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)

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

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

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

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.

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

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.

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

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

$$V_s = fpm \times 0.00508 = m/sec$$

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.

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

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

13. Particulate - probe, cyclone, and filter.

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

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

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

14. Particulate total.

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

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

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

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

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

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

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

16. Particulate - total, at stack conditions.

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

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

17. Particulate - probe, cyclone, and filter.

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

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

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

18. Particulate - total.

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

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

19. Mercury – µg/dscm

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

20. Mercury – lbs/10^{12} Btu

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

21. DSCFM – calculated

DSCFM = (Unit Heat Input 10^6Btu/hr) x F_d x [20.9 ÷ (20.9 – O_2)] ÷ 60 min/hr

22. Mercury - lbs/hr

lbs/hr = µg ÷ Vm_{std} x (2.205 x 10^{-9} lbs/µg) x DSCFM* x 60 min/hr

23. Mercury lbs/hr input in coal = Hg ppm ÷ 1 x 10^6 x coal flow lbs/hr

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:	99-95SHW3
JOB NAME:	TENNESSEE VALLEY AUTHORITY
LOCATION:	WEST PADUCAH, KENTUCKY
UNIT TESTED:	UNIT 3 BAGHOUSE A INLET DUCT

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			10/28/99	10/29/99	10/29/99
BEGIN TIME			1615	0855	1435
END TIME			1839	1119	1659
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	29.90 (759)	29.94 (760)	29.88 (759)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	0.564 (14.3)	0.618 (15.7)	0.625 (15.9)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	62.643 (1.774)	64.689 (1.832)	66.256 (1.876)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	90 (32)	72 (22)	85 (29)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	60.190 (1.704)	64.354 (1.822)	64.213 (1.818)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	95.6	98.6	97.4
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	4.512 (0.128)	4.654 (0.132)	4.597 (0.130)
%M	MOISTURE IN STACK GAS BY VOLUME	%	6.97	6.74	6.68

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

SOURCE EMISSION CALCULATIONS

TENNESSEE VALLEY AUTHORITY
WEST PADUCAH, KENTUCKY
UNIT 3 BAGHOUSE A INLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.9303	0.9326	0.9332
CO2		%	11.6	11.2	11.0
O2		%	8.2	8.2	8.6
CO		%	0.0	0.0	0.0
N2		%	80.2	80.6	80.4
%EA	EXCESS AIR @ SAMPLING POINT	%	62.8	62.3	67.7
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.18 (30.18)	30.12 (30.12)	30.10 (30.10)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	29.33 (29.33)	29.30 (29.30)	29.30 (29.30)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	1.250 (31.8)	1.290 (32.8)	1.308 (33.2)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	319 (159)	315 (157)	314 (157)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	28.58 (726)	28.62 (727)	28.56 (725)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	4,461 (22.66)	4,513 (22.93)	4,543 (23.08)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,312 (6.01)	9,312 (6.01)	9,312 (6.01)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	174,393 (296,294)	178,023 (302,461)	179,177 (304,422)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	288,479 (490,126)	291,812 (495,789)	293,783 (499,137)

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

METCO ENVIRONMENTAL

SOURCE EMISSION SURVEY

JOB NUMBER:	99-95SHW3
JOB NAME:	TENNESSEE VALLEY AUTHORITY
LOCATION:	WEST PADUCAH, KENTUCKY
UNIT TESTED:	UNIT 3 BAGHOUSE OUTLET DUCT

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			10/28/99	10/29/99	10/29/99
BEGIN TIME			1615	0855	1435
END TIME			1930	1144	1725
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	29.82 (757)	29.92 (760)	29.88 (759)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	0.385 (9.8)	0.539 (13.7)	0.551 (14.0)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	53.683 (1.520)	59.418 (1.683)	62.621 (1.773)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	94 (34)	84 (29)	95 (35)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	51.049 (1.446)	57.756 (1.635)	59.586 (1.687)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	72.5	97.6	91.4
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	3.422 (0.097)	4.607 (0.130)	4.314 (0.122)
%M	MOISTURE IN STACK GAS BY VOLUME	%	6.28	7.39	6.75

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

SOURCE EMISSION CALCULATIONS

TENNESSEE VALLEY AUTHORITY
WEST PADUCAH, KENTUCKY
UNIT 3 BAGHOUSE OUTLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.9372	0.9261	0.9325
CO2		%	11.0	10.0	10.4
O2		%	8.8	9.0	9.0
CO		%	0.0	0.0	0.0
N2		%	80.2	81.0	80.6
%EA	EXCESS AIR @ SAMPLING POINT	%	70.7	72.2	72.8
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.11 (30.11)	29.96 (29.96)	30.02 (30.02)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	29.35 (29.35)	29.08 (29.08)	29.21 (29.21)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	0.292 (7.4)	0.317 (8.1)	0.351 (8.9)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	306 (152)	301 (149)	308 (153)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	27.97 (710)	28.01 (711)	27.90 (709)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	2,140 (10.87)	2,225 (11.30)	2,375 (12.07)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	55,007 (35.49)	55,007 (35.49)	55,007 (35.49)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	495,488 (841,834)	513,144 (871,832)	544,350 (924,851)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	817,291 (1,388,577)	849,909 (1,443,995)	907,317 (1,541,532)

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

SOURCE EMISSION CALCULATIONS

TENNESSEE VALLEY AUTHORITY
WEST PADUCAH, KENTUCKY
UNIT 3 BAGHOUSE OUTLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Tt	NET TIME OF TEST	MINUTES	150	150	150
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.226 (0.006)	0.226 (0.006)	0.226 (0.006)
%I	PERCENT ISOKINETIC	%	94.5	103.3	100.4
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:	99-95SHW3
JOB NAME:	TENNESSEE VALLEY AUTHORITY
LOCATION:	WEST PADUCAH, KENTUCKY
UNIT TESTED:	SHAWNEE UNIT NUMBER 3 BAGHOUSE B INLET DUCT

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			10/28/99	10/29/99	10/29/99
BEGIN TIME			1955	0737	1209
END TIME			2025	0807	1239
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	29.90 (759)	29.89 (759)	29.93 (760)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	1.600 (40.6)	1.600 (40.6)	1.750 (44.5)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	22.366 (0.633)	20.936 (0.593)	22.058 (0.625)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	84 (29)	68 (20)	83 (28)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	21.783 (0.617)	21.001 (0.595)	21.552 (0.610)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	36.6	26.0	32.4
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	1.728 (0.049)	1.227 (0.035)	1.529 (0.043)
%M	MOISTURE IN STACK GAS BY VOLUME	%	7.35	5.52	6.63
Tt	NET TIME OF TEST	MINUTES	30	30	30

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

SOURCE EMISSION CALCULATIONS

TENNESSEE VALLEY AUTHORITY
WEST PADUCAH, KENTUCKY
SHAWNEE UNIT NUMBER 3 BAGHOUSE B INLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.9265	0.9448	0.9337
CO2		%	11.6	11.6	11.0
O2		%	8.2	8.2	8.3
CO		%	0.0	0.0	0.0
N2		%	80.2	80.2	80.7
%EA	EXCESS AIR @ SAMPLING POINT	%	62.8	62.8	63.4
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.18 (30.18)	30.18 (30.18)	30.09 (30.09)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	29.29 (29.29)	29.51 (29.51)	29.29 (29.29)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	1.405 (35.7)	1.375 (34.9)	1.413 (35.9)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	340 (171)	337 (169)	338 (170)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	28.61 (727)	28.57 (726)	28.60 (726)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	4,769 (24.23)	4,714 (23.95)	4,796 (24.36)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,312 (6.01)	9,312 (6.01)	9,312 (6.01)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	180,988 (307,499)	182,865 (310,688)	183,822 (312,314)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	308,407 (523,983)	304,811 (517,874)	310,165 (526,970)

