	76	74	leak ✓ to 609.687; 6.0 @ 0.000
1	1314	612.02	1.20	0.74	0.74	3.5	121	246	252	60	78	75	
2	1319	614.31	1.35	0.82	0.82	3.5	126	253	256	57	80	74	
2	1324	616.75	1.30	0.80	0.80	3.5	130	254	255	58	82	75	
3	1329	619.21	1.70	1.05	1.05	4.0	128	259	257	56	83	75	
3	1334	621.97	1.60	0.98	0.98	4.0	128	256	256	56	84	75	
End	1339	624.724	—	—	—	—	—	—	—	—	—	—	leak ✓ to 624.910; 6.0 @ 0.000
B 1	1400	625.007	1.20	0.74	0.74	3.5	126	249	252	67	77	75	leak ✓ to 625.007; 10.0 @ 0.000
1	1405	627.32	1.30	0.80	0.80	3.5	126	274	261	58	79	75	
2	1410	629.87	1.60	0.98	0.98	4.0	127	271	265	55	81	75	
2	1415	632.43	1.50	0.92	0.92	4.0	127	274	268	55	82	76	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 65.468 ft³
Water Collected V_w 239.4 ml
Time of Test T_t 120 min.
Stack Pressure P_s -1.80 "H₂O

Pitot Tube No. M-3 ✓
Baro. Press. P_b ~~29.20~~ 28.91 "Hg BH
Probe Tip Dia. D_n 0.175 ✓ in.
% CO_2 11.4 % CO 0.0
% O_2 7.4 % N_2 81.2
Area Stack A_s 40.649 ✓ in²

Barometer No. 19-1 ✓
Total Volume of Leak Checks After Start: 0.398 ft³
V_m = Dry Gas Meter Calibration Factor 1.034 ✓ X 63.315

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

Probe Tip No. TFE-1-6 ✓

Impinger Box No. HG-4

Impinger 1	Final Weight	939.8	Imp8 Final 946.1	Impinger 1	191.8
	Initial Weight	748.0	Int. 932.0	Impinger 2	25.6
	Increase	191.8	Increase 14.1	Impinger 3	4.0
Impinger 2	Final Weight	782.5		Impinger 4	2.4
	Initial Weight	756.9			
	Increase	25.6		Impinger 5	0.7
Impinger 3	Final Weight	758.7	V_w =	Impinger 6	0.1
	Initial Weight	754.7	g SO_2 =	Impinger 7	0.7
	Increase	4.0	V_w =		
Impinger 4	Final Weight	735.5	✓ Change BH 9/22/95		
	Initial Weight	733.1			
	Increase	2.4		Total	239.4 = V_w
Impinger 5	Final Weight	763.3	P_b = ~~27.70~~ ~~29.20~~ 28.91 ✓	$\%CO_2$ =	11.4 ✓
	Initial Weight	762.6	V_m = 65.468 ✓	$\%O_2$ =	7.4 ✓
	Increase	0.7	V_w = 239.4 ✓	%CO =	0.0 ✓
			P_m = 0.933 ✓	$\%N_2$ =	81.2 ✓
Impinger 6	Final Weight	665.2	Avg ΔP = 1.513 ✓	A_s =	40.649 ✓
	Initial Weight	665.1		D_n =	0.175 ✓
	Increase	0.1	Avg$\sqrt{\Delta P}$ = 1.228 ✓	T_t =	120 ✓
			C_p = 0.808		~~29.07~~ 28.78
Impinger 7	Final Weight	765.2	P_s = -1.80 "H_2O		~~27.57~~ "Hg
	Initial Weight	764.5	T_m = 78 ✓ °F		538 ✓ °R
	Increase	0.7	T_s = 125 ✓ °F		585 ✓ °R

Moisture Content: %M = ~~15.93~~ ~~15.24~~ 15.37 ✓ M_d = ~~0.840~~ ~~0.847~~ 0.8463 ✓ MW_d = 30.120 ✓ MW = ~~28.187~~ ~~19~~ ~~28.27~~ 28.26 ✓

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 65.468 \left[\frac{28.91 + \frac{0.933}{13.6}}{\cancel{27.70}\ 78 + 460}\right] = \cancel{59.641}\ 62.240\ \text{sft}^3 \quad \cancel{0.497}\ \cancel{0.521}\ 0.519\ \text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 239.4 = 11.300 ✓ sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{11.300}{59.641 + 11.300}$ x 100 = ~~15.93~~ ~~15.24~~ % 15.37 ✓

V_s = 5123.8 x 0.808 ~~29.07~~ ~~27.57~~ 28.78 585 x ~~28.19~~ ~~26.22~~ 28.26 x 1.228 = ~~4441~~ ~~4289~~ 4312 fpm ✓

ACFM: ~~1,245,092~~ ~~1,217,312~~ ~~1,210,719~~ 1,217,127 ✓

SCFM: ~~873,804~~ ~~897,558~~ ~~963,401~~ ~~896,621~~ 847,621

%I = $\frac{1{,}039 \times 585 \times \cancel{59.641}\ 62.240}{120 \times \cancel{0.5407}\ \cancel{0.8463} \times \cancel{27.57}\ \cancel{29.07}\ \cancel{28.91} \times \cancel{4441}\ \cancel{4289}\ 4312 \times (0.175)^2}$ = ~~96.5~~ ~~98.1~~ ~~97.57~~ % 98.0 ✓

%EA: 52.4 ✓

Run Number 1

Unit Bruce Mansfield Unit 1A Stack

Date 9-21-99

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	Remarks
B 3	1420	635.17	1.60	0.98	0.98	4.0	127	274	268	54	83	75	
3	1425	637.72	1.50	0.92	0.92	4.0	128	271	269	54	84	76	
End	1430	640.380	—	—	—	—	—	—	—	—	—	—	leak/to 640.492; 7.02 0.0[illegible]
A 1	1440	640.579	1.60	0.98	0.98	4.5	119	249	272	63	80	77	leak/to 640.579; 7.0 ± 0.4[illegible]
1	1445	643.23	1.40	0.89	0.89	4.5	119	272	268	56	82	76	
2	1450	645.81	1.60	0.98	0.98	4.5	125	273	270	56	83	76	multiport orsat invalid
2	1455	648.54	1.70	1.10	1.10	4.5	126	270	269	55	83	76	due to leak. Grab
3	1500	651.35	1.70	1.10	1.10	4.5	126	273	273	56	84	76	orsat was taken.
3	1505	654.42	1.75	1.10	1.10	4.5	127	263	271	56	85	76	JF.
End	1510	657.100	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-95 BRM 1 ✓
Job Name EPRI ✓
Run Number 2 ✓
Unit Bruce Mansfield Unit 1M Stack ✓
Date 9-21-99 ✓
Operator Lee/Conway/Hart/Hefley ✓
Sample Box No. Hs 2 Meter Box No. 8-2 ✓

Hs Field Data

Read and record at the start of each test point.

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

Ambient Temp. °F 80
Assumed Moisture % 16%
Probe Length 8'
C Factor 6.0 ⇒ 12.0 to reference
Initial Leak @ 15.0 "Hg = 0.000 cfm
Final Leak @ 11.0 "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 (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	Dry Gas Temp. °F Outlet (T_m)	Remarks
A 1	1722	657.530	1.70	1.00	1.00	3.5	127	272	271	66	76	76	ΔP ⇒ Ref to 1.50
1	1727	660.36	1.60	0.95	0.95	3.5	127	272	270	58	77	75	Multi-Point
2	1732	663.04	1.70	1.00	1.00	3.5	127	267	272	56	78	76	Int. Orsat
2	1737	665.81	1.60	0.95	0.95	3.5	127	262	274	56	80	76	
3	1742	668.47	1.70	1.00	1.00	3.5	128	254	273	55	81	76	
3	1747	671.21	1.70	1.00	1.00	3.5	128	246	274	54	83	76	
End	1752	674.001	–	–	–	–	–	–	–	–	–	–	leak ✓ to 674.114; 6.0 @ 0.000
B 1	1800	674.230	1.20	0.72	0.72	3.5	127	248	275	56	80	76	leak ✓ to 674.230; 6.0 @ 0.000
1	1805	676.72	1.20	0.72	0.72	3.5	127	256	274	55	81	76	
2	1810	679.18	1.60	0.95	0.95	3.5	127	259	274	54	82	76	
2	1815	681.46	1.40	0.90	0.90	4.0	127	257	273	54	83	76	
3	1820	684.02	1.60	1.05	1.05	4.0	127	268	272	53	84	77	
3	1825	686.82	1.50	0.97	0.97	4.0	127	271	269	53	85	77	
3 end	1830	689.548	–	–	–	–	–	–	–	–	–	–	leak ✓ to 689.650; 6.0 @ 0.000
C 1	1845	689.729	1.10	0.70	0.70	3.5	126	249	250	60	78	76	leak ✓ to 689.729; 6.0 @ 0.000
1	1850	692.04	1.20	0.77	0.77	3.5	127	248	251	53	80	76	
2	1855	694.81	1.35	0.85	0.85	3.5	127	264	251	53	81	76	
2	1900	696.97	1.40	0.90	0.90	4.0	127	266	265	53	82	76	

Pitot Tube Calibration Factor C_p 0.803 ✓
Volume Collected V_m 66.047 ✓ ft^3
Water Collected V_w 228.8 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s –1.70 ✓ "H_2O

Pitot Tube No. M-3 ✓
Baro. Press. P_b 28.80 ✓ "Hg
Probe Tip Dia. D_n 0.175 ✓ in.
% CO_2 11.7 ✓ % CO 0 ✓
% O_2 7.1 ✓ % N_2 81.2 ✓
Area Stack A_s 40.649 ✓ in^2

Barometer No. 19-1 ✓ Probe Tip No. TFE 1-6 ✓
Total Volume of Leak Checks After Start: 0.295 ft^3
V_m = Dry Gas Meter Calibration Factor 1.034 ✓ X 63.875

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

Impinger Box No. Hg 2

Impinger 1	Final Weight	932.5	Imp 8 Final 927.1	Impinger 1	183.0
	Initial Weight	749.5	Int. 913.9	Impinger 2	26.6
	Increase	183.0	13.2	Impinger 3	2.8
Impinger 2	Final Weight	776.9		Impinger 4	2.9
	Initial Weight	750.3			
	Increase	26.6		Impinger 5	0.4
Impinger 3	Final Weight	762.8	V_w =	Impinger 6	0.4
	Initial Weight	760.0	g SO_2 =	Impinger 7	-0.5
	Increase	2.8	V_w =	impinger 8	13.2
Impinger 4	Final Weight	753.8		Total	228.8 = V_w
	Initial Weight	750.9			
	Increase	2.9			
Impinger 5	Final Weight	757.3	P_b = 28.80	$\%CO_2$ = 11.7	
	Initial Weight	756.9	V_m = 66.047	$\%O_2$ = 7.1	
	Increase	0.4	V_w = 228.8	%CO = 0	
			P_m = 0.937	$\%N_2$ = 81.2	
Impinger 6	Final Weight	755.3	Avg ΔP = 1.498	A_s = 40.649	
	Initial Weight	754.9		D_n = 0.175	
	Increase	0.4	Avg$\sqrt{\Delta P}$ = 1.222	T_t = 120	
			C_p = 0.808		
Impinger 7	Final Weight	763.5	P_s = -1.70 "H_2O	28.68 "Hg	
	Initial Weight	764.0	T_m = 79 °F	539 °R	
	Increase	-0.5	T_s = 127 °F	587 °R	

Moisture Content: %M = 14.75 M_d = 0.8525 MW_d = 30.156 MW = 28.363

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 66.047 \left[\frac{28.80 + \frac{0.937}{13.6}}{79 + 460}\right] = 62.437\ sft^3 = 0.520\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 228.8 = 10.799 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{10.799}{62.437 + 10.799}$ x 100 = 14.75 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{587}{28.68 \times 28.363}}$ x 1.222 = 4298 fpm

ACFM: ~~1,213,153~~ 1,213,217

SCFM: 895070

$$\%I = \frac{1{,}039 \times 62.437 \times 587}{120 \times 0.8525 \times 28.68 \times 4298 \times (0.175)^2} = 98.6\ \%$$

%EA: 49.2

Run Number 2

Unit Bruce Mansfield Unit 1A Stack

Date 9-21-99

Hs 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	Remarks
C 3	1905	699.56	1.60	1.05	1.05	4.0	127	262	267	53	83	76	
3	1910	702.28	1.60	1.05	1.05	4.5	127	271	273	53	84	76	
End	1915	705.134	—	—	—	—	—	—	—	—	—	—	leak V to 705.300; 7.0 @ 0.00
D 1	1929	705.400	1.40	0.90	0.90	4.5	126	272	273	63	78	76	leak V to 705.400; 7.0 @ 0.00
1	1934	708.05	1.40	0.90	0.90	4.5	126	273	272	59	79	76	
2	1939	710.66	1.60	1.05	1.05	4.5	126	270	268	59	81	76	
2	1944	713.34	1.70	1.10	1.10	4.5	126	265	264	60	82	76	
3	1949	716.22	1.50	0.96	0.96	4.5	126	273	263	62	83	76	
3	1954	718.98	1.60	1.05	1.05	4.5	126	273	263	63	83	76	
End	1959	721.700	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-95 BRM 1
Job Name CPRI
Run Number 3
Unit Bruce Mansfield Unit 1A Stack
Date 9-22-99
Operator Lee/Hart/Conway/Heffley
Sample Box No. H_S 4 Meter Box No. 8-2

H_S Field Data

Read and record at the start of each test point.

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

Ambient Temp. °F 66
Assumed Moisture % 16%
Probe Length 8'
C Factor 1.0 ⇒ 1.6 to reference
Initial Leak @ 18.0 "Hg = 0.000 cfm
Final Leak @ 11.0 "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 (T_m)	Dry Gas Temp. °F Outlet	Remarks
D 1	0900	734.035	1.30	0.83	0.83	3.0	124	274	264	56	67	66	Multi-Point
1	0905	736.55	1.35	0.84	0.84	3.0	124	273	265	51	68	66	Int orsat
2	0910	739.06	1.50	0.96	0.96	3.5	125	252	267	50	70	66	
2	0915	741.97	1.50	0.96	0.96	3.5	125	248	268	50	72	66	
3	0920	744.41	1.60	1.00	1.00	3.5	125	247	269	50	74	66	
3	0925	747.11	1.65	1.05	1.05	3.5	125	250	267	51	75	67	
End	0930	748.890	—	—	—	—	—	—	—	—	—	—	leak/to 750.055; 6.0 @ 0.000
C 1	0943	750.191	1.20	0.77	0.77	3.0	125	246	248	58	71	67	leak/to 750.191; 7.0 @ 0.000
1	0948	752.60	1.20	0.77	0.77	3.0	125	250	251	53	73	67	
2	0953	755.14	1.30	0.84	0.84	3.5	125	252	249	52	75	68	
2	0958	757.57	1.30	0.84	0.84	3.5	125	261	260	52	76	68	
3	1003	760.04	1.50	0.96	0.96	3.5	126	254	269	51	78	68	
3	1008	762.76	1.50	0.96	0.96	3.5	126	286	271	52	79	69	
End	1013	765.304	—	—	—	—	—	—	—	—	—	—	leak/to 765.400; 6.0 @ 0.000
B 1	1023	765.485	1.10	0.70	0.70	3.5	126	273	274	58	73	69	leak/to 765.485; 6.0 @ 0.000
1	1028	767.73	1.10	0.70	0.70	3.5	126	270	275	53	75	69	
2	1033	770.13	1.40	0.90	0.90	3.5	126	262	270	51	75	69	
2	1038	772.61	1.30	0.83	0.83	3.5	126	251	267	51	77	70	

Pitot Tube Calibration Factor C_p 0.808
Volume Collected V_m 63.466 ft^3
Water Collected V_w 189.2 ml
Time of Test T_t 120 min.
Stack Pressure P_s -1.60 "H_2O

Pitot Tube No. M-3
Baro. Press. P_b 28.92 "Hg
Probe Tip Dia. D_n 0.175 in.
% CO_2 12.0 % CO ϕ
% O_2 6.8 % N_2 81.2
Area Stack A_s 40.649 in^2

Barometer No. 19-2 Probe Tip No. TFE-1-6
Total Volume of Leak Checks After Start: 0.648 ft^3
V_m = Dry Gas Meter Calibration Factor 1.034 X 61.379

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

Impinger Box No. Hg 4

Impinger 1	Final Weight	920.8		Impinger 1	170.0
	Initial Weight	750.8			
	Increase	170.0		Impinger 2	21.7
Impinger 2	Final Weight	784.6		Impinger 3	0.7
	Initial Weight	762.9			
	Increase	21.7		Impinger 4	-0.9
Impinger 3	Final Weight	754.9		Impinger 5	-3.7
	Initial Weight	754.2			
	Increase	0.7		Impinger 6	-4.2
Impinger 4	Final Weight	741.5		Impinger 7	-3.8
	Initial Weight	742.4		impinger 8	9.4
	Increase	-0.9		Total	189.2 = V_w
Impinger 5	Final Weight	760.0			
	Initial Weight	763.7			
	Increase	-3.7			
Impinger 6	Final Weight	661.4			
	Initial Weight	665.6			
	Increase	-4.2			
Impinger 7	Final Weight	765.4			
	Initial Weight	769.2			
	Increase	-3.8			

Water Weight Gain

Imp 8
Final 952.7
Int. 943.3
9.4

V_w =
g SO_2 = -
V_w =

P_b =	28.92		%CO_2 =	12.0
V_m =	63.466		%O_2 =	6.8
V_w =	189.2		%CO =	0
P_m =	~~0.889~~ 0.883		%N_2 =	81.2
Avg ΔP =	1.383		A_s =	40.649
			D_n =	0.195
Avg$\sqrt{\Delta P}$ =	1.174		T_t =	120
C_p =	0.808			
P_s =	-1.60	"H_2O	28.80	"Hg
T_m =	72	°F	532	°R
T_s =	125	°F	585	°R

Moisture Content: %M = 12.76 M_d = 0.8724 MW_d = 30.192 MW = 28.64

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 63.466 \left[\frac{28.92 + \frac{0.883}{13.6}}{72 + 460}\right] = \frac{61.030}{\cancel{61.031}}\ \text{sft}^3 \quad 0.509\ \text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 189.2 = 8.930 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{8.930}{61.031 + 8.930}$ x 100 = 12.76 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{585}{28.80 \times 28.64}}$ x 1.174 = 4093 fpm

ACFM: 1155458

SCFM: 878919

%I = $\frac{1{,}039 \times 61.031 \times 585}{120 \times 0.8724 \times 28.80 \times 4093 \times (0.175)^2}$ = 98.2 %

%EA: 46.2

Run Number 3

Unit Bruce Mansfield Unit 1A Stack

Date 9-22-99

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	Remarks
B3	1043	775.08	1.50	0.96	0.96	4.0	126	250	263	51	78	70	
3	1048	777.73	1.60	1.00	1.00	4.0	126	252	263	51	79	70	
End	1053	780.484	—	—	—	—	—	—	—	—	—	—	leak/to 780.553; 6.0 @ 0.0
A1	1103	780.650	1.30	0.83	0.83	3.5	126	250	260	59	74	70	leak/to 780.650; 6.0 @ 0.0
1	1108	783.29	1.30	0.83	0.83	3.5	125	257	260	53	76	71	
2	1113	785.69	1.50	0.96	0.96	4.0	126	253	261	52	78	71	
2	1118	788.36	1.40	0.90	0.90	4.0	126	256	260	52	79	71	
3	1123	791.04	1.40	0.90	0.90	4.0	126	253	265	52	79	71	
3	1128	793.48	1.40	0.90	0.90	4.0	126	249	266	53	80	71	
End	1133	796.062	—	—	—	—	—	—	—	—	—	—	

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-95BRM1

Job Name EPRI

Stack Height — ft.

Sampling Location Mansfield Scrubber Inlet 1B

Sampling Port Height Above Ground 72 ft.

Date ~~9/20~~ 9/20 Time 1748 ~~EST~~

(BH)

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)	186 1/2	186 1/2	186	185 1/2	~~185.875~~ 185.938
Port & Wall Thickness (in.)	6 1/8	6 1/8	6	5 1/2	~~5 7/8~~ 5 15/16
Inside Stack Diameter (in.)	180	180	180	180	180

Sampling Ports are 28 ft. ____ in. (1.33 ~~stack~~ duct diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are — ft. 12 in. (0.07 ~~stack~~ duct 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~~ B ΔP/T_s/α	Port ~~B~~ A ΔP/T_s/α	Port C ΔP/T_s/α	Port D ΔP/T_s/α
1	2.1	3.780	3 3/4	0.14 ~~1265~~ 180 1 0	0.37 1178 1 5	/ /	0.35 1214 1 5
2	6.7	12.060	12 1/16	0.19 1185 1 25	0.51 1180 1 0	/ /	0.54 1220 1 0
3	11.8	21.240	21 1/4	0.21 1225 1 -15	0.47 1230 1 0	/ /	0.65 1241 1 3
4	17.7	31.860	31 7/8	0.25 1259 1 0	0.45 1281 1 5	/ /	0.59 1286 1 0
5	25.0	45.000	45	0.31 1280 1 0	0.45 1291 1 -3	/ /	0.65 1300 1 -5
6	35.6	64.080	64 1/16	0.47 1285 1 0	0.55 1289 1 0	/ /	0.75 1314 1 -5
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12				/ /	/ /	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. m3

C_p = 0.808

P_b = 28.30 "Hg

P_s = -15.0 "H_2O 27.20 "Hg

A_s = 25,447 in.²

Average ΔP 0.438

Average $\Delta P^{1/2}$ 0.648

Average T_s 247 °F

Average α 5.06 degrees

Note: Access to Port C was not available at time of preliminary traverse

METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-95 BRM 1 Sample Location: Bruce Mansfield 1B Scrubber Inlet Duct

Job Name: EPRI Analytical Method: 3B

Location: Shippingsport, Pa. Sample Type: Single point or Multi point; Grab or Integrated

Date: 9/21/99 Leak Check: Time: 5 (min. 4 minutes) Rate: 0.0

Operator: Pellegrine Ambient Air Check:

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

Run Number 1 Run Time 1212-1415	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.8	11.7	11.7	11.7
O_2 - % Vol.	7.1	7.1	7.1	7.1
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.1	81.2	81.2	81.2

Run Number 2 Run Time 1742-2008	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.0	12.0	12.0	12.0
O_2 - % Vol.	7.0	6.9	7.0	7.0
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.0	81.1	81.0	81.0

Run Number 3 Run Time 0900-1118	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.6	12.6	12.7	12.6
O_2 - % Vol.	~~5.4~~ 6.3	6.3	6.3	6.3
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.1	81.1	~~81.2~~ 81.0	81.1

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PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-95

Job Name EPRI

Sampling Location Bruce Mansfeild Stack 1A

Date 9-20-99 Time 1900

Stack Height 953 ft.

Sampling Port Height Above Ground ~~353~~ ft. 370

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)	233	233	233	233	233 ✓
Port & Wall Thickness (in.)	5½"	5½"	5½"	5½"	5½" ✓
Inside Stack Diameter (in.)	227½	227½	227½	227½	227½ ✓

circ. = ~~732~~ 749¼ ✓

Sampling Ports are 267 ✓ ft. — in. (~~14.08~~ stack diameters) downstream from disturbance
583 ✓ 30.75 ✓ (inlet, constriction, bend, expansion) BH

Sampling Ports are ~~600~~ ft. — in. (~~31.65~~ 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 $\Delta P/T_s/\alpha$	Port B $\Delta P/T_s/\alpha$	Port C $\Delta P/T_s/\alpha$	Port D $\Delta P/T_s/\alpha$
1	4.4 ✓	10.010 ✓	10 ✓	1.451/291 0	1.301/291 +1	1.401/291 +3	1.351/291 -1
2	14.6 ✓	33.215 ✓	33 3/16" ✓	1.601/291 +2	1.351/291 -1	1.301/291 +2	1.751/291 0
3	29.6 ✓	67.340 ✓	67 5/16" ✓	1.601/291 +1	1.601/291 -2	1.501/291 0	1.701/301 0
4				/ /	/ /	/ /	/ /
5				/ /	/ /	/ /	/ /
6				/ /	/ /	/ /	/ /
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12				/ /	/ /	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. M-2 ✓

C_p = 0.808 ✓

P_b = 28.72 "Hg (29.10) @ 800 ft elv. ✓

P_s = -1.8 "H_2O 28.59 "Hg

A_s = 40,649 ✓ in.²

Average ΔP 1.492 ✓

Average $\Delta P^{1/2}$ 1.220 ✓

Average T_x 129 ✓ °F

Average α 1.08 ✓ degrees

METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-95 BRM 1 Sample Location: Bruce Mansfield Unit 1A Stack

Job Name: EPRI Analytical Method: 3B

Location: Shippingport, Pa. Sample Type: Single point or Multi point; Grab or Integrated

Date: 9/21/99 Leak Check: Time: 5 min (min. 4 minutes) Rate: 0.0

Operator: Pellegrine Ambient Air Check:

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

Run Number 1 Run Time 1130-1510	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.4	11.3	11.4	11.4
O_2 - % Vol.	7.4	7.4	7.4	7.4
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.2	81.3	81.2	81.2

Run Number 2 Run Time 1722-1959	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.7	11.7	11.7	11.7
O_2 - % Vol.	7.0	7.1	7.1	7.1
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.3	81.2	81.2	81.2

Run Number 3 Run Time 0900-1133	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.0	12.0	12.0	12.0
O_2 - % Vol.	6.9	6.8	6.8	6.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.1	81.2	81.2	81.2

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APPENDIX C

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #M-2	0.808	09/14/99
Pitot Tube #M-3	0.808	09/15/99
Probe Tip #TFE-1-6	0.175	08/09/99
Probe Tip #TFE-1-7	0.200	08/09/99
Dry Gas Meter #8-2	1.034	09/02/99
Stack Unit Orifice #8-2		09/03/99
Digital Temperature Indicator #8-2		09/02/99
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
Barometer #19-1		08/09/99
Barometer #19-2		08/16/99

APPENDIX C

Post Test

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #M-2	0.808	10/04/99
Pitot Tube #M-3	0.808	10/04/99
Probe Tip #TFE-1-6	0.174	10/04/99
Probe Tip #TFE-1-7	0.200	10/04/99
Dry Gas Meter #8-2	1.070	10/05/99
Stack Unit Orifice #8-2		10/06/99
Digital Temperature Indicator #8-2		10/05/99
Dry Gas Meter #27-2	1.015	11/07/99
Stack Unit Orifice #27-2		11/07/99
Digital Temperature Indicator #27-2		11/07/99
Barometer #19-1		10/04/99
Barometer #19-2		10/04/99

PITOT TUBE CALIBRATION

Date: 9-14-99

Time: 1415

Pitot No.: M2 (new)

T_s: 72 °F

Pitot Dimensions: 3/8" tips

C_{pstd}: 0.990

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	$\sqrt{\text{Standard Average}}$	High	$\sqrt{\text{High}}$	Cal. Factor	Low	$\sqrt{\text{Low}}$	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: Mike Bass

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 9-15-99

Time: 0928

Pitot No.: M3 (new)

T_s: 72 °F

Pitot Dimensions: 3/8" Tips

C_{psid}: 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	0.1.50	0.387	0.808	0.1.50	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	1.00	1.50	1.225	0.808	1.50	1.225	0.808
50	80	1.30	1.30	1.14	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 Conway #273

Checked By: #127

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-1 (New)

Date 8-09-99 Calibrator: Mike Bass

	4	6	7	8	10	12
Reading 1	0.118	0.175	0.201	0.228	0.309	0.362
Reading 2	0.116	0.176	0.198	0.227	0.308	0.364
Reading 3	0.115	0.174	0.201	0.227	0.308	0.363
Reading 4	0.118	0.173	0.199	0.227	0.310	0.362
Reading 5	0.116	0.175	0.199	0.227	0.310	0.364
Reading 6	0.115	0.175	0.200	0.228	0.310	0.362
Reading 7	0.117	0.176	0.201	0.226	0.310	0.363
Reading 8	0.116	0.177	0.201	0.227	0.309	0.363
Reading 9	0.118	0.176	0.200	0.227	0.310	0.363
Reading 10	0.118	0.175	0.200	0.226	0.310	0.363
Average	0.117	0.175	0.200	0.227	0.309	0.363

	14	—	—	—	—	—
Reading 1	0.432					
Reading 2	0.434					
Reading 3	0.430					
Reading 4	0.434					
Reading 5	0.430					
Reading 6	0.434					
Reading 7	0.430					
Reading 8	0.430					
Reading 9	0.431					
Reading 10	0.432					
Average	0.432					

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 8-2

Date: 9-2-99

ΔH ("H_2O)	C_{DG}
0.5	1.046
1.0	1.036
1.5	1.035
2.0	1.021
3.0	1.035
4.0	1.030
Average	1.034

Variation: + 1.16%

- 1.26%

Calibrator: Jason Chessher #275

Checked By: Mike Bass

C_{DG} @ 2 liters/min. = 1.043

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 9-2-99

Calibrator: Jason Chessher

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

Run No.: 1 @ 0.50" H_2O

P_b: 29.86 "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	1431	5.271	cf	75	°F	-0.80 "H_2O	476.141	cf	75	°F	75 °F	0.50 "H_2O
Start	1417	0.000	cf	75	°F	-0.80 "H_2O	471.129	cf	72	°F	72 °F	0.50 "H_2O
Avg.	14	5.271	cf	75	°F	-0.80 "H_2O	5.012	cf	74		°F	0.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.271 \left[\frac{29.86 + \frac{-0.80}{13.6}}{75 + 460}\right] \times 1.000 \ (C_f) = 5.182 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.012 \left[\frac{29.86 + \frac{0.50}{13.6}}{74 + 460}\right] = 4.953 \text{ dcsf}$$

$$C_{DG} = \frac{5.182}{4.953} = \boxed{1.046}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 9-2-99

Calibrator: Jason Chessher

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

Run No.: 1 @ 1.0" H_2O

P_b: 29.86 "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	1446	5.218 cf	75 °F	-1.3	"H_2O	482.256 cf	73 °F	79 °F	1.00	"H_2O
Start	1437	0.000 cf	75 °F	-1.3	"H_2O	477.246 cf	73 °F	76 °F	1.00	"H_2O
Avg.	9	5.218 cf	75 °F	-1.3	"H_2O	5.010 cf	75 °F	°F	1.00	"H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.218 \left[\frac{29.86 + \frac{-1.3}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = 5.124 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.010 \left[\frac{29.86 + \frac{1.00}{13.6}}{75 + 460}\right] = 4.948 \text{ dcsf}$$

$$C_{DG} = \frac{5.124}{4.948} = \boxed{1.036}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 9-2-99

Calibrator: Jason Chessher

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

Run No.: 1 @ 1.50" H_2O

P_b: 29.86 "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	1506	10.404 cf	76 °F	-1.80 "H_2O	492.610 cf	74 °F	81 °F	1.50 "H_2O
Start	1451	0.000 cf	76 °F	-1.80 "H_2O	482.598 cf	75 °F	81 °F	1.50 "H_2O
Avg.	15	10.404 cf	76 °F	-1.80 "H_2O	10.012 cf	78	°F	1.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.404 \left[\frac{29.86 + \frac{-1.80}{13.6}}{76 + 460}\right] \times 1.000\ (C_f) = 10.185 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.012 \left[\frac{29.86 + \frac{1.50}{13.6}}{78 + 460}\right] = 9.844 \text{ dcsf}$$

$$C_{DG} = \frac{10.185}{9.844} = \boxed{1.035}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 9-2-99

Calibrator: Jason Chessher

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

Run No.: 1 @ 2.0" H_2O

P_b: 29.86 "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	10.370 cf	75 °F	-2.10 "H_2O	503.477 cf	75 °F	81 °F	2.0 "H_2O
Start	1510	0.000 cf	75 °F	-2.10 "H_2O	493.369 cf	74 °F	80 °F	2.0 "H_2O
Avg.	14	10.370 cf	75 °F	-2.10 "H_2O	10.108 cf	78 ~~77.5~~ °F		2.0 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.370 \left[\frac{29.86 + \frac{-2.10}{13.6}}{75 + 460}\right] \times 1.000 \ (C_f) = 10.163 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.108 \left[\frac{29.86 + \frac{2.0}{13.6}}{78 + 460}\right] = 9.951 \text{ dcsf}$$

$$C_{DG} = \frac{10.163}{9.951} = \boxed{1.021}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 9-2-99

Calibrator: Jason Chessher

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

Run No.: 1 @ 3.0" H_2O

P_b: 29.86 "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	1536	10.399 cf	75 °F	-3.20 "H_2O	513.955 cf	76 °F	90 °F	3.00 "H_2O
Start	1525	0.000 cf	75 °F	-3.20 "H_2O	503.929 cf	75 °F	85 °F	3.00 "H_2O
Avg.	11	10.399 cf	75 °F	-3.20 "H_2O	10.026 cf	82 °F		3.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.399 \left[\frac{29.86 + \frac{-3.20}{13.6}}{75 + 460}\right] \times 1.000 \ (C_f) = 10.163 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.026 \left[\frac{29.86 + \frac{3.00}{13.6}}{82 + 460}\right] = 9.821 \text{ dcsf}$$

$$C_{DG} = \frac{10.163}{9.821} = \boxed{1.035}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Calibrator: Jason Chessher

Date: 9-2-99

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

Run No.: 1 @ 4.0" H_2O

P_b: 29.86 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)	Time	Meter Reading	Temp.	P_m
End	1551	10.820 cf	75 °F	-3.90 "H_2O
Start	1540	0.000 cf	75 °F	-3.90 "H_2O
Avg.	11	10.820 cf	75 °F	-3.90 "H_2O

Dry Gas Meter	Meter Reading	Temp. In	Temp. Out	P_m
End	525.120 cf	87 °F	76 °F	4.00 "H_2O
Start	514.703 cf	85 °F	76 °F	4.00 "H_2O
Avg.	10.417 cf	81 °F		4.00 "H_2O

$$Wet\ Test\ Meter\ Vm_{std} = 17.65 \times 10.820 \left[\frac{29.86 + \frac{-3.90}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = 10.556\ dcsf$$

$$Dry\ Gas\ Meter\ Vm_{std} = 17.65 \times 10.417 \left[\frac{29.86 + \frac{4.00}{13.6}}{81 + 460}\right] = 10.248\ dcsf$$

$$C_{DG} = \frac{10.556}{10.248} = \boxed{\cancel{10.030}\ 1.030}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 9-2-99

Calibrator: Jason Chessher

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

Run No.: 1 @ 2 L/min

P_b: 29.86 "Hg

Control Module Vacuum: 2.0 "Hg

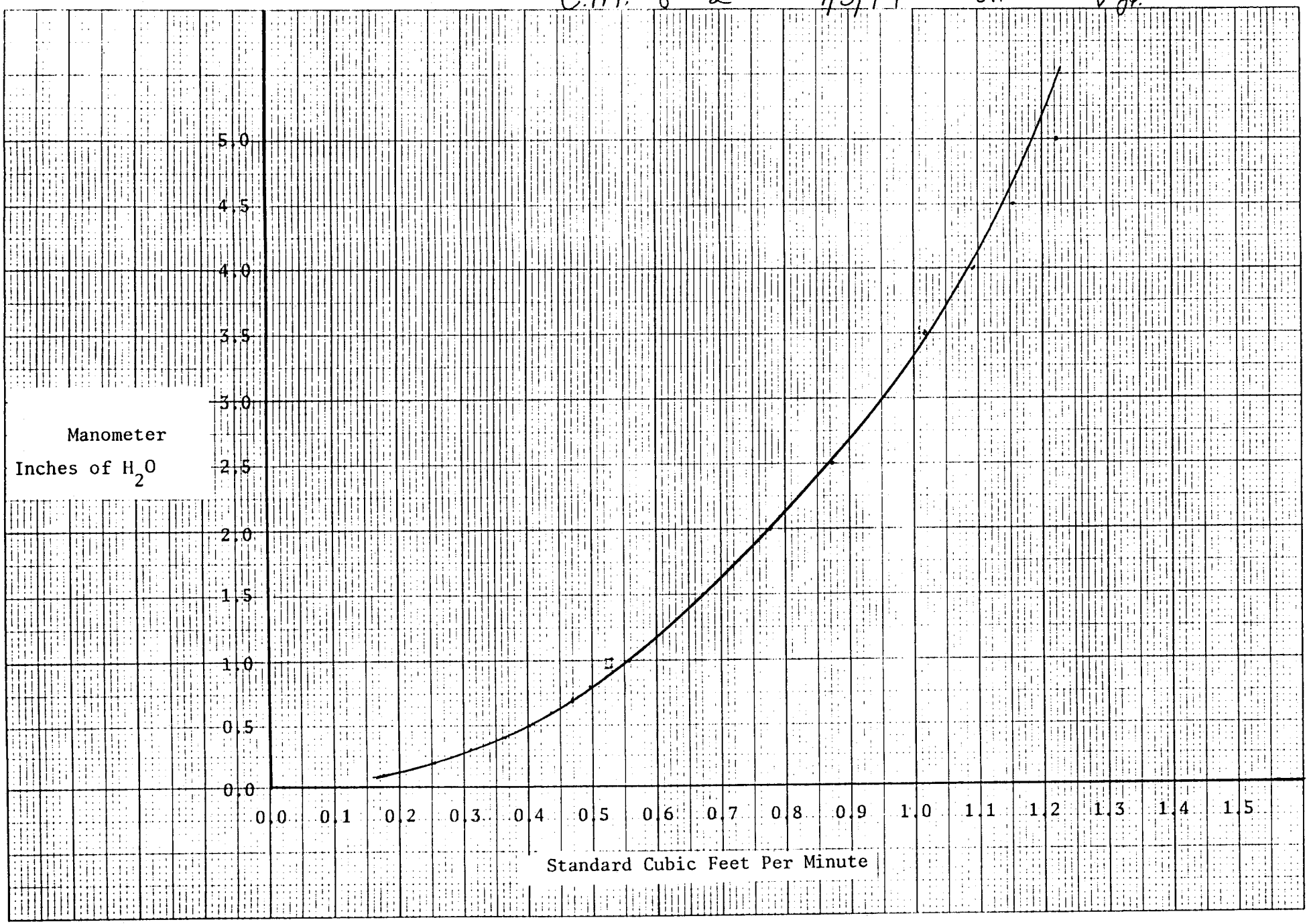
	Wet Test Meter (No. 1)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1646	2.073 cf	74 °F	-0.70 "H_2O	528.148 cf	75 °F	75 °F	0.01 "H_2O
Start	1615	0.000 cf	74 °F	-0.70 "H_2O	526.144 cf	77 °F	76 °F	0.01 "H_2O
Avg.	31	2.073 cf	74 °F	-0.70 "H_2O	2.004 cf	76 °F	°F	0.01 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 2.073 \left[\frac{29.86 + \frac{-0.70}{13.6}}{74 + 460}\right] \times 1.006 \quad (C_f) = \cancel{2.042}\ 2.055 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 2.004 \left[\frac{29.86 + \frac{0.01}{13.6}}{76 + 460}\right] = 1.971 \text{ dcsf}$$

$$C_{DG} = \frac{\cancel{2.042}\ 2.055}{1.971} = \boxed{\cancel{1.036}\ 1.043}$$

C.M. 8-2 9/3/99 SH VJL



METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 8-2

CALIBRATION DATA

Date: 9-2-99

Media	Time	Mercury Temperature (°F)	DTI (°F)
Ambient Air	1120	75	72
Ice Bath	1127	37	36
Boiling Water	1135	212	212
Oven	1320	250	252
Oven	1325	300	302
Oven	1329	350	350
Oven	1335	375	377

Meter Adjusted? Yes _____ No /

Calibrator: Jason Chessher #275

Checked By: Mike Bass

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

Calibrator: Shane Lea

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 @ 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)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m		Meter Reading	Temp. In	Temp. Out	P_m
End	1449	5.168 cf	73 °F	-1.80 "H_2O		307.007 cf	73 °F	72 °F	1.00 "H_2O
Start	1440	0.000 cf	73 °F	-1.80 "H_2O		301.998 cf	72 °F	71 °F	1.00 "H_2O
Avg.	9	5.168 cf	73 °F	-1.80 "H_2O		5.009 cf	72 °F		1.00 "H_2O

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

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 @ 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

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

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

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

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

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 @ 3.0 "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	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

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

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

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

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

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 l/min.

P_b: 29.20 "Hg

Control Module Vacuum: 5.0 "Hg

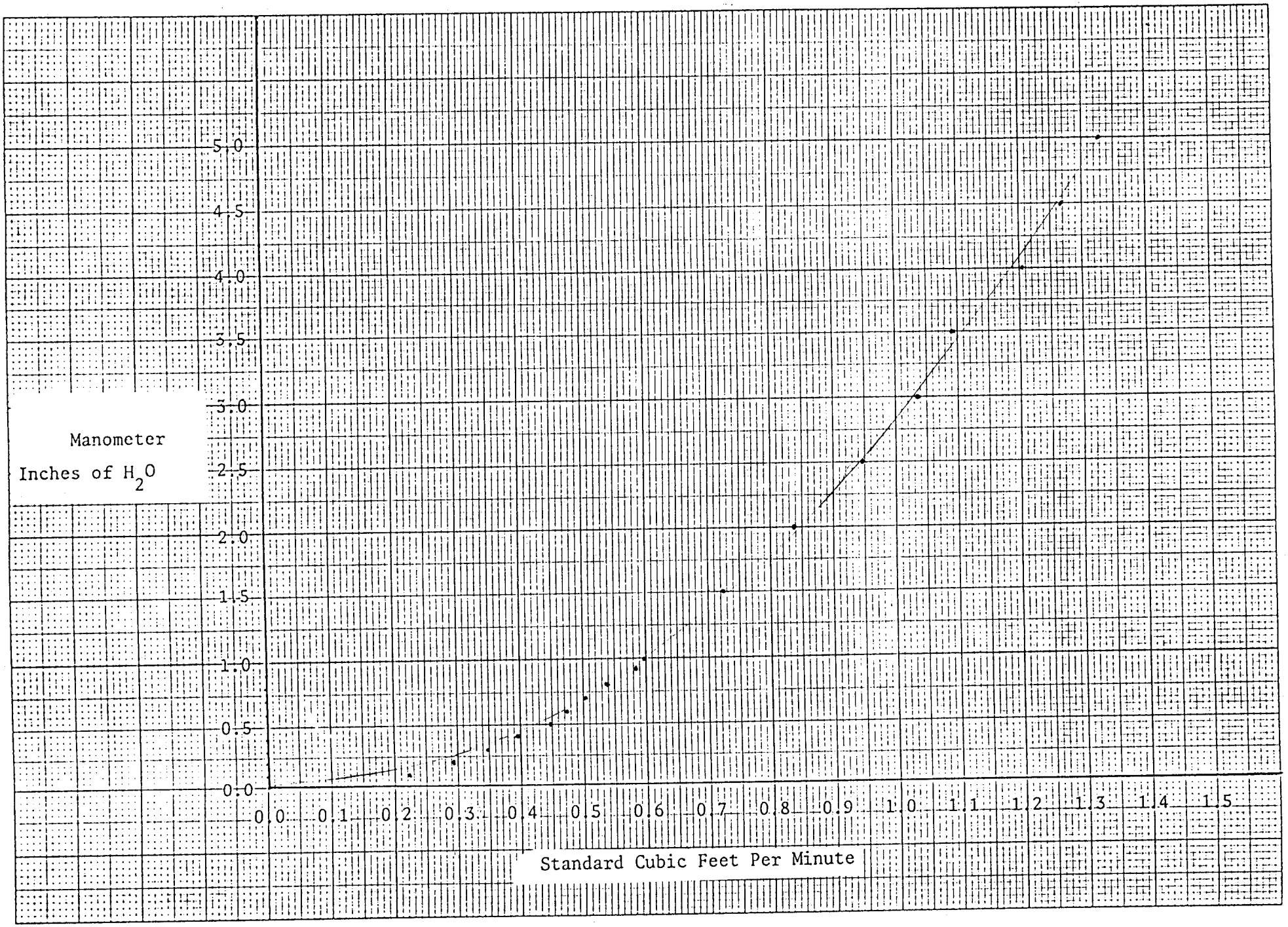
Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1711	2.700 cf	73 °F	-0.20 "H_2O	369.641 cf	73 °F	72 °F	0.02 "H_2O
Start	1636	0.000 cf	73 °F	-0.20 "H_2O	367.018 cf	79 °F	75 °F	0.02 "H_2O
Avg.	35	2.700 cf	73 °F	-0.20 "H_2O	2.623 cf		75 °F	0.02 "H_2O

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

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

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

CM 27-2 1.029


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

BAROMETER CALIBRATION

Barometer No. 19-1

Date: 8-09-99

Time: 1630

Barometric Pressure @ Addison Airport @ 719 ft.	=	29.83
	-	0.719
Absolute Pressure @ Addison Airport	=	29.111
	+	0.083
Absolute Pressure @ METCO @ 636 ft.	=	29.194
Barometer Reading	=	29.200
Variation	=	-0.006

Barometer Adjusted? Yes _____ No ✓

Mike Bass

Signature of Calibrator

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 19-2

Date: 8-16-99

Time: 1415

Barometric Pressure @ Addison Airport @ 719 ft.	=	30.10
	-	0.719
Absolute Pressure @ Addison Airport	=	29.381
	+	0.083
Absolute Pressure @ METCO @ 636 ft.	=	29.464 ✓
Barometer Reading	=	29.47 ✓
Variation	=	0.006 ✓

Barometer Adjusted? Yes _____ No ✓

Mike Buss FSS II #244

Signature of Calibrator

PITOT TUBE CALIBRATION

Date: 10-4-99 Time: 1030

Pitot No.: M2 T_s: 72 °F

Pitot Dimensions: 3/8" tps 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: 1130

Pitot No.: M3 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: Jam Brom 274

Checked By: Jason Conway #273

METCO ENVIRONMENTAL

✓ AM 107

NOZZLE CALIBRATION

Nozzle Set No. TFE-1

Date 10-4-00 Calibrator: Jason Brown [illegible]

	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

Dry Gas Meter Calibration

Dry Gas Meter No.: 8-2

Date: 10/5/99

ΔH ("H_2O)	C_{DG}
0.5	1.078
1.0	1.065
1.5	1.065
2.0	1.070
3.0	1.071
4.0	1.068
Average	1.070 ✓

Variation: + 0.75 ✓

- 0.47 ✓

Calibrator: Shane Lee. 261

Checked By: Scott B Hart # 268

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 10-5-99

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: 29.76 "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	1596	5.317 cf	75 °F	-0.90	"H_2O	328.475 cf	83 °F	82 °F	0.50	"H_2O
Start	1531	0.000 cf	75 °F	-0.90	"H_2O	323.494 cf	82 °F	81 °F	0.50	"H_2O
Avg.	15	5.317 cf	75 °F	-0.90	"H_2O	4.981 cf	82 °F		0.50	"H_2O

$$Wet\ Test\ Meter\ Vm_{std} = 17.65 \times 5.317 \left[\frac{29.76 + \frac{-0.90}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = 5.209\ dcsf$$

$$Dry\ Gas\ Meter\ Vm_{std} = 17.65 \times 4.981 \left[\frac{29.76 + \frac{0.50}{13.6}}{82 + 460}\right] = 4.833\ dcsf$$

$$C_{DG} = \frac{5.209}{4.833} = \boxed{1.078}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 10-5-99

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: 29.76 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)	Time	Meter Reading	Temp.	P_m	Dry Gas Meter	Meter Reading	Temp. In	Temp. Out	P_m
End	1557	5.460 cf	75 °F	-1.40 "H_2O"		333.976 cf	88 °F	82 °F	1.00 "H_2O"
Start	1548	0.000 cf	75 °F	-1.40 "H_2O"		328.794 cf	84 °F	82 °F	1.00 "H_2O"
Avg.	9 ✓	5.460 ✓ cf	75 ✓ °F	-1.40 ✓ "H_2O"		5.182 ✓ cf	84 ✓ °F		1.00 ✓ "H_2O"

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.460 \left[\frac{29.76 + \frac{-1.40}{13.6}}{75 + 460}\right] \times 1.000 \ (C_f) = 5.342 \checkmark \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.182 \left[\frac{29.76 + \frac{1.00}{13.6}}{84 + 460}\right] = 5.016 \checkmark \text{ dcsf}$$

$$C_{DG} = \frac{5.342}{5.016} = \boxed{1.065 \checkmark}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Calibrator: Shane Lee

Date: 10-5-99

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

Run No.: 1 @ 1.5" H_2O

P_b: 29.76 "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	1616	12.002 cf	75 °F	-2.00 "H_2O		345.693 cf	93 °F	87 °F	1.50 "H_2O
Start	1559	0.000 cf	75 °F	-1.80 "H_2O		334.272 cf	87 °F	82 °F	1.50 "H_2O
Avg.	17	12.002 cf	75 °F	-1.90 "H_2O		11.425 cf	87 °F		1.50 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 12.002 \left[\frac{29.76 + \frac{-1.90}{13.6}}{75 + 460}\right] \times 1.000 \quad (C_f) = 11.728 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 11.425 \left[\frac{29.76 + \frac{1.50}{13.6}}{87 + 460}\right] = 11.012 \text{ dcsf}$$

$$C_{DG} = \frac{11.728}{11.012} = \boxed{1.065}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 10-5-99

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" H_2O

P_b: 29.76 "Hg

Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)	Time	Meter Reading	Temp.	P_m	Dry Gas Meter	Meter Reading	Temp. In	Temp. Out	P_m
End	1647	10.812 cf	75 °F	-2.60 "H_2O"		357.542 cf	96 °F	84 °F	2.00 "H_2O"
Start	1633	0.000 cf	75 °F	-2.60 "H_2O"		347.309 cf	87 °F	83 °F	2.00 "H_2O"
Avg.	14 ✓	10.812 ✓ cf	75 ✓ °F	-2.60 ✓ "H_2O"		10.233 ✓ cf	88 ✓ °F		2.00 ✓ "H_2O"

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.812 \left[\frac{29.76 + \frac{-2.60}{13.6}}{75 + 460}\right] \times 1.000\ (C_f) = 10.547\ \text{dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.233 \left[\frac{29.76 + \frac{2.00}{13.6}}{88 + 460}\right] = 9.857\ \text{dcsf}$$

$$C_{DG} = \frac{10.547}{9.857} = \boxed{1.070}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 8-2

Date: 10-5-99

Calibrator: Shane Lee

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

Run No.: 1 @ 3.0" H.O

P_b: 29.76 "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	1700	11.024 cf	75	°F	-3.20 "H_2O	368.291 cf	100	°F	85 °F	3.00 "H_2O
Start	1649	0.000 cf	75	°F	-3.20 "H_2O	352.851 cf	94	°F	84 °F	3.00 "H_2O
Avg.	11 ✓	11.024 ✓ cf	75 ✓	°F	-3.20 ✓ "H_2O	15.440 ✓ cf	91 ✓	°F		3.00 ✓ "H_2O

$$Wet\ Test\ Meter\ Vm_{std} = 17.65 \times 11.024 \left[\frac{29.76 + \frac{-3.20}{13.6}}{75 + 460} \right] \times 1.000\ (C_f) = 10.738\ ✓\ dcsf$$

$$Dry\ Gas\ Meter\ Vm_{std} = 17.65 \times 15.440 \left[\frac{29.76 + \frac{3.00}{13.6}}{91 + 460} \right] = 10.026\ ✓\ dcsf$$

$$C_{DG} = \frac{10.738}{10.026} = \boxed{1.071\ ✓}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 5-2

Date: 10-5-99

Calibrator: Shawna Lee

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

Run No.: 1 @ 4.0' 4.0

P_b: 29.76 "Hg

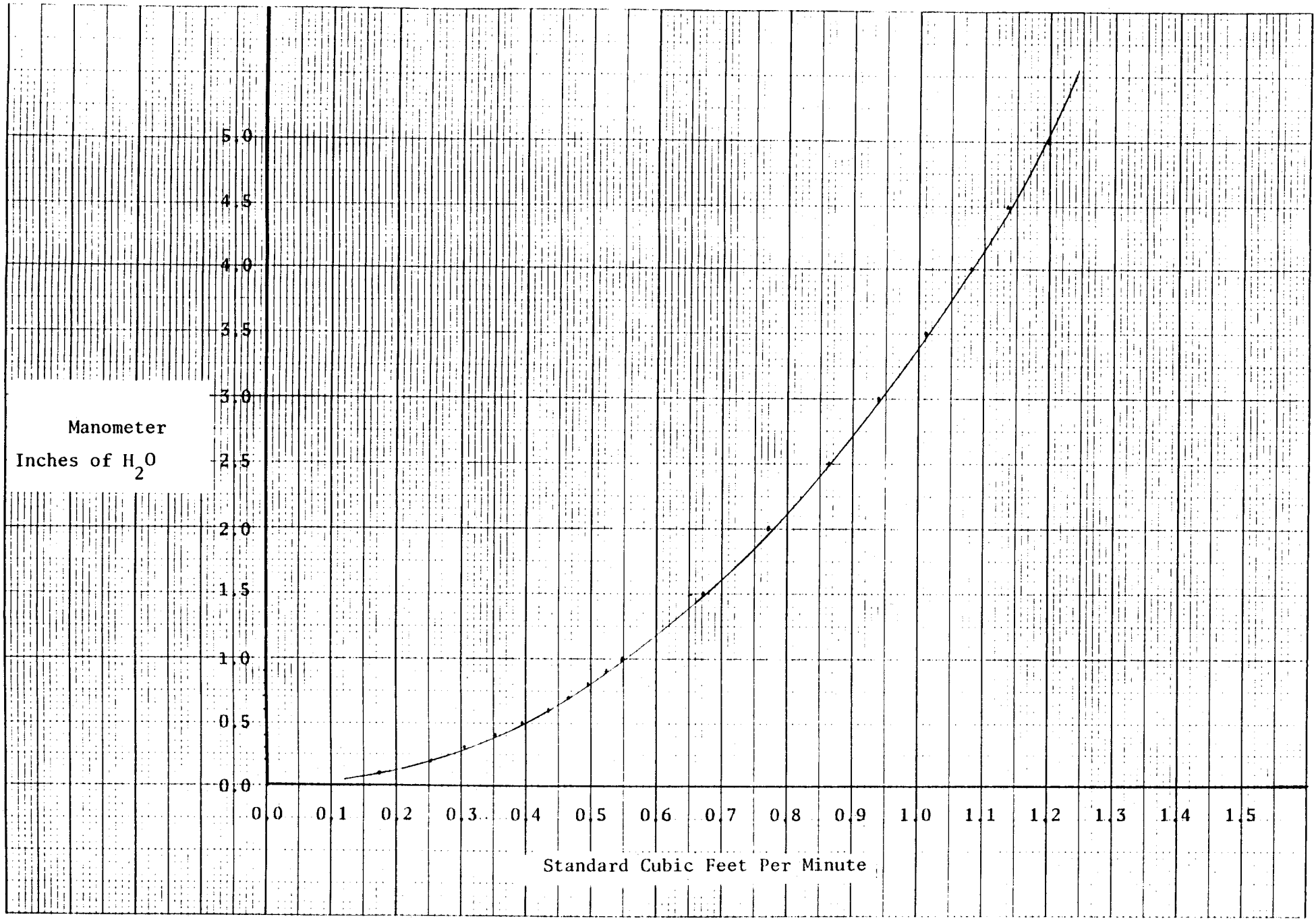
Control Module Vacuum: 5.0 "Hg

Wet Test Meter (No. 3)	Time	Meter Reading		Temp.		P_m		Dry Gas Meter	Meter Reading		Temp. In		Temp. Out		P_m	
End	1716	12.705	cf	75	°F	-4.00	"H_2O		380.752	cf	102	°F	86	°F	4.00	"H_2O
Start	1704	0.000	cf	75	°F	-4.00	"H_2O		368.719	cf	94	°F	85	°F	4.00	"H_2O
Avg.	12	12.705	cf	75	°F	-4.00	"H_2O		12.033	cf	92			°F	4.00	"H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 12.705 \left[\frac{29.76 + \frac{-4.00}{13.6}}{75 + 460} \right] \times 1.000 \; (C_f) = 12.351 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 12.033 \left[\frac{29.76 + \frac{4.00}{13.6}}{92 + 460} \right] = 11.563 \text{ dcsf}$$

$$C_{DG} = \frac{12.351}{11.563} = \boxed{1.068}$$


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. 8-2

CALIBRATION DATA

Date: 10/5/99

Media	Time	Mercury Temperature (°F)	DTI (°F)
Ambient Air	1355	80	80
Ice Bath	1357	32	32
Boiling Water	1402	212	212
Oven	1405	250	250
Oven	1407	300	301
Oven	1410	350	351
Oven	1411	375	375

Meter Adjusted? Yes _____ No ✓

Calibrator: Shane Lee

Checked By: Scott Hart #268

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. Buss

Checked By: Pam Brown

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)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1310	5.015 cf	74 °F	-0.90 "H_2O	572.057 cf	77 °F	76 °F	0.50 "H_2O
Start	1257	0.000 cf	74 °F	-0.90 "H_2O	567.114 cf	76 °F	75 °F	0.50 "H_2O
Avg.	13	5.015 cf	74 °F	-0.900 "H_2O	4.943 cf	76 °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	577.407 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

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.295 \left[\frac{29.32 + \frac{-1.600}{13.6}}{74 + 460}\right] \times 1.000 \ (C_1) = 9.937 \text{ dcsf}$$

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

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

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)

	Time	Meter Reading	Temp.	P_m
End	1400	10.330 cf	74 °F	-2.90 "H_2O
Start	1358	0.000 cf	74 °F	-2.90 "H_2O
Avg.	10	10.330 cf ✓	74 °F ✓	-2.900 "H_2O ✓

Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	608.602 cf	89 °F	79 °F	3.00 "H_2O
Start	598.364 cf	85 °F	78 °F	3.00 "H_2O
Avg.	10.238 cf ✓	83 °F ✓		3.000 "H_2O ✓

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 Calibrator: M. 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 @ 4.0" H_2O P_b: 29.32 "Hg

Control Module Vacuum: 3.00 "Hg

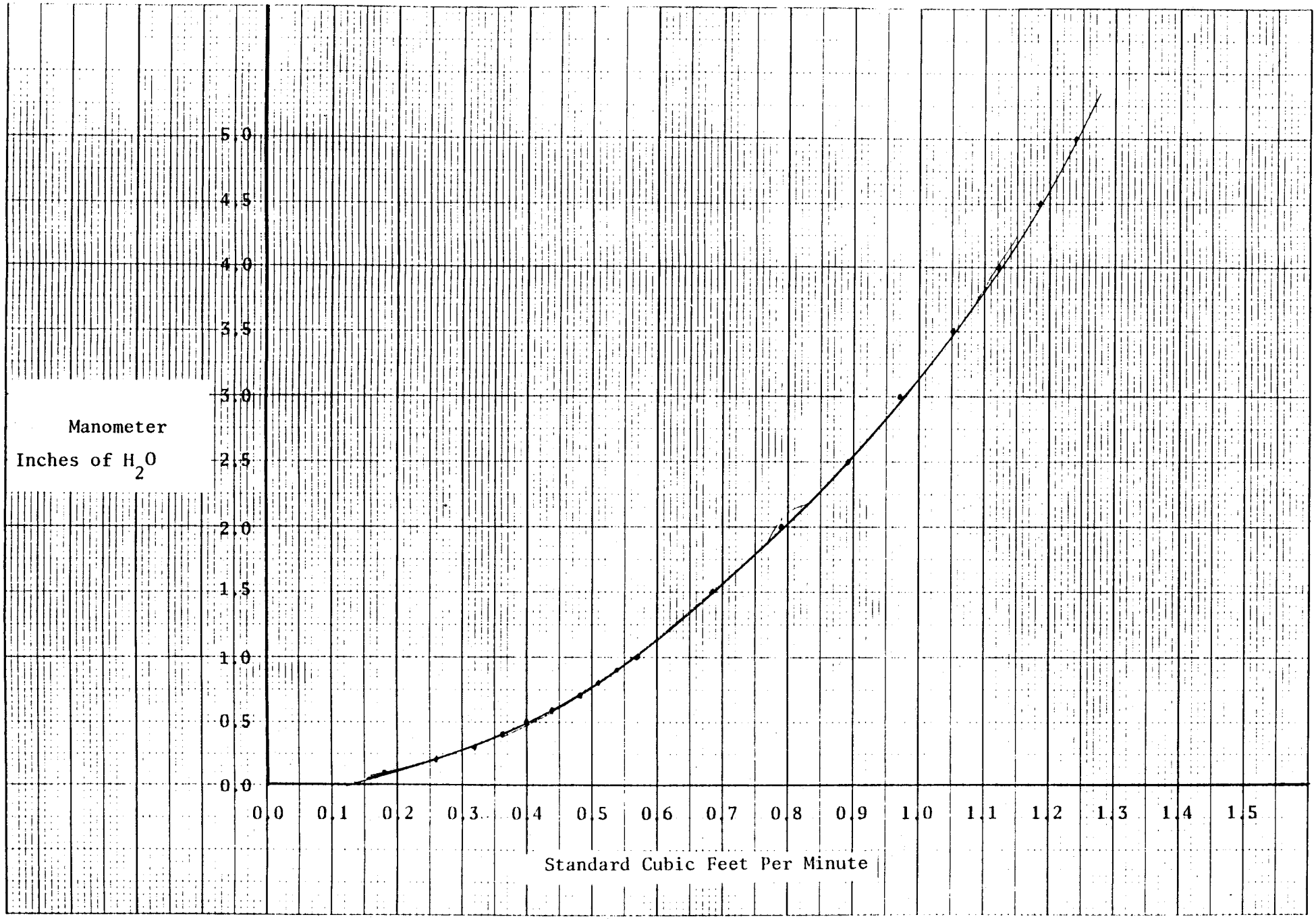
	Wet Test Meter (No. 3)					Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m		Meter Reading	Temp. In	Temp. Out	P_m
End	1419	10.130 cf	74 °F	-3.70	"H_2O	619.031 cf	91 °F	80 °F	4.00 "H_2O
Start	1410	0.000 cf	74 °F	-3.70	"H_2O	608.926 cf	87 °F	79 °F	4.00 "H_2O
Avg.	9	10.130 cf ✓	74 °F ✓	-3.700	"H_2O ✓	10.105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

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.130 \left[\frac{29.32 + \frac{-3.700}{13.6}}{74 + 460}\right] \times 1.000 \quad (C_f) = 9.726 \text{ dcsf} \checkmark$$

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

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

CMA = 27.2 11-7-99 Cdf = 1.015



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: Jon Brown

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

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 19-2

Date: 10-4-99

Time: 1504

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	=	29.520
Variation	=	- 0.054

Barometer Adjusted? Yes ✓ No _____

Shane Lee 261

Signature of Calibrator

APPENDIX D

Analytical Data

TestAmerica
INCORPORATED

November 5, 1999

97-95 BRM1

DRS 11/5/99

RECEIVED
NOV 8 1999
By_____

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

Dear Doug,

Please find included with this letter the analytical report and data package for the Pennsylvania Power Bruce - Mansfield Plant samples submitted to TestAmerica for analysis. The samples were analyzed following the SOPs based on the Ontario-Hydro Method and ASTM 6414-99.

Case Narrative

TestAmerica received the samples on September 25, 1999. Several items were noted:

- Sample containers did not have the volume marked on the side.
- The sample identified as thimble Q9/Unit 1 Scrubber Inlet Run 2 was broken while unpacking at the Laboratory. The sample filter and particulate was able to be recovered for analysis.
- Container # 3 of the Unit 1 Stack Blank Train was marked "1 of 2". Chain only indicated 1 bottle. Only one bottle was received.
- Bottles from Container # 5 of the Unit 1 Stack Blank Train do not match in appearance. One is clear and one dark.
- Chain of Custody indicates that only one bottle for container # 3 of the Unit 1 Scrubber Inlet Blank Train. Two bottles were received.
- Chain of Custody indicates that there were two bottles for container # 5 of the Unit 1 Scrubber Inlet Blank Train. Only one bottle was received. The extra bottle for container # 3 does not match container #5 in appearance.
- Mercury was detected in Container #3 of Unit 1A Stack Blank Run. The result was confirmed by re-digesting and reanalyzing the sample.