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

APPENDIX B

Field Data

METCO ENVIRONMENTAL

Job Number 99-955HW3 ✓
Job Name EPRI / TVA ✓
Run Number 1 ✓
Unit 3 Baghouse Inlet A Duct ✓
Date 10/28/99 ✓
Operator Bass / Brown / Hart / 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 85
Assumed Moisture % 8
Probe Length 10'
C Factor 3 to 0.42 to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 16.00 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H2O	Orifice ΔH "H2O Desired	Orifice ΔH "H2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F ΔPs	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A6	1615	034.040	1.05	0.49	0.49	10.00	~~333~~ 329	248	250	68	89	92	263	thimble
6	1618	035.34	1.06	0.49	0.49	10.00	323	250	251	68	89	91	265	filter
5	1621	036.47	1.40	0.66	0.66	11.50	325	257	250	67	90	91	262	CDT
5	1624	037.84	1.40	0.66	0.66	11.50	325	277	252	67	90	92	259	int. orsat
4	1627	039.24	1.30	0.61	0.61	11.00	322	276	251	64	90	91	259	
4	1630	040.60	1.30	0.61	0.61	11.00	321	260	250	61	90	91	257	
3	1633	041.95	1.05	0.49	0.49	10.00	315	254	251	60	90	91	261	
3	1636	043.17	1.05	0.49	0.49	10.00	314	264	252	59	90	91	264	
2	1639	044.39	1.00	0.47	0.47	10.00	308	282	253	58	90	91	266	
2	1642	045.57	1.00	0.47	0.47	10.00	307	277	252	59	90	91	268	
1	1645	046.75	1.10	0.52	0.52	10.50	306	263	253	58	91	91	269	
1	1648	047.98	1.10	0.52	0.52	10.50	306	252	254	57	91	91	269	
B6	1651	049.08	1.30	0.61	0.61	11.50	328	254	250	57	90	91	269	
6	1654	050.34	1.30	0.61	0.61	11.50	331	258	252	57	90	91	270	
5	1657	051.67	1.45	0.68	0.68	12.50	331	259	251	57	91	91	269	
5	1700	053.04	1.45	0.68	0.68	12.50	330	280	252	56	91	91	268	
4	1703	054.49	1.45	0.68	0.68	12.50	322	289	253	56	91	91	268	
4	1706	055.91	1.45	0.68	0.68	12.50	320	278	253	56	91	91	269	

Pitot Tube Calibration Factor C_p 0.810 ✓
Volume Collected V_m 62.443 ✓ ft³
Water Collected V_w 95.6 ✓ ml
Time of Test T_t 144 ✓ min.
Stack Pressure P_s -18.0 ✓ "H_2O

Pitot Tube No. MB ✓
Baro. Press. P_b 29.90 ✓ "Hg
Probe Tip Dia. D_n 0.174 ✓ in.
% CO_2 11.6 ✓ % CO 0.0 ✓
% O_2 8.2 ✓ % N_2 80.2 ✓
Area Stack A_s ~~9408~~ 9312 ✓ in²

Barometer No. 19-1 ✓
Probe Tip No. TFE1-6 ✓
Total Volume of Leak Checks After Start: ~ ft³
V_m = Dry Gas Meter Calibration Factor 60.878 X 1.029 ✓
[Dry Gas Meter Reading ~ ft³ - (T_t ~ min. X Leak Rate ~ cfm)]

Impinger Box No. Hg 1

			Water Weight Gain		
Impinger 1	Final Weight	701.8	Imp. 2 820.7	Impinger 1	65.9
	Initial Weight	635.9	Int 805.6	Impinger 2	8.9
	Increase	65.9	15.1	Impinger 3	3.7
Impinger 2	Final Weight	661.7		Impinger 4	2.5
	Initial Weight	652.8	V_w =	Impinger 5	0.3
	Increase	8.9	g SO_2 =	Impinger 6	-0.4
Impinger 3	Final Weight	663.9	V_w =	Impinger 7	-0.4
	Initial Weight	660.2		Impinger 8	15.1
	Increase	3.7		Total	95.6 = V_w
Impinger 4	Final Weight	747.4			
	Initial Weight	744.9			
	Increase	2.5			
Impinger 5	Final Weight	760.0	P_b = 29.90 ✓	$\%CO_2$ = 11.6 ✓	
	Initial Weight	759.7	V_m = 62.643 ✓	$\%O_2$ = 8.2 ✓	
	Increase	0.3	V_w = 95.6 ✓	%CO = 0.0	
			P_m = 0.564 ✓	$\%N_2$ = 80.2 ✓	
Impinger 6	Final Weight	768.0	Avg ΔP = 1.250 ✓	A_s = ~~9408~~ 9312 ✓	
	Initial Weight	768.4		D_n = 0.174	
	Increase	-0.4	Avg $\sqrt{\Delta P}$ = 1.115 ✓	T_t = 144 ✓	
			C_p = 0.810 ✓		
Impinger 7	Final Weight	770.4	P_s = -18.0 ✓ "H_2O	28.58 ✓ "Hg	
	Initial Weight	770.8	T_m = 90 ✓ °F	550 ✓ °R	
	Increase	-0.4	T_s = 319 ✓ °F	~~729.769~~ °R	

Moisture Content: %M = 6.97 ✓ M_d = 0.9303 ✓ MW_d = 30.184 ✓ MW = 29.33 ✓

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 62.643 \left[\frac{29.90 + \frac{0.564}{13.6}}{90 + 460}\right] = \frac{60.190}{0.418} \frac{\text{sft}^3}{\text{scfm}}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 95.6 = 4.512 ✓ sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{4.512}{60.190 + 4.512}$ x 100 = 6.97 ✓ %

V_s = 5123.8 x 0.810 $\sqrt{\frac{\text{~~769~~ 779}}{28.58 \times 29.33}}$ x 1.115 = ~~4432~~ 4461 ✓ fpm

ACFM: ~~288 576~~ 288 479 ✓ 174,393 ✓

SCFM: ~~177321~~

%I = $\frac{1{,}039 \times 60.190 \times 769}{28.58 \times \text{~~0.903~~ } 0.9303 \times \text{~~4432~~ } 4461 \times 144 \times (0.174)^2}$ = ~~93.6~~ 94.2 ✓ %

%EA: 62.8 ✓

182853

Run Number 1

Unit 3 Baghouse Inlet/Duct

Date 10/28/99

Hg FIELD DATA

			ΔP_s			P_m	T_s				T_m			
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B3	1709	057.31	1.45	0.68	0.68	12.50	310	257	251	55	91	91	269	
3	1712	058.72	1.45	0.68	0.68	12.50	307	259	254	55	91	91	269	
2	1715	060.14	1.40	0.66	0.66	12.50	308	257	253	55	91	91	270	
2	1718	061.53	1.40	0.66	0.66	12.50	308	253	255	55	91	91	270	
1	1721	062.91	1.20	0.56	0.56	12.00	310	252	254	55	91	90	269	
1	1724	064.26	1.20	0.56	0.56	11.50	310	266	253	55	91	90	269	
C6	1727	065.42	1.45	0.68	0.68	12.50	322	270	251	56	91	90	270	
6	1730	066.72	1.45	0.68	0.68	13.00	330	265	252	56	90	90	270	
5	1733	068.12	1.50	0.70	0.70	13.00	330	258	251	56	90	90	270	
5	1736	069.57	1.50	0.70	0.70	13.00	330	258	252	56	90	90	269	
4	1739	070.99	1.50	0.70	0.70	13.00	327	256	253	55	90	90	269	
4	1742	072.42	1.50	0.70	0.70	13.00	325	252	253	54	90	90	268	
3	1745	073.86	1.50	0.70	0.70	13.00	311	255	254	53	89	90	268	
3	1748	075.30	1.50	0.70	0.70	13.50	309	263	252	53	89	90	268	
2	1751	076.73	1.50	0.70	0.70	13.50	306	270	255	52	89	90	269	
2	1754	078.17	1.50	0.70	0.70	13.50	306	283	251	52	89	89	268	
1	1757	079.61	1.05	0.49	0.49	11.00	309	269	252	53	89	89	268	
1	1800	080.89	1.05	0.49	0.49	11.00	309	258	252	53	88	89	267	
D6	1803	081.98	1.10	0.56	0.56	11.50	332	255	253	54	88	89	268	1 to 0.16
6	1806	083.17	1.10	0.56	0.56	11.50	333	252	252	53	88	89	267	
5	1809	084.44	1.20	0.50	0.50	11.00	334	267	251	53	88	89	268	1 to 0.13
5	1812	085.68	1.20	0.50	0.50	11.00	334	268	253	53	88	89	267	
4	1815	086.88	1.05	0.44	0.44	10.50	331	269	253	53	88	89	268	
4	1818	088.04	1.05	0.44	0.44	10.50	329	265	254	54	88	88	268	
3	1821	089.17	1.00	0.37	0.37	10.00	320	258	254	54	88	88	267	3 to 0.35
3	1824	090.25	1.00	0.37	0.37	10.00	320	258	251	54	88	88	266	

Run Number 1

Unit 3 Baghouse Inlet A Duct

Date 10/28/99

Hg FIELD DATA

ΔP_s P_m T_s T_m

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
D2	1827	091.36	1.05	0.31	0.31	9.50	314	256	251	54	88	88	267 3 to 0.28
2	1830	092.27	1.05	0.31	0.31	9.50	314	255	251	54	87	88	268
1	1833	093.23	0.95	0.28	0.28	9.00	306	259	252	54	87	88	267
1	1836	094.16	0.95	0.28	0.28	9.00	306	273	253	54	87	88	267
END	1839	094.968	—	—	—	—	—	—	—	—	—	—	—

METCO ENVIRONMENTAL

Job Number 99.95SilW3 ✓
Job Name EPRI / TVA ✓
Run Number 2 ✓
Unit 3 Baghouse Inlet A Duct ✓
Date 10/29/99 ✓
Operator Bass / Hart / 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 66
Assumed Moisture % 7
Probe Length 10'
C Factor 1 to 0.15 to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 18.00 "Hg = 0.007 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H2O	Orifice ΔH "H2O Desired	Orifice ΔH "H2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A6	0855	165.747	1.10	0.53	0.53	11.00	318	250	249	62	68	69	257	thimble
6	0858	166.85	1.10	0.53	0.53	11.00	318	251	250	54	68	68	256	filter
5	0901	168.09	1.05	0.50	0.50	11.00	319	272	251	53	68	68	256	int. orsat
5	0904	169.32	1.05	0.50	0.50	11.00	319	254	252	51	68	69	257	CDT
4	0907	170.53	1.30	0.62	0.62	12.00	316	255	251	51	68	69	258	
4	0910	171.85	1.30	0.62	0.62	12.00	315	250	252	50	68	68	258	
3	0913	173.18	1.05	0.50	0.50	11.00	309	252	254	49	68	69	259	
3	0916	174.42	1.05	0.50	0.50	11.00	309	252	254	49	69	69	259	
2	0919	175.62	1.05	0.50	0.50	11.00	300	253	255	49	69	69	258	
2	0922	176.83	1.05	0.50	0.50	11.00	300	254	256	49	69	69	260	
1	0925	178.04	0.98	0.47	0.47	10.00	299	254	251	49	69	69	260	
1	0928	179.23	0.98	0.47	0.47	10.00	299	255	252	50	70	69	261	
B6	0931	180.33	1.50	0.72	0.72	15.00	320	254	250	50	70	69	261	
6	0934	181.52	1.50	0.72	0.72	14.50	320	254	251	50	70	69	261	
5	0937	182.93	1.50	0.72	0.72	14.50	320	260	252	50	71	69	263	
5	0940	184.39	1.50	0.72	0.72	15.00	320	265	252	51	71	69	264	
4	0943	185.83	1.55	0.74	0.74	15.00	310	262	250	51	71	69	265	
4	0946	187.29	1.55	0.74	0.74	15.00	310	264	251	51	71	70	265	

Pitot Tube Calibration Factor C_p 0.810 ✓
Volume Collected V_m 64.689 ✓ ft^3 98.6
Water Collected V_w ~~96.4~~ ✓ ml
Time of Test T_t 144 ✓ min.
Stack Pressure P_s -18.0 ✓ "H_2O

Pitot Tube No. M8 ✓
Baro. Press. P_b 29.94 ✓ "Hg
Probe Tip Dia. D_n 0.174 ✓ in.
% CO_2 11.2 ✓ % CO 0.0 ✓
% O_2 8.2 ✓ % N_2 80.6 ✓
Area Stack A_s ~~9408~~ 9312 ✓ in^2

Barometer No. 19-1 ✓
Probe Tip No. TFE1-6 ✓
Total Volume of Leak Checks After Start: — ft^3
V_m = Dry Gas Meter Calibration Factor 62.866 X 1.029

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

Impinger Box No. Hg 3

			Water Weight Gain		
Impinger 1	Final Weight	728.2	Imp & Final 918.5	Impinger 1	72.9
	Initial Weight	655.3	Int. 904.3	Impinger 2	9.1
	Increase	72.9	14.2	Impinger 3	2.2
Impinger 2	Final Weight	754.1		Impinger 4	2.7
	Initial Weight	745.0	V_w =		
	Increase	9.1	$g\ SO_2$ = -	Impinger 5	-0.7
Impinger 3	Final Weight	753.1	V_w =		
	Initial Weight	750.9		Impinger 6	-1.0
	Increase	2.2			
Impinger 4	Final Weight	752.7		Impinger 7	-0.8 ✓
	Initial Weight	750.0		Impinger 8	14.2 98.6 gm
	Increase	2.7		Total	~~96.4~~ = V_w

Impinger 5	Final Weight	742.4	P_b =	29.94 ✓	$\%CO_2$ =	11.2 ✓	
	Initial Weight	743.1	V_m =	64.689 ✓	$\%O_2$ =	8.2 ✓	
	Increase	-0.7	V_w =	~~96.4~~ 98.6	%CO =	0.0 ✓	
			P_m =	0.618 ✓	$\%N_2$ =	80.6 ✓	
Impinger 6	Final Weight	742.0	Avg ΔP =	1.290 ✓	A_s =	~~9408~~ 9312 ✓	
	Initial Weight	743.0			D_n =	0.174 ✓	
	Increase	-1.0	Avg$\sqrt{\Delta P}$ =	1.131 ✓	T_t =	144 ✓	
			C_p =	0.810 ✓			
Impinger 7	Final Weight	754.4	P_s =	-18.0 ✓ H_2O		28.62 ✓	"Hg
	Initial Weight	755.2	T_m =	72 ✓ °F		532 ✓	°R
	Increase	-0.8 ✓	T_s =	315 ✓ °F		775 ✓	°R

Moisture Content: %M = ~~6.60~~ 6.74 ✓ M_d = ~~0.9340~~ 0.9326 ✓ MW_d = 30.120 ✓ MW = ~~29.32~~ 29.30 ✓

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 64.689 \left[\frac{29.94 + \frac{0.618}{13.6}}{72 + 460}\right] = \frac{64.354 \checkmark}{0.447 \checkmark}\ scfm^3$$

$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times$ ~~96.4~~ 98.6 $=$ ~~4.550~~ 4.654 ✓ sft^3

% Moisture $= \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 =$ ~~4.550~~ 4.654 / (64.354 + ~~4.550~~ 4.654) $\times 100 =$ ~~6.60~~ 6.74 ✓ %