No other problems were noted during analysis. 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: Penn Power
Bruce Mansfield Plant
Shippingport, PA

Hg Analysis
Ontario Hydro Method

Summary Report

	Unit 1A Stack Run 1	Unit 1A Stack Run 2	Unit 1A Stack Run 3	Unit 1A Scrubber Inlet Duct Run 1	Unit 1A Scrubber Inlet Duct Run 2	Unit 1A Scrubber Inlet Duct Run 3
Particle Bound Hg (ug)	0.049	0.096	0.055	0.284	0.784	0.267
Oxidized Hg (ug)	2.52	3.73	1.66	8.87	10.60	8.10
Elemental Hg (ug)	9.34	10.88	11.30	1.62	2.24	1.65
Total Hg (ug)	11.91	14.71	13.02	10.77	13.62	10.02

	Unit 1A Stack Blank Train	Unit 1A Scrubber Inlet Duct Blank Train
Particle Bound Hg (ug)	0.000	0.000
Oxidized Hg (ug)	2.42	0.00
Elemental Hg (ug)	0.00	0.00
Total Hg (ug)	2.42	0.00

	Reagent Blanks
Container # 7 (ug/L)	<0.20
Container # 8 (ug/L)	<2.0
Container # 9 (ug/L)	<4.0
Container # 10 (ug/L)	<2.0
Container # 11 (ug/L)	<0.20
Container # 12A (ug)	<0.01
Container # 12B (ug)	<0.01

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

TestAmerica
INCORPORATED

Sample ID: Penn Power
Bruce Mansfield Plant
Shippingport, PA

Hg Analysis
Ontario Hydro Method

Duplicate Summary Report

	Unit 1A Stack Run 1	Unit 1A Stack Run 2	Unit 1A Stack Run 3	Unit 1A Scrubber Inlet Duct Run 1	Unit 1A Scrubber Inlet Duct Run 2	Unit 1A Scrubber Inlet Duct Run 3
Particle Bound Hg (ug)	0.051	0.096	0.419	0.272	0.784	0.256
Oxidized Hg (ug)	2.35	3.78	1.63	8.79	10.50	8.03
Elemental Hg (ug)	9.29	10.53	11.07	1.61	2.19	1.57
Total Hg (ug)	11.69	14.41	13.12	10.67	13.47	9.86

	Unit 1A Stack Blank Train	Unit 1A Scrubber Inlet Duct Blank Train
Particle Bound Hg (ug)	0.000	0.000
Oxidized Hg (ug)	2.39	0.00
Elemental Hg (ug)	0.00	0.00
Total Hg (ug)	2.39	0.00

	Reagent Blanks
Container # 7 (ug/L)	<0.20
Container # 8 (ug/L)	<2.0
Container # 9 (ug/L)	<4.0
Container # 10 (ug/L)	<2.0
Container # 11 (ug/L)	<0.20
Container # 12A (ug)	<0.01
Container # 12B (ug)	<0.01

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

TestAmerica
INCORPORATED

Sample ID: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Stack Run 1

Hg Analysis
Ontario Hydro Method

ollected On: 9/21/99
Collected By: METCO

ontainer # 1A - Main Filter
Container # 1B - Backup Filter
ontainer # 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
ontainer # 1A	SP-47	10/20/99	10/20/99	jpp	0.049	0.051	2.8	0.051	3.8	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
ontainer # 2	SP-43	10/20/99	10/20/99	jpp	<0.40	<0.40	0	---	---	ug		
ontainer # 3	SP-44	10/20/99	10/20/99	jpp	2.52	2.35	6.6	---	---	ug		
Container # 4	SP-45	10/20/99	10/20/99	jpp	<0.62	<0.62	0	---	---	ug		
Container # 5	SP-46	10/20/99	10/27/99	jpp	9.34	9.29	0.6	9.29	0.6	ug		

article Bound Hg (ug) **0.049**
ontainers 1A, 1B, and 2)

Oxidized Hg (ug) **2.52**
(Containers 3)

Elemental Hg (ug) **9.34**
(Containers 4 and 5)

Total Hg (ug) **11.91**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.051**
ontainers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **2.35**
(Containers 3)

Dup. Elemental Hg (ug) **9.29**
(Containers 4 and 5)

Dup. Total Hg (ug) **11.69**
(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: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Stack Run 2

Hg Analysis
Ontario Hydro Method

ollected On: 9/21/99
Collected By: METCO

ontainer # 1A - Main Filter
Container # 1B - Backup Filter
ontainer # 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
ontainer # 1A	SP-42	10/20/99	10/20/99	jpp	0.096	0.096	0.5	---	---	ug		
Container # 1B		Not Provided		jpp	N/A	---	---	---	---	ug		
ontainer # 2	SP-38	10/20/99	10/20/99	jpp	<0.31	<0.31	0	---	---	ug		
ontainer # 3	SP-39	10/20/99	10/20/99	jpp	3.73	3.78	1.3	---	---	ug		
Container # 4	SP-40	10/20/99	10/20/99	jpp	<0.90	<0.90	0	---	---	ug		
Container # 5	SP-41	10/20/99	10/27/99	jpp	10.88	10.53	1.6	---	---	ug	*1	

article Bound Hg (ug) **0.096**
ontainers 1A, 1B, and 2)

Oxidized Hg (ug) **3.73**
(Containers 3)

Elemental Hg (ug) **10.88**
(Containers 4 and 5)

Total Hg (ug) **14.71**
(Containers 1A, 1B, 2, 3, 4, and 5)

up. Part. Bound Hg (ug) **0.096**
ontainers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **3.78**
(Containers 3)

Dup. Elemental Hg (ug) **10.53**
(Containers 4 and 5)

Dup. Total Hg (ug) **14.41**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 Sample was analyzed on a different day than it was prepared due to autosampler error and instrument downtime.

TestAmerica
INCORPORATED

Sample ID: Penn Power
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Stack Run 3

Hg Analysis
Ontario Hydro Method

Collected On: 9/22/99
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	SP-19	10/20/99	10/20/99	jpp	0.055	0.055	0	---	---	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	SP-15	10/20/99	10/20/99	jpp	<0.35	0.364	8.8	---	---	ug		
Container # 3	SP-16	11/01/99	11/01/99	jpp	1.66	1.63	2.2	---	---	ug		
Container # 4	SP-17	10/20/99	10/20/99	jpp	<0.80	<0.80	0	---	---	ug		
Container # 5	SP-18	10/20/99	10/20/99	jpp	11.3	11.07	1.7	---	---	ug		

Particle Bound Hg (ug) **0.055**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **1.66**
(Containers 3)

Elemental Hg (ug) **11.30**
(Containers 4 and 5)

Total Hg (ug) **13.02**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.419**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **1.63**
(Containers 3)

Dup. Elemental Hg (ug) **11.07**
(Containers 4 and 5)

Dup. Total Hg (ug) **13.12**
(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: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Scrubber Inlet Duct Run 1

Hg Analysis
Ontario Hydro Method

Collected On: 9/21/99
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	SP-36	10/20/99	10/20/99	jpp	0.284	0.272	4.3	---	---	ug		
Container # 1B	SP-37	10/20/99	10/20/99	jpp	<0.01	<0.01	0	---	---	ug		
Container # 2	SP-32	10/20/99	10/20/99	jpp	<0.31	<0.31	0	---	---	ug		
Container # 3	SP-33	10/20/99	10/20/99	jpp	8.87	8.79	0.8	---	---	ug		
Container # 4	SP-34	10/20/99	10/20/99	jpp	<1.22	<1.22	0	---	---	ug		
Container # 5	SP-35	10/20/99	10/20/99	jpp	1.62	1.61	0.3	---	---	ug		

Particle Bound Hg (ug) **0.284**
Containers 1A, 1B, and 2)

Oxidized Hg (ug) **8.87**
(Containers 3)

Elemental Hg (ug) **1.62**
(Containers 4 and 5)

Total Hg (ug) **10.77**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.272**
Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **8.79**
(Containers 3)

Dup. Elemental Hg (ug) **1.61**
(Containers 4 and 5)

Dup. Total Hg (ug) **10.67**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

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TestAmerica
INCORPORATED

Sample ID: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Scrubber Inlet Duct Run 2

Hg Analysis
Ontario Hydro Method

ollected On: 9/21/99
Collected By: METCO

ontainer # 1A - Main Filter
Container # 1B - Backup Filter
ontainer # 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
ontainer # 1A	SP-30	10/20/99	10/20/99	jpp	0.784	0.784	0	---	---	ug	*1	
Container # 1B	SP-31	10/20/99	10/20/99	jpp	<0.01	<0.01	0	---	---	ug		
ontainer # 2	SP-26	10/20/99	10/20/99	jpp	<0.32	<0.32	0	---	---	ug		
ontainer # 3	SP-27	10/20/99	10/20/99	jpp	10.6	10.5	1.0	---	---	ug		
Container # 4	SP-28	10/20/99	10/20/99	jpp	<0.92	<0.92	0	---	---	ug		
Container # 5	SP-29	10/20/99	10/20/99	jpp	2.24	2.19	2.0	---	---	ug		

article Bound Hg (ug) **0.784**
ontainers 1A, 1B, and 2)

Oxidized Hg (ug) **10.60**
(Containers 3)

Elemental Hg (ug) **2.24**
(Containers 4 and 5)

Total Hg (ug) **13.62**
(Containers 1A, 1B, 2, 3, 4, and 5)

up. Part. Bound Hg (ug) **0.784**
ontainers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **10.50**
(Containers 3)

Dup. Elemental Hg (ug) **2.19**
(Containers 4 and 5)

Dup. Total Hg (ug) **13.47**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: *1 - Sample containers broke during handling. Filter and particulate were recoverd.

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TestAmerica
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Sample ID: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Scrubber Inlet Duct Run 3

Hg Analysis
Ontario Hydro Method

Collected On: 9/22/99
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	SP-24	10/20/99	10/20/99	jpp	0.267	0.256	4.4	0.289	7.1	ug		
Container # 1B	SP-25	10/20/99	10/20/99	jpp	<0.01	<0.01	0	---	---	ug		
Container # 2	SP-20	10/20/99	10/20/99	jpp	<0.28	<0.28	0	---	---	ug		
Container # 3	SP-21	10/20/99	10/20/99	jpp	8.10	8.03	0.9	---	---	ug		
Container # 4	SP-22	10/20/99	10/20/99	jpp	<0.78	<0.78	0	---	---	ug		
Container # 5	SP-23	10/20/99	10/20/99	jpp	1.65	1.57	4.5	---	---	ug		

Particle Bound Hg (ug) **0.267**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **8.10**
(Containers 3)

Elemental Hg (ug) **1.65**
(Containers 4 and 5)

Total Hg (ug) **10.02**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.256**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **8.03**
(Containers 3)

Dup. Elemental Hg (ug) **1.57**
(Containers 4 and 5)

Dup. Total Hg (ug) **9.86**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

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TestAmerica
INCORPORATED

Sample ID: Penn Power
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Stack Blank Train

Hg Analysis
Ontario Hydro Method

Collected On: 9/22/99
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	SP-1	11/01/99	11/01/99	jpp	2.42	2.39	1.2	---	---	ug	*1, *2	
Container # 4	SP-2	10/20/99	10/20/99	jpp	<0.64	<0.64	0	---	---	ug		
Container # 5	SP-3	10/20/99	10/20/99	jpp	<1.22	<1.22	0	---	---	ug	*3	

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

Oxidized Hg (ug) 2.42
(Containers 3)

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

Total Hg (ug) 2.42
(Containers 1A, 1B, 2, 3, 4, and 5)

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

Dup. Oxidized Hg (ug) 2.39
(Containers 3)

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

Dup. Total Hg (ug) 2.39
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:
*1 - Sample was reprepared and reanalyzed to confirm results.
*2 - Original Sample Bottle was marked "1 of 2" only one bottle was received. COC listed only 1 bottle.
*3 - Original Bottle Labelled "2 of 2" is clear, does not match "1 of 1" which is dark

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

TestAmerica
INCORPORATED

Sample ID: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Unit 1A Scrubber Inlet Duct Blank Train

Hg Analysis
Ontario Hydro Method

Collected On: 9/22/99
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	SP-11	11/01/99	11/01/99	jpp	<1.21	<1.21	0	<1.21	0	ug	*1	
Container # 4	SP-12	10/20/99	10/20/99	jpp	<0.84	<0.84	0	---	---	ug		
Container # 5	SP-13	10/20/99	10/20/99	jpp	<1.02	<1.02	0	<1.02	0	ug	*2	

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) 0.00
(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) 0.00
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:
*1 - COC indicates only one bottle (2 received)
*2 - COC indicates two bottles (bottle "1 of 2" received). The extra bottle for container #3 and does not match container # 5

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TestAmerica
INCORPORATED

Sample ID: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Reagent Blanks

Hg Analysis
Ontario Hydro Method

Collected On: 9/22/99
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

	ID	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Triplicate Result	RPD	Units	Flags	Notes
Container # 7	SP-4	N/A	10/27/99	jpp	<0.20	<0.20	0	---	---	ug/L		
Container # 8	SP-5	11/01/99	11/01/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 9	SP-6	10/20/99	10/20/99	jpp	<4.0	<4.0	0	---	---	ug/L		
Container # 10	SP-7	10/20/99	10/20/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 11	SP-8	N/A	10/27/99	jpp	<0.20	<0.20	0	---	---	ug/L		
Container # 12A	SP-9	10/20/99	10/20/99	jpp	<0.01	<0.01	0	---	---	ug	*1	
Container # 12B	SP-10	10/20/99	10/20/99	jpp	<0.01	<0.01	0	---	---	ug	*1	

Notes: *1 - Main Filter Blank (88 mm), Backup Filter Blank (47 mm). A thimble blank was not digested as they weren't included in the sample digestion

Mercury Sample Train Receipt Records

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPING PORT, PA

Location ID/Run #
UNIT 1 STACK
RUN 1

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☑ 2 (1)	200 + – + – = 200 L	SP-43	*1
☑ 3 (2)	505 + 140 + ___ = 645 L	SP-44A, 44B	
☑ 4 (1)	155 + – + – = 155 L	SP-45	
☑ 5 (2)	465 + 95 + – = 540 L	SP-46A, 46B	
☐ 7 ( )	___ + ___ + ___ = ___ L		
☐ 8 ( )	___ + ___ + ___ = ___ L		
☐ 9 ( )	___ + ___ + ___ = ___ L		
☐ 10 ( )	___ + ___ + ___ = ___ L		
☐ 11 ( )	___ + ___ + ___ = ___ L		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A (1)	EEG U23	SP-47	*2
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: *1 VOLUME NOT MARKED PRIOR TO SHIPMENT
*2 RECEIVED AT LAB 10/18/99

Checked By: JAM

Date: 10/19/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPINGPORT, PA

Location ID/Run #
UNIT 1 STACK
RUN 2

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☑ 2 (1)	155 + – + – = 155 mL	SP-38	*1
☑ 3 (2)	460 + 220 + – = 680 L	SP-39A, 39B	*2
☑ 4 (1)	225 + – + – = 225 L	SP-40	↓
☑ 5 (2)	425 + 160 + – = 585 L	SP-41A, 41B	↓
☐ 7 ( )	___ + ___ + ___ = ___ L		
☐ 8 ( )	___ + ___ + ___ = ___ L		
☐ 9 ( )	___ + ___ + ___ = ___ L		
☐ 10 ( )	___ + ___ + ___ = ___ L		
☐ 11 ( )	___ + ___ + ___ = ___ L		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A (1)	EOG A106	SP-42	*3
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: *1 SAMPLE APPEARS TO HAVE VOLUME MARK BUT IT IS INCORRECT - DID NOT USE
*2 VOLUME NOT MARKED PRIOR TO SHIPMENT
*3 SAMPLE RECEIVED 10/19/99

Checked By: JAO

Date: 10/19/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPING PORT, PA

Location ID/Run #
UNIT 1 STACK
RUN 3

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☑ 2 (1)	175 + - + - = 175 L	SP-15 ~~A, 15B~~ JAD 10/19	*1
☑ 3 (2)	440 + 270 + - = ~~640~~ 710 L JAD-10/19	SP-16A, 16B	
☑ 4 (1)	200 + - + - = 200 L	SP-17	
☑ 5 (2)	460 + 180 + - = 640 L	SP-18A, 18B	
☐ 7 ( )	___ + ___ + ___ = ___ L		
☐ 8 ( )	___ + ___ + ___ = ___ L		
☐ 9 ( )	___ + ___ + ___ = ___ L		
☐ 10 ( )	___ + ___ + ___ = ___ L		
☐ 11 ( )	___ + ___ + ___ = ___ L		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A (1)	8EG A107	SP-19	*2
☐ 1B ( )			
☐ 12A ( )			
☐ 12B ( )			

Notes: *1 VOLUME NOT MARKED PRIOR TO SHIPMENT
*2 SAMPLE RECEIVED 10/18/99

Checked By: JAD

Date: 10/19/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPINGPORT, PA

Location ID/Run #
UNIT 1 SCRUBBER INLET
RUN 1

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☑ 2 (1)	155 + – + – = 155 L	SP-32	#1
☑ 3 (2)	460 + 265 + – = 745 L	SP-33A, 33B	#1
☑ 4 (1)	305 + – + – = 305 L	SP-34	#1
☑ 5 (2)	500 + 100 + – = 600 L	SP-35A, 35B	#1
☐ 7 ( )	___ + ___ + ___ = ___ L		
☐ 8 ( )	___ + ___ + ___ = ___ L		
☐ 9 ( )	___ + ___ + ___ = ___ L		
☐ 10 ( )	___ + ___ + ___ = ___ L		
☐ 11 ( )	___ + ___ + ___ = ___ L		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A (1)	THIMBLE Q10	SP-36	#2
☑ 1B (1)	47019	SP-37	#2
☐ 12A ( )			
☐ 12B ( )			

Notes: #1 VOLUME NOT MARKED PRIOR TO SHIPMENT
#2 SAMPLE RECEIVED 10/18/99

Checked By: JAD

Date: 10/19/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPINGPORT, PA

Location ID/Run #
UNIT 1 SCRUBBER INLET
RUN 2

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☑ 2 (1)	160 + -- + — = 160 L	SP-26	*2
☑ 3 (2)	475 + 275 + - = ~~650~~ 750 L	SP-27A, 27B	
☑ 4 (1)	230 + — + — = 230 L	SP-28	
☑ 5 (2)	405 + 175 + — = 580 L	SP-29A, 29B	
☐ 7 ( )	___ + ___ + ___ = ___ L		
☐ 8 ( )	___ + ___ + ___ = ___ L		
☐ 9 ( )	___ + ___ + ___ = ___ L		
☐ 10 ( )	___ + ___ + ___ = ___ L		
☐ 11 ( )	___ + ___ + ___ = ___ L		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A (1)	THIMBLE 69	SP-30	*1, *3, *4
☑ 1B (1)	47 Q20	SP-31	*1, *3, ~~*4~~ OK JAN 11/1
☐ 12A ( )			
☐ 12B ( )			

Notes: *1 ID FROM CHAIN OF CUSTODY, COULD NOT READ ON FILTERS
*2 VOLUME NOT MARKED PRIOR TO SHIPMENT
*3 SAMPLE RECEIVED 10/18/99
*4 SAMPLE CONTAINER BROKE DURING HANDLING, SAMPLE FILTERS/PARTICULATE SALVAGED.

Checked By: JAN

Date: 10/19/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPINGPORT, PA

Location ID/Run #
UNIT 1 SCRUBBER INLET
RUN 3

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☑ 2 (1)	140 + - + - = 140 L	SP-20	*1
☑ 3 (2)	500 + 250 + - = 750 L	SP-21A, 21B	
☑ 4 (1)	~~140~~ 195 + - + - = 195 L	SP-22	
☑ 5 (2)	455 + 155 + - = 610 L	SP-23A, 23B	
☐ 7 ( )	___ + ___ + ___ = ___ L		
☐ 8 ( )	___ + ___ + ___ = ___ L		
☐ 9 ( )	___ + ___ + ___ = ___ L		
☐ 10 ( )	___ + ___ + ___ = ___ L		
☐ 11 ( )	___ + ___ + ___ = ___ L		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A (1)	THIMBLE Q22	SP-24	*2
☑ 1B (1)	47Q21	SP-25	*2
☐ 12A ( )			
☐ 12B ( )			

Notes: *1 VOLUME NOT MARKED PRIOR TO SHIPMENT
*2 SAMPLE RECEIVED 10/18/99

Checked By: JAN

Date: 10/19/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPINGPORT PA

Location ID/Run #
UNIT 1 STACK
BLANK TRAIN
REAGENTS

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___ L		*2
☑ 3 (1)	415 + - + - = 415 mL	SP-1	*3, *5
☑ 4 (1)	160 + - + - = 160 L	SP-2	
☑ 5 (2)	480 + 130 + - = 610 L	SP-3A, 3B	*6
☑ 7 (1)	- + - + - = 50 mL	SP-4	*4
☑ 8 (1)	- + - + - = 50 L	SP-5	
☑ 9 (1)	- + - + - = 48 L	SP-6	
☑ 10 (1)	- + - + - = 50 L	SP-7	
☑ 11 (1)	- + - + - = 100 L	SP-8	*1

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			*2
☐ 1B ( )			*2
☑ 12A (3)	88Q2-99, 100, 101	SP-9	*1, ~~*7~~ JAD K/G
☑ 12B (3)	47Q22, 23, 24	SP-10	*1, ~~*7~~ 1

Notes: *1 RECEIVED SEPARATELY 10/18/99
*2 NOT RECOVERED ACCORDING TO CHAIN OF CUSTODY
*3 BOTTLE MARKED "1 OF 2" - ONLY 1 BOTTLE - CHAIN = 1 BOTTLE
*4 VOLUME TAKEN FROM CHAIN OF CUSTODY
*5 VOLUMES NOT MARKED PRIOR TO SHIPMENT
*6 BOTTLE LABELLED "2 OF 2" IS CLEAR, DOES NOT MATCH "1 OF 1"
~~*7 SAMPLE RECEIV~~ JAD 10/19

Checked By: JAD

Date: 10/18 & 10/19

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
PENN POWER
BRUCE MANSFIELD PLANT
SHIPPING PORT, PA

Location ID/Run #
UNIT 1 SCRUBBER INLET
BLANK TRAIN

Solutions:

Cont. ID/(#)	Volumes	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___ L		*1
☑ 3 (2)	475 + 130 + -- = 605 mL	SP-11A, 11B	*2, *4
☑ 4 (1)	210 + - + - = 210 L	SP-12	*4
☑ 5 (1)	510 + - + - = 510 L	SP-13	*3, *4
☐ 7 ( )	___ + ___ + ___ = ___ L		
☐ 8 ( )	___ + ___ + ___ = ___ L		
☐ 9 ( )	___ + ___ + ___ = ___ L		
☐ 10 ( )	___ + ___ + ___ = ___ L		
☐ 11 ( )	___ + ___ + ___ = ___ L		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			*1
☐ 1B ( )			
☑ 12A (3)	THIMBLE Q4, Q6, Q11	SP-14	*5
☐ 12B ( )			

Notes: *1 NOT RECOVERED ACCORDING TO CHAIN OF CUSTODY
*2 CHAIN INDICATES ONLY 1 BOTTLE (2 RECEIVED)
*3 CHAIN INDICATES TWO BOTTLES (1 RECEIVED, MARKED "1 OF 2" - EXTRA BOTTLE FOR CONTAINER 3 IS CLEAR AND DOES NOT MATCH CONTAINER 5
*4 VOLUME NOT MARKED PRIOR TO SHIPMENT
*5 SAMPLE RECEIVED 10/19/99

Checked By: JAN

Date: 10/19/99

TestAmerica INCORPORATED

Sample Preparation Batch Sheets

Mercury in Flue Gas
Filter Preparation Batch Log

Analyst(s) [illegible] Preparation Date 10/20/99

Reagent Reference #'s

HCl	65-28-2	$SnCl_2$	65-28-3
$NH_2OH*HCl$	65-13-3 (65-20-19)	Calibration Standards	65-21-4
$KMnO_4$	65-26-16	ICV Standard	65-21-12
HNO_3	65-27-9	4% BOMC	65-28-4
		$K_2S_2O_8$	65-24-7

X	Lab ID	Filter ID	Sample Description	Final Vol (mL)	Lab ID	Filter ID	Sample Description	Final Vol (mL)
	SP 9	12A	(2) 88Q Z99	50.				
	SP10	12B	(3) 47Q22	50				
	SP19	1A	(4) 88Q A107	50				
*	SP24	1A	(1) Q22 (2/2)	50/0.5409				
*	SP25	1B	(5) 47Q21 (1/2)	50				
*	SP30	1A	(6) Q9 (1/2)	50/0.5410				
*	SP31	1B	(7) 47Q20 (2/2)	50				
*	SP36	1A	(8) Q10 (1/2)	50/0.5316				
	SP37	1B	(9) 47Q19 2/2	50				
	SP42	1A	(10) 88Q A106	50				
	SP47	1A	(11) 88Q U23	50				
			(12) NIST 1633B	50/0.5336				
			(13) BLANK					

NOTES * SAMPLE CONTAINERS BROKEN IN LAB *SP 24 SPIK
0.5g ash sample weighed

TestAmerica INCORPORATED

Mercury in Flue Gas

COAL ~~Filter~~ Preparation Batch Log

JMP 10/20/09

Analyst(s) JMP Preparation Date 10/20/09

Reagent Reference #'s

HCl	65-28-2	$SnCl_2$	65-28-3
$NH_2OH*HCl$	65-13-3 (65-20-19)	Calibration Standards	65-21-11
$KMnO_4$	65-26-16	ICV Standard	65-24-2
HNO_3	65-27-9		

Lab ID	Filter ID	Sample Description	Final Vol (mL)	Lab ID	Filter ID	Sample Description	Final Vol (mL)
N/A	N/A	BLANK	50				
		LCS					
		NIST1630A (1.0235g)					
		~~SAMMIS #1 (1.0124g)~~					
		SAMMIS #2 (1.0020g)					
		~~SAMMIS #3 (1.0068g)~~					
		BMP #1 (1.0586g)					
		BMP #2 (1.0792g)					
		BMP #3 (1.0862g)					

NOTES * Temp. 80°C 80°C

Time 0955 1100

TestAmerica INCORPORATED

Mercury in Flue Gas
Aqueous Preparation Batch Log

Analyst(s) MMC Preparation Date 10/20/98

Reagent Reference #'s

HCl	65-28-2	$SnCl_2$	65-28-3
$NH_2OH*HCl$	65-13-3	Calibration Standards	65-21-11
$KMnO_4$	6526-16	ICV Standard	65-21-12
HNO_3	65-27-9	$K_2S_2O_8$	65-24-7
		Boric Acid	65-28-4

	Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)
1	SP43	2	SP STACK #1	200	5.0	50.0
2	SP38	2	SP STACK #2	155	5.0	50.0
3	SP15	2	SP STACK #3	175	5.0	50.0
4	SP32	2	SP SCRUB #1	155	5.0	50.0
5	SP26	2	SP SCRUB #2	160	5.0	50.0
6	SP20	2	SP SCRUB #3	140	5.0	50.0
7	SP5	8	INKCl BLANK	50		50.0
8	SP1	3	10% HNO3 BLANK TRAIN	415		50.0
9	A+B SP11	3	10% HNO3 Rinse IMP 1,2,3	605	5.0	50.0
10	A+B SP16	3	STACK RUN #1	710	5.0	50.0
11	A+B SP21	3	STACK RUN #2	750	5.0	50.0
12	A+B SP27	3	STACK RUN #3	750	5.0	50.0
13	A+B SP33	3	SCRUB RUN #1	745	5.0	50.0
14	A+B SP39	3	SCRUB RUN #2	680	5.0	50.0
15	A+B SP44	3	SCRUB RUN #3	645	5.0	50.0

Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)

NOTES

3:25 95° 4:25 95° 5:25 95°

NOTEBOOK #1

TestAmerica INCORPORATED

Mercury in Flue Gas
Aqueous Preparation Batch Log

Analyst(s) JBP Preparation Date 10/20/99

Reagent Reference #'s

HCl	65-28-2	$SnCl_2$	65-28-3
$NH_2OH*HCl$	65-13-3	Calibration Standards	65-21-11
$KMnO_4$	65-26-16	ICV Standard	65-21-12
HNO_3	65-27-9	$K_2S_2O_8$	~~65-24-7~~
		Boric Acid 4%	65-28-4

	Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)	Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)
	SP6	9	BLANK	48	2.5 ~~5.0~~	50.0						
2	SP2 ~~SP6~~	4	BLANK	160	2.5 ~~5.0~~	50.0						
3	SP12	4	IMP #4 0.1N HNO3 Rinse	210	2.5 ~~5.0~~	50.0						
4	SP17	4		200	2.5 ~~5.0~~	50.0						
5	SP22	4		195	2.5 ~~5.0~~	50.0						
6	SP28	4		230	2.5 ~~5.0~~	50.0						
7	SP34	4		305	2.5 ~~5.0~~	50.0						
8	SP40	4		225	2.5 ~~5.0~~	50.0						
9	SP45	4		155	2.5 ~~5.0~~	50.0						
10	SP7	10	BLANK	50	2 5.0	50.0						
11	SP13	5	BLANK + ANN	510	5.0	50.0						
12	SP3A,B	5	KMnO4/H2SO4 ~~RUN#1~~ STACK	610	5.0	50.0						
13	SP18 A,B	5	RUN#3 STACK	640	5.0	50.0						
14	SP23 A+B	5	RUN#3 SCRUB ~~STACK~~	610	5.0	50.0						
15	SP29 A+B	5	RUN#2 SCRUB	580	5.0	50.0						
16	SP35 A+B	5	RUN#1 SCRUB	600	5.0	50.0						
17	SP41 A+B	5	STACK #2	585	5.0	50.0						
18	SP46 A+B	5	STACK RUN#1	540	5.0	50.0						

NOTES

Mercury in Flue Gas
Aqueous Preparation Batch Log

Analyst(s) JPP Preparation Date 11/1/99

Reagent Reference #'s

HCl	65-31-8	$SnCl_2$	65-32-11
$NH_2OH*HCl$	65-30-6	Calibration Standards	65-32-9
$KMnO_4$	65-31-5	ICV Standard	65-32-10
HNO_3	65-31-20		
$K_2S_2O_8$	65-24-7		

Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)	Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)
SP1	3	KCl imp	415	5.0	50.0						
SP5	3	1N KCl Blank	50.	5.0	50.0						
SP11	3	KCl imp	605	5.0	50.0						
SP16	3	KCl imp	710	5.0	50.0						

NOTES Reprep to verify hit in blank sample

Mercury in Flue Gas
Aqueous Preparation Batch Log

out of sequence

Analyst(s) JBB Preparation Date 10/27/95

Reagent Reference #'s

HCl	65-28-2	$SnCl_2$	65-30-15
$NH_2OH*HCl$	~~65-13-3~~ 65-30-6	Calibration Standards	65-21-4
$KMnO_4$	65-26-16	ICV Standard	65-21-12
HNO_3	65-27-9		

Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)
SP4	7	0.1 N HNO_3 Blank	50	~~50~~	
SP8	11	$NH_2OH \cdot HCl$ Blank	100	~~50~~	
SP41	A+B 5	H_2SO_4 / $KMnO_4$ 0.1 N HNO_3 rinse	535	5.0	50
SP46	A+B 5	H_2SO_4 / $KMnO_4$ 0.1 N HNO_3 rinse	540	5.0	50

Lab ID	Cont. #	Sample Description	Init Cont Vol (mL)	Init Prep Vol (mL)	Final Vol (mL)

NOTES Reprepped + rerun, left out of initial run batch.
SP4 + SP8 Run straight, no prep.