$V_s = 5123.8 \times 0.810 \sqrt{\frac{775}{28.62 \times \text{~~29.32~~ } 29.30}} \times 1.131 =$ ~~4511~~ 4513 ✓ fpm

ACFM: ~~294,719~~ 291,812 ✓ / 178,023 ✓

SCFM: ~~180,049~~ / 98.7 ✓

$\%I = \frac{1{,}039 \times 64.354 \times 775}{0.9340 \times 28.62 \times \text{~~4511~~ } 4513 \times 144 \times (0.174)^2} =$ ~~98.6~~ % ✓

%EA: 62.3 ✓

Run Number 2 Hg FIELD DATA

Unit 3 Baghouse Inlet A Duct

Date 10/29/99

			ΔP_s			P_m	T_s				T_m		
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F Remarks
B3	0949	188.75	1.55	0.74	0.74	15.00	306	264	252	52	72	70	264
3	0952	190.22	1.55	0.74	0.74	15.00	306	266	254	52	72	70	265
2	0955	191.84	1.45	0.70	0.70	15.00	300	263	253	52	72	70	265
2	0958	193.12	1.45	0.70	0.70	15.00	300	259	253	52	72	71	265
1	1001	194.55	1.40	0.67	0.67	14.50	298	258	254	52	72	71	265
1	1004	195.96	1.40	0.67	0.67	14.50	298	259	254	52	72	71	264
C6	1007	197.18	1.50	0.72	0.72	16.00	325	260	253	52	72	71	264
6	1010	198.39	1.50	0.72	0.72	16.00	325	260	255	52	72	71	264
5	1013	199.82	1.55	0.74	0.74	16.00	328	261	254	52	72	71	264
5	1016	201.30	1.55	0.74	0.74	16.00	327	263	252	53	72	71	263
4	1019	202.74	1.55	0.74	0.74	16.00	321	263	251	53	73	71	265
4	1022	204.23	1.55	0.74	0.74	16.00	320	262	251	53	73	71	265
3	1025	205.69	1.55	0.74	0.74	16.00	314	263	255	53	73	72	265
3	1028	207.17	1.55	0.74	0.74	16.00	314	259	254	54	74	72	264
2	1031	208.63	1.50	0.72	0.72	16.00	312	258	253	55	75	73	265
2	1034	210.07	1.50	0.72	0.72	16.00	312	262	253	55	76	74	266
1	1037	211.52	1.10	0.53	0.53	13.50	302	263	254	56	77	74	267
1	1040	212.80	1.10	0.53	0.53	13.50	302	265	253	57	77	75	265
D6	1043	213.88	1.15	0.55	0.55	12.50	328	265	254	58	78	75	268
6	1046	215.09	1.15	0.55	0.55	12.50	331	262	253	59	78	76	267
5	1049	216.35	1.25	0.60	0.60	13.00	333	261	253	59	78	76	268
5	1052	217.66	1.25	0.60	0.60	13.00	334	262	252	59	78	76	268
4	1055	218.98	1.20	0.57	0.57	13.00	339	260	251	59	78	76	269
4	1058	220.28	1.20	0.57	0.57	13.00	341	259	252	59	78	76	268
3	1101	221.58	1.10	0.53	0.53	13.00	323	262	253	59	77	76	268
3	1104	222.86	1.10	0.53	0.53	13.00	322	263	252	59	76	76	268

Run Number 2 Hg FIELD DATA

Unit 3 Baghouse Inlet A Duct

Date 10/29/99

			ΔP_s			P_m	T_s					T_m	
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F Remarks
D2	1107	224.11	1.10	0.53	0.53	13.00	313	261	255	59	76	76	268
2	1110	225.37	1.10	0.53	0.53	13.00	311	260	254	59	76	76	267
1	1113	226.59	0.92	0.44	0.44	11.00	305	258	254	59	76	76	267
1	1116	227.72	0.92	0.44	0.44	11.00	305	257	253	59	76	76	268
END	1119	228.613	—	—	—	—	—	—	—	—	—	—	—

METCO ENVIRONMENTAL

Job Number 99-95 OSHW 3 ✓
Job Name EPRI / TVA ✓
Run Number 3 ✓
Unit 3 Baghouse Inlet A Duct ✓
Date 10/29/99 ✓
Operator Bass / Brown / Hart / 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 85
Assumed Moisture % 7
Probe Length 10'
C Factor 1 to 0.16 to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 13.00 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H2O	Orifice ΔH "H2O Desired	Orifice ΔH "H2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F (T_m)	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A6	1435	257.319	1.10	0.53	0.53	8.50	316	249	251	64	85	84	276	thimble
6	1438	258.53	1.10	0.53	0.53	8.50	320	253	252	62	85	84	277	filter
5	1441	259.78	1.50	0.72	0.72	10.00	322	270	251	59	85	85	274	Int. circuit
5	1444	261.20	1.50	0.72	0.72	10.00	322	266	253	57	85	85	271	cDT
4	1447	262.44	1.40	0.67	0.67	10.00	312	272	252	57	86	85	272	
4	1450	264.06	1.40	0.67	0.67	10.00	310	262	252	56	85	85 B6 NG	267	Changed
3	1453	265.47	1.05	0.50	0.50	8.50	310	275	254	56	86	85	266	P. tot.
3	1456	266.73	1.05	0.50	0.50	8.50	310	265	251	57	86	85	261	
2	1459	267.95	0.98	0.47	0.47	8.00	313	257	252	57	87	85	261	
2	1502	269.13	0.98	0.47	0.47	8.00	311	255	252	57	87	86	259	
1	1505	270.32	1.05	0.50	0.50	8.00	308	252	255	57	87	86	257	
1	1508	271.53	1.05	0.50	0.50	8.00	308	250	254	57	87	86	257	
B6	1511	272.64	1.40	0.67	0.67	10.00	316	255	253	58	86	86	256	
6	1514	274.04	1.40	0.67	0.67	10.00	318	269	254	58	86	86	255	
5	1517	275.61	1.45	0.70	0.70	10.00	312	281	254	57	87	86	255	
5	1520	276.86	1.45	0.70	0.70	10.00	316	273	255	57	86	86	256	
4	1523	278.29	1.50	0.72	0.72	10.00	310	264	253	57	86	86	257	
4	1526	279.75	1.50	0.72	0.72	10.00	310	260	254	57	86	86	256	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 64.256 ✓ ft³
Water Collected V_w 97.4 ✓ ml
Time of Test T_t 144 ✓ min.
Stack Pressure P_s -18.0 ✓ "H_2O

Pitot Tube No. M3 ✓
Baro. Press. P_b 29.88 ✓ "Hg
Probe Tip Dia. D_n 0.174 ✓ in.
% CO_2 11.0 ✓ % CO 0.0 ✓
% O_2 8.6 ✓ % N_2 80.4 ✓
Area Stack A_s ~~9408~~ 9312 ✓ in²

Barometer No. 19-1 ✓ Probe Tip No. TFE 1-6 ✓
Total Volume of Leak Checks After Start: — ft³
V_m = Dry Gas Meter Calibration Factor 64.389 X 1.029 ✓

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

Impinger Box No. Hg 1

			Water Weight Gain		
Impinger 1	Final Weight	705.9	Imp 8	Impinger 1	69.0
	Initial Weight	636.9	Final 837.1	Impinger 2	8.8
	Increase	69.0	Int. 820.5		
Impinger 2	Final Weight	656.4	16.6	Impinger 3	1.8
	Initial Weight	647.6		Impinger 4	3.1
	Increase	8.8	V_w =		
Impinger 3	Final Weight	659.0	g SO_2 = -	Impinger 5	0.0
	Initial Weight	657.2	V_w =		
	Increase	1.8		Impinger 6	-0.8
Impinger 4	Final Weight	754.1		Impinger 7	-1.1
	Initial Weight	751.0		Impinger 8	16.6
	Increase	3.1		Total	97.4 = V_w
Impinger 5	Final Weight	758.1	P_b = 29.88 ✓	$\%CO_2$ = 1.0 ✓	
	Initial Weight	758.1	V_m = 66.256 ✓	$\%O_2$ = 8.6 ✓	
	Increase	0.0	V_w = 97.4 ✓	%CO = 0.0 ✓	
			P_m = 0.625 ✓	$\%N_2$ = 80.4 ✓	
Impinger 6	Final Weight	760.0	Avg ΔP = ~~1.232~~ 1.308 ✓	A_s = ~~0.108~~ 0.312 ✓	
	Initial Weight	760.8		D_n = 0.174 ✓	
	Increase	-0.8	Avg $\sqrt{\Delta P}$ = ~~1.099~~ 1.141 ✓	T_t = 144 ✓	
			C_p = 0.808 ✓		
Impinger 7	Final Weight	766.8	P_s = -18.0 ✓ "H_2O	28.56 ✓ "Hg	
	Initial Weight	767.9	T_m = 85 ✓ °F	545 ✓ °R	
	Increase	-1.1	T_s = 314 ✓ °F	774 ✓ °R	

Moisture Content: %M = 6.68 ✓ M_d = 0.9332 ✓ MW_d = 28.104 ✓ MW = 29.30 ✓

$$Vm_{std} = 17.65\ Vm\left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 66.256\left[\frac{29.88 + \frac{0.625}{13.6}}{85 + 460}\right] = \frac{64.213}{0.446}\ \text{sft}^3/\text{scfm}$$ ✓

Vw_{gas} = 0.0472 x Vw = 0.0472 x 97.4 = 4.597 ✓ sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{4.597}{64.213 + 4.597}$ x 100 = 6.68 ✓ %

V_s = 5123.8 x $\frac{0.808}{\sqrt{\frac{774}{28.56 \times 29.30}}}$ x $\frac{1.141}{\sim\sim 1.099 \sim\sim}$ = ~~4370~~ 4543 ✓ fpm

ACFM: ~~285,886~~ $\frac{293,783}{179,177}$ ✓

SCFM: ~~174,370~~

%I = $\frac{1,039 \times 64.213 \times 774}{\frac{\sim\sim 4370 \sim\sim}{4543} \times 28.56 \times 0.9332 \times 144 \times (0.174)^2}$ = ~~101.6~~ 97.8 ✓ %

%EA: 67.7 ✓

Run Number 3 ____ Hg ____ FIELD DATA

Unit 3 Baghouse Inlet

Date 10/29/99

			ΔP_s			P_m	T_s				T_m			
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B3	1529	281.22	1.45	0.70	0.70	10.00	315	250	252	57	86	86	256	
3	1532	282.64	1.45	0.70	0.70	10.00	312	261	253	57	85	86	255	
2	1535	284.09	1.30	0.62	0.62	10.00	316	263	254	58	85	85	255	
2	1538	285.47	1.30	0.62	0.62	10.00	315	261	254	58	85	84	254	
1	1541	286.82	1.35	0.65	0.65	10.00	309	260	255	59	84	85	255	
1	1544	288.21	1.35	0.65	0.65	10.00	309	264	254	58	84	85	255	
C6	1547	289.47	1.30	0.62	0.62	10.00	306	255	251	59	84	85	252	
6	1550	290.78	1.30	0.62	0.62	10.00	306	256	252	59	84	85	255	
5	1553	292.11	1.40	0.67	0.67	10.50	312	251	255	59	84	84	259	
5	1556	293.51	1.40	0.67	0.67	10.50	310	255	254	60	84	84	257	
4	1559	294.93	1.50	0.72	0.72	11.00	311	270	253	60	84	84	261	
4	1602	296.38	1.50	0.72	0.72	11.00	310	280	254	59	84	84	263	
3	1605	297.86	1.55	0.74	0.74	11.50	318	262	253	59	84	84	264	
3	1608	299.32	1.55	0.74	0.74	11.50	320	257	253	59	84	84	262	
2	1611	300.80	1.55	0.74	0.74	11.50	322	254	253	60	83	83	264	
2	1614	302.29	1.55	0.74	0.74	11.50	322	250	255	60	83	83	263	
1	1617	303.81	1.20	0.57	0.57	10.00	305	263	252	60	83	83	263	
1	1620	305.08	1.20	0.57	0.57	10.00	304	278	251	60	84	84	263	
D6	1623	306.25	1.20	0.57	0.57	9.50	318	283	254	60	83	83	263	
6	1626	307.46	1.20	0.57	0.57	9.50	318	267	255	61	84	83	265	
5	1629	308.74	1.40	0.67	0.67	11.00	322	262	255	61	83	83	266	
5	1632	310.15	1.40	0.67	0.67	11.00	322	253	254	61	83	83	265	
4	1635	311.52	1.30	0.62	0.62	11.00	322	257	254	61	83	83	264	
4	1638	312.86	1.30	0.62	0.62	11.00	322	259	251	61	83	83	264	
3	1641	314.21	1.20	0.57	0.57	10.50	317	282	252	61	83	83	265	
3	1644	315.53	1.20	0.57	0.57	10.50	316	269	254	62	83	83	264	

Run Number 3

Unit 7 Baghouse Inlet A Duct

Date 10/29/99

Hg FIELD DATA

			ΔP_s			P_m	T_s				T_m		
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F Remarks
D 2	1647	316.83	1.20	0.57	0.57	11.00	324	257	253	62	84	83	267
2	1650	318.13	1.20	0.57	0.57	11.00	324	254	254	62	84	83	266
1	1653	319.42	1.05	0.50	0.50	10.00	310	257	253	62	83	83	262
1	1656	320.66	1.05	0.50	0.60	10.00	310	261	252	62	83	83	265
END	1659	321.708	—	—	—	—	—	—	—	—	—	—	—

METCO ENVIRONMENTAL

Job Number 99-95 SHW 3 ✓
Job Name EPRI - TVA ✓
Run Number 1 ✓
Unit Unit 3 Baghouse Outlet Duct ✓
Date 10-28-99 ✓
Operator Lee ✓
Sample Box No. HS-2 Meter Box No. 29-1 ✓

Hg Field Data

Read and record at the start of each test point.

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

Ambient Temp. °F 92
Assumed Moisture % 8%
Probe Length 12'
C Factor 1.0 ⇒ 0.78 to reference
Initial Leak @ 16.0 "Hg = 0.000 cfm
Final Leak @ 16.0 "Hg = 0.004 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H2O ΔPs	Orifice ΔH "H2O Desired	Orifice ΔH "H2O Actual	Pump Vacuum "Hg Guage Pm	Stack Temp °F Ts	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet Tm	Dry Gas Temp. °F Outlet	Heated Line	Remarks
M 3	1615	566.170	0.24	0.31	0.31	8.5	310	263	274	66	98	95	288	Filter 47086
2	1620	567.48	0.35	0.45	0.45	9.0	314	262	271	65	98	93	287	
1	1625	568.71	0.33	0.42	0.42	9.0	277	265	273	64	99	93	285	
End	1630	570.472	—	—	—	—	—	—	—	—	—	—	—	
I 3	1632	570.885	0.27	0.35	0.35	8.0	277	269	275	61	100	93	287	
2	1637	572.61	0.27	0.35	0.35	8.0	320	264	278	61	101	93	288	
1	1642	574.22	0.20	0.26	0.26	7.0	265	267	278	60	102	94	290	
End	1647	575.621	—	—	—	—	—	—	—	—	—	—	—	
E 3	1648	575.801	0.20	0.26	0.26	7.0	268	269	280	65	103	93	295	
2	1653	577.18	0.16	0.21	0.21	6.5	311	262	279	61	104	93	297	
1	1658	578.69	0.13	0.17	0.17	6.0	270	257	281	61	104	93	296	
End	1703	580.145	—	—	—	—	—	—	—	—	—	—	—	0.338 ✓
E 3	1707	580.483	0.20	0.26	0.26	7.0	309	255	281	62	104	93	297	
2	1712	582.37	0.20	0.26	0.26	7.0	317	253	280	60	103	93	297	
1	1717	584.18	0.25	0.32	0.32	8.5	312	255	281	61	103	92	296	
End	1722	585.941	—	—	—	—	—	—	—	—	—	—	—	0.185 ✓
B 3	1725	586.126	0.29	0.37	0.37	8.0	303	251	281	62	103	92	295	
2	1730	587.98	0.33	0.42	0.42	8.0	321	253	282	62	102	92	296	