10/20/99 Analytical Run

```
Protocol: SYSTEST
                        Rev: 3.001    Time: 09:43:06  20 Oct 1999
Folder: OCT99B          Seq: 108                        Print: On
User:                   Batch:              Id: StoBPed1   Duo: 1 22 Gas:    0.25 LPM
State: Idle                                                Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 100099a

Duo	Id	Extended id	Weight	Volume	Macro	Check	Help
1	ico		1.0000	1.0000			
2	Blank		1.0000	1.0000			
3	LCS		1.0000	1.0000			
4	NIST 1630a		1.0000	1.0000			
5	NIST duo		1.0000	1.0000			
6	~~Sample~~		1.0000	1.0000			
7	Sam #1 duo		1.0000	1.0000			
8	Sample #2		1.0000	1.0000			
9	~~Sam #2 duo~~		1.0000	1.0000			
10	ccc		1.0000	1.0000			
11	ccv		1.0000	1.0000			
12	~~Sample #3~~		1.0000	1.0000			
13	~~Sam #3 duo~~		1.0000	1.0000			
14	BMP #1		1.0000	1.0000			
15	BMP #1 duo		1.0000	1.0000			

PgDn

```
Duo 1   ID: ico                                   Call entry, Ins to exition
```

```
Protocol: SYSTEST
                    Rev: 1.001    Time: 09:43:10  20 Oct 1999
Folder: OCT99E      Seq: 108                     Print: On
User:               Batch:            Id: StocRepl   Cuo: 1 22 Gas:    0.23 LPM
State: Idle                                        Xmit: Off Autosampler: On
```

```
AUTOSAMPLER:  Rack entry   Rack 100099a                                    Page
Cuo Id          Extended id          Weight Volume Macro check Help
16 SMP #2                            1.0000 1.0000
17 SMP #2 cuo                        1.0000 1.0000
18 SMP #3                            1.0000 1.0000
19 SMP #3 cuo                        1.0000 1.0000
20 SMP #3 ttl                        1.0000 1.0000
21 xxx                               1.0000 1.0000
22 xxx                               1.0000 1.0000
23                                   1.0000 1.0000
24                                   1.0000 1.0000
25                                   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
```

```
Cuo 16 ID: SMP #2                                   Call entry, Ins to switch
```

Protocol: SYSTEST Rev: 1.001 Time: 14:48:07 20 Oct 1999
Folder: OCT99B Seq: 135 Print: On
User: Batch: Id: ccv Cuv: 1 20 Bem: 0.22 LPM
State: Idle Limit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 1920996

Cuv	Id	Entered Id	Weight	Volume	Macro check	relo
1	icb		1.0000	1.0000		
2	ccv		1.0000	1.0000		
3	sb #6		1.0000	1.0000		
4	sb #6 cuv		1.0000	1.0000		
5	sb #2		1.0000	1.0000		
6	sb #2 cuv		1.0000	1.0000		
7	sb #12 - SPK		1.0000	1.0000		
8	sb #12 cuv		1.0000	1.0000		
9	ccc		1.0000	1.0000		
10	ccv		1.0000	1.0000		
11	sb #17		1.0000	1.0000		
12	sb #17 cuv		1.0000	1.0000		
13	sb #22		1.0000	1.0000		
14	sb #22 cuv		1.0000	1.0000		
15	sb #25		1.0000	1.0000		

PgDn

Cuv 1 ID: icb Cell entry. Ins to switch

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 14:50:14  26 Oct 1999
Folder: OCT999      Seq: 129                    Print: On
User:               Batch:            Id: ccv        Cup: 1 22 Gas:    0.23 LPM
State: Idle                                          Xmit: Off Autosampler: On
```

```
AUTOSAMPLER:  Rack entry   Rack 102099b                                    Page:
Cup Id          Extended Id          Weight Volume Macro check rate
16 sp #29 cup                        1.00000 1.00000
17 sp #34                            1.00000 1.00000
18 sp #34 cup                        1.00000 1.00000
19 ccb                               1.00000 1.00000
20 ccv                               1.00000 1.00000
21 sp #40                            1.00000 1.00000
22 sp #40 cup                        1.00000 1.00000
23 sp #45                            1.00000 1.00000
24 sp #45 cup                        1.00000 1.00000
25 sp #7                             1.00000 1.00000
26 sp #7 cup                         1.00000 1.00000
27 sp #13                            1.00000 1.00000
28 sp #13 cup                        1.00000 1.00000
29 sp #13 trc                        1.00000 1.00000
30 ccc                               1.00000 1.00000
                                                                        . PgDn
```

```
Cup 16 ID: sp #29 cup                          Call entry, Ins to switch
```

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 14:51:30  30 Oct 1999
Folder: OCT999      Seq: 135                     Print: On
User:               Batch:            Id: ccv        Cuv: 1 22 Gas:    0.25 LPM
State: Idle                                          Xmit: Off Autosampler: On
```

```
AUTOSAMPLER:  Rack entry   Rack 1030996                                    Page
cuv Id          Extended id          Weight Volume Macro check help
01 ccv                               1.0000 1.0000
02 sc #3                             1.0000 1.0000
03 sc #3 cuv                         1.0000 1.0000
04 sc #15                            1.0000 1.0000
05 sc #18 cuv                        1.0000 1.0000
06 sc #23   — SPK                    1.0000 1.0000
07 sc #22 cuv                        1.0000 1.0000
08 sc #29                            1.0000 1.0000
09 sc #29 cuv                        1.0000 1.0000
40 sc #35                            1.0000 1.0000
41 sc #35 cuv                        1.0000 1.0000
42 ccb                               1.0000 1.0000
43 ccv                               1.0000 1.0000
44                                   1.0000 1.0000

                                                                           End
```

```
Cuv 01 ID: ccv                                   Cell entry, ing to switch
```

```
Protocol: SYSTEST
                    Rev: 3.001    Time: 16:56:59  20 Oct 1999
Folder: OCT99B      Seq: 173                     Print: On
User:               Batch:              Id: ccv        Cuo: 1 43 Sas:    6.23 LPM
State: Idle                                            Xmit: Off Autosampler: On

AUTOSAMPLER:  Rack entry   Rack 102099b
cuo Id          Extended id          Weight Volume Macro check Help
 1 sp #12 sok                        1.0000 1.0000
 2 sp #23 sok                        1.0000 1.0000
 3 sp #43                            1.0000 1.0000
 4 sp #42 cuo                        1.0000 1.0000
 5 sp #33                            1.0000 1.0000
 6 sp #32 cuo                        1.0000 1.0000
 7 sp #15                            1.0000 1.0000
 8 sp #15 cuo                        1.0000 1.0000
 9 sp #22                            1.0000 1.0000
10 sp #32 cuo                        1.0000 1.0000
11 sp #26                            1.0000 1.0000
12 sp #26 cuo                        1.0000 1.0000
13 sp #20                            1.0000 1.0000
14 sp #20 cuo                        1.0000 1.0000
15 sp #3                             1.0000 1.0000
                                                                          >10>

Cuo 1  ID: sp #12 sok                          Call entry, lie to switch
```

See 11/1/99 Repeat data BBB 11/4/99

```
Protocol: SYSTEST
                    Rev: 1.001   Time: 16:57:20  20 Oct 1999
Folder: OCT999      Seq: 178                    Print: On
User:               Batch:            Id: ccv        Dup: 1 43 Gas:    0.20 LPM
State: Idle                                          Xmit: Off Autosampler: On

AUTOSAMPLER:  Rack entry    Rack: 102999b                                    Fgup
Dup Id        Extended Id          Weight Volume Macro check help
16 sp spok
17 so #1                           1.0000 1.0000
18 so #1 dup                       1.0000 1.0000
19 so #11                          1.0000 1.0000
20 so #11 dup                      1.0000 1.0000
21 so #11 tro                      1.0000 1.0000
22 so #11 spk                      1.0000 1.0000
23 ccb                             1.0000 1.0000
24 ccv                             1.0000 1.0000
25 so #16                          1.0000 1.0000
26 so #16 dup                      1.0000 1.0000
27 so #21                          1.0000 1.0000
28 so #21 dup                      1.0000 1.0000
29 so #27                          1.0000 1.0000
30 so #27 dup                      1.0000 1.0000
31 so #00                          1.0000 1.0000
                                                                            PgDn

Dup is ID: so #1                          Call entry. Ins to switch
```

Cre 1/1/99 Repeat data stop 11/4 ka

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 16:57:22  20 Oct 1999
Folder: OCT998      Seq: 178                    Print: On
User:               Batch:            Id: ccv        Cup: 1 43 Gas:    0.20 LPM
State: Idle                                          Xmit: Off Autosampler: On
```

```
AUTOSAMPLER:  Rack entry   Rack 1020998                                    Fcup
cup Id          Extended id          Weight Volume Macro check -elb
01 sp #30 cup                        1.0000 1.0000
02 sp #25                            1.0000 1.0000
03 sp #39 cup                        1.0000 1.0000
04 sp #44                            1.0000 1.0000
05 sp #44 cup                        1.0000 1.0000
06 sp #9                             1.0000 1.0000
07 sp #9 cup                         1.0000 1.0000
08 sp #10                            1.0000 1.0000
09 sp #10 cup                        1.0000 1.0000
40 sp #19                            1.0000 1.0000
41 sp #19 cup                        1.0000 1.0000
42 sp #24                            1.0000 1.0000
43 sp #24 cup                        1.0000 1.0000
44 sp #24 tmp                        1.0000 1.0000

                                                                           FcOn
```

```
Cup 31 Id: sp #30 cup                          Cell entry, Ins to switch
```

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 19:04:35  20 Oct 1999
Folder: OCT998      Seq: 222                    Print: On
User:               Batch:          Id: sp #24 trp Cuv: 1 44 Gas:    0.23 LPM
State: Idle                                        Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 102099b

Cuv Id	Extended id	Weight	Volume	Macro check	Help
1 ccb		1.0000	1.0000		
2 ccv		1.0000	1.0000		
3 sp #24		1.0000	1.0000		
4 sp #24 cuv		1.0000	1.0000		
5 sp #24 trp		1.0000	1.0000		
6 sp #24 spk		1.0000	1.0000		
7 sp #25		1.0000	1.0000		
8 sp #25 cuv		1.0000	1.0000		
9 sp #30		1.0000	1.0000		
10 sp #30 cuv		1.0000	1.0000		
11 sp #31		1.0000	1.0000		
12 sp #31 cuv		1.0000	1.0000		
13 sp #36		1.0000	1.0000		
14 sp #36 cuv		1.0000	1.0000		
15 sp #37		1.0000	1.0000		

Page

```
Cuv 1  ID: ccb                                  Cell entry, Ins to switch
```

```
Protocol: SYSTEST
                        Rev: 3.001    Time: 19:06:08  20 Oct 1999
Folder: OCT99B          Seq: 222                      Print: On
Laser:                  Batch:              Id: so #24 trp Qua: 1 44 Bas:    0.23 LPM
State: Idle                                                Xmit: Off Autosampler: On
```

```
AUTOSAMPLER:  Rack entry    Rack 10202996  Range  1-44 Clear seQ Undo exit    Fqua
cup Id          Extended id          Weight Volume Macro check Help
16 so #27 cup                        1.0000 1.0000
17 so #42                            1.0000 1.0000
18 so #42 cup                        1.0000 1.0000
19 so #47                            1.0000 1.0000
20 so #47 cup                        1.0000 1.0000
21 so #47 trp                        1.0000 1.0000
22 ~~~~ NIST1633B                    1.0000 1.0000
23 ~~~~ NIST1633BDUP                 1.0000 1.0000
24 BLANK                             1.0000 1.0000
25 BLANK2 DUP                        1.0000 1.0000
26 CCB                               1.0000 1.0000
27 CCV                               1.0000 1.0000
28                                   1.0000 1.0000
29                                   1.0000 1.0000
30                                   1.0000 1.0000
                                                                                 FqOn
```

```
                                                   Column entry, Ins to switch
```

*** Standard: 1 Rep: 1 Seq: 102 09:23:46 20 Oct 1999 HG

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

Folder: OCT99B Page 404
09:25:28 20 Oct 1999 Protocol: SYSTEST

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

*** Standard: 2 Rep: 1 Seq: 103 09:25:28 20 Oct 1999 HG

Hg .200 ug/L 2610
Ave. Int. = 2610 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 104 09:27:52 20 Oct 1999 HG

Hg .500 ug/L 8847
Ave. Int. = 8847 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 105 09:30:26 20 Oct 1999 HG

Hg 1.00 ug/L 19245
Ave. Int. = 19245 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 106 09:33:09 20 Oct 1999 HG

Hg 2.00 ug/L 37758
Ave. Int. = 37758 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 107 09:36:01 20 Oct 1999 HG

Hg 3.00 ug/L 58173
Ave. Int. = 58173 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 09:37:01 20 Oct 1999

Folder: OCT99B Seq: 108 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 22 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

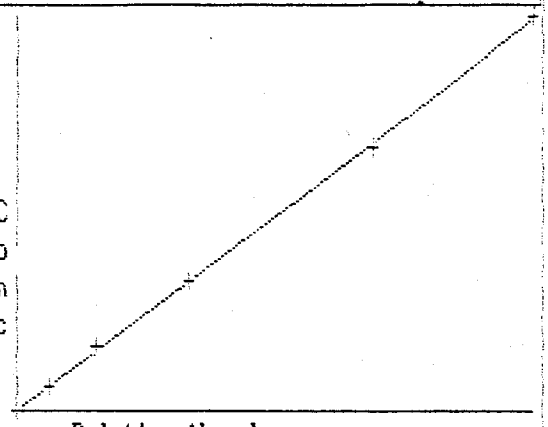
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted
S1	.000	.019	.019	LiNear
S2	.200	.199	-.001	Quadratic
S3	.500	.466	-.034	WtdLinear
S4	1.00	.996	-.004	C
S5	2.00	2.04	.041	Accept o
S6	3.00	2.98	-.021	n
				StdAdd c

A .0000000 r .999733

B 5.09358e-5 C 1.56054e-2



Relative Absorbance

	Mean	%RSD	
S1	67	0	67
S2	3610	0	3610
S3	8847	0	8847
S4	19245	0	19245
S5	39758	0	39758
S6	58173	0	58173

337

New calibration coefficients stored

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Check Standard: 2 CKS					Seq: 108	09:44:46 20 Oct 1999 HG			
Line	Flag	%Rcv.	Found	True	Units	SD/RSD			
Hg		104.	.631	.604	ug/L	.000			104%
*** Sample ID: icb					Seq: 109	09:47:18 20 Oct 1999 HG			
Hg	-.015	ug/L	.000	-.015		< 0.01 µg/g	~~<0.008 mg/kg~~		DMP 10/20/99
							~~<0.008 µg/g~~		DMP 10/20/99
*** Sample ID: Blank					Seq: 110	09:49:35 20 Oct 1999 HG			
Hg	.037	ug/L	.000	.037		<0.01 µg/g	~~<0.008 mg/kg~~		WWLAS
*** Sample ID: LCS					Seq: 111	09:51:52 20 Oct 1999 HG			
Hg	1.03	ug/L	.000	1.03		103%			
*** Sample ID: NIST 1630e					Seq: 112	09:54:24 20 Oct 1999 HG			RPD - NA
Hg	1.79	ug/L	.000	1.79		0.087 µg/g			
*** Sample ID: NIST dup					Seq: 113	09:57:19 20 Oct 1999 HG			
Hg	1.79	ug/L	.000	1.79		0.087 µg/g			
*** Sample ID: Sample #1					Seq: 114	10:00:01 20 Oct 1999 HG			RPD = 0.0
Hg	1.54	ug/L	.000	1.54		0.076 µg/g wet wt.			
						~~0.080~~ µg/g dry			
*** Sample ID: Sam #1 dup					Seq: 115	10:02:44 20 Oct 1999 HG			
Hg	1.53	ug/L	.000	1.53		0.076 µg/g wet			
						0.079 µg/g Dry			
*** Sample ID: Sample #2					Seq: 116	10:05:23 20 Oct 1999 HG			RPD = 3.7%
Hg	1.59	ug/L	.000	1.59		0.079 µg/g wet			
						0.084 µg/g Dry			
*** Sample ID: Sam #2 dup					Seq: 117	10:08:04 20 Oct 1999 HG			
Hg	1.65	ug/L	.000	1.65		0.082 µg/g wet			
						0.086 µg/g Dry			
*** Sample ID: ccb					Seq: 118	10:10:46 20 Oct 1999 HG			
Hg	-.018	ug/L	.000	-.018		<0.01 µg/g			
*** Sample ID: ccv					Seq: 119	10:13:05 20 Oct 1999 HG			
Hg	2.16	ug/L	.000	2.16		108%			

10:15:47 20 Oct 1999 Protocol: SYSTEST

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: Sample #2					Seq: 120	10:15:47 20 Oct 1999 HG		
Hg	1.55	ug/L	.000	1.55				
*** Sample ID: Sam #2 dup					Seq: 121	10:18:27 20 Oct 1999 HG		
Hg	1.52	ug/L	.000	1.52				
*** Sample ID: BMP #1					Seq: 122	10:21:06 20 Oct 1999 HG		
Hg	1.76	ug/L	.000	1.76				
*** Sample ID: BMP #1 dup					Seq: 123	10:23:47 20 Oct 1999 HG		
Hg	1.79	ug/L	.000	1.79				
*** Sample ID: BMP #2					Seq: 124	10:26:20 20 Oct 1999 HG		
Hg	1.34	ug/L	.000	1.34				
*** Sample ID: BMP #2 dup					Seq: 125	10:29:06 20 Oct 1999 HG		
Hg	1.32	ug/L	.000	1.32				
*** Sample ID: BMP #3					Seq: 126	10:31:46 20 Oct 1999 HG		
Hg	2.20	ug/L	.000	2.20				
*** Sample ID: BMP #3 dup					Seq: 127	10:34:26 20 Oct 1999 HG		
Hg	2.15	ug/L	.000	2.15				
*** Sample ID: BMP #3 tr					Seq: 128	10:37:10 20 Oct 1999 HG		
Hg	[illegible]	ug/L	.000	[illegible]				
*** Sample ID: CCB					Seq: 129	10:39:53 20 Oct 1999 HG		
Hg	[illegible]	ug/L	.000	[illegible]				
*** Sample ID: BMP #3					Seq: 130	10:42:30 20 Oct 1999 HG		
Hg	2.10	ug/L	.000	2.10				
*** Sample ID: BMP #3 dup					Seq: 131	10:45:27 20 Oct 1999 HG		
Hg	2.10	ug/L	.000	2.10				

0.077 µg/g Wet
0.081 µg/g Dry
RPD = 1.95

0.075 µg/g Wet
0.079 µg/g Dry

0.083 µg/g Wet
0.088 µg/g Dry
RPD = 1.6

0.085 µg/g Wet
0.089 µg/g Dry

0.062 µg/g Wet
0.066 µg/g Dry
RPD = 1.48

0.063 µg/g Wet
0.067 µg/g Dry

Printer malfunction BMP in ug/L

0.097 µg/g Wet
0.102 µg/g Dry
RPD = N/D

0.097 µg/g Wet
0.102 µg/g Dry

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: SMP #3 trp					Seq: 132	10:45:15 20 Oct 1999 HG		RPD = 4.2
Hg	2.19	ug/L	.000	2.19		0.101 µg/g wet 0.106 µg/g Dry		
*** Sample ID: ccm					Seq: 133	10:51:01 20 Oct 1999 HG		
Hg	-.022	ug/L	.000	-.022		<0.01 µg/g		
*** Sample ID: ccv					Seq: 134	10:53:19 20 Oct 1999 HG		
Hg	2.13	ug/L	.000	2.13		107%		

Line	Conc.	Units	ED/RED	1	2	3	4	5
*** Sample ID: icb				Seq:	135	14:55:44 20 Oct 1999 HG		
Hg	.015	ug/L	.000	.015				
*** Sample ID: icv				Seq:	136	14:58:01 20 Oct 1999 HG		
Hg	2.00	ug/L	.000	2.00				
*** Sample ID: so #2			~~1:10~~ 1:4 lac	Seq:	137	15:00:48 20 Oct 1999 HG		
Hg	.032	ug/L	.000	.032		<4.0 ug/L		RPD= N/A
*** Sample ID: so #2 dup			~~1:10~~ 1:4 lac	Seq:	138	15:02:05 20 Oct 1999 HG		
Hg	.017	ug/L	.000	.017		<4.0 ug/L		
*** Sample ID: so #2				Seq:	139	15:03:22 20 Oct 1999 HG		
Hg	.022	ug/L	.000	.022		<0.64 ug/L		RPD-N/A
*** Sample ID: so #2 dup				Seq:	140	15:07:39 20 Oct 1999 HG		
Hg	.022	ug/L	.000	.022		<0.64 ug/L		
*** Sample ID: so #12				Seq:	141	15:09:56 20 Oct 1999 HG		
Hg	.054	ug/L	.000	.054		<0.84 ug ~~1L~~ 50mL		RPD-N/A
*** Sample ID: so #12 dup				Seq:	142	15:12:12 20 Oct 1999 HG		
Hg	.037	ug/L	.000	.037		<0.84 ug ~~1L~~ 50mL		
*** Sample ID: ccb				Seq:	143	15:14:30 20 Oct 1999 HG		
Hg	-.005	ug/L	.000	-.005		<0.2 ug ~~1L~~ 50mL		
*** Sample ID: ccv				Seq:	144	15:16:47 20 Oct 1999 HG		
Hg	2.06	ug/L	.000	2.06		103%		
*** Sample ID: so #17				Seq:	145	15:19:21 20 Oct 1999 HG		
Hg	.026	ug/L	.000	.026		<0.80 ug ~~1L~~ 50mL		RPD-N/A
*** Sample ID: so #17 dup				Seq:	146	15:21:47 20 Oct 1999 HG		
Hg	.042	ug/L	.000	.042		<0.80 ug ~~1L~~ 50mL		

Folder: OCT95 Page [illegible]
15:24:06 20 Oct 1999 Protocol: SYSTEST

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: sb #22					Seq: 147	15:24:06 20 Oct 1999 HG			
Hg	.066	ug/L	.000	.066			<0.78 ug		RPD-N/A
*** Sample ID: sb #22 dup					Seq: 148	15:26:23 20 Oct 1999 HG			
Hg	.091	ug/L	.000	.091			<0.78 ug		
*** Sample ID: sb #25					Seq: 149	15:28:40 20 Oct 1999 HG			
Hg	.048	ug/L	.000	.048			<0.92 ug		RPD-N/A
*** Sample ID: sb #25 dup					Seq: 150	15:30:57 20 Oct 1999 HG			
Hg	.056	ug/L	.000	.056			<0.92 ug		
*** Sample ID: sb #34					Seq: 151	15:33:14 20 Oct 1999 HG			
Hg	.046	ug/L	.000	.046			<1.22 ug		RPD-N/A
*** Sample ID: sb #34 dup					Seq: 152	15:35:31 20 Oct 1999 HG			
Hg	.055	ug/L	.000	.055			<1.22 ug		
*** Sample ID: ccb					Seq: 153	15:37:48 20 Oct 1999 HG			
Hg	.002	ug/L	.000	.002			< 0.2 ug/L		
*** Sample ID: ccv					Seq: 154	15:40:05 20 Oct 1999 HG			
Hg	2.00	ug/L	.000	2.00			100%		
*** Sample ID: sb #40					Seq: 155	15:42:19 20 Oct 1999 HG			
Hg	.035	ug/L	.000	.035			<0.90 ug		RPD-N/A
*** Sample ID: sb #40 dup					Seq: 156	15:45:08 20 Oct 1999 HG			
Hg	.062	ug/L	.000	.062			<0.90 ug		
*** Sample ID: sb #45					Seq: 157	15:47:27 20 Oct 1999 HG			
Hg	.039	ug/L	.000	.039			<0.62 ug		RPD-N/A
*** Sample ID: sb #45 dup					Seq: 158	15:49:45 20 Oct 1999 HG			
Hg	.040	ug/L	.000	.040			<0.62 ug		

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: sb #7					Seq: 159	15:52:03 20 Oct 1999 HG			
Hg	.015	ug/L	.000	.015			<2.0 ug/L		
*** Sample ID: sb #7 dup					Seq: 160	15:54:22 20 Oct 1999 HG			RPD-N/A
Hg	.002	ug/L	.000	.002			<2.0 ug/L		
*** Sample ID: sb #10					Seq: 161	15:56:41 20 Oct 1999 HG			
Hg	.025	ug/L	.000	.025			<1.02 ug		
*** Sample ID: sb #10 dup					Seq: 162	15:58:59 20 Oct 1999 HG			RPD-N/A
Hg	.002	ug/L	.000	.002			<1.02 ug		
*** Sample ID: sb #10 rrp					Seq: 163	16:01:17 20 Oct 1999 HG			
Hg	.025	ug/L	.000	.025			<1.02 ug		
*** Sample ID: ccs					Seq: 164	16:03:36 20 Oct 1999 HG			
Hg	.006	ug/L	.000	.006			<0.2 ug/L		
*** Sample ID: ccv					Seq: 165	16:05:55 20 Oct 1999 HG			
Hg	2.01	ug/L	.000	2.01			100%		
*** Sample ID: sb #3					Seq: 166	16:08:40 20 Oct 1999 HG			
Hg	.012	ug/L	.000	.012			<1.22 ug		
*** Sample ID: sb #3 dup					Seq: 167	16:10:58 20 Oct 1999 HG			RPD = N/A
Hg	.002	ug/L	.000	.002			<1.22 ug		
*** Sample ID: sb #15					Seq: 168	16:13:15 20 Oct 1999 HG			
Hg	1.76	ug/L	.000	1.76			~~11.23~~ 11.3 ug		RPD = 1.72%
*** Sample ID: sb #15 dup					Seq: 169	16:16:02 20 Oct 1999 HG			
Hg	1.72	ug/L	.000	1.73			11.07 ug		
*** Sample ID: sb #20					Seq: 170	16:18:45 20 Oct 1999 HG			
Hg	.270	ug/L	.000	.270			1.65 ug		

Folder: OCT99B

16:21:07 20 Oct 1999 Protocol: SYSTEST

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: so #22 dup					Seq: 171	16:21:07 20 Oct 1999 HG			RPD=4.5
Hg	.258	ug/L	.000	.258		1.57µg			
*** Sample ID: so #29					Seq: 172	16:23:28 20 Oct 1999 HG			
Hg	.386	ug/L	.000	.386		2.24µg			
*** Sample ID: so #29 dup					Seq: 173	16:25:51 20 Oct 1999 HG			RPD=2.0%
Hg	.378	ug/L	.000	.378		2.19µg			
*** Sample ID: so #35					Seq: 174	16:28:21 20 Oct 1999 HG			
Hg	.270	ug/L	.000	.270		1.62µg			
*** Sample ID: so #35 dup					Seq: 175	16:30:44 20 Oct 1999 HG			RPD=0.3%
Hg	.269	ug/L	.000	.269		1.61µg			
*** Sample ID: ccb					Seq: 176	16:33:15 20 Oct 1999 HG			
Hg	-.008	ug/L	.000	-.008		<0.2µg/L			
*** Sample ID: ccv					Seq: 177	16:35:36 20 Oct 1999 HG			
Hg	2.02	ug/L	.000	2.02		101%			

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: sp #12 spk				Seq: 178	17:01:19 20 Oct 1999 HG			
Hg	1.04	ug/L	.000	1.04			104%	
*** Sample ID: sp #23 spk				Seq: 179	17:03:57 20 Oct 1999 HG			
Hg	1.28	ug/L	.000	1.28			101%	
*** Sample ID: sp #43				Seq: 180	17:09:47 20 Oct 1999 HG			
Hg	.095	ug/L	.000	.095			<0.40 ug	
*** Sample ID: sp #43 dup				Seq: 181	17:12:04 20 Oct 1999 HG			RPD=NI
Hg	.061	ug/L	.000	.061			<0.40 ug	
*** Sample ID: sp #38				Seq: 182	17:14:21 20 Oct 1999 HG			
Hg	.165	ug/L	.000	.165			<0.310 ug	
*** Sample ID: sp #38 dup				Seq: 183	17:16:39 20 Oct 1999 HG			RPD=NI
Hg	.162	ug/L	.000	.162			<0.310 ug	
*** Sample ID: sp #15				Seq: 184	17:18:57 20 Oct 1999 HG			
Hg	.191	ug/L	.000	.191			<0.350 ug	
*** Sample ID: sp #15 dup				Seq: 185	17:21:19 20 Oct 1999 HG			RPD=8.
Hg	.206	ug/L	.000	.206			0.364 ug	
*** Sample ID: sp #22				Seq: 186	17:23:38 20 Oct 1999 HG			
Hg	.011	ug/L	.000	.011			<0.310 ug	
*** Sample ID: sp #22 dup				Seq: 187	17:25:56 20 Oct 1999 HG			RPD=NI
Hg	.029	ug/L	.000	.029			<0.310 ug	
*** Sample ID: sp #26				Seq: 188	17:28:14 20 Oct 1999 HG			
Hg	.023	ug/L	.000	.023			<0.320 ug	
*** Sample ID: sp #26 dup				Seq: 189	17:30:31 20 Oct 1999 HG			RPD-NI
Hg	.006	ug/L	.000	.006			<0.320 ug	

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: sp #20					Seq:	190	17:32:48 20 Oct 1999 HG		
Hg	.036	ug/L	.000	.036			<0.28 ug		
*** Sample ID: sp #20 dup					Seq:	191	17:35:05 20 Oct 1999 HG		RPD - N/
Hg	.029	ug/L	.000	.029			<0.28 ug		
*** Sample ID: sp #5					Seq:	192	17:37:22 20 Oct 1999 HG		
Hg	.029	ug/L	.000	.029			<2.0 ug/L		
*** Sample ID: ~~sp #1~~ SP#5 DUP (SPP w/10/lag)					Seq:	193	17:39:39 20 Oct 1999 HG		RPD - N/
Hg	-.001	ug/L	.000	-.001			<2.0 ug/L		
*** Sample ID: sp #1 ~~sp~~ (SPP w/10/lag)					Seq:	194	17:41:56 20 Oct 1999 HG		
Hg	.582	ug/L	.000	.582			2.14 ug		
*** Sample ID: sp ~~#1~~ #1 DUP (SPP w/10/lag)					Seq:	195	17:44:24 20 Oct 1999 HG		RPD - 7.
Hg	.540	ug/L	.000	.540			2.24 ug		
*** Sample ID: sp #11 ~~sp~~ (SPP w/10/lag)					Seq:	196	17:46:54 20 Oct 1999 HG		
Hg	.041	ug/L	.000	.041			<1.21 ug		
*** Sample ID: sp #11 ~~sp~~ DUP (SPP w/10/lag)					Seq:	197	17:49:12 20 Oct 1999 HG		RPD - N/
Hg	.060	ug/L	.000	.060			<1.21 ug		
*** Sample ID: sp #11 ~~sp~~ TRP (SPP w/10/lag)					Seq:	198	17:51:30 20 Oct 1999 HG		
Hg	.076	ug/L	.000	.076			<1.21 ug		
*** Sample ID: ~~sp~~ SP#11 SPK (SPP w/10/lag)					Seq:	199	17:53:49 20 Oct 1999 HG		RPD - N/
Hg	1.04	ug/L	.000	1.04			104%		
*** Sample ID: ~~sp~~ CCB (SPP w/10/lag)					Seq:	200	17:56:26 20 Oct 1999 HG		
Hg	.007	ug/L	.000	.007			<0.2 ug/L		
*** Sample ID: ~~sp~~ CCV (SPP w/10/lag)					Seq:	201	17:58:47 20 Oct 1999 HG		
Hg	1.99	ug/L	.000	1.99			99%		