Pitot Tube Calibration Factor C_p 0.8068 ✓
Volume Collected V_m 53.683 ✓ ft³
Water Collected V_w 72.5 ✓ ml
Time of Test T_t 150 ✓ min.
Stack Pressure P_s -25.2 ✓ "H_2O

Pitot Tube No. M-6 ✓
Baro. Press. P_b 29.52 ✓ "Hg
Probe Tip Dia. D_n 0.226 ✓ in.
% CO_2 11.0 ✓ % CO 0 ✓
% O_2 8.8 ✓ % N_2 80.2 ✓
Area Stack A_s ~~55,065~~ 55,007 ✓ in²

Barometer No. 19-2 ✓ Probe Tip No. TFE 1-8 ✓
Total Volume of Leak Checks After Start: 0.983 ✓ ft³
V_m = Dry Gas Meter Calibration Factor 1.000 ✓ X 53.683

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

Impinger Box No. Hg - 2

Impinger 1	Final Weight	797.9	**Water Weight Gain**	Impinger 1	53.3
	Initial Weight	744.6	Imp. 8 final 874.4	Impinger 2	10.3
	Increase	53.3	Init 869.6 / 4.8	Impinger 3	0.4
Impinger 2	Final Weight	759.9		Impinger 4	3.3
	Initial Weight	749.6		Impinger 5	-0.3
	Increase	10.3		Impinger 6	0.0
Impinger 3	Final Weight	722.4	V_w =	Impinger 7	-0.1
	Initial Weight	722.0	g SO_2 = -	Imp 8	4.8
	Increase	0.4	V_w =	Total	72.5 = V_w
Impinger 4	Final Weight	754.7			
	Initial Weight	751.4			
	Increase	3.3			
Impinger 5	Final Weight	674.1	P_b = 29.82	%CO_2 = 11.0	
	Initial Weight	674.4	V_m = 53.683	%O_2 = 8.8	
	Increase	-0.3	V_w = 72.5	%CO = 0	
Impinger 6	Final Weight	750.8 ~~775.4~~ (BH)	P_m = 0.385	%N_2 = 80.2	
	Initial Weight	750.0	Avg ΔP = 0.292	A_s = ~~55.065~~ 55,002	
	Increase	~~25.4~~ 0.8	Avg$\sqrt{\Delta P}$ = 0.535	D_n = 0.226	
Impinger 7	Final Weight	680.5 ~~655.9~~	C_p = 0.808	T_t = 150	
	Initial Weight	680.6	P_s = -25.2 "H_2O	27.97 "Hg	
	Increase	~~-24.7~~ -0.1 (BH)	T_m = 94 °F	554 °R	
			T_s = ~~-25.2~~ 306 °F	766 °R	

Moisture Content: %M = 6.28 M_d = 0.9372 MW_d = 30.112 MW = 29.35

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 53.683 \left[\frac{29.82 + \frac{0.385}{13.6}}{94 + 460}\right] = \frac{51.049\ \text{sft}^3}{0.340\ \text{scfm}}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 72.5 = 3.422 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.422}{51.049 + 3.422}$ x 100 = 6.28 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{766}{27.97 \times 29.35}}$ x 0.535 = 2140 fpm

%I = $\frac{1{,}039 \times 51.049 \times 766}{150 \times 0.9372 \times 27.97 \times 2140 \times (0.226)^2}$ = 94.5 %

ACFM: ~~818,153~~ 817,291 ~~496,010~~ 495,488 (BH)

SCFM: ~~4,032,602~~

%EA: 70.7

Run Number 1

Unit 3 Baghouse Outlet Duct

Date 10-28-99

Hg FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B1	1735	589.72	0.37	0.48	0.48	9.0	320	253	282	61	101	92	295	
End	1740	591.628	—	—	—	—	—	—	—	—	—	—	—	leak/to 591.950; 12.0 20.00
M3	1806	591.950	0.40	0.54	0.54	9.0	320	252	271	67	96	90	298	4st ΔH ≥ 1.06
2	1811	594.05	0.33	0.44	0.44	9.0	323	254	271	65	95	90	296	0.322
1	1816	595.99	0.40	0.54	0.54	9.0	322	252	271	63	95	90	297	
End	1821	597.982	—	—	—	—	—	—	—	—	—	—	—	
K3	1823	598.063	0.40	0.54	0.54	9.0	327	257	272	64	95	89	297	
2	1828	600.07	0.32	0.43	0.43	8.5	325	261	271	62	95	89	298	
1	1833	601.96	0.27	0.36	0.36	8.0	316	256	271	62	95	89	298	
End	1838	603.613	—	—	—	—	—	—	—	—	—	—	—	
H3	1840	603.727	0.20	0.27	0.27	7.0	310	254	269	65	96	89	296	
2	1845	605.06	0.22	0.29	0.29	7.0	321	254	267	64	95	88	295	
1	1850	606.56	0.18	0.24	0.24	7.0	289	251	270	64	95	88	297	
End	1855	607.922	—	—	—	—	—	—	—	—	—	—	—	0.138 ✓
O3	1858	608.060	0.35	0.46	0.46	9.0	311	253	269	65	95	87	297	
2	1903	610.02	0.35	0.46	0.46	9.0	316	255	268	61	95	87	299	
1	1908	611.92	0.33	0.44	0.44	9.0	284	256	268	60	94	87	297	
End	1913	613.936	—	—	—	—	—	—	—	—	—	—	—	
B3	1915	613.964	0.40	0.54	0.54	9.0	309	252	268	63	94	86	294	
2	1920	615.93	0.47	0.62	0.62	11.0	319	253	266	60	93	86	291	
1	1925	618.17	0.36	0.48	0.48	10.0	283	253	265	59	93	86	289	
End	1930	620.836	—	—	—	—	—	—	—	—	—	—	—	

uct A

METCO ENVIRONMENTAL

Job Number 99-95.SHW3 ✓
Job Name EPRD - TVA ✓
Run Number 2 ✓
Unit Unit 3 Baghouse Outlet Duct ✓
Date 10-29-99 ✓
Operator Lee / Conway / Hedley ✓
Sample Box No. Hg 4 Meter Box No. 29-1 ✓

Hg Field Data

Read and record at the start of each test point.