Repeat 11/1/99 SPP 11/4/99

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: sp #16 ~~[illegible]~~ mp 10/20				Seq:	202	18:01:31 20 Oct 1999 HG		
Hg	.192	ug/L	.000	.192		<1.42 ug		
*** Sample ID: sp ~~#21~~ #16 DUP mp 10/2				Seq:	203	18:03:50 20 Oct 1999 HG		RPD=6.5
Hg	.205	ug/L	.000	.205		1.45 ug		
*** Sample ID: sp #21 ~~[illegible]~~ mp 10/20				Seq:	204	18:06:09 20 Oct 1999 HG		
Hg	1.08	ug/L	.000	1.08		8.10 ug		
*** Sample ID: sp ~~#27~~ 21 DUP mp 10/20				Seq:	205	18:08:48 20 Oct 1999 HG		RPD ~ 0.9
Hg	1.07	ug/L	.000	1.07		8.03 ug		
*** Sample ID: sp #27 ~~[illegible]~~ mp 10/20				Seq:	206	18:11:27 20 Oct 1999 HG		
Hg	1.42	ug/L	.000	1.42		10.65 ug		
*** Sample ID: sp ~~#33~~ 27 DUP mp 10/20				Seq:	207	18:14:09 20 Oct 1999 HG		RPD ~ 1.0
Hg	1.40	ug/L	.000	1.40		10.5 ug		
*** Sample ID: sp #33 ~~[illegible]~~ mp 10/20				Seq:	208	18:16:49 20 Oct 1999 HG		
Hg	1.19	ug/L	.000	1.19		8.87 ug		
*** Sample ID: sp ~~#27~~ #33 DUP mp 10/20				Seq:	209	18:19:29 20 Oct 1999 HG		RPD ~ 0.8
Hg	1.18	ug/L	.000	1.18		8.79 ug		
*** Sample ID: sp #39 ~~[illegible]~~ mp 10/20				Seq:	210	18:22:09 20 Oct 1999 HG		
Hg	.549	ug/L	.000	.549		3.73 ug		
*** Sample ID: sp ~~#44~~ #39 DUP mp 10/20				Seq:	211	18:24:40 20 Oct 1999 HG		RPD=1.29
Hg	.556	ug/L	.000	.556		3.78 ug		
*** Sample ID: sp #44 ~~[illegible]~~ mp 10/20				Seq:	212	18:27:14 20 Oct 1999 HG		
Hg	.390	ug/L	.000	.390		2.52 ug		RPD ~ 6.6
*** Sample ID: sp ~~#5~~ #44 DUP mp 10/20				Seq:	213	18:29:44 20 Oct 1999 HG		
Hg	.365	ug/L	.000	.365		2.35 ug		

Repeat 11/1/99 mp 11/4/99

Line	Conc.	units	SD/RSD	1	2	3	4	5
*** Sample ID: sp #9 ~~[illegible]~~					Seq: 214	18:32:15 20 Oct 1999 HG		
Hg	.061	ug/L	.000	.061		<0.01 ug		
*** Sample ID: sp ~~[illegible]~~ #9 DUP					Seq: 215	18:34:35 20 Oct 1999 HG RPD-N/A		
Hg	.054	ug/L	.000	.054		<0.01 ug		
*** Sample ID: sp #10 ~~[illegible]~~					Seq: 216	18:36:55 20 Oct 1999 HG		
Hg	-.008	ug/L	.000	-.008		<0.01 ug		
*** Sample ID: sp ~~[illegible]~~ #10 DUP					Seq: 217	18:39:15 20 Oct 1999 HG RPD ~ N/A		
Hg	.040	ug/L	.000	.040		<0.01 ug		
*** Sample ID: sp #19 ~~[illegible]~~					Seq: 218	18:41:37 20 Oct 1999 HG		
Hg	1.09	ug/L	.000	1.09		0.055 ug/Filter		
*** Sample ID: sp ~~[illegible]~~ #19 DUP					Seq: 219	18:44:20 20 Oct 1999 HG RPD-0.91%		
Hg	1.10	ug/L	.000	1.10		0.055 ug/Filter		
*** Sample ID: sp #24 ~~[illegible]~~					Seq: 220	18:47:01 20 Oct 1999 HG		
Hg	-.040	ug/L	.000	-.040		NO DATA		
*** Sample ID: sp #24 ~~[illegible]~~ 24DUP					Seq: 221	18:49:21 20 Oct 1999 HG		
Hg	.003	ug/L	.000	.003		NO DATA		

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: ~~SP#16~~ ~~SP#24 TRP~~ 10/20/99 CCB					Seq: 222	19:06:48 20 Oct 1999 HG		
Hg	-.013	ug/L	.000	-.013		<0.01		
*** Sample ID: ccv					Seq: 223	19:11:05 20 Oct 1999 HG		
Hg	2.00	ug/L	.000	2.00		100%		
*** Sample ID: sp #24					Seq: 224	19:13:47 20 Oct 1999 HG		
Hg	.257	ug/L	.000	.257		0.024 mg/g		
*** Sample ID: sp #24 dup					Seq: 225	19:16:07 20 Oct 1999 HG	RPD=4.37%	
Hg	.246	ug/L	.000	.246		0.023 mg/g		
*** Sample ID: sp #24 trp					Seq: 226	19:18:28 20 Oct 1999 HG	RPD=7.13	
Hg	.276	ug/L	.000	.276		0.026 mg/g		
*** Sample ID: sp #24 ccv					Seq: 227	19:20:45 20 Oct 1999 HG		
Hg	1.17	ug/L	.000	1.17		91%		
*** Sample ID: sp #25					Seq: 228	19:23:25 20 Oct 1999 HG		
Hg	.087	ug/L	.000	.087		<0.01 mg/Filter		
*** Sample ID: sp #25 dup					Seq: 229	19:25:45 20 Oct 1999 HG	RPD-N/A	
Hg	.095	ug/L	.000	.095		<0.01 mg/Filter		
*** Sample ID: sp #30					Seq: 230	19:29:03 20 Oct 1999 HG		
Hg	.774	ug/L	.000	.774		0.071 mg/g		
*** Sample ID: sp #30 dup					Seq: 231	19:30:26 20 Oct 1999 HG	RPD=0.78%	
Hg	.768	ug/L	.000	.768		0.071 mg/g		
*** Sample ID: sp #31					Seq: 232	19:33:11 20 Oct 1999 HG		
Hg	.080	ug/L	.000	.080		<0.01 mg/Filter		
*** Sample ID: sp #31 dup					Seq: 233	19:35:29 20 Oct 1999 HG	RPD-N/A	
Hg	.105	ug/L	.000	.105		<0.01 mg/Filter		

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: sp #36					Seq: 234	19:37:46 20 Oct 1999 HG		
Hg	.248	ug/L	.000	.248		0.023 ug/g		
*** Sample ID: sp #36 dup					Seq: 235	19:40:06 20 Oct 1999 HG	RPD=7.10%	
Hg	.231	ug/L	.000	.231		0.022 ug/g		
*** Sample ID: sp #37					Seq: 236	19:42:23 20 Oct 1999 HG		
Hg	.085	ug/L	.000	.085		<0.01 ug/Filter		
*** Sample ID: sp #37 dup					Seq: 237	19:44:40 20 Oct 1999 HG		
Hg	.102	ug/L	.000	.102		<0.01 ug/Filter		
*** Sample ID: sp #42					Seq: 238	19:46:57 20 Oct 1999 HG		
Hg	1.91	ug/L	.000	1.91		0.096 ug/Filter		
*** Sample ID: sp #42 dup					Seq: 239	19:49:35 20 Oct 1999 HG	RPD=0.522%	
Hg	1.92	ug/L	.000	1.92		0.096 ug/Filter		
*** Sample ID: sp #47					Seq: 240	19:52:17 20 Oct 1999 HG		
Hg	.982	ug/L	.000	.982		0.05 ug/Filter		
*** Sample ID: sp #47 dup					Seq: 241	19:54:53 20 Oct 1999 HG	RPD=2.81%	
Hg	1.01	ug/L	.000	1.01		0.051 ug/Filter		
*** Sample ID: sp #47 trp					Seq: 242	19:57:32 20 Oct 1999 HG	RPD=3.80%	
Hg	1.02	ug/L	.000	1.02		0.051 ug/Filter		
*** Sample ID: ~~sp~~ NIST1633B					Seq: 243	20:00:13 20 Oct 1999 HG		
Hg	1.60	ug/L	.000	1.60		0.141 ug/g		
*** Sample ID: ~~sp~~ NIST1633B DUP					Seq: 244	20:02:55 20 Oct 1999 HG	RPD=0.623	
Hg	1.61	ug/L	.000	1.61		0.142 ug/g		
*** Sample ID: blank					Seq: 245	20:17:15 20 Oct 1999 HG		
Hg	-.004	ug/L	.000	-.004		<0.02 ug/g		

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: blank dup					Seq: 246	20:19:34 20 Oct 1999 HG		
Hg	.013	ug/L	.000	.013			<0.02 ug/g	
*** Sample ID: ccc					Seq: 247	20:21:52 20 Oct 1999 HG		
Hg	.016	ug/L	.000	.016			<0.2 ug/L	
*** Sample ID: ccv					Seq: 248	20:24:10 20 Oct 1999 HG		
Hg	2.00	ug/L	.000	2.00			100%	

10/27/99 Analytical Run

Protocol: SYSTEST

Rev: 3.001 Time: 14:57:23 27 Oct 1999

Folder: OCT99c Sec: 2E Print: On

User: Batch: Ic: Std6Real Cuc: 1 14 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 102799b

cuc	Id	Extended id	Weight	Volume	Macro	check	Help
1	100		1.00000	1.00000			
2	sp 4		1.00000	1.00000			
3	sp 4dup		1.00000	1.00000			
4	sp 8		1.00000	1.00000			
5	sp 8dup		1.00000	1.00000			
6	sp 41		1.00000	1.00000			
7	sp 41dup		1.00000	1.00000			
8	ccb		1.00000	1.00000			
9	ccv		1.00000	1.00000			
10	sp 4c		1.00000	1.00000			
11	sp 4cdup		1.00000	1.00000			
12	sp 4ctrp		1.00000	1.00000			
13	ccb		1.00000	1.00000			
14	ccv		1.00000	1.00000			
15			1.00000	1.00000			

PgDn

Cuc 15 ID: Call entry, Ins to switch

*** Standard: 1 Rep: 1 Seq: 22 14:41:23 27 Oct 1999 HG

Hg .000 ug/L -998
Ave. Int. = -998 S. D. = 0

*** Standard: 2 Rep: 1 Seq: 23 14:43:44 27 Oct 1999 HG

Hg .200 ug/L 11807
Ave. Int. = 11807 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 24 14:46:06 27 Oct 1999 HG

Hg .500 ug/L 29538
Ave. Int. = 29538 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 25 14:48:29 27 Oct 1999 HG

Hg 1.00 ug/L 58762
Ave. Int. = 58762 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 26 14:50:54 27 Oct 1999 HG

Hg 2.00 ug/L 114722
Ave. Int. = 114722 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 27 14:53:27 27 Oct 1999 HG

Hg 3.00 ug/L 173231
Ave. Int. = 173231 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 14:53:49 27 Oct 1999

Folder: OCT99c Seq: 28 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 14 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

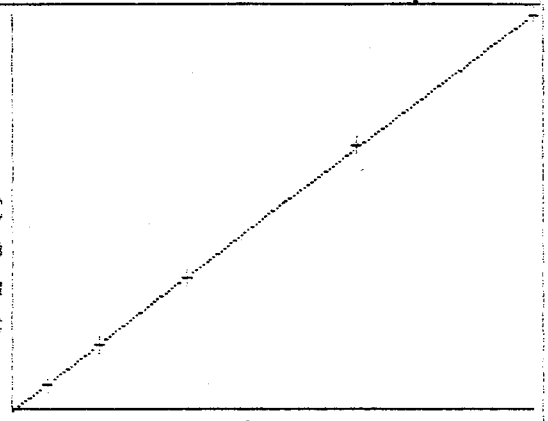
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear	
S1	.000	-.019	-.019	Quadratic	
S2	.200	.203	.003	WtdLinear	
S3	.500	.511	.011		C
S4	1.00	1.02	.017	Accept	o
S5	2.00	1.99	-.013		n
S6	3.00	3.00	.001	StdAdd	c

A .0000000 r .999932

B 1.73300e-5 C -1.29700e-3



Relative Absorbance

	Mean	%RSD	
S1	-998	0	-998
S2	11807	0	11807
S3	29538	0	29538
S4	58762	0	58762
S5	114723	0	114723
S6	173231	0	173231

33?

New calibration coefficients stored

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

*** Check Standard: 2 CK2 Seq: 28 14:58:52 27 Oct 1999 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		99.2	.599	.604	ug/L	.000

99%

*** Sample ID: icb Seq: 29 15:06:12 27 Oct 1999 HG

Hg -.008 ug/L .000 -.008 <0.0002

*** Sample ID: sb 4 Seq: 30 15:08:49 27 Oct 1999 HG

Hg .003 ug/L .000 .003 <0.2 ug/L

*** Sample ID: sb ~~4DUP~~ 4DUP Seq: 31 15:11:06 27 Oct 1999 HG

Hg -.004 ug/L .000 -.004 <0.2 ug/L

RPD - N/A

*** Sample ID: sb ~~11~~ 8 Seq: 32 15:13:23 27 Oct 1999 HG

Hg -.021 ug/L .000 -.021 <0.2 ug/L

*** Sample ID: sb ~~11DUP~~ 8DUP Seq: 33 15:15:40 27 Oct 1999 HG

Hg -.020 ug/L .000 -.020 <0.2 ug/L

RPD - N/A

*** Sample ID: sb 41 Seq: 34 15:17:58 27 Oct 1999 HG

Hg 1.86 ug/L .000 1.86 10.88 ug

*** Sample ID: sb 41dup Seq: 35 15:20:20 27 Oct 1999 HG

Hg 1.80 ug/L .000 1.80 10.53 ug

RPD = 1.6

*** Sample ID: sb 41spk Seq: 36 15:27:00 27 Oct 1999 HG

Hg 2.84 ug/L .000 2.84 98%

*** Sample ID: ccb Seq: 37 15:29:28 27 Oct 1999 HG

Hg -.025 ug/L .000 -.025 < 0.2 ug/L

*** Sample ID: ccv Seq: 38 15:31:46 27 Oct 1999 HG

Hg 2.04 ug/L .000 2.04 102%

*** Sample ID: sb 46 Seq: 39 15:34:15 27 Oct 1999 HG

Hg 1.72 ug/L .000 1.72 9.34 ug

RPD = 0.580

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: so 45 dup					Seq: 40	15:36:38 27 Oct 1999 HG		
Hg	1.72	ug/L	.000	1.72			9.29 ug	
*** Sample ID: so 46tro					Seq: 41	15:39:05 27 Oct 1999 HG		RPD=0.580
Hg	1.72	ug/L	.000	1.72			9.29 ug	
*** Sample ID: cmb					Seq: 42	15:41:32 27 Oct 1999 HG		
Hg	-.014	ug/L	.000	-.014			<0.2 ug	
*** Sample ID: ccv					Seq: 43	15:43:49 27 Oct 1999 HG		
Hg	1.99	ug/L	.000	1.99			99%	

11/01/99 Analytical Run

```
Protocol: SYSTEST
                    Rev: 3.001    Time: 17:01:22  01 Nov 1999
Folder: NOV99       Seq: 105                     Print: On
User:               Batch:          Ic: ccv        Cup: 1 15 Gas:    0.23 LPM
State: Idle                                        Xmit: Off Autosampler: On

AUTOSAMPLER:  Rack entry   Rack 110199c  Range  1-44 Clear seal Undo exit
cup Id        Extended Id          Weight Volume Macro check Help
 1 icc                             1.0000 1.0000
 2 sp #1                           1.0000 1.0000
 3 sp #1cup                        1.0000 1.0000
 4 sp #5                           1.0000 1.0000
 5 sp #5cup                        1.0000 1.0000
 6 sp #11                          1.0000 1.0000
 7 sp#11cup                        1.0000 1.0000
 8 sp #11 tmp                      1.0000 1.0000
 9 sp #16                          1.0000 1.0000
10 sp #16cup                       1.0000 1.0000
11 sp #16 sox                      1.0000 1.0000
12 ccc                             1.0000 1.0000
13 ccv                             1.0000 1.0000
14                                 1.0000 1.0000
15                                 1.0000 1.0000
                                                                    Page

                                                Column entry. Ins to switch
```

*** Standard: 1 Rep: 1 Seq: 85 16:08:55 01 Nov 1999 HG

Hg .000 ug/L 406
Ave. Int. = 406 S. D. = 0

*** Standard: 2 Rep: 1 Seq: 86 16:08:16 01 Nov 1999 HG

Hg .200 ug/L 10873
Ave. Int. = 10873 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 87 16:10:38 01 Nov 1999 HG

Hg .500 ug/L 26000
Ave. Int. = 26000 S. D. = 0

Folder: NOV99 Page 40
16:11:40 01 Nov 1999 Protocol: SYSTEST

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

*** Standard: 4 Rep: 1 Seq: 88 16:13:00 01 Nov 1999 HG

Hg 1.00 ug/L 52411
Ave. Int. = 52411 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 89 16:13:24 01 Nov 1999 HG

Hg 2.00 ug/L 103727
Ave. Int. = 103727 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 90 16:13:51 01 Nov 1999 HG

Hg 3.00 ug/L 154362
Ave. Int. = 154362 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 16:18:53 01 Nov 1999

Folder: NOVA99 Seq: 91 Print: On

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

State: Idle Xmit: Off Autosampler: On

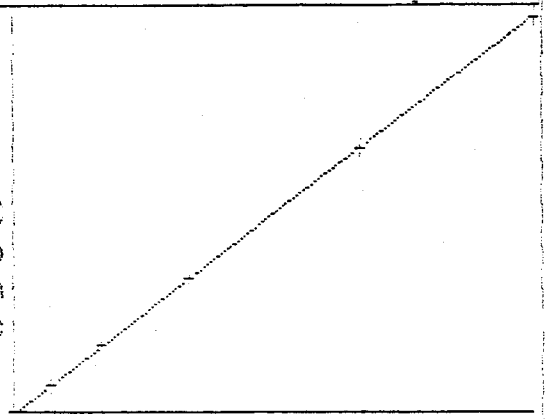
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear	
S1	.000	-.004	-.004	Quadratic	
S2	.200	.200	.000	WtdLinear	
S3	.500	.495	-.005		C
S4	1.00	1.01	.009	Accept	o
S5	2.00	2.01	.007		n
S6	3.00	2.99	-.007	StdAdd	c

A .0000000 r .999984

B 1.94644e-5 C -1.15528e-2



Relative Absorbance

	Mean	%RSD	
S1	406	0	406
S2	10873	0	10873
S3	26000	0	26000
S4	52411	0	52411
S5	103727	0	103727
S6	154362	0	154362

33?

New calibration coefficients stored

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

*** Check Standard: 2 Cx2 Seq: 91 16:26:08 01 Nov 1999 HG

Line	Flag	%Rev.	Found	True	Units	SD/RSD
Hg		102.	.615	.604	ug/L	.000

*** Sample ID: 100 Seq: 92 16:28:27 01 Nov 1999 HG

Hg -.009 ug/L .000 -.009 <0.2 ug

*** Sample ID: sb #1 Seq: 93 16:30:44 01 Nov 1999 HG

Hg .582 ug/L .000 .582 2.42 ug

*** Sample ID: sb #1dup Seq: 94 16:33:01 01 Nov 1999 HG

Hg .575 ug/L .000 .575 2.39 ug

RPD = 1.21

*** Sample ID: sb #8 Seq: 95 16:35:18 01 Nov 1999 HG

Hg -.011 ug/L .000 -.011 ~~<0.2 ug~~ <0.1 ug/L

*** Sample ID: sb #8dup Seq: 96 16:37:35 01 Nov 1999 HG

Hg -.011 ug/L .000 -.011 ~~<0.2 ug~~ <0.1 ug/L

RPD = N/A

*** Sample ID: sb #11 Seq: 97 16:39:52 01 Nov 1999 HG

Hg .046 ug/L .000 .046 ~~<0.2 ug~~ <1.21 ug/L

*** Sample ID: sb#11dup Seq: 98 16:42:09 01 Nov 1999 HG

Hg .041 ug/L .000 .041 <1.21 ug/L

*** Sample ID: sb #11 smp Seq: 99 16:44:26 01 Nov 1999 HG

Hg .037 ug/L .000 .037 <1.21 ug/L

*** Sample ID: sb #16 Seq: 100 16:46:44 01 Nov 1999 HG

Hg .224 ug/L .000 .224 1.66 ug/L

*** Sample ID: sb #16dup Seq: 101 16:49:02 01 Nov 1999 HG

Hg .229 ug/L .000 .229 1.63 ug/L

RPD = 2.16%

*** Sample ID: sb#16spk Seq: 102 16:51:18 01 Nov 1999 HG

Hg 1.26 ug/L .000 1.26 103%

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: ccb					Seq: 103	16:53:36 01 Nov 1999 HG		
Hg	-.020	ug/L	.000	-.020			<0.2 µg/L	
*** Sample ID: ccv					Seq: 104	16:55:53 01 Nov 1999 HG		
Hg	2.02	ug/L	.000	2.02			101%	

Dry Weight Results

Dry Weight/Total Volatile Solids (TVS) Notebook # 5

Sample Number	[redacted]			BMP →		
Client/Pan #	#1 RUN #1	#2 RUN#2	#3 RUN#3	#4 RUN#1	#5 RUN#2	#6 RUN#3
Wt of Pan + Sample	26.1368 ~~25.4740~~	24.4101	25.4543	25.5202	28.2050	26.9918
Wt after Drying	24.8686	23.[illegible]208	24.2961	24.2684	26.6654	25.7205
Wt of Pan or Wt After Ignition	2.6212	2.6074	2.6124	2.6235	2.6033	2.6197
Difference	22.2474	20.7134	21.6837	21.6449	24.0621	23.1008
Sample amount g	23.5156	21.8027	22.8419	22.8967	25.6017	24.3721
Result	[illegible]	[illegible]	[illegible]	94.5%	94.0%	94.8%

Sample Number						
Client/Pan #						
Wt of Pan + Sample						
Wt after Drying						
Wt of Pan or Wt After Ignition						
Difference						
Sample amount g						
Result						

Sample Number					Batch Number:
Client/Pan #					3395
Wt of Pan + Sample					Note: Samples not logged in
Wt after Drying					
Wt of Pan or Wt After Ignition					
Difference					
Sample amount g					
Result					

Analyst: JDB Date: 10/18/99

TestAmerica

Chemical Lot Numbers

TestAmerica
INCORPORATED

Chemical Lot Numbers as Provided by METCO Environmental

Manufacturer	Chemical	Lot Numbers
Fisher	30 % Hydrogen Peroxide	972983 981384 964291A
EM Science	Nitric Acid	B20714
Fisher	Water (HPLC Grade)	981810 986952 984006
EM Science	Sulfuric Acid	35090
Fluka	Potassium Chloride	380440/1 35298
Fluka	Potassium Permanganate	351262/1 22799 351262/1 43596

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

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: 188431
Received: 24-NOV-99
Reported: 16-DEC-99

PURCHASE ORDER: 79-95-BRM1

Project Description: Penn Power-Shipping Port Unit #1

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Run 1 Coal Comp (BMP HG)						
Lab Sample: 1384796						
sampled: 21-SEP-99 15:30						
Moisture, Total	5.49		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	11.4	12.1	%	D 3174	08-DEC-99	VJO
Sulfur	4.05	4.29	%	D 4239	08-DEC-99	VJO
Heating Value	12440	13160	BTU/lb	D 3286	02-DEC-99	VJO
Chloride, Total	0.08	0.08	%	E776/300.0	14-DEC-99	DRK
Run 2 Coal Comp (BMP HG)						
Lab Sample: 1384797						
sampled: 21-SEP-99 20:15						
Moisture, Total	5.98		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	8.06	8.57	%	D 3174	08-DEC-99	VJO
Sulfur	4.27	4.54	%	D 4239	08-DEC-99	VJO
Heating Value	12860	13680	BTU/lb	D 3286	02-DEC-99	VJO
Chloride, Total	0.07	0.07	%	E776/300.0	14-DEC-99	DRK
Run 3 Coal Comp (BMP HG)						
Lab Sample: 1384798						
sampled: 22-SEP-99 11:45						
Moisture, Total	5.42		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	10.6	11.2	%	D 3174	08-DEC-99	VJO
Sulfur	4.35	4.60	%	D 4239	08-DEC-99	VJO
Heating Value	12520	13240	BTU/lb	D 3286	02-DEC-99	VJO

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

Client: METCO Environmental
Project: 188431

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Run 3 Coal Comp (BMP HG)						
Lab Sample: 1384798 - continued						
Chloride, Total	0.08	0.08	%	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#:188433,188435,188427,188429,188431

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		
1384796-Ash					12.2	12.0	1.7	11.8	11.9	101	N/A	0.01
1384797-Sulfur					4.52	4.58	1.32	1.78	1.77	99	N/A	0.01
1384797-Heating Value					13710	13686	0.17	13350	13410	100	N/A	50
1384797-Chlorine					0.07	0.08	13	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) 821-9667

UNIT #1

155431

Report Results To:	
PO # 79-95-BRM1 Job ID PENN POWER-SHIPPINGPORT	
Name	DOUG SAOTHOFF
Company	METCO ENVIRONMENTAL
Mailing Address	P.O. BOX 598
City	ADDISON State TX Zip 75025
Telephone #	972/931/7127 Fax # 972/931/3398

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

Page 1 of 1

PAS Quote#

Sample Container Information

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

Analysis Requested

Sampled by:

	SAMPLE DESCRIPTION	Air Vol. (L or m/n)	Matrix Type	Date Sampled	Time Sampled	BTU CONTENT	FLY ASH	SULFUR	CHLORIDE	ASTM-D-3286	ASTM-D-3174	ASTM-D-5016	ASTM-?
1.	RUN 1 COAL comp.			9/21/99	1530	X	X	X	X				
2	RUN 2 COAL comp.			9/21/99	2015	X	X	X	X				
3	RUN 3 COAL comp.			9/22/99	1145	X	X	X	X				
4													
5													
6	* SEE ATTACHED												
7	INSTRUCTIONS												
8	→												
9													
10													

Comments/Hazards/Location Details

ATTN: CHRIS WEATHINGTON
TEST AMERICA, INC.
3601 S. DIXIE DRIVE
DAYTON, OH 45439
PH: 1-800-572-9839
* AFTER SAMPLE HAS BEEN PREPPED, PLEASE RETURN A 4 oz. JAR SAMPLE TO TEST AMERICA AT THE ABOVE ADDRESS! THANK YOU!

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

Samples relinquished to shipper or courier by:	Date 11-19-99	Time 1600	
Samples received by:	Date	Time	

Samples Relinquished by:	Samples Relinquished to:	Date	Time
Samples Relinquished by:	Samples Relinquished to Laboratory:	Date 11/24/99	Time 1000

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:

Bags labelled "BMP HG" 11.24.99

D-76

TOTAL P.06

^ 12/11/99 + page 1

Mixer SAMPLE ID:

188431

1384796

		INPUT AIR DRY	AS RECEIVED	DRY BASIS
AIR DRY LOSS:	%	4.94	4.94 > 5.49	****
MOISTURE:	%	0.58	0.55	****
VOLATILE MATTER:	%	0.00	0.00	0.00
FIXED CARBON:	%	****	83.10	87.93
ASH:	%	12.00	11.41	12.07
PROXIMATE TOTAL:	%	****	100.00	100.00
HEATING VALUE:	BTU/LB	13086	12440	13160
SULFUR:	%	4.26	4.05	4.28
CARBON:	%	0.00	0.00	0.00
HYDROGEN EXCL WATER:	%	0.00	-0.06	-0.07
HYDROGEN INCL WATER:	%	0.00	0.55	****
NITROGEN:	%	0.00	0.00	0.00
CHLORINE:	%	0.00	0.00	0.00
OXYGEN EXCL WATER:	%	****	79.11	83.71
OXYGEN INCL WATER:	%	83.74	83.99	****
ULT TOTAL EXCL WATER:	%	****	100.00	100.00
ULT TOTAL INCL WATER:	%	100.00	100.00	****

^ 12/11/99 + page 1

Metro

#188431

#138479

SAMPLE ID:		INPUT AIR DRY	AS RECEIVED	DRY BASIS
AIR DRY LOSS:	%	5.51	5.51 > 5.98	****
MOISTURE:	%	0.50	0.47	****
VOLATILE MATTER:	%	0.00	0.00	0.00
FIXED CARBON:	%	****	85.96	91.43
ASH:	%	8.53	8.06	8.57
PROXIMATE TOTAL:	%	****	100.00	100.00
HEATING VALUE:	BTU/LB	13608	12860	13680
SULFUR:	%	4.52	4.27	4.54
CARBON:	%	0.00	0.00	0.00
HYDROGEN EXCL WATER:	%	0.00	-0.05	-0.06
HYDROGEN INCL WATER:	%	0.00	0.62	****
NITROGEN:	%	0.00	0.00	0.00
CHLORINE:	%	0.00	0.00	0.00
OXYGEN EXCL WATER:	%	****	81.74	86.94
OXYGEN INCL WATER:	%	86.95	87.05	****
ULT TOTAL EXCL WATER:	%	****	100.00	100.00
ULT TOTAL INCL WATER:	%	100.00	100.00	****

^ 12/11/99 + page 1

Metco

18843/
#1384798

SAMPLE ID:		INPUT AIR DRY	AS RECEIVED	DRY BASIS
AIR DRY LOSS:	%	4.96	4.96 > 5.42	****
MOISTURE:	%	0.48	0.46	****
VOLATILE MATTER:	%	0.00	0.00	0.00
FIXED CARBON:	%	****	84.03	88.85
ASH:	%	11.10	10.55	11.15
PROXIMATE TOTAL:	%	****	100.00	100.00
HEATING VALUE:	BTU/LB	13176	12520	13240
SULFUR:	%	4.58	4.35	4.60
CARBON:	%	0.00	0.00	0.00
HYDROGEN EXCL WATER:	%	0.00	-0.05	-0.05
HYDROGEN INCL WATER:	%	0.00	0.56	****
NITROGEN:	%	0.00	0.00	0.00
CHLORINE:	%	0.00	0.00	0.00
OXYGEN EXCL WATER:	%	****	79.73	84.30
OXYGEN INCL WATER:	%	84.32	84.54	****
ULT TOTAL EXCL WATER:	%	****	100.00	100.00
ULT TOTAL INCL WATER:	%	100.00	100.00	****

Moisture Metco

rev 1.0 - 3/10/99

	Sample #	Tare wt. of Dish (g)	Wet Wt. Sample + Dish (g)	Dry Wt. Sample + Dish	% Moisture	
261	1383831	429.7	1664.5	1575	7.25	11/23/99
	1383832	426	1806.5	1703.3	7.48	
	1383833	429	1718.4	1612.4	8.22	
422	1384771	425.9	1726.9	1669.4	4.42	
	1384772	428.9	1683.7	1615.1	5.47	12/1/99
	1384773	421.5	1749.6	1671.3	5.90	
88423	1384774	428	1292	1234.8	6.62	
	1384775	461.7	1305.4	1250.4	6.52	12/1/99
	1384776	434.3	1271.6	1211.1	7.23	
88425	1387777	433.1	1897.4	1836.2	4.18	
	1384778	423.3	1767	1704.1	4.68	12/1/99
	1384779	436.4	1884.1	1817.9	4.57	
88429	1384792	427.1	757.3	718.8	11.7	
	1384793	427.9	742.2	701.2	13.0	12/1/99
	1384794	431.3	738.8	695.6	14.0	
188431	1384796	431.1	1155.9	1120.1	4.94	
	1384797	429.3	1286.3	1239.1	5.51	12/1/99
	1384798	429.3	1386.2	1338.7	4.96	
188433	1384801	431.9	1827.8	1464.7	26.0	
	1384802	429.6	1826.6	1734.7	6.58	12/1/99
	1384803	425.9	1593.4	1499.2	8.07	

#DIV/0!

Metco-

188429

Metco

188431

Metco-

188433

188435

Metco

Date	Lab No.	Client	BTU/Lbs	BTU/Lbs. Sulfur	BTU/Gals	Remarks	Oper.
12/2/99	1384789	Metco	12330			188427	[illegible]
	1384792	"	11562			"	
	1384793	"	11524			188429	
	1384794	"	11843			"	
	1384796	"	13184			188431	
	1384797	"	13712			"	
Dup.	1384797	"	13686			"	
	1384798	"	13281			"	
	1384795	Kimberly C	09200			188430	
	1384801	Metco	09107			188433	
12/7/99							
	1384755	CER	7240			188418	[illegible]
	1384756	"	7736			"	
	1384757	"	7493			"	
	1384694	Lehigh Univ	18348	18327		188398	
	1384695	"	18437	18418		"	
	1384802	Metco	7523	7523		188433	
	1384803	"	6855			"	
(Dup)	1384803	"	6822			"	
	1384806	"	11971			188435	
	1384807	"	13451			"	
	1384808	"	13407			"	
	1384812	"	10743			188437	
	1384813	"	9924			"	
	1384814	"	10155			"	
(Dup)	1384814	"	10155			"	
	1384908	"	9970			188461	
	1384909	"	10142			"	
	1384910	"	10516			"	
	1384815	Raytheon	Raytheon	18776		188439	
(Dup)	1384910	~~[illegible]~~	10535			188461	
	1384816	Raytheon	18772			188439	
	1384817	"	19556			"	
	1384818	"	19602			"	
	1384819	"	18617			"	
	1385280	Maine Env.	18813			188536	
	1385377	Merck	19399			188553	
	1385401	Budd Co.	~~Kimberly~~	18723		188561	
	1385410	Kimberly Cl.	9257			188565	
(Dup)	1385280	Maine Env.	18398			188536	

Coal/RDF Proximate Analysis

DATE: 12/8/99

Signature: V. O'Neill

CLIENT	Mitco							
Laboratory Number	1384797	1384798	1384801	1384802	1384803	1384806	1384807	1384807 Dupl
all weights in grams								
% Air-dry Loss	5.51	4.96	26.0	6.58	8.07	3.38	3.49	

Coal/RDF Proximate Analysis

DATE: 12/8/99

Signature: V. O'Neill

CLIENT	Control	Mitco						
Laboratory Number	98	1384788	1384789	1384792	1384793	1384794	1384796	1384796 Dupl
all weights in grams								
% Air-dry Loss		9.67	9.21	11.7	13.0	14.0		4.94
Weight of Crucible and Sample	22.9922	19.4649	22.9958	18.7495	21.2418	20.4727	21.5807	18.1269
Weight of Crucible	21.7892	18.3122	21.9190	17.6834	20.2544	19.3866	20.6194	17.1628
Weight of Sample	1.2055	1.1527	1.0768	1.0661	.9874	1.0917	.9613	.9641
Weight of Crucible and Sample	22.9977	19.4649	22.9958	18.7498	21.2418	20.4727	21.5807	18.1269
Weight after 105 deg. C	22.9846	19.4173	22.9560	18.6863	21.1820	20.4330	21.5751	18.1213
Weight loss (moisture)	.0131	.0476	.0390	.0632	.0598	.0447	.0056	.0056
% Residual Moisture	1.05	4.13	3.62	5.93	6.06	4.09	0.58	0.58
Weight of Crucible and Sample								
Weight of Crucible								
Weight of Sample								
Weight of Crucible and Sample								
Weight after 950 deg. C for 7 min.								
Weight loss (Volatiles)								
% Volatiles								
% Residual Moisture								
% Volatile Matter								
Weight after 750 deg. C	21.9328	18.4193	22.4195	17.7499	20.3196	19.4540	20.7347	17.2766
Weight of Crucible	21.7892	18.3122	21.9190	17.6834	20.2544	19.3866	20.6194	17.1628
Weight of Ash	.1436	.1071	.1005	.0665	.0652	.0680	.1170	.1138
% Ash	11.9	9.29	9.33	8.11	6.60	6.41	[illegible]	[illegible]

DATE/ TIME	SAMPLE #	SAMPLE WT. (g)	ANALYST	DATE/ TIME	$AgNO_3$ (ml)	mv readings	1st DERIV-ATIVE	2nd DERIV-ATIVE	END POINT (ml)	NORMALITY of $AgNO_3$ and Standardization Reference	BLANK CORRECT	% CHLORINE	ANALYST
12/8/99	1384794 188429	50/0.5532	RAD			2044 mg/l ×		50/0.5532	× .0001	= 0.02 % chlorine			
	1384796 188431	50/0.5289				8.809 mg/l		× 50/0.5289	× .0001	= 0.08 % chlorine			
	1384797 188731	50/0.5178				6.825 mg/l		× 50/0.5178	× .0001	= 0.07 % chlorine			
	1384787 Dup	50/0.5039				8.022 mg/l		× 50/0.5039	× .0001	= 0.08 % chlorine			
	1384798	50/0.5708				9.145 mg/l		× 50/0.5708	× .0001	= 0.08 % chlorine			

TestAmerica
INCORPORATED

Sample ID: **Penn Power**
Bruce Mansfield Plant
Shippingport, PA
Coal Samples

Hg Analysis
ASTM D6414-99

Collected On: 9/21/99 for Run 1 and Run 2, 9/22/99 for Run 3 Composite
Collected By: METCO

	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Units	Dry Weight (%)	Flags	Notes
Run 1 Composite	12/20/99	12/21/99	jpp	0.096	0.097	<1.0	ug/g	100		
Run 2 Composite	12/20/99	12/21/99	jpp	0.079	0.079	<1.0	ug/g	100	*1	
Run 3 Composite	12/20/99	12/21/99	jpp	0.103	0.104	<1.0	ug/g	99.9		

Notes: *1 - Sample was analyzed in triplicate. The triplicate result was 0.082 ug/g with an RPD of 2.5 %.

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 Davis 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

Job#99-95-BRM1 Unit Tested Number 1

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
Penn Power
Bruce Mansfield
Shippingport, PA.

Collected By/Company
EL/First Energy

Fuel Sample / Sludge Samples / Slurry Samples SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	Ash Content	Sulfur Metals	Hg	Chlorine	Heating Value	REMARKS (Specific Compounds/Methods)
Run 1 Coal Composite	9/21/99	1530			✓		1	EL							✓	✓	✓	✓	✓	Analyze per Instruction
Run 2 Coal Composite	9/21/99	2015			✓		1	EL							✓	✓	✓	✓	✓	
Run 3 Coal Composite	9/22/99	1145			✓		1	EL							✓	✓	✓	✓	✓	
1B Sludge	9/21/99	1249				✓	1	EL									✓			
1B Sludge	9/22/99	1000				✓	1	EL									✓			
U1 Lime Slurry	9/21/99	1300				✓	1	EL									✓			
U1 Lime Slurry	9/22/99	1030				✓	1	EL									✓			

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
			Shane Lee	9/25/99	1400	[illegible]	9/25/99	14:00
Analyzed by:	Date:	Time:	Data Reviewed by:	Date:	Time:	Remarks:		

Ship to: Test America

METCO ENVIRONMENTAL

PHILIP ANALYTICAL SERVICES

Chain of Custody Record

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

UNIT #1

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

Report Results To:

PO # 79-95-BRM1 Job ID PENN POWER-SHIPPINGPORT
Name DOUG SAOTHOFF
Company METCO ENVIRONMENTAL
Mailing Address P.O. BOX 598
City ADDISON State TX Zip 75025
Telephone # 972/931/7127 Fax # 972/931/3398

Send Invoice To:

Name SAME Telephone #
Company/ Dept.
Mailing Address
City State Zip
Credit Card # Exp. Date

Analysis Requested: BTU CONTENT, FLY ASH, SULFUR, CHLORIDE, ASTM-D-3286, ASTM-D-3174, ASTM-D-5016, ASTM-?

Page 1 of 1
PAS Quote#

Sampled by:

	SAMPLE DESCRIPTION	Air Vol. (L or min)	Matrix Type	Date Sampled	Time Sampled	BTU CONTENT	FLY ASH	SULFUR	CHLORIDE									
1.	RUN 1 COAL COMP.			9/21/99	1530	X	X	X	X									
2	RUN 2 COAL COMP.			9/21/99	2015	X	X	X	X									
3	RUN 3 COAL COMP.			9/22/99	1145	X	X	X	X									
4																		
5																		
6	* SEE ATTACHED																	
7	INSTRUCTIONS																	
8	→																	
9																		
10																		

Comments/Hazards/Location Details

ATTN: CHRIS WEATHINGTON
TEST AMERICA, INC.
3601 S. DIXIE DRIVE
DAYTON, OH 45439
PH: 1-800-572-9839
* AFTER SAMPLE HAS BEEN PREPPED, PLEASE RETURN A 4 oz. JAR SAMPLE TO TEST AMERICA AT THE ABOVE ADDRESS! THANK YOU!

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

Samples relinquished to shipper or courier by: [signature] Date 11-19-99 Time 1600
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:

HSRACK # 122199Y

COALS

NONAQUEOUS MERCURY BATCH SHEET

Analyst: JRP Date: 12/20/99 Water Bath: start mid end

Standard Reference: 65-41-17 (12/21/99) temp:

ICV Reference: 65-41-18 date:

% DW	Sample # / Client	Weight	MS	MSD
95.1	1384801 JRP [redacted]	1.0724 g		
76.7	1384802 JRP	1.0031 g		
76.8	1384803	1.0423 g		
84.2	1384908 [redacted]	1.0150 g		
88.2	1384909	1.0678 g		
88.7	1384910	1.0018 g		
95.0 ~~96.5~~	1384787 [redacted]	1.0110 g		
96.5	1384788	1.0059 g		
97.0	1384789	1.0816 g		
100	1384796 BMP-Hg	1.0090 g		
100	1384797 JRP	1.0203 g		
99.9	1384798 JRP	1.0674 g		
92.9	1384774 [redacted]	1.0772 g		
93.8	1384775	1.0734 g		
94.2	1384776	1.0350 g		
86.5	1386554 [redacted]	1.0768 g		
83.5	1386555	1.0290 g		
83.4	1386556	1.0095 g		
	NIST 1630 A	1.0044 g		
	Blank			

MB

ICV

MS

MSD

RPD

FLAG

HNO_3 - 65-48-14
HCl - 65-46-1
$KMnO_4$ - 65-33-1
12/21 JRP ~~$SnCl_2$ - 65-50-6~~
NH_2OH - 65-50-6
$SnCl_2$ - 65-50-16

SECONDARY DATA CHECK: analyst:
date:

Comments:

[illegible]

[illegible]	Entered [illegible]	Weight	Volume	Macro	Cross	Help
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
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[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			

1:5

1:5

1:5

1:5

NO DIL

NO DIL

NO DIL

NO DIL

NO DIL

NO DIL

1:5

1:5

NO OIL

NO OIL

1:5 (= 1.44 mg/L)

1:5

Protocol: SYSTEST

Rev: 3.001 Time: 18:21:11 21 Dec 1999

Folder: DEC99C Seq: 144 Print: On

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

State: Idle Xmit: Off Autosampler: On

CALIBRATION: Line Calibration

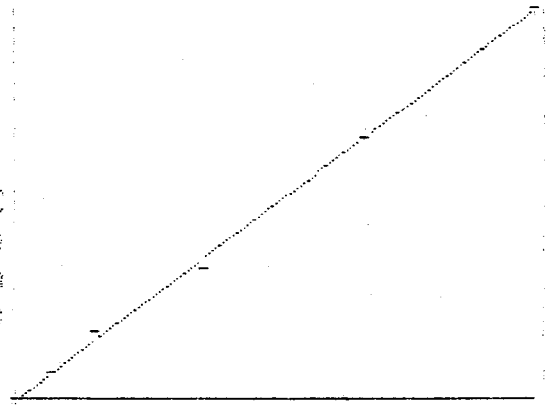
Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear	
S1	.000	-.005	-.005	Quadratic	
S2	.200	.192	-.008	WtdLinear	
S3	.500	.456	-.044		C
S4	1.00	1.00	.077	Accept	o
S5	2.00	2.00	.001		n
S6	3.00	2.98	-.021	StdAdd	c

A .0000000 r .999383

B 2.39812e-5 C -3.11581e-2

	Mean	%RSD	
S1	1096	0	1096
S2	9335	0	9335
S3	28394	0	28394
S4	46366	0	46366
S5	85828	0	85828
S6	125926	0	125926



New calibration coefficients stored 149 2 5

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.0002 mg/L
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.0002 mg/L
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.0002 mg/L
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.091 mg/kg
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TV = 0.106 ± 0.032	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.090 µg/g
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TV = 0.100 ± 0.032	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NODATA
[illegible]	[illegible]	[illegible]	[illegible]	1:5	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.222 µg/g
[illegible]	[illegible]	[illegible]	[illegible]	1:5	[illegible]	[illegible]	[illegible]	RPD = 3.3%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.208 µg/g
[illegible]	[illegible]	[illegible]	[illegible]	1:5	[illegible]	[illegible]	[illegible]	RPD = <1.0%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.225 µg/g
[illegible]	[illegible]	[illegible]	[illegible]	1:5	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.180 µg/g
[illegible]	[illegible]	[illegible]	[illegible]	1:5	[illegible]	[illegible]	[illegible]	RPD = <1.0%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	~~0.180 µg/g~~

1:5

TV=1.0 99.8%

[redacted] 1:5

0.362 µg/g

1:5 RPD = <1.0%

0.365 µg/g

[redacted] 1:5

0.110 µg/g

1:5 RPD = 2.6%

0.113 µg/g

[redacted] 1:5

0.102 µg/g

1:5 RPD = 3.8%

0.106 µg/g

[redacted] 1:5

0.098 µg/g

1:5 RPD = 1.7%

0.099 µg/g

1:5

[redacted]

NO DATA

0.022 µg/g

RPD = <1.0%

0.022 µg/g

		1:S			NO DATA			
		[redacted]			0.039 µg/g			
						RPD = <1.0%		
					0.039 µg/g			
		[redacted]						
					0.024 µg/g			
						RPD = 2.1%		
					~~0.025 µg/g~~			
		BMP 1:S						
					0.096 µg/g			
		1:S				RPD = <1.0%		
					0.097 µg/g			
					<0.2 µg/L			
				TV = 2.00	99%			
		BMP 1:S						
					0.079 µg/g			
		1:S				RPD = <1.0%		
					0.079 µg/g			
		1:S				RPD = 2.5%		
					0.082 µg/g			

BMP 1:5

NO DATA

0.103 µg/g ~~0.516 µg/g~~ 1/6/00

RPD = <1.0%

0.104 µg/g ~~0.520 µg/g~~ 1/6/00

1:5

TV = 1.0

100%

[redacted] 1:5

0.134 µg/g

1:5

RPD = <1.0%

0.133 µg/g

[redacted] 1:5

0.142 µg/g

1:5

RPD = 1.0%

0.143 µg/g

[redacted] 1:5

0.141 µg/g

1:5

RPD = <1.0%

0.139 µg/g

[redacted] 1:5

0.287 µg/g

1:5

RPD = <1.0%

0.287 µg/g

0.290 µg/g

RPD = <1.0%

0.291 µg/g

1:5

0.287 µg/g

RPD = 2.7%

~~0.280 µg/g~~

<0.0002 mg/L

TV = 2.00 100%

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

Sample Number/ Test (DW/TVS)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Client/Pan #	LAWRENCE 17 R1	18 R2	19 R3	MICHIGAN 20 R1	21 DUP [illegible]	22 R2
Wt of Pan + Sample	8.9951	9.2612	8.5994	9.1860	8.0610	8.7108
Wt after Drying	8.5997	8.7743	8.2963	7.[illegible]95	8.5274	7.3689
Wt of Pan or Wt After Ignition	0.9808	0.9770	0.9[illegible]	0.9772	0.9776	0.9794
Difference	7.6189	7.7973	7.3158	6.8223	7.5498	6.3895
Sample amount g	8.0143	8.2842	7.6189	8.2088	9.0834	7.7314
Result	[illegible] %	94.1 %	96.0 %	[illegible] %	[illegible] %	[illegible] %

Sample Number/ Test (DW/TVS)	[illegible]	[illegible]	[illegible]	[illegible]	1384796	1384797
Client/Pan #	MICHIGAN 23 R3	LACHONE 24 R1	25 R2	6 R3	BMP HG 27 R1	28 R2
Wt of Pan + Sample	11.1414	8.6880	8.6[illegible]0	8.6025	6.3006	9.2582
Wt after Drying	9.4832	7.4730	7.7521	7.7375	6.3018	9.2572
Wt of Pan or Wt After Ignition	0.9827	0.9[illegible]00	0.9778	0.9789	0.9820	0.9842
Difference	8.5005	6.4930	6.7743	6.7586	5.3198	8.2730
Sample amount g	10.[illegible]87	7.7080	7.6362	7.6236	5.3186	8.2740
Result	85.7 %	89.2 %	88.7 %	88.7 %	100.0 %	100.0 %

Sample Number/ Test (DW/TVS)	1384798	138[illegible]	[illegible]471	138[illegible]772
Client/Pan #	BMP HG 29 R3	CINERGY 30 R1	31 DUP R1	32 R2
Wt of Pan + Sample	8.2005	9.0194	8.7[illegible]25	7.3404
Wt after Drying	8.1950	8.3329	7.[illegible]9414	6.6936
Wt of Pan or Wt After Ignition	0.9863	0.9840	0.9868	0.9865
Difference	7.2087	7.3489	6.9546	5.7071
Sample amount g	7.2142	8.[illegible]354	7.8057	6.3539
Result	99.9 %	[illegible] %	89.1 %	89.8 %

Batch Number —
TVS -
DW - 3395

Note:
METCO COALS
- CONTD -

TestAmerica INCORPORATED

Analyst: RP Date: 12/21/99

APPENDIX E

Unit Operational Data

BMP Hg Testing
Run #1

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

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LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

[redacted]	[redacted] 1A SO2	[redacted] 1A NOX	[redacted] 1A CO2	[redacted] 1AGASFLO	[redacted] DAB HG
09/21/99 12:20:00	96	174	10.2	1050	849.6
12:21:00	94	175	10.2	1055	847.4
12:22:00	94	173	10.3	1073	848.8
12:23:00	94	173	10.2	1059	846.1
12:24:00	97	174	10.2	1050	846.1
12:25:00	97	174	10.2	1048	847.0
12:26:00	98	175	10.3	1064	848.1
12:27:00	99	174	10.2	1052	848.0
12:28:00	99	174	10.2	1062	848.4
12:29:00	98	173	10.2	1055	848.2
12:30:00	99	174	10.2	1055	847.7
12:31:00	98	173	10.2	1052	848.0
12:32:00	99	172	10.1	1060	846.0
12:33:00	100	172	10.2	1053	846.9
12:34:00	102	172	10.1	1065	847.8
12:35:00	101	171	10.1	1061	846.9
12:36:00	102	171	10.1	1051	845.8
12:37:00	102	172	10.1	1049	847.4
12:38:00	105	173	10.1	1063	848.4
12:39:00	107	172	10.1	1062	848.7
12:40:00	104	173	10.1	1077	849.2
12:41:00	101	172	10.1	1070	847.5
12:42:00	98	173	10.0	1079	846.2
12:43:00	98	173	10.0	1051	846.3
12:44:00	101	173	10.0	1077	847.1
12:45:00	100	174	10.0	1061	845.3
12:46:00	98	174	10.0	1057	845.9
12:47:00	96	175	10.0	1065	844.7
12:48:00	98	175	10.0	1065	848.2

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 12:49:00	99	177	10.0	1061	846.3
12:50:00	99	176	10.0	1076	845.6
12:51:00	97	175	10.1	1053	849.1
12:52:00	97	175	10.1	1075	846.6
12:53:00	99	174	10.0	1066	845.3
12:54:00	100	175	10.1	1067	846.8
12:55:00	99	174	10.1	1084	846.5
12:56:00	98	174	10.1	1070	846.9
12:57:00	96	174	10.0	1070	849.0
12:58:00	95	174	10.0	1070	847.7
12:59:00	96	174	10.0	1073	846.5
13:00:00	97	174	10.0	1088	846.4
13:01:00	95	174	10.0	1071	846.2
13:02:00	93	174	10.0	1076	847.7
13:03:00	95	175	10.1	1062	849.7
13:04:00	96	174	10.1	1077	849.1
13:05:00	95	174	10.1	1070	848.5
13:06:00	91	174	10.0	1054	849.1
13:07:00	90	174	10.0	1064	847.8
13:08:00	93	174	10.0	1073	847.9
13:09:00	92	173	10.0	1033	845.9
13:10:00	93	173	10.0	1038	847.8
13:11:00	92	172	10.0	1081	849.3
13:12:00	89	172	10.0	1066	849.7
13:13:00	93	172	10.1	1067	850.6
13:14:00	94	173	10.2	1074	847.8
13:15:00	94	174	10.2	1072	847.6
13:16:00	96	173	10.2	1086	848.2
13:17:00	97	172	10.2	1094	851.0

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 13:18:00	97	173	10.2	1079	849.9
13:19:00	96	173	10.2	1071	849.7
13:20:00	96	172	10.2	1091	850.4
13:21:00	95	172	10.2	1080	849.9
13:22:00	91	173	10.1	1069	848.2
13:23:00	90	174	10.1	1093	850.0
13:24:00	90	174	10.1	1081	850.4
13:25:00	90	174	10.1	1080	850.3
13:26:00	89	173	10.0	1091	848.8
13:27:00	87	174	10.0	1086	848.0
13:28:00	88	173	9.9	1079	847.5
13:29:00	89	173	10.0	1077	848.8
13:30:00	90	172	10.0	1081	850.2
13:31:00	91	172	10.1	1084	849.8
13:32:00	89	173	10.1	1083	850.6
13:33:00	89	173	10.1	1081	850.7
13:34:00	89	174	10.0	1077	849.0
13:35:00	91	174	10.0	1080	849.9
13:36:00	90	174	10.0	1088	849.8
13:37:00	90	174	10.0	1088	849.9
13:38:00	89	173	10.0	1080	850.2
13:39:00	88	174	10.0	1090	849.8
13:40:00	88	174	10.0	1068	849.2
13:41:00	88	175	10.0	1085	851.7
13:42:00	87	175	10.0	1084	852.0
13:43:00	87	175	10.0	1081	851.9
13:44:00	87	176	10.0	1073	850.2
13:45:00	86	175	10.0	1083	851.3
13:46:00	86	175	10.0	1080	850.0

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

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LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 13:47:00	84	174	10.0	1088	850.3
13:48:00	83	175	10.1	1089	849.9
13:49:00	85	176	10.1	1079	849.0
13:50:00	87	176	10.1	1091	848.8
13:51:00	87	175	10.0	1091	847.0
13:52:00	84	175	10.0	1079	850.4
13:53:00	82	178	10.0	1082	851.8
13:54:00	82	177	9.9	1084	850.8
13:55:00	83	178	9.9	1083	850.1
13:56:00	81	180	9.9	1084	851.7
13:57:00	81	180	10.0	1094	849.0
13:58:00	82	180	9.9	1092	848.1
13:59:00	83	181	9.9	1090	849.6
14:00:00	83	181	9.9	1097	850.3
14:01:00	83	181	9.9	1086	848.8
14:02:00	80	180	9.9	1094	848.5
14:03:00	80	180	9.9	1106	850.0
14:04:00	78	181	9.9	1088	850.7
14:05:00	78	181	9.9	1089	847.0
14:06:00	78	180	9.9	1082	848.2
14:07:00	77	181	10.0	1085	849.2
14:08:00	77	181	10.0	1096	850.6
14:09:00	77	180	10.0	1166	849.6
14:10:00	77	180	9.9	1169	849.3
14:11:00	77	179	10.0	1082	849.5
14:12:00	76	176	9.9	1084	852.3
14:13:00	74	177	9.9	1100	849.1
14:14:00	75	177	9.9	1082	848.6
14:15:00	78	176	9.9	1077	847.8

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

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LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99					
14:16:00	80	177	10.0	1079	848.5
14:17:00	81	178	10.0	1080	850.3
14:18:00	80	177	10.0	1079	848.5
14:19:00	80	177	10.0	1072	847.0
14:20:00	81	175	10.1	1070	851.6
14:21:00	80	175	10.1	1072	850.6
14:22:00	78	174	10.1	1068	849.9
14:23:00	79	174	10.1	1085	849.0
14:24:00	82	173	10.1	1073	850.1
14:25:00	82	174	10.2	1079	850.5
14:26:00	81	174	10.1	1085	848.7
14:27:00	81	174	10.1	1084	848.1
14:28:00	78	175	10.1	1069	849.0
14:29:00	79	175	10.1	1063	848.7
14:30:00	80	175	10.1	1064	847.5
14:31:00	80	175	10.1	1079	849.3
14:32:00	81	175	10.1	1075	849.6
14:33:00	79	175	10.2	1072	850.2
14:34:00	79	174	10.2	1078	849.7
14:35:00	80	175	10.2	1095	849.5
14:36:00	82	175	10.2	1076	849.0
14:37:00	81	175	10.2	1091	847.9
14:38:00	81	177	10.2	1085	848.2
14:39:00	78	179	10.2	1100	849.3
14:40:00	79	178	10.1	1094	851.8
14:41:00	78	181	10.2	1099	851.9
14:42:00	77	180	10.2	1089	852.4
14:43:00	77	178	10.2	1083	848.8
14:44:00	80	173	10.3	1081	848.0

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 14:45:00	84	173	10.5	1080	840.8
14:46:00	85	172	10.5	1075	852.5
14:47:00	84	172	10.4	1078	850.8
14:48:00	88	173	10.4	1076	843.2
14:49:00	92	174	10.7	1084	849.1
14:50:00	91	174	10.4	1073	851.8
14:51:00	93	173	10.4	1084	851.3
14:52:00	95	172	10.5	1094	851.2
14:53:00	93	172	10.5	1073	851.3
14:54:00	96	172	10.5	1093	848.5
14:55:00	99	172	10.6	1081	848.0
14:56:00	98	173	10.5	1092	847.4
14:57:00	93	175	10.3	1096	849.3
14:58:00	91	176	10.2	1089	851.1
14:59:00	89	176	10.1	1097	854.9
15:00:00	88	177	10.0	1099	852.4
15:01:00	88	176	10.0	1107	851.0
15:02:00	87	176	10.1	1094	851.1
15:03:00	83	176	10.2	1099	849.7
15:04:00	85	176	10.3	1100	849.6
15:05:00	87	178	10.3	1104	850.0
15:06:00	88	176	10.2	1108	852.2
15:07:00	88	176	10.2	1116	852.3
15:08:00	85	177	10.3	1122	850.6
15:09:00	83	167	9.4	1128	852.3
15:10:00	79	168	9.4	1133	852.7
	89 (m)	175	10.1 (m)	1080	849.0

BMP HG TESTING
RUN # 1

TEST
CO DATA

Snapshot Values/Averages
PVR

Scrubber

PV RETRIEVAL REQUEST

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PAGE 1

LEGEND: ^ = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
09/21/99 12:20:00	696.0	320.5	121.3	6271	627.3	849.6
12:21:00	695.4	320.5	121.5	6257	631.8	847.4
12:22:00	695.3	320.5	121.5	6238	630.9	848.8
12:23:00	695.5	320.5	121.3	6246	633.3	846.1
12:24:00	694.8	320.5	121.3	6257	629.4	846.1
12:25:00	693.7	320.5	121.6	6270	633.9	847.0
12:26:00	693.0	320.7	121.5	6295	628.3	848.1
12:27:00	692.4	321.0	121.5	6293	634.9	848.0
12:28:00	692.3	321.1	121.3	6282	633.3	848.4
12:29:00	692.2	321.1	121.3	6260	628.6	848.2
12:30:00	692.8	321.1	121.5	6261	628.0	847.7
12:31:00	697.0	321.0	121.7	6260	630.1	848.0
12:32:00	701.5	320.8	121.4	6264	637.1	846.0
12:33:00	700.3	320.6	121.5	6282	637.9	846.9
12:34:00	697.7	320.5	121.7	6285	637.9	847.8
12:35:00	699.3	320.5	121.6	6296	636.2	846.9
12:36:00	698.2	320.4	121.5	6293	637.8	845.8
12:37:00	697.8	320.4	121.5	6292	637.6	847.4
12:38:00	697.9	320.3	121.5	6285	636.9	848.4
12:39:00	697.9	320.3	121.5	6276	636.3	848.7
12:40:00	698.6	320.0	121.3	6281	637.1	849.2
12:41:00	699.0	319.9	121.5	6272	639.8	847.5
12:42:00	699.8	319.9	121.3	6265	637.1	846.2
12:43:00	699.6	319.9	121.3	6275	634.6	846.3
12:44:00	699.8	319.9	121.5	6280	638.5	847.1
12:45:00	699.6	320.0	121.3	6278	637.6	845.3
12:46:00	699.1	319.9	121.4	6281	633.3	845.9
12:47:00	698.9	320.0	121.3	6285	634.7	844.7
12:48:00	699.0	319.9	121.0	6285	637.6	848.2

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 12:49:00	698.4	319.9	120.9	6295	640.3	846.3
12:50:00	698.4	319.7	121.2	6294	637.7	845.6
12:51:00	698.4	319.5	121.3	6293	637.7	849.1
12:52:00	700.3	319.2	121.2	6298	638.4	846.6
12:53:00	700.2	319.3	121.3	6285	644.4	845.3
12:54:00	700.1	319.1	121.3	6287	639.0	846.8
12:55:00	700.8	319.0	121.5	6283	637.2	846.5
12:56:00	700.6	319.0	121.3	6285	640.0	846.9
12:57:00	700.7	319.3	121.0	6292	643.9	849.0
12:58:00	700.1	319.0	120.9	6295	641.2	847.7
12:59:00	700.1	319.0	120.9	6291	639.5	846.5
13:00:00	700.0	319.1	121.0	6281	639.1	846.4
13:01:00	701.2	318.9	121.3	6279	645.4	846.2
13:02:00	701.3	318.9	121.4	6291	642.8	847.7
13:03:00	700.1	318.9	121.3	6286	643.9	849.7
13:04:00	701.5	319.0	121.1	6286	642.7	849.1
13:05:00	698.6	319.0	121.3	6299	642.7	848.5
13:06:00	699.0	319.0	120.9	6294	645.6	849.1
13:07:00	698.0	318.9	121.3	6290	640.2	847.8
13:08:00	698.1	319.0	121.3	6302	645.2	847.9
13:09:00	698.3	319.1	121.3	6294	640.5	845.9
13:10:00	698.2	319.2	121.3	6284	645.7	847.8
13:11:00	699.4	319.6	121.3	6288	641.6	849.3
13:12:00	699.6	319.7	121.5	6291	638.1	849.7
13:14:00	699.8	320.0	121.5	6281	647.7	850.6
13:15:00	699.4	320.0	121.6	6280	642.3	847.8
13:16:00	699.7	320.1	121.5	6286	640.7	847.6
13:17:00	699.8	320.0	121.5	6291	646.0	848.2
13:18:00	700.4	319.9	121.7	6312	647.2	851.0

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 13:19:00	703.8	320.0	121.5	6313	649.1	849.9
13:20:00	703.5	320.2	121.7	6309	644.1	849.7
13:21:00	700.1	320.2	121.5	6303	644.0	850.4
13:22:00	699.7	320.3	121.3	6295	649.4	849.9
13:23:00	698.6	320.3	121.5	6282	646.6	848.2
13:24:00	699.0	320.3	121.5	6274	645.7	850.0
13:25:00	698.6	320.3	121.7	6283	643.6	850.4
13:26:00	697.7	320.4	121.3	6280	639.5	850.3
13:27:00	696.7	320.2	121.5	6276	650.2	848.8
13:28:00	696.9	320.3	121.5	6284	644.7	848.0
13:29:00	697.3	320.3	121.4	6294	648.6	847.5
13:30:00	698.5	320.2	121.6	6304	645.7	848.8
13:31:00	698.4	319.7	121.3	6305	651.2	850.2
13:32:00	698.9	319.7	121.5	6300	650.9	849.8
13:33:00	698.8	319.6	121.6	6297	647.4	850.6
13:34:00	699.2	319.6	121.3	6292	646.5	850.7
13:35:00	699.4	319.8	121.5	6272	647.6	849.0
13:36:00	699.0	319.8	121.3	6274	653.0	849.9
13:37:00	699.7	319.7	121.5	6278	648.0	849.8
13:38:00	699.5	319.7	121.5	6286	645.0	849.9
13:39:00	699.3	319.7	121.5	6307	646.1	850.2
13:40:00	698.8	319.7	121.3	6312	649.0	849.8
13:41:00	698.9	319.8	121.3	6300	646.1	849.2
13:42:00	699.0	319.8	121.3	6290	650.9	851.7
13:43:00	698.9	319.8	121.4	6283	647.8	852.0
13:44:00	698.4	319.7	121.7	6267	647.4	851.9
13:45:00	699.0	319.7	121.3	6277	650.8	850.2
13:46:00	700.1	319.8	121.5	6296	644.9	851.3
13:47:00	700.1	319.9	121.7	6299	646.2	850.0