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

Ambient Temp. °F 76
Assumed Moisture % 6%
Probe Length 12'
C Factor 1.7 ⇒ 6.0 to reference
Initial Leak @ 16.0 "Hg = 0.000 cfm
Final Leak @ 17.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O ΔP_s	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage P_m	Stack Temp °F T_s	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet T_m	Dry Gas Temp. °F Outlet	Heated Line	Remarks
Duct A														
B-3	0855	628.245	0.38	0.65	0.65	8.5	306	252	286	57	82	74	278	filter 42289
2	0900	630.83	0.43	0.73	0.73	9.0	312	255	287	54	82	74	280	
1	0905	633.19	0.50	0.85	0.85	9.0	289	253	283	52	83	75	281	
End	0910	635.543	—	—	—	—	—	—	—	—	—	—	—	
D-3	0911	635.587	0.39	0.66	0.66	8.5	290	253	288	52	84	75	285	
2	0916	639.71	0.37	0.63	0.63	9.5	310	255	286	51	85	75	288	
1	0921	639.87	0.33	0.56	0.56	8.0	296	254	284	50	85	75	288	
End	0926	641.788	—	—	—	—	—	—	—	—	—	—	—	
H-3	0928	641.903	0.08	0.14	0.14	6.0	288	254	276	56	88	76	290	
2	0933	642.96	0.12	0.20	0.20	6.0	299	257	280	54	88	77	291	
1	0938	644.05	0.16	0.27	0.27	7.0	293	259	278	55	90	76	290	
End	0943	645.501	—	—	—	—	—	—	—	—	—	—	—	
K-3	0944	645.578	0.45	0.77	0.77	9.5	294	257	283	55	91	77	291	
2	0949	647.71	0.31	0.53	0.53	8.0	310	259	287	52	91	77	290	
1	0954	649.74	0.25	0.43	0.43	8.0	285	261	289	54	91	77	289	
End	0959	651.552	—	—	—	—	—	—	—	—	—	—	—	
M-3	1000	651.642	0.39	0.66	0.66	9.0	304	258	290	55	91	77	288	
2	1005	653.86	0.34	0.58	0.58	8.5	313	261	288	54	91	78	289	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 59.418 ✓ ft³
Water Collected V_w 97.6 ✓ ml
Time of Test T_t 150 ✓ min.
Stack Pressure P_s -26.0 ✓ "H₂O

Pitot Tube No. M-6 ✓
Baro. Press. P_b 29.92 ✓ "Hg
Probe Tip Dia. D_n 0.226 ✓ in.
% CO_2 10.0 ✓ % CO Φ ✓
% O_2 9.0 ✓ % N_2 81.0
Area Stack A_s ~~55.065~~ 55.007 ✓ in²

Barometer No. 19-2 ✓ Probe Tip No. TFE 1-8 ✓
Total Volume of Leak Checks After Start: 0.982 ✓ ft³
V_m = Dry Gas Meter Calibration Factor 1.000 ✓ X 59.418

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

Impinger Box No. $Hg - 4$

			Water Weight Gain		
Impinger 1	Final Weight	823.5	Imp 5 final 940.5	Impinger 1	70.1
	Initial Weight	753.4	Imp 5 init 929.6	Impinger 2	10.9
	Increase	70.1	10.9	Impinger 3	2.8
Impinger 2	Final Weight	770.1		Impinger 4	2.7
	Initial Weight	759.2	V_w =		
	Increase	10.9	g SO_2 = -	Impinger 5	0.7
Impinger 3	Final Weight	663.6	V_w =		
	Initial Weight	660.8		Impinger 6	0.1
	Increase	2.8			
Impinger 4	Final Weight	760.7		Impinger 7	-0.6
	Initial Weight	758.0		Imp 8	10.9
	Increase	2.7		Total	97.6 = V_w
Impinger 5	Final Weight	753.0	P_b = 29.92	$\%CO_2$ =	10.0
	Initial Weight	752.3	V_m = 59.418	$\%O_2$ =	9.0
	Increase	0.7	V_w = 97.6	%CO =	0
			P_m = 0.539	$\%N_2$ =	81.0
Impinger 6	Final Weight	756.5	Avg ΔP = 0.317	A_s = ~~55,065~~	55,007
	Initial Weight	756.4		D_n =	0.226
	Increase	0.1	Avg $\sqrt{\Delta P}$ = 0.556	T_t =	150
			C_p = 0.808		
Impinger 7	Final Weight	751.6	P_s = -26.10 H_2O		28.01 °Hg
	Initial Weight	752.2	T_m = 84 °F		514 °R
	Increase	-0.6	T_s = 301 °F		761 °R

Moisture Content: %M = 7.39 M_d = 0.9261 MW_d = 29.960 MW = 29.08

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 59.418 \left[\frac{29.92 + \frac{0.539}{13.6}}{84 + 460}\right] = \frac{57.756}{0.385}\ \text{sft}^3/\text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 97.6 = 4.607 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{4.607}{57.756 + 4.607} \times 100 = 7.39$ %

V_s = 5123.8 x 0.809 $\sqrt{\frac{761}{28.01 \times 29.08}}$ x 0.556 = 2225 fpm

ACFM: ~~849,509~~ ~~850,805~~ 513,144

SCFM: ~~513,685~~

%I = $\frac{1{,}039 \times 57.756 \times 761}{150 \times 0.9261 \times \frac{29.92}{28.01} \times 2225 \times (0.226)^2}$ = 103.3 %

%EA: 72.2

Run Number 2 ____ Hg ____ FIELD DATA

Unit Unit 3 Baghouse Outlet Duct

Date 10-29-99

			ΔP_s			P_m	T_s				T_m			
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line	Remarks
M-1	1010	655.94	0.33	0.56	0.56	8.0	304	261	290	54	90	78	290	
End	1015	657.903	—	—	—	—	—	—	—	—	—	—	—	0.207 ✓
B-3	1019	658.110	0.35	0.60	0.60	8.5	306	259	285	59	91	78	290	
2	1024	660.63	0.39	0.63	0.63	8.5	315	262	280	56	92	79	293	
1	1029	662.44	0.27	0.46	0.46	8.0	299	263	276	55	91	80	290	
End	1034	664.541	—	—	—	—	—	—	—	—	—	—	—	
C-3	1035	664.622	0.31	0.53	0.53	8.0	317	256	289	57	92	80	289	
2	1040	666.43	0.27	0.46	0.46	8.0	311	260	288	56	92	80	288	
1	1045	668.29	0.34	0.58	0.58	8.5	307	258	285	56	92	80	287	
End	1050	670.181	—	—	—	—	—	—	—	—	—	—	—	0.370 ✓
F-3	1053	670.551	0.26	0.44	0.44	8.0	291	260	281	59	93	80	289	
2	1058	672.32	0.31	0.53	0.53	8.0	317	261	278	57	94	80	289	
1	1103	674.38	0.35	0.59	0.59	8.5	305	259	271	57	93	80	288	
End	1108	676.520	—	—	—	—	—	—	—	—	—	—	—	0.405 ✓
J-3	1112	676.925	0.30	0.51	0.51	8.0	314	260	271	58	95	81	289	
2	1117	678.75	0.27	0.46	0.46	7.5	287	262	270	57	95	82	286	
1	1122	680.84	0.28	0.48	0.48	8.0	294	263	269	57	93	82	288	
End	1127	682.406	—	—	—	—	—	—	—	—	—	—	—	
M-3	1129	682.753	0.34	0.57	0.57	8.5	282	260	274	58	93	82	285	
2	1134	684.96	0.36	0.61	0.61	9.0	287	259	277	58	93	82	286	
1	1139	686.79	0.29	0.50	0.51	8.5	292	260	275	57	93	82	287	
End	1144	688.645	—	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-95 SHW 3 ✓
Job Name EPRI - TVA ✓
Run Number 3 ✓
Unit Unit 3 Baghouse Outlet Duct ✓
Date 10-29-99 ✓
Operator Lee/Conway/Hefley ✓
Sample Box No. Hg 2 Meter Box No. 29-1 ✓

Hg Field Data

Read and record at the start of each test point.