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 13:48:00	699.5	320.0	121.5	6301	648.6	850.3
13:49:00	699.2	320.0	121.7	6289	648.2	849.9
13:50:00	699.9	320.2	121.5	6284	644.4	849.0
13:51:00	700.6	320.3	121.5	6289	647.4	848.8
13:52:00	700.7	320.4	121.5	6294	648.2	847.0
13:53:00	700.7	320.2	121.6	6295	653.2	850.4
13:54:00	701.2	320.0	121.5	6283	651.2	851.8
13:55:00	701.3	319.9	121.3	6262	649.3	850.8
13:56:00	700.5	319.9	121.5	6270	643.1	850.1
13:57:00	700.7	320.1	121.5	6282	655.8	851.7
13:58:00	700.6	319.9	121.5	6290	650.2	849.0
13:59:00	699.3	320.1	121.3	6305	649.4	848.1
14:00:00	698.0	320.1	121.5	6305	649.6	849.6
14:01:00	697.7	320.2	121.3	6294	648.7	850.3
14:02:00	697.4	320.2	121.3	6283	653.6	848.8
14:03:00	697.7	320.2	121.3	6279	650.8	848.5
14:04:00	697.5	320.2	121.5	6280	652.3	850.0
14:05:00	697.3	320.2	121.3	6273	646.8	850.7
14:06:00	697.6	320.2	121.3	6277	656.5	847.0
14:07:00	697.3	320.1	121.3	6289	647.5	848.2
14:08:00	697.3	320.0	121.5	6309	653.5	849.2
14:09:00	697.0	319.7	121.7	6300	653.6	850.6
14:10:00	696.8	319.5	121.6	6285	650.8	849.6
14:11:00	696.2	319.5	121.5	6279	652.5	849.3
14:12:00	696.3	319.5	121.3	6289	651.5	849.5
14:13:00	696.4	319.5	121.1	6271	652.2	852.3
14:14:00	696.2	319.4	121.3	6270	653.2	849.1
14:15:00	696.2	319.4	121.5	6270	656.0	848.6
14:16:00	696.2	319.5	121.4	6294	649.4	847.8

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 14:17:00	696.1	319.5	121.3	6308	656.2	848.5
14:18:00	696.2	319.5	121.5	6300	653.6	850.3
14:19:00	696.0	319.6	121.7	6290	653.8	848.5
14:20:00	695.6	319.5	121.5	6295	659.7	847.0
14:21:00	695.6	319.5	121.4	6300	653.5	851.6
14:22:00	695.6	319.5	121.6	6281	655.0	850.6
14:23:00	695.6	319.5	121.3	6267	656.1	849.9
14:24:00	696.1	319.5	121.3	6281	655.2	849.0
14:25:00	696.4	319.6	121.8	6282	656.3	850.1
14:26:00	697.3	319.8	122.0	6285	654.5	850.5
14:27:00	698.4	320.0	121.8	6292	655.2	848.7
14:28:00	698.1	320.0	121.6	6298	651.8	848.1
14:29:00	698.5	320.2	121.6	6302	650.7	849.0
14:30:00	698.7	320.2	121.5	6296	656.0	848.7
14:31:00	698.8	320.3	121.7	6287	651.6	847.5
14:32:00	698.9	320.3	121.4	6291	654.5	849.3
14:33:00	700.0	320.3	121.8	6286	657.0	849.6
14:34:00	700.7	320.5	122.0	6285	654.6	850.2
14:35:00	704.1	320.5	122.0	6293	652.8	849.7
14:36:00	704.0	320.9	122.0	6308	650.1	849.5
14:37:00	704.0	321.1	122.0	6307	653.4	849.0
14:38:00	704.5	321.1	121.8	6308	651.7	847.9
14:39:00	703.9	321.1	121.5	6306	651.6	848.2
14:40:00	704.1	321.3	121.7	6290	657.8	849.3
14:41:00	704.0	321.6	122.0	6261	658.1	851.8
14:42:00	704.1	321.7	122.0	6260	656.0	851.9
14:43:00	703.9	321.8	122.0	6271	659.6	852.4
14:44:00	703.9	322.2	122.0	6283	656.5	848.8
14:45:00	703.3	321.9	122.2	6341	652.5	848.0

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 14:46:00	703.9	321.9	122.0	6291	668.7	840.8
14:47:00	704.1	321.7	122.0	6303	637.9	852.5
14:48:00	704.1	321.8	122.0	6336	657.8	850.8
14:49:00	704.0	321.7	122.1	6306	658.8	843.2
14:50:00	703.7	321.6	121.9	6305	657.5	849.1
14:51:00	703.9	321.6	122.1	6297	660.5	851.8
14:52:00	703.7	321.6	122.6	6276	663.0	851.3
14:53:00	703.7	321.6	122.5	6273	662.5	851.2
14:54:00	704.7	321.7	122.4	6290	661.2	851.3
14:55:00	704.3	321.6	122.2	6324	657.1	848.5
14:56:00	704.2	321.5	121.9	6342	661.5	848.0
14:57:00	704.3	321.5	121.8	6339	651.5	847.4
14:58:00	704.1	321.5	122.0	6317	661.7	849.3
14:59:00	703.7	321.5	122.0	6281	657.8	851.1
15:00:00	703.9	321.4	121.9	6252	665.5	854.9
15:01:00	703.3	321.5	122.2	6236	656.4	852.4
15:02:00	703.7	321.7	121.9	6243	660.8	851.0
15:03:00	703.4	321.8	121.9	6275	661.9	851.1
15:04:00	703.4	321.9	121.2	6306	656.1	849.7
15:05:00	703.6	321.9	121.5	6309	657.9	849.6
15:06:00	703.1	322.2	122.0	6315	657.0	850.0
15:07:00	703.3	322.3	122.2	6311	660.5	852.2
15:08:00	703.0	322.3	121.9	6296	661.3	852.3
15:09:00	703.4	322.3	122.0	6281	656.4	850.6
15:10:00	703.5	322.2	121.8	6277	657.4	852.3
15:10:00'	????????	????????	121.9	????????	????????	852.7
			121.5	6288 (170)	647.7	849.0 (171)

BMP Hg TESTING
RUN # 2

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

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PAGE 1

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 17:22:00	61	195	10.0	1110	856.6
17:23:00	63	196	10.1	1107	851.7
17:24:00	63	194	10.1	1089	850.4
17:25:00	63	193	10.2	1086	843.3
17:26:00	62	194	10.2	1094	849.3
17:27:00	61	191	10.0	1078	861.2
17:28:00	61	188	10.0	1081	864.4
17:29:00	62	187	9.9	1070	861.0
17:30:00	63	183	9.9	1096	859.4
17:31:00	66	184	10.0	1085	855.2
17:32:00	69	185	10.2	1075	855.6
17:33:00	71	181	10.2	1095	856.0
17:34:00	69	182	10.2	1098	854.5
17:35:00	66	183	10.1	1098	857.4
17:36:00	62	186	10.0	1097	859.8
17:37:00	61	193	9.9	1092	862.3
17:38:00	64	190	9.9	1109	865.2
17:39:00	66	187	10.1	1117	864.6
17:40:00	69	185	10.2	1100	863.9
17:41:00	72	183	10.3	1098	868.6
17:42:00	73	183	10.5	1085	863.0
17:43:00	71	183	10.4	1092	852.2
17:44:00	65	184	10.2	1096	855.9
17:45:00	60	186	10.0	1097	868.1
17:46:00	59	187	9.9	1084	865.3
17:47:00	60	188	9.8	1103	855.9
17:48:00	60	187	9.8	1070	850.9
17:49:00	62	184	9.9	1083	854.5
17:50:00	63	182	9.9	1069	854.2

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 17:51:00	67	182	10.1	1054	849.7
17:52:00	71	184	10.2	1065	843.5
17:53:00	72	183	10.1	1043	854.4
17:54:00	71	183	10.1	1039	852.7
17:55:00	72	182	10.1	1045	844.8
17:56:00	74	181	10.1	1047	842.1
17:57:00	75	182	10.1	1050	846.2
17:58:00	75	181	10.1	1041	854.0
17:59:00	77	182	10.1	1046	842.1
18:00:00	73	180	10.0	1070	838.9
18:01:00	70	178	9.7	1064	842.2
18:02:00	69	178	9.7	1072	844.3
18:03:00	68	178	9.6	1084	848.4
18:04:00	68	179	9.6	1085	830.8
18:05:00	66	179	9.6	1091	844.2
18:06:00	62	181	9.4	1095	862.1
18:07:00	64	180	9.3	1084	843.8
18:08:00	73	180	9.8	1091	830.9
18:09:00	72	181	9.8	1025	834.5
18:10:00	68	183	9.5	1023	843.3
18:11:00	65	181	9.4	1097	844.4
18:12:00	65	186	9.5	1103	845.7
18:13:00	66	195	9.6	1106	845.0
18:14:00	66	198	9.7	1110	844.1
18:15:00	66	199	9.7	1116	844.0
18:16:00	67	198	9.8	1122	841.1
18:17:00	67	200	9.9	1109	840.8
18:18:00	66	201	9.8	1133	845.2
18:19:00	67	200	9.8	1118	846.2

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 18:20:00	67	202	9.9	1124	848.6
18:21:00	66	201	9.8	1117	856.4
18:22:00	67	201	9.9	1122	862.8
18:23:00	69	202	9.9	1123	856.7
18:24:00	75	201	10.3	1111	837.7
18:25:00	74	203	10.4	1097	834.4
18:26:00	66	207	10.2	1113	853.9
18:27:00	60	210	9.8	1103	856.7
18:28:00	63	209	9.7	1107	853.8
18:29:00	64	212	9.9	1106	850.0
18:30:00	63	215	9.9	1093	839.0
18:31:00	61	217	9.9	1098	840.4
18:32:00	59	213	9.8	1110	858.6
18:33:00	60	210	9.7	1105	848.2
18:34:00	64	205	9.9	1093	845.2
18:35:00	63	203	10.0	1069	840.3
18:36:00	62	204	9.8	1062	839.0
18:37:00	63	205	9.8	1066	841.1
18:38:00	63	205	9.7	1059	838.1
18:39:00	64	204	9.7	1050	841.4
18:40:00	66	205	9.8	1054	839.3
18:41:00	68	204	9.9	1061	842.9
18:42:00	68	202	9.9	1052	841.1
18:43:00	70	201	10.0	1044	837.9
18:44:00	73	200	10.0	1041	834.6
18:45:00	73	199	10.1	1043	834.8
18:46:00	73	198	10.1	1046	835.7
18:47:00	75	196	10.1	1027	841.2
18:48:00	74	196	10.0	1032	841.4

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 18:49:00	76	196	10.0	1027	837.9
18:50:00	78	196	10.1	1021	834.1
18:51:00	80	195	10.1	1042	835.5
18:52:00	81	192	10.2	1024	839.3
18:53:00	86	193	10.2	1030	839.1
18:54:00	92	193	10.4	1035	837.1
18:55:00	95	192	10.5	1035	841.9
18:56:00	93	192	10.4	1036	840.2
18:57:00	93	193	10.4	1039	843.8
18:58:00	92	193	10.4	1023	844.3
18:59:00	91	193	10.4	1041	844.3
19:00:00	91	197	10.5	1029	845.6
19:01:00	88	197	10.4	1033	844.9
19:02:00	87	196	10.3	1052	842.8
19:03:00	88	198	10.4	1058	843.6
19:04:00	87	198	10.4	1052	844.3
19:05:00	86	199	10.4	1045	846.8
19:06:00	82	200	10.4	1070	844.4
19:07:00	79	201	10.4	1056	845.2
19:08:00	77	202	10.4	1069	847.3
19:09:00	77	201	10.3	1110	848.0
19:10:00	74	202	10.3	1108	848.1
19:11:00	70	204	10.2	1083	847.9
19:12:00	70	204	10.2	1087	848.4
19:13:00	69	205	10.2	1080	847.8
19:14:00	68	206	10.2	1093	850.1
19:15:00	67	206	10.2	1085	849.8
19:16:00	64	205	10.1	1090	844.2
19:17:00	63	205	10.0	1078	847.7

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 19:18:00	65	206	10.1	1087	852.2
19:19:00	67	205	10.1	1078	849.8
19:20:00	66	205	10.1	1079	848.0
19:21:00	64	206	10.0	1082	852.3
19:22:00	65	207	10.0	1088	848.7
19:23:00	64	208	10.1	1079	849.6
19:24:00	64	209	10.0	1078	848.5
19:25:00	64	210	10.0	1072	847.1
19:26:00	64	211	10.1	1096	848.0
19:27:00	64	210	10.1	1098	850.1
19:28:00	64	211	10.0	1087	850.8
19:29:00	65	214	10.1	1073	850.8
19:30:00	66	213	10.1	1075	847.7
19:31:00	64	210	10.1	1070	849.4
19:32:00	61	207	9.9	1073	850.2
19:33:00	63	205	9.9	1070	846.7
19:34:00	62	206	10.0	1097	843.4
19:35:00	62	208	9.9	1065	842.5
19:36:00	63	207	9.9	1065	845.0
19:37:00	61	206	9.9	1047	844.6
19:38:00	63	206	9.9	1061	846.8
19:39:00	65	202	9.9	1048	848.0
19:40:00	66	201	9.9	1051	845.3
19:41:00	67	202	9.9	1053	842.1
19:42:00	69	201	9.9	1042	840.9
19:43:00	69	199	10.0	1041	840.9
19:44:00	70	199	10.0	1043	841.0
19:45:00	69	199	10.0	1036	846.4
19:46:00	68	198	9.9	1039	847.3

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/21/99 19:47:00	67	198	9.9	1039	846.3
19:48:00	69	199	10.0	1029	843.0
19:49:00	69	198	10.0	1046	844.3
19:50:00	69	198	10.0	1039	842.5
19:51:00	69	196	10.0	1030	846.5
19:52:00	69	197	10.0	1034	844.0
19:53:00	69	197	10.0	1041	841.7
19:54:00	71	198	10.0	1047	841.5
19:55:00	71	198	10.0	1042	844.9
19:56:00	71	198	10.1	1047	844.4
19:57:00	70	198	10.1	1056	841.7
19:58:00	68	199	10.0	1044	846.6
19:59:00	68	199	10.0	1046	847.0
20:00:00	69	199	10.0	1049	844.4
20:01:00	72	200	10.0	1044	844.5
20:02:00	72	200	10.0	1051	844.6
20:03:00	72	200	10.0	1044	846.2
20:04:00	71	200	10.1	1046	846.1
20:05:00	70	201	10.1	1040	846.7
20:06:00	68	201	10.0	1045	846.3
20:07:00	66	200	10.0	1039	847.3
20:08:00	67	201	10.0	1059	847.9
20:09:00	70	202	10.0	1077	845.2
20:10:00	70	203	10.0	1075	845.1
	69 (1.69)	197	10.0	1071	847.2

BMP HG TESTING

RUN # 2

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

21:17 21 Sep 99
PAGE 1

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 17:22:00	714.5	325.5	121.5	6243	678.4	856.6
17:23:00	713.4	325.5	121.9	6238	681.5	851.7
17:24:00	713.2	325.5	121.7	6269	623.6	850.4
17:25:00	708.7	325.4	121.5	6357	650.3	843.3
17:26:00	708.9	325.0	121.5	6356	664.2	849.3
17:27:00	709.1	324.8	121.5	6318	660.1	861.2
17:28:00	708.8	324.4	121.7	6258	655.7	864.4
17:29:00	708.7	324.2	121.7	6193	672.2	861.0
17:30:00	708.0	323.8	121.5	6176	666.9	859.4
17:31:00	708.4	323.7	121.7	6209	668.5	855.2
17:32:00	710.1	323.6	122.2	6264	660.3	855.6
17:33:00	705.5	323.5	122.3	6308	645.4	856.0
17:34:00	703.6	323.2	122.2	6332	647.2	854.5
17:35:00	703.3	323.0	121.7	6327	654.3	857.4
17:36:00	703.3	323.0	121.7	6268	656.2	859.8
17:37:00	703.9	322.5	121.5	6201	654.5	862.3
17:38:00	704.6	322.4	121.7	6168	669.2	865.2
17:39:00	705.3	322.5	121.7	6163	683.3	864.6
17:40:00	705.3	322.8	121.7	6167	680.4	863.9
17:41:00	706.7	323.0	122.2	6213	655.4	868.6
17:42:00	701.0	323.1	122.3	6299	641.3	863.0
17:43:00	697.1	323.0	122.5	6375	646.3	852.2
17:44:00	694.9	323.0	121.7	6385	654.4	855.9
17:45:00	692.8	323.0	121.5	6302	646.1	868.1
17:46:00	691.9	322.9	121.5	6254	647.7	865.3
17:47:00	691.8	322.6	121.5	6218	656.2	855.9
17:48:00	692.9	322.4	121.5	6199	650.1	850.9
17:49:00	694.1	322.3	121.7	6185	647.9	854.5
17:50:00	692.8	322.2	121.5	6236	643.6	854.2

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

21:17 21 Sep 99
PAGE 2

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 17:51:00	691.1	322.1	121.7	6274	640.2	849.7
17:52:00	689.8	321.7	121.7	6310	647.1	843.5
17:53:00	689.2	321.2	121.5	6265	646.8	854.4
17:54:00	689.4	320.9	121.7	6249	644.8	852.7
17:55:00	690.1	320.4	121.7	6243	643.5	844.8
17:56:00	691.1	320.0	121.5	6232	651.9	842.1
17:57:00	690.3	319.5	121.7	6229	647.8	846.2
17:58:00	690.2	319.2	121.7	6214	648.2	854.0
17:59:00	688.3	318.8	121.5	6269	650.1	842.1
18:00:00	688.3	318.4	121.5	6265	644.8	838.9
18:01:00	691.5	318.0	120.8	6267	645.7	842.2
18:02:00	689.0	318.0	120.9	6251	646.9	844.3
18:03:00	687.8	317.7	121.1	6249	615.8	848.4
18:04:00	688.3	317.4	120.9	6308	622.1	830.8
18:05:00	689.0	317.4	120.8	6241	695.2	844.2
18:06:00	687.5	317.6	120.9	6134	646.0	862.1
18:07:00	687.4	317.9	120.9	6173	643.9	843.8
18:08:00	687.5	318.0	120.7	6233	650.6	830.9
18:09:00	687.3	318.0	120.4	6300	651.1	834.5
18:10:00	687.5	318.0	120.4	6344	653.9	843.3
18:11:00	688.1	318.1	120.5	6343	657.4	844.4
18:12:00	688.3	318.3	120.4	6293	664.0	845.7
18:13:00	693.5	318.5	120.3	6251	661.6	845.0
18:14:00	690.9	318.6	120.4	6242	660.4	844.1
18:15:00	696.0	318.7	120.8	6265	664.5	844.0
18:16:00	694.0	318.9	120.4	6285	660.8	841.1
18:17:00	693.6	319.1	120.4	6307	660.2	840.8
18:18:00	692.4	319.3	120.4	6323	658.7	845.2
18:19:00	693.4	319.3	120.8	6318	665.4	846.2

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 18:20:00	694.3	319.2	121.0	6307	662.6	848.6
18:21:00	694.9	319.2	120.9	6246	692.7	856.4
18:22:00	696.6	319.2	121.1	6136	672.7	862.8
18:23:00	700.5	319.3	120.8	6164	659.3	856.7
18:24:00	693.7	319.3	120.8	6304	627.2	837.7
18:25:00	691.9	319.2	120.9	6419	659.9	834.4
18:26:00	691.3	319.2	120.9	6384	652.7	853.9
18:27:00	690.4	319.2	120.8	6311	644.2	856.7
18:28:00	690.5	319.1	120.9	6230	646.4	853.8
18:29:00	691.0	319.1	120.8	6190	634.7	850.0
18:30:00	690.4	319.2	120.9	6243	643.0	839.0
18:31:00	690.5	319.2	120.8	6238	681.6	840.4
18:32:00	691.1	319.2	120.7	6169	664.3	858.6
18:33:00	690.0	319.6	120.5	6150	657.8	848.2
18:34:00	689.2	319.8	120.3	6216	648.3	845.2
18:35:00	688.7	319.8	120.4	6260	653.5	840.3
18:36:00	691.2	319.8	120.4	6305	639.8	839.0
18:37:00	690.5	319.8	120.5	6330	649.6	841.1
18:38:00	693.0	319.3	120.7	6306	648.1	838.1
18:39:00	695.0	319.2	121.0	6273	652.8	841.4
18:40:00	695.6	318.8	120.9	6194	657.8	839.3
18:41:00	697.0	318.7	120.9	6122	657.2	842.9
18:42:00	697.9	318.6	120.9	6117	652.8	841.1
18:43:00	699.3	318.6	120.7	6138	659.5	837.9
18:44:00	696.3	318.6	120.9	6201	659.6	834.6
18:45:00	694.3	318.5	121.0	6295	659.0	834.8
18:46:00	693.0	318.1	121.1	6334	651.6	835.7
18:47:00	695.4	317.6	120.8	6329	646.5	841.2
18:48:00	690.3	317.3	121.0	6293	652.4	841.4

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 18:49:00	689.2	316.9	121.0	6220	659.9	837.9
18:50:00	688.2	316.7	120.8	6196	661.4	834.1
18:51:00	688.7	316.4	120.8	6196	662.4	835.5
18:52:00	689.0	316.2	121.1	6195	662.5	839.3
18:53:00	689.0	316.1	121.0	6218	664.2	839.1
18:54:00	689.0	316.1	120.9	6250	662.4	837.1
18:55:00	689.1	315.9	121.1	6289	658.3	841.9
18:56:00	688.6	315.6	121.5	6300	656.5	840.2
18:57:00	689.0	315.5	121.7	6291	663.2	843.8
18:58:00	689.3	315.5	121.5	6292	661.5	844.3
18:59:00	689.6	315.5	121.0	6283	660.3	844.3
19:00:00	689.7	315.5	121.1	6262	663.2	845.6
19:01:00	690.1	315.5	121.5	6249	668.6	844.9
19:02:00	690.3	315.5	121.5	6242	660.0	842.8
19:03:00	690.4	315.6	121.5	6253	667.3	843.6
19:04:00	689.7	315.8	121.5	6263	669.4	844.3
19:05:00	690.3	316.0	121.5	6268	666.6	846.8
19:06:00	690.4	316.1	121.5	6258	657.4	844.4
19:07:00	690.2	316.1	121.1	6249	662.0	845.2
19:08:00	690.3	316.1	121.0	6261	661.5	847.3
19:09:00	690.4	316.1	120.8	6285	666.8	848.0
19:10:00	691.2	316.2	121.1	6279	661.1	848.1
19:11:00	692.1	316.5	120.9	6271	658.5	847.9
19:12:00	693.5	316.7	120.7	6253	665.4	848.4
19:13:00	693.5	316.9	120.7	6233	661.8	847.8
19:14:00	704.1	317.2	120.7	6221	664.1	850.1
19:15:00	700.5	317.3	120.8	6240	662.4	849.8
19:16:00	699.9	317.3	120.7	6248	664.0	844.2
19:17:00	699.6	317.7	120.7	6248	660.1	847.7

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 19:18:00	699.6	317.9	120.7	6262	661.0	852.2
19:19:00	698.6	317.9	120.8	6269	661.5	849.8
19:20:00	697.6	318.2	120.7	6253	656.3	848.0
19:21:00	697.7	318.4	120.7	6248	656.2	852.3
19:22:00	697.5	318.5	120.6	6244	662.4	848.7
19:23:00	698.7	318.6	120.2	6235	658.3	849.6
19:24:00	699.6	318.6	120.2	6225	662.5	848.5
19:25:00	699.4	318.6	120.4	6229	652.8	847.1
19:26:00	699.4	318.9	120.2	6241	658.1	848.0
19:27:00	699.5	318.9	120.2	6244	657.2	850.1
19:28:00	699.4	319.0	120.5	6239	656.2	850.8
19:29:00	697.4	318.9	120.8	6224	657.2	850.8
19:30:00	695.8	318.6	120.8	6199	656.3	847.7
19:31:00	695.2	318.6	120.6	6184	651.9	849.4
19:32:00	694.4	318.5	120.3	6209	654.5	850.2
19:33:00	694.1	318.4	120.2	6241	655.4	846.7
19:34:00	693.4	318.2	120.4	6260	655.3	843.4
19:35:00	692.7	317.8	120.2	6267	654.3	842.5
19:36:00	692.9	317.7	120.3	6273	652.3	845.0
19:37:00	692.9	317.3	120.2	6264	652.3	844.6
19:38:00	696.4	317.2	120.2	6240	655.1	846.8
19:39:00	695.5	316.8	120.0	6215	655.8	848.0
19:40:00	696.0	316.5	120.3	6192	659.8	845.3
19:41:00	694.9	316.2	120.2	6183	658.6	842.1
19:42:00	694.3	316.1	120.0	6197	656.8	840.9
19:43:00	694.4	316.0	120.0	6241	659.9	840.9
19:44:00	694.0	315.9	120.4	6259	652.8	841.0
19:45:00	693.7	315.5	120.4	6262	649.1	846.4
19:46:00	693.9	315.4	120.6	6254	654.9	847.3

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/21/99 19:47:00	695.3	315.4	120.5	6238	654.3	846.3
19:48:00	691.5	315.0	120.2	6218	658.4	843.0
19:49:00	691.0	314.8	120.0	6207	657.3	844.3
19:50:00	692.2	314.8	120.3	6208	657.0	842.5
19:51:00	692.2	314.8	120.0	6223	656.4	846.5
19:52:00	691.9	314.4	120.2	6235	660.4	844.0
19:53:00	692.2	314.3	120.5	6238	658.9	841.7
19:54:00	695.3	314.3	120.7	6233	655.1	841.5
19:55:00	695.7	314.2	120.7	6238	649.9	844.9
19:56:00	694.6	314.2	120.9	6248	656.8	844.4
19:57:00	693.9	314.1	120.2	6242	655.7	841.7
19:58:00	693.9	314.1	120.0	6232	659.1	846.6
19:59:00	693.9	314.0	120.0	6227	657.4	847.0
20:00:00	694.0	313.7	120.4	6224	657.8	844.4
20:01:00	693.8	313.6	120.0	6213	653.1	844.5
20:02:00	693.8	314.0	120.0	6218	656.8	844.6
20:03:00	693.8	314.0	120.7	6246	656.8	846.2
20:04:00	694.1	314.1	120.2	6268	652.7	846.1
20:05:00	694.6	314.1	120.2	6259	653.9	846.7
20:06:00	694.7	314.1	120.0	6235	653.0	846.3
20:07:00	694.9	314.1	120.4	6215	656.2	847.3
20:08:00	694.9	314.2	120.3	6217	653.0	847.9
20:09:00	695.6	314.1	120.3	6218	650.5	845.2
20:10:00	695.6	314.2	120.6	6218	659.3	845.1
			120.9	6249	656.4	847.2 (162)

BMP HG TESTING
RUN #3

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:56 22 Sep 99
PAGE 1

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
09/22/99 09:00:00	119	193	10.2	982	852.4
09:01:00	118	191	10.2	987	851.9
09:02:00	117	189	10.3	987	847.0
09:03:00	120	188	10.6	1004	840.1
09:04:00	123	189	10.6	1004	844.7
09:05:00	121	189	10.5	1005	844.9
09:06:00	118	193	10.5	1006	844.4
09:07:00	115	194	10.4	1007	847.7
09:08:00	116	194	10.4	1010	848.8
09:09:00	114	183	9.5	1000	846.8
09:10:00	111	184	9.6	994	844.6
09:11:00	113	186	9.8	1026	840.5
09:12:00	112	188	9.8	990	839.9
09:13:00	113	189	9.9	1015	840.7
09:14:00	113	190	9.9	1005	839.2
09:15:00	113	191	10.0	1029	841.4
09:16:00	113	193	10.1	1020	845.4
09:17:00	111	194	10.1	1010	842.4
09:18:00	110	195	10.1	1021	843.3
09:19:00	111	195	10.2	1010	842.0
09:20:00	110	195	10.2	1019	843.3
09:21:00	107	196	10.2	1019	846.3
09:22:00	106	197	10.2	1014	847.1
09:23:00	107	198	10.2	1016	847.4
09:24:00	109	197	10.3	1025	847.6
09:25:00	109	197	10.3	1035	847.4
09:26:00	109	199	10.3	1023	847.4
09:27:00	107	199	10.4	1015	847.7
09:28:00	107	199	10.4	1011	849.9

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/22/99 09:29:00	109	201	10.4	1029	849.8
09:30:00	109	200	10.4	1026	851.1
09:31:00	108	202	10.4	1017	854.3
09:32:00	108	203	10.4	1018	856.2
09:33:00	109	202	10.4	1018	855.8
09:34:00	110	201	10.5	1014	854.6
09:35:00	111	202	10.5	1019	856.9
09:36:00	113	202	10.6	1013	856.9
09:37:00	110	200	10.6	1009	854.8
09:38:00	109	201	10.6	1014	857.8
09:39:00	110	202	10.6	1016	858.7
09:40:00	108	202	10.6	1022	856.4
09:41:00	107	203	10.6	1004	854.4
09:42:00	107	202	10.6	1003	855.9
09:43:00	107	202	10.6	1010	856.2
09:44:00	106	201	10.6	1021	853.4
09:45:00	107	201	10.6	994	850.2
09:46:00	107	200	10.6	1004	853.9
09:47:00	104	199	10.6	1001	855.9
09:48:00	105	199	10.6	1010	853.7
09:49:00	107	201	10.6	1026	849.5
09:50:00	106	202	10.6	1018	849.8
09:51:00	106	203	10.6	1027	853.2
09:52:00	103	204	10.5	1012	853.9
09:53:00	102	205	10.5	1021	850.1
09:54:00	101	203	10.5	1017	847.8
09:55:00	100	203	10.5	1017	847.3
09:56:00	99	204	10.4	1021	850.9
09:57:00	100	205	10.5	1021	854.8

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:56 22 Sep 99
PAGE 3

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/22/99 09:58:00	100	205	10.5	1043	850.9
09:59:00	99	206	10.4	1019	847.0
10:00:00	96	206	10.3	1028	846.0
10:01:00	95	207	10.3	1030	845.3
10:02:00	93	209	10.2	1021	848.8
10:03:00	91	211	10.3	1029	846.8
10:04:00	94	209	10.3	1016	847.1
10:05:00	95	208	10.3	1016	847.0
10:06:00	97	208	10.3	1014	847.1
10:07:00	97	207	10.4	1033	844.7
10:08:00	98	204	10.4	1016	841.9
10:09:00	99	202	10.4	1015	842.9
10:10:00	100	203	10.4	1015	844.9
10:11:00	99	204	10.4	1018	845.3
10:12:00	99	204	10.4	1016	847.7
10:13:00	98	205	10.3	1020	844.1
10:14:00	98	205	10.3	1005	844.3
10:15:00	99	205	10.3	1017	844.6
10:16:00	101	204	10.4	1010	842.5
10:17:00	101	203	10.4	1007	840.2
10:18:00	102	203	10.5	1006	841.7
10:19:00	102	203	10.5	1005	843.5
10:20:00	100	203	10.4	1008	843.2
10:21:00	100	201	10.4	997	844.2
10:22:00	99	201	10.5	1014	842.6
10:23:00	101	199	10.5	1021	841.9
10:24:00	103	197	10.6	1029	842.3
10:25:00	105	197	10.6	1031	840.3
10:26:00	104	197	10.5	1016	841.1

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/22/99 10:27:00	102	199	10.6	1017	851.2
10:28:00	99	197	10.5	1009	855.0
10:29:00	104	197	10.6	1022	851.8
10:30:00	110	194	10.8	1022	843.1
10:31:00	114	193	10.9	1015	839.2
10:32:00	111	192	10.8	1017	842.7
10:33:00	102	194	10.5	1026	849.3
10:34:00	97	197	10.3	1023	852.4
10:35:00	97	197	10.3	1038	851.6
10:36:00	96	198	10.4	1037	846.0
10:37:00	98	197	10.5	1024	846.4
10:38:00	100	198	10.5	1042	845.8
10:39:00	102	198	10.5	1044	845.3
10:40:00	104	198	10.5	1037	844.6
10:41:00	103	200	10.5	1057	852.5
10:42:00	97	201	10.4	1042	857.1
10:43:00	94	200	10.4	1061	853.6
10:44:00	96	200	10.4	1050	852.4
10:45:00	96	202	10.5	1048	851.9
10:46:00	98	203	10.4	1053	853.3
10:47:00	95	203	10.4	1050	851.6
10:48:00	93	205	10.4	1043	852.2
10:49:00	92	206	10.4	1043	850.7
10:50:00	92	207	10.4	1040	851.2
10:51:00	91	208	10.3	1036	852.9
10:52:00	91	210	10.3	1045	851.4
10:53:00	92	208	10.3	1055	850.8
10:54:00	93	209	10.3	1039	852.5
10:55:00	95	209	10.4	1045	851.8

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:56 22 Sep 99
PAGE 5

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/22/99					
10:56:00	96	209	10.4	1047	853.5
10:57:00	98	209	10.5	1036	851.1
10:58:00	93	208	10.5	1031	852.8
10:59:00	93	208	10.4	1048	852.7
11:00:00	96	207	10.5	1036	853.2
11:01:00	97	205	10.5	1048	853.0
11:02:00	95	204	10.4	1027	852.4
11:03:00	92	204	10.4	1017	851.5
11:04:00	100	205	10.4	1021	851.0
11:05:00	127	204	10.4	1036	851.7
11:06:00	144	204	10.5	1011	851.5
11:07:00	155	205	10.5	1024	851.2
11:08:00	158	204	10.5	1025	851.0
11:09:00	160	205	10.5	1000	850.1
11:10:00	163	203	10.5	994	851.7
11:11:00	160	202	10.5	1036	850.3
11:12:00	159	201	10.5	1008	849.7
11:13:00	160	201	10.5	1012	849.5
11:14:00	164	202	10.5	1005	849.1
11:15:00	152	202	10.5	1002	848.3
11:16:00	125	202	10.6	1013	848.6
11:17:00	110	201	10.5	1023	848.5
11:18:00	103	202	10.6	1016	848.7
11:19:00	114	200	10.5	1004	848.6
11:20:00	135	201	10.5	1011	850.0
11:21:00	153	200	10.5	998	850.3
11:22:00	161	201	10.5	1008	850.3
11:23:00	161	200	10.5	1003	850.0
11:24:00	162	200	10.6	1011	848.4

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:56 22 Sep 99
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LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	S1002 PPM 1A SO2	S1004 PPM 1A NOX	S1012 PCT 1A CO2	S1006 DSKCFM 1AGASFLW	E1002 MW DAS MW
09/22/99 11:25:00	164	198	10.6	1007	849.0
11:26:00	163	199	10.6	1009	849.6
11:27:00	162	199	10.6	1015	850.5
11:28:00	161	200	10.6	1023	851.0
11:29:00	163	200	10.6	1009	850.8
11:30:00	160	199	10.6	1010	849.8
11:31:00	158	198	10.6	1022	850.8
11:32:00	160	197	10.6	1021	852.0
11:33:00	158	196	10.6	1038	851.1
	112 ✓	200 ✓ (154)	10.4 ✓	1020 ✓	848.9 ✓

BMP HG. TESTING
RUN # 3

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:52 22 Sep 99
PAGE 1

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
09/22/99 09:00:00	693.9	305.7	118.4	6233	636.3	852.4
09:01:00	692.0	305.8	118.4	6225	630.9	851.9
09:02:00	692.0	306.4	118.4	6252	630.4	847.0
09:03:00	692.4	306.9	118.5	6249	629.2	840.1
09:04:00	692.6	303.0	118.1	6265	630.2	844.7
09:05:00	692.6	303.0	118.5	6283	626.5	844.9
09:06:00	692.4	303.6	118.4	6274	631.5	844.4
09:07:00	692.4	303.6	118.3	6254	623.0	847.7
09:08:00	693.2	303.8	118.4	6245	630.8	848.8
09:09:00	693.6	307.1	118.4	6231	629.8	846.8
09:10:00	694.4	308.2	118.9	6231	635.8	844.6
09:11:00	694.2	308.4	118.9	6243	630.6	840.5
09:12:00	694.9	308.4	118.5	6245	636.8	839.9
09:13:00	695.0	308.5	118.6	6252	632.2	840.7
09:14:00	695.4	308.8	118.9	6274	633.0	839.2
09:15:00	694.9	308.9	118.9	6270	636.2	841.4
09:16:00	695.4	309.0	119.0	6259	636.7	845.4
09:17:00	694.9	309.0	119.0	6252	635.9	842.4
09:18:00	694.9	308.9	119.0	6240	637.0	843.3
09:19:00	694.3	309.0	119.1	6243	642.2	842.0
09:20:00	693.9	309.0	119.0	6255	635.1	843.3
09:21:00	693.4	309.0	119.0	6285	636.3	846.3
09:22:00	693.2	308.9	118.8	6293	637.2	847.1
09:23:00	693.1	308.5	119.0	6304	640.4	847.4
09:24:00	693.5	308.1	119.0	6296	641.7	847.6
09:25:00	694.5	307.6	119.2	6296	643.0	847.4
09:26:00	694.8	306.9	119.0	6286	636.6	847.4
09:27:00	695.9	306.7	119.0	6289	631.9	847.7
09:28:00	702.1	306.5	119.2	6285	629.3	849.9

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/22/99 09:29:00	702.4	306.0	118.8	6288	636.7	849.8
09:30:00	702.2	305.8	118.5	6290	631.3	851.1
09:31:00	701.8	303.5	118.7	6269	633.4	854.3
09:32:00	701.0	302.1	118.8	6265	632.6	856.2
09:33:00	700.9	301.5	119.2	6268	635.0	855.8
09:34:00	703.9	300.5	119.0	6273	635.0	854.6
09:35:00	704.6	300.4	119.2	6281	634.7	856.9
09:36:00	704.4	300.3	119.2	6303	628.6	856.9
09:37:00	704.3	300.5	118.8	6322	626.3	854.8
09:38:00	702.9	300.9	118.7	6311	623.3	857.8
09:39:00	702.3	301.0	119.1	6291	622.6	858.7
09:40:00	702.7	300.9	119.4	6306	625.8	856.4
09:41:00	702.4	301.0	119.2	6295	623.5	854.4
09:42:00	702.1	301.2	119.4	6265	619.0	855.9
09:43:00	702.6	302.1	119.5	6239	620.1	856.2
09:44:00	702.9	302.1	119.2	6246	621.6	853.4
09:45:00	703.1	302.1	119.4	6274	620.8	850.2
09:46:00	702.6	302.2	119.4	6288	621.3	853.9
09:47:00	702.6	302.3	119.4	6295	620.0	855.9
09:48:00	700.5	302.8	119.2	6302	616.4	853.7
09:49:00	700.5	302.8	119.4	6308	619.8	849.5
09:50:00	700.3	302.9	119.4	6295	619.7	849.8
09:51:00	700.5	303.1	119.4	6267	619.1	853.2
09:52:00	700.1	303.3	119.4	6246	613.5	853.9
09:53:00	700.1	303.5	119.3	6262	617.2	850.1
09:54:00	700.1	304.0	119.5	6271	617.0	847.8
09:55:00	699.8	305.1	119.5	6265	616.4	847.3
09:56:00	699.3	305.1	119.5	6272	613.8	850.9
09:57:00	699.3	304.0	119.3	6269	613.9	854.8

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:52 22 Sep 99
PAGE 3

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/22/99						
09:58:00	700.7	303.6	119.4	6293	612.9	850.9
09:59:00	700.5	303.8	119.4	6307	599.8	847.0
10:00:00	699.4	303.6	119.4	6297	607.2	846.0
10:01:00	698.1	304.2	119.4	6276	612.8	845.3
10:02:00	697.9	304.9	119.4	6257	617.8	848.8
10:03:00	697.7	305.9	118.9	6259	613.2	846.8
10:04:00	698.1	304.5	118.7	6233	624.8	847.1
10:05:00	698.1	304.6	119.5	6235	626.6	847.0
10:06:00	698.1	304.6	119.7	6254	621.5	847.1
10:07:00	698.2	304.6	119.8	6277	616.2	844.7
10:08:00	697.7	304.8	119.7	6300	615.9	841.9
10:09:00	698.1	307.7	119.6	6320	616.1	842.9
10:10:00	697.5	308.9	119.6	6318	615.8	844.9
10:11:00	694.3	309.5	119.6	6300	613.1	845.3
10:12:00	694.3	309.5	119.6	6283	621.0	847.7
10:13:00	696.7	309.7	119.6	6261	618.6	844.1
10:14:00	696.1	309.7	119.7	6250	619.3	844.3
10:15:00	696.2	309.6	120.0	6268	626.8	844.6
10:16:00	696.2	308.9	119.8	6291	627.9	842.5
10:17:00	695.8	309.2	120.0	6331	613.7	840.2
10:18:00	695.6	309.7	119.4	6339	622.7	841.7
10:19:00	695.9	309.7	119.7	6340	621.4	843.5
10:20:00	696.3	309.7	119.9	6331	626.9	843.2
10:21:00	692.0	309.6	119.8	6310	624.3	844.2
10:22:00	693.5	309.7	119.8	6311	625.1	842.6
10:23:00	689.8	309.7	119.9	6308	631.2	841.9
10:24:00	690.2	309.7	120.0	6320	624.9	842.3
10:25:00	690.6	309.7	120.2	6349	628.9	840.3
10:26:00	690.2	309.7	120.4	6355	642.5	841.1

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:52 22 Sep 99
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LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/22/99 10:27:00	687.6	309.6	120.0	6322	653.0	851.2
10:28:00	688.4	309.7	120.0	6304	661.2	855.0
10:29:00	690.1	309.6	120.0	6322	645.0	851.8
10:30:00	692.2	309.5	120.0	6387	620.9	843.1
10:31:00	699.4	309.2	120.5	6446	615.3	839.2
10:32:00	701.2	309.2	120.2	6439	625.1	842.7
10:33:00	701.1	308.9	119.9	6382	623.3	849.3
10:34:00	699.7	308.6	120.2	6295	634.9	852.4
10:35:00	699.9	308.4	120.4	6239	631.4	851.6
10:36:00	698.7	308.2	120.2	6247	637.1	846.0
10:37:00	698.2	308.0	120.0	6274	636.3	846.4
10:38:00	698.9	308.1	120.2	6328	635.8	845.8
10:39:00	699.0	307.2	120.2	6388	632.4	845.3
10:40:00	698.4	306.2	120.4	6420	633.6	844.6
10:41:00	698.4	306.7	120.2	6390	642.3	852.5
10:42:00	699.0	307.8	120.3	6353	642.2	857.1
10:43:00	699.6	308.0	120.5	6328	638.5	853.6
10:44:00	700.8	308.3	120.3	6319	640.8	852.4
10:45:00	696.5	308.6	120.2	6310	641.5	851.9
10:46:00	695.8	308.7	120.4	6321	639.5	853.3
10:47:00	693.5	308.8	120.2	6333	634.5	851.6
10:48:00	693.4	308.9	120.4	6336	634.7	852.2
10:49:00	696.4	309.1	120.2	6334	635.9	850.7
10:50:00	694.9	309.2	120.2	6332	635.4	851.2
10:51:00	694.5	309.2	120.4	6329	636.3	852.9
10:52:00	694.2	309.0	119.8	6324	631.5	851.4
10:53:00	694.7	309.2	119.9	6319	633.5	850.8
10:54:00	694.7	309.0	119.9	6325	636.8	852.5
10:55:00	694.5	309.3	120.0	6335	635.5	851.8

Snapshot Values/Averages
PVR

PV RETRIEVAL REQUEST

12:52 22 Sep 99
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LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/22/99 10:56:00	694.7	309.3	119.8	6338	637.0	853.5
10:57:00	694.7	309.3	120.2	6330	636.2	851.1
10:58:00	694.6	309.0	120.0	6328	633.8	852.8
10:59:00	696.1	309.4	120.4	6334	634.6	852.7
11:00:00	696.0	309.5	120.1	6343	638.7	853.2
11:01:00	695.7	309.4	120.0	6347	638.0	853.0
11:02:00	695.6	309.2	119.8	6337	631.9	852.4
11:03:00	694.8	309.1	120.0	6338	630.8	851.5
11:04:00	694.8	309.1	120.0	6338	633.0	851.0
11:05:00	694.7	309.1	120.1	6330	637.5	851.7
11:06:00	697.6	309.0	120.5	6335	635.9	851.5
11:07:00	696.4	309.0	120.6	6337	631.4	851.2
11:08:00	696.1	308.9	120.7	6342	630.8	851.0
11:09:00	696.0	308.5	120.1	6348	637.4	850.1
11:10:00	695.5	308.5	120.2	6340	638.1	851.7
11:11:00	696.0	308.5	120.2	6323	637.8	850.3
11:12:00	697.5	308.5	120.0	6319	635.9	849.7
11:13:00	699.5	308.5	120.5	6319	633.2	849.5
11:14:00	698.6	308.6	120.9	6327	634.3	849.1
11:15:00	697.8	308.5	120.9	6336	636.9	848.3
11:16:00	696.8	308.6	120.7	6340	638.8	848.6
11:17:00	696.8	308.6	120.9	6344	634.6	848.5
11:18:00	696.4	308.6	120.2	6339	635.0	848.7
11:19:00	696.3	308.6	120.2	6322	637.0	848.6
11:20:00	695.6	308.5	120.4	6322	639.3	850.0
11:21:00	696.9	308.6	120.7	6320	636.9	850.3
11:22:00	696.8	308.5	120.7	6325	644.3	850.3
11:23:00	693.2	308.1	120.9	6340	639.5	850.0
11:24:00	693.1	308.0	120.9	6337	642.3	848.4

LEGEND: ' = Calculated time ~ = Time changed " = HG data * = Less than expected # samples

DATE/ TIME	B1037 DEGF AIH1A IG	B1039 DEGF AIH1A OG	S1037 DEGF S1B OGAS	F1065 KPPH BY FW FL	B1048 KPPH TOT FFLO	E1002 MW DAS MW
09/22/99 11:25:00	692.7	307.9	121.1	6344	637.7	849.0
11:26:00	692.8	307.9	120.5	6358	641.7	849.6
11:27:00	695.1	307.7	120.5	6358	639.8	850.5
11:28:00	694.6	307.5	120.7	6341	640.4	851.0
11:29:00	694.6	307.5	120.3	6348	642.0	850.8
11:30:00	694.1	307.4	121.0	6333	636.8	849.8
11:31:00	694.1	307.4	121.3	6332	645.2	850.8
11:32:00	693.9	307.5	121.2	6314	643.9	852.0
11:33:00	693.8	307.5	121.0	6312	642.7	851.1
			119.7 ✓	6304	630.6 ✓	848.9 ✓ (153)

Plant Name: MNSF
General Average Report
Reporting Period: 09/21/1999 to 09/21/1999

Site Name: FLUE1A
Data Averaging Type: 1h

Time of Report: 10/18/99 12:16
Rolling Average Interval: 1

Date	Time	CO2 (PERCENT)	NOXPPM (PPM)	FLOWZS (SCFM)	SO2PPM (PPM)
09/21/99	07:00	10.31	181.61	1066405.5	131.27
	08:00	10.12	181.23	1058300.3	108.36
	09:00	10.33	181.50	1073998.8	110.62
	10:00	10.14	181.13	1073208.6	97.88
	11:00	10.17	175.18	1066372.9	100.65
	12:00	10.08	175.86	1081397.9	91.50
	13:00	10.20	176.97	1088302.5	84.90
	14:00	9.96	173.30	1091386.4	83.44
	15:00	10.14	169.89	1077684.4	82.25
	16:00	10.11	188.02	1086503.4	69.23
	17:00	9.97	198.52	1074822.0	73.85
	18:00	10.10	204.18	1065339.0	71.19
Average =		10.14	182.28	1075310.1	92.09
Maximum =		10.33	204.18	1091386.4	131.27
Minimum =		9.96	169.89	1058300.3	69.23
ossible Values =		12	12	12	12
ncluded Values =		12	12	12	12
Total =		121.63	2187.39	1.290E+07	1105.14

Mills on, Run 1 - B, C, E, F, G, H

Run 2 - B, C, D, E, F, H

- excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
- invalid
- suspect
V - invalid for state
- exceedance
- stack not operating
B - invalid (PADER)
U - missing data substituted
999 - missing value
888 - value could not be calculated

i

Plant Name: MNSF
General Average Report
Reporting Period: 09/22/1999 to 09/22/1999

Site Name: FLUE1A
Data Averaging Type: 1h

Time of Report: 10/18/99 12:17
Rolling Average Interval: 1

Date	Time	CO2 (PERCENT)	NOXPPM (PPM)	FLOWZS (SCFM)	SO2PPM (PPM)
09/22/99	07:00	10.43	193.07	1012459.6	147.34
	08:00	10.33	199.26	1016440.1	109.80
	09:00	10.48	203.68	1030396.8	100.95
	10:00	10.53	199.57	1011527.7	152.03
Average =		10.44	198.90	1017706.0	127.53
Maximum =		10.53	203.68	1030396.8	152.03
Minimum =		10.33	193.07	1011527.7	100.95
Possible Values =		4	4	4	4
Included Values =		4	4	4	4
Total =		41.76	795.59	4070824.1	510.11

Mills on Rec 3 - B,C,D,E C,H

- excluded values (missing, OOC, invalid, suspect)
- missing
T - out-of-control
- invalid
- suspect
V - invalid for state
H - exceedance
- stack not operating
- invalid (PADER)
U - missing data substituted
-999 - missing value
888 - value could not be calculated

APPENDIX F

Chain of Custody Records

Job# 99-958 Unit Tested Unit 1B Scrubber Inlet **CHAIN OF CUSTODY RECORD** Page # 1/1

Facility Name/Location
Pennpower
Bruce Mansfield Plant
Shippingport, PA

Collected By/Company
METCO Environmental

Unit 1B Scrubber Inlet Duct SAMPLE I.D. Run Number	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 per Instruction
* Container 1 Thimble Q10 Backup 47Q19	9/21/99	1629	X				II	BH									✓			Ship to METCO for weight
Container 2 0.1 N HNO_3 F.W. Rinse	9/21/99	1649	X				I	BH									✓			Container 2A not recovered.
Container 3 10% HNO_3 Imp 1,2,3 Rinse	9/21/99	1610	X				II	BH									✓			
Container 4 0.1 N HNO_3 Imp. 4 Rinse	9/21/99	1658	X				I	BH									✓			
Container 5 0.1 N HNO_3 Imp 4,5,6 Rinse	9/22/99	1723	X				II	BH									✓			Used Hydroxylamine Sulfate / Sodium Chloride

Received by:	Date:	Time:	Transported by: Shane Lee	Date: 9/23/99	Time: 1400	Received at Lab by:	Date: 9/23/99	Time: 14:00
Analyzed by:	Date:	Time:	Data Reviewed by: JRM	Date: 12/08/99	Time: 1300	Remarks:		

Ship to: TestAmerica

METCO ENVIRONMENTAL

* RECEIVED 10/18/99 JAS

F-2

Job# 99-95 Unit Tested Penn Power

CHAIN OF CUSTODY RECORD

Page # 1 of 1

Facility Name/Location
Penn Power
Bruce Mansfield Plant
Shipping Port, PA

Collected By/Company
METCO

Unit Number 1B Scrubber Inlet Duct SAMPLE I.D. Run 2	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 per Instruction
* Container 1 thimmable and back-up filter	9/21		✓				II	BH									✓			Ship to METCO for weight. Thimble Q9 Backup 47020
Container 2 0.1 N HNO_3 FW	9/21		✓				I	BH									✓			Container 2A not recovered
Container 3 10% HNO_3 Rinse Imp. 1,2,3	9/21		✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp. 4	9/21		✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	9/21		✓				II	BH									✓			Used Hydroxylamine Sulfate / Sodium Chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
			Shane Lee	9/25/99	1400	[illegible]	9/25/99	14:00
Analyzed by:	**Date:**	**Time:**	**Data Reviewed by:**	**Date:**	**Time:**	**Remarks:**		
			JRM	12/08/99	13:00			

Ship to: Test America

METCO ENVIRONMENTAL

* RECEIVED 10/18/95 JMO

Job# 99-95 BR Unit Tested Unit 1A Stack

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
Penn Power
Bruce Mansfield Plant
Shipping Port, PA

Collected By/Company
METCO Environmental

SAMPLE I.D. Unit 1A Stack Run 1	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)
Container 1 filter 88 QV23	9/21/99	(BH) ~~1822~~ 1912	X				I	BH									✓			Ship to METCO for Weight
Container 2 0.1 N HNO_3 F.W.	9/21/99	1916	X				I	BH									✓			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp. 1,2,3	9/21/99	1822	X				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	9/21/99	1840	X				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	9/21/99	1901	X				II	BH									✓			Used Hydroxylamine Sulfate / Sodium Chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
			Steve Lee	9/25/99	1400	[illegible]	9/25/99	14:0
Analyzed by:	**Date:**	**Time:**	**Data Reviewed by:**	**Date:**	**Time:**	**Remarks:**		
			RM	10/08/99	1300			

Ship to: TestAmerica

METCO ENVIRONMENTAL

* RECEIVED 10/18/99 JRP

Job# 99-95 Unit Tested Unit 1A Stack **CHAIN OF CUSTODY RECORD** Page # 1/1

Facility Name/Location: Pennpower Bruce Mansfield Plant Shippingport, PA

Collected By/Company: METCO

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)
Unit 1A Stack Run 2	9/21	2104																		Analyze per Instruction
Filter 88 Q A10C container 1	9/21	2100	✓				I	SR									✓			Ship to METCO for weight ~~filter~~
0.1 N HNO_3 F.W. container 2	9/21	2030	✓				I	SR									✓			Container 2A not recovered
Container 3 10% HNO_3 Rinse Imp. 1,2 & 3	9/21	2118	✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	9/21	2120	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp. 5,6 & 7	9/21	2145	✓				II	BH									✓			Used Hydroxylamine Sulfate / Sodium chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
			Steve Lee	9/25/99	1400	[illegible]	9/25/99	14:00
Analyzed by:	**Date:**	**Time:**	**Data Reviewed by:**	**Date:**	**Time:**	**Remarks:**		
			JRM	12/08/99	1300			

Ship to: Test America

METCO ENVIRONMENTAL

* RECEIVED 10/18/99 JMS

Job# 99-95 Unit Tested Unit 1A Stack

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
Penn Power
Bruce Mansfield Plant
Shippingport, PA

Collected By/Company
METCO

SAMPLE I.D. Unit 1A Stack Run 3	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hs			REMARKS (Specific Compounds/Methods)
																				Analyze per Instruction
Container 1 filter 88QA107	9/22	1410	✓				I	BH									✓			Ship to METCO for weight.
Container 2 0.1N HNO_3 F/W	9/22	1410	✓				I	Sc									✓			Container 2A not recovered
Container 3 10% HNO_3 Rinse; Imp. 1,2+3	9/22	1410	✓				II	BH									✓			
Container 4 0.1N HNO_3 Rinse; Imp 4	9/22	1410	✓				I	BH									✓			
Container 5 0.1N HNO_3 Rinse Imp. 5,6+7	9/22	1410	✓				II	BH									✓			Used Hydroxylamine Sulfate / Sodium Chloride

Received by:	Date:	Time:	Transported by: Shane Lee	Date: 9/23/99	Time: 1400	Received at Lab by:	Date: 9/23/99	Time: 14:00
Analyzed by:	Date:	Time:	Data Reviewed by: JRM	Date: 12/06/99	Time: 1300	Remarks:		

Ship to: Test America

METCO ENVIRONMENTAL

RECEIVED 10/16/99

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Job# 99-95BEMI Unit Tested Unit 1

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
PennPower
Bruce Mansfield Plant
Shippingport, PA

Collected By/Company
METCO

Unit 1A Scrubber Inlet Duct

SAMPLE I.D. Blank Train	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)
Container 1 Filter	9/22/99						~~I~~	~~BH~~												Container 1 not recovered
Container 2 0.1 N HNO_3 F.W.	9/22/99						~~I~~	~~BH~~												Container 2 not recovered
Container 3 10% HNO_3 Rinse Imp 1,2,3	9/22/99	1048	X				I	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	9/22/99	1054	X				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	9/22/99	1115	X				II	BH									✓			Used Hydroxylamine sulfate / sodium chloride

Time at Inlet 0740 - 1015.
Analyze per Instruction

Received by:	Date:	Time:	Transported by: Shane Lee	Date: 9/23/99	Time: 1400	Received at Lab by:	Date: 9/23/99	Time: 14:00
Analyzed by:	Date:	Time:	Data Reviewed by: JRM	Date: 12/08/99	Time: 13:00	Remarks:		

Ship to: TestAmerica

METCO ENVIRONMENTAL

* Reviewed 10/18/99 JAM

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Job# 99-95 BRM11 Unit Tested Unit 1

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
Penn Power
Bruce Mansfield Plant
Shippingport, PA

Collected By/Company
METCO Environment

Unit 1A Stack 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)
Container 1 Filter	9/22/99		X				~~I~~	~~BH~~												Container 1 not recovered.
Container 2 0.1 N HNO3 F.W.	9/22/99		X				~~I~~	~~BH~~												Container 2 not recovered.
Container 3 10% HNO3 Rinse Imp 1,2,3	9/22/99	1158	X				I	BH									✓			
Container 4 0.1 N HNO3 Rinse Imp 4	9/22/99	1201	X				I	BH									✓			
Container 5 0.1 N HNO3 Rinse Imp 5,6,7	9/22/99	1211	X				II	BH									✓			Used Hydroxalymino Sulfate / Sodium Chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
			Shane Lee	9/25/99	1400		9/25/99	14:00
Analyzed by:	**Date:**	**Time:**	**Data Reviewed by:**	**Date:**	**Time:**	**Remarks:**		

Ship to: TestAmerica

N. Canton 10/18/99 JAO

METCO ENVIRONMENTAL

Job# 4495 Unit Tested Unit 1

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
PennPower
Bruce Mansfield Plant
Shippingport, PA

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 per Instruction
Container 7 0.1 N HNO_3 Blank	9/22	0838	X				I	BH									✓			Vol. = 50 ml
Container 8 1 N KCl Blank	9/22/99	0840	X				I	BH									✓			Vol. = 50 ml
Container 9 5% HNO_3 - 10% H_2O_2 Blank	9/22/99	0843	X				I	BH									✓			Vol. = 48 ml
Container 10 H_2SO_4 - $KMnO_4$ Blank	9/22/99	0845	X				I	BH									✓			Vol. = 50 ml
* Container 11 Hydoxylamine Sulfate / Sodium Chloride Blank	9/22/99	0854	X				I	BH									✓			Vol. = 100 ml
* Container 12 Sample Filter Blank	9/22/99	0908	X				III	BH									✓			47 mm = 47Q22, 47Q23, 47Q24 88 mm = 88QZ99, 88QZ100, 88QZ101 Thimble = Q4, Q6, Q4

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
			[signature]	9/25/99	1400	[signature]	9/25/99	14:00
Analyzed by:	**Date:**	**Time:**	**Data Reviewed by:**	**Date:**	**Time:**	**Remarks:**		
			[signature]	12/08/99	1300			

Ship to: TestAmerica

* RECEIVED 10/18/99 JAD

METCO ENVIRONMENTAL

F-10

Job#99-95-B1... Unit Tested Number 1

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
Penn Power
Bruce Mansfield
Shippingport, PA.

Collected By/Company
EL/First Energy

SAMPLE I.D. (Fuel Sample / Sludge Samples / Slurry Samples)	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	Ash Content	SULFUR METALS	Hg	CHLORINE	Heating Value	REMARKS (Specific Compounds/Methods)
RUN 1 Coal Composite	9/21/99	1530			✓		1	EL							✓	✓	✓	✓	✓	Analyze per Instruction
RUN 2 Coal Composite	9/21/99	2015			✓		1	EL							✓	✓	✓	✓	✓	
RUN 3 Coal Composite	9/22/99	1145			✓		1	EL							✓	✓	✓	✓	✓	
1B Sludge	9/21/99	1249				✓	1	EL									✓			
1B Sludge	9/22/99	1000				✓	1	EL									✓			
U1 Lime Slurry	9/21/99	1330				✓	1	EL									✓			
U1 Lime Slurry	9/22/99	1030				✓	1	EL									✓			

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
			Frank Lee	9/25/99	1400	[illegible]	9/25/99	14:00
Analyzed by:	**Date:**	**Time:**	**Data Reviewed by:**	**Date:**	**Time:**	**Remarks:**		

Ship to: Test America

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.

JOHN D. PELLEGRINE; Project Manager

Education	B.S. in Forestry, 1985, Stephen F. Austin State University; Nacogdoches, Texas, in Forest Land Management. A.A.S. 1979, State University of New York at Morrisville; Morrisville, New York, in Business Administration.
Professional Training Courses	Two-day short course, "Performing and Observing Source Sampling," Dallas, Texas, November 1988. Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, May 1990. Also attended 8-hour refresher course annually. Attended Fred Pryor one-day management seminar, February 1991.
Certification	Certified Visible Emissions Evaluator
Technical Experience	Participated in the sampling of over 350 sources (six of which were trial burns), serving in the supervisory capacity on over 250 sources, including several of which were sampled simultaneously using more than one sampling train at several points in the flue gas stream. 1988-present. Over nine years experience with EPA and Texas Air Control Board (TACB) methods of sampling stationary sources. Thoroughly trained in the following EPA and TACB testing procedures: CFR, Title 40, Chapter I, Part 60, EPA Methods 1 through 17, 20, 23 through 25, and 101 through 110. Performance Specifications 1 through 5. "Sampling Procedures Manual, Texas Air Control Board, January 1982," Parts 1-1 through 8-8, 13-1 through 14-6, Appendix B through Appendix M.

PELLEGRINE

Experienced with sampling Method 0010, Method 23 (Modified Method 5 Sampling Train), Method 0030 (Volatile Organic Sampling Train), and various EPA and "Site-Specific" multiple metal and acid gas sampling trains.

Has performed on-site analysis for gravimetric particulate, sulfur trioxide, sulfur dioxide, total reduced sulfur, and hydrogen sulfide.

Experienced in the sampling of commercial calibration gas cylinders for sulfur dioxide, oxides of nitrogen, carbon dioxide, oxygen, carbon monoxide.

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
Ratfisch Model RS 100 Total Hydrocarbon Analyzer
Ratfisch Model RS 55 Total Hydrocarbon Analyzer
Western Research Model 721 AT Sulfur Dioxide Analyzer
Shimadzu C-R6A Gas Chromatograph
Horiba Model PIR 2000 Carbon Dioxide Analyzer
J.U.M. Model VE-7 Total Hydrocarbon Analyzer

Thoroughly trained in the calibration techniques for all field testing equipment.

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 Visible 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. 1992-1993.

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 CONWAY; Environmental Technician I

Education	B.S. Biology, July 1999; Southeastern Oklahoma State University; Durant, 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.

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.