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

Ambient Temp. °F 82
Assumed Moisture % 6 %
Probe Length 12'
C Factor 4.0 ⇒ 2.5 to reference
Initial Leak @ 16.0 "Hg = 0.002 cfm
Final Leak @ 17.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	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)	Heated Line	Remarks
M-3	1435	689.937	0.30	0.47	0.47	9.0	280	252	271	66	95	90	271	filter
2	1440	692.28	0.27	0.43	0.43	8.5	320	250	271	59	95	91	274	Multi-Point
1	1445	694.16	0.37	0.58	0.58	9.0	317	251	273	52	93	90	275	Duct Orsat
End	1450	696.326	—	—	—	—	—	—	—	—	—	—	—	
J-3	1452	696.421	0.39	0.61	0.61	9.5	276	252	270	50	97	91	278	
2	1457	698.53	0.36	0.56	0.56	9.5	271	256	272	49	97	90	278	
1	1502	700.76	0.29	0.46	0.46	9.0	300	255	272	47	98	90	279	
End	1507	702.706	—	—	—	—	—	—	—	—	—	—	—	0.215 ✓
F-3	1510	702.921	0.27	0.42	0.42	8.0	320	259	271	47	101	90	281	
2	1515	704.63	0.28	0.44	0.44	8.0	323	260	270	47	101	91	283	
1	1520	706.54	0.29	0.46	0.46	8.5	321	261	271	46	104	91	283	
End	1525	708.515	—	—	—	—	—	—	—	—	—	—	—	0.234 ✓
E-3	1529	708.749	0.42	0.66	0.66	10.0	313	263	272	47	105	91	281	
2	1534	711.01	0.39	0.61	0.61	9.5	327	263	271	47	105	92	283	
1	1539	713.33	0.40	0.63	0.63	10.0	322	260	271	48	103	92	285	
End	1544	715.490	—	—	—	—	—	—	—	—	—	—	—	
B-3	1545	715.611	0.32	0.50	0.50	9.0	318	259	273	48	101	92	284	
2	1550	717.54	0.37	0.58	0.58	9.5	316	257	273	48	100	92	285	

not D

B-20

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 62.621 ✓ ft³
Water Collected V_w 91.4 ✓ ml
Time of Test T_t 150 ✓ min.
Stack Pressure P_s −26.9 ✓ "H_2O

Pitot Tube No. M-6 ✓
Baro. Press. P_b 29.88 ✓ "Hg
Probe Tip Dia. D_n 0.226 ✓ in.
% CO_2 10.4 ✓ % CO 0 ✓
% O_2 9.0 ✓ % N_2 80.6 ✓
Area Stack A_s ~~55.065~~ 55.007 ✓ in²

Barometer No. 19-2 ✓
Probe Tip No. TFE 1-8 ✓
Total Volume of Leak Checks After Start: 0.649 ✓ ft³
V_m = Dry Gas Meter Calibration Factor 1.000 ✓ X 62.621

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

Impinger Box No. Hg 2

Impinger 1	Final Weight	809.7	**Water Weight Gain**	Impinger 1	63.4
	Initial Weight	746.3	Imp 8 Final 892.6	Impinger 2	12.3
	Increase	63.4	Int. 879.6	Impinger 3	0.3
Impinger 2	Final Weight	758.7	13.0	Impinger 4	3.4
	Initial Weight	746.4		Impinger 5	-0.8
	Increase	12.3		Impinger 6	-0.1
Impinger 3	Final Weight	721.3	V_w =	Impinger 7	-0.1
	Initial Weight	721.0	g SO_2 = -	Imp8	13.0
	Increase	0.3	V_w =	Total	91.4 = V_w
Impinger 4	Final Weight	758.1			
	Initial Weight	754.7			
	Increase	3.4			
Impinger 5	Final Weight	671.0	P_b = 29.88	%CO_2 = 10.4	
	Initial Weight	671.8	V_m = 62.621	%O_2 = 9.0	
	Increase	-0.8	V_w = 91.4	%CO = 0	
Impinger 6	Final Weight	747.1	P_m = ~~0.351~~ 0.551	%N_2 = 80.6	
	Initial Weight	747.2	Avg ΔP = ~~0.591~~ 0.351	A_s = ~~55.065~~ 55.00	
	Increase	-0.1		D_n = 0.226	
			Avg$\sqrt{\Delta P}$ = 0.591	T_t = 150	
			C_p = 0.808		
Impinger 7	Final Weight	679.8	P_s = -26.9 "H_2O	27.90 "Hg	
	Initial Weight	679.9	T_m = 95 °F	555 °R	
	Increase	-0.1	T_s = 308 °F	768 °R	

Moisture Content: %M = 6.75 M_d = 0.9325 MW_d = 30.024 MW = 29.21

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 62.621 \left[\frac{29.88 + \frac{0.551}{13.6}}{95 + 460}\right] = 59.586\ \text{sft}^3 \quad 0.397\ \text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 91.4 = 4.314 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{4.314}{59.586 + 4.314}$ x 100 = 6.75 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{768}{27.90 \times 29.21}}$ x 0.591 = 2375 fpm

%I = $\frac{1{,}039 \times 59.586 \times 768}{150 \times 0.9325 \times 27.90 \times 2375 \times (0.226)^2}$ = 100.4 %

ACFM: ~~908,274~~ 907,317

SCFM: ~~544,924~~ 544,350

%EA: 72.8

Run Number 3 FIELD DATA Hg FIELD DATA

Unit Unit 3 Baghouse Outlet Duct

Date 10-29-99

			ΔP_s			P_m	T_s					T_m		
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B1	1555	719.87	0.31	0.48	0.48	9.0	307	255	271	47	99	92	284	
End	1600	722.385	—	—	—	—	—	—	—	—	—	—	—	
M-3	1602	722.497	0.35	0.55	0.55	9.0	312	253	270	48	99	92	285	
2	1607	724.01	0.40	0.63	0.63	10.0	318	257	273	49	98	92	286	
1	1612	726.27	0.38	0.60	0.60	10.0	315	256	271	49	98	92	285	
End	1617	728.295	—	—	—	—	—	—	—	—	—	—	—	0.110 ✓
M-3	1620	728.405	0.32	0.50	0.50	9.0	304	253	269	50	98	91	287	
2	1625	730.58	0.35	0.55	0.55	9.0	321	250	270	50	98	91	286	
1	1630	732.36	0.30	0.47	0.47	9.0	319	251	271	51	98	90	285	
End	1635	734.200	—	—	—	—	—	—	—	—	—	—	—	
H-3	1636	734.292	0.32	0.50	0.50	9.0	273	254	270	53	98	90	285	
2	1641	736.23	0.40	0.63	0.63	9.5	290	257	269	52	97	91	286	
1	1646	738.49	0.38	0.60	0.60	9.5	286	259	270	52	97	91	288	
End	1651	740.628	—	—	—	—	—	—	—	—	—	—	—	
O-3	1652	740.816	0.42	0.66	0.66	10.0	316	260	270	54	97	91	287	
2	1657	743.00	0.40	0.63	0.63	10.0	318	261	274	56	96	90	286	
1	1702	745.46	0.35	0.55	0.55	9.5	302	258	276	57	97	90	285	
End	1707	747.205	—	—	—	—	—	—	—	—	—	—	—	
B-3	1710	747.295	0.39	0.61	0.61	9.5	300	257	275	60	97	90	286	0.090 ✓
2	1715	749.62	0.32	0.50	0.50	9.0	323	257	273	59	96	89	286	
1	1720	751.59	0.42	0.66	0.66	8.5	317	259	271	60	96	89	285	
End	1725	753.207	—	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-955HW3 ✓
Job Name EPRI / TVA ✓
Run Number 1 ✓
Unit Unit 3 Baghouse Inlet Duct B ✓
Date 10/28/99 ✓
Operator Fordyce / Brown / Hefley ✓
Sample Box No. 19-3 Meter Box No. 27-2

H_2O / Vel. 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 % —
Probe Length —
C Factor — to reference
Initial Leak @ 15.00 "Hg = 0.000 cfm
Final Leak @ 9.0 (11.0) "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF (ΔP_s)	"Pitot" "H_2O	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
B3	1955	98.854	0.51	1.60	1.60	8.5	341	235	241	66	85	85	A6 1959
.	2000	102.25	1.25	1.60	1.60	9.0	342	237	243	66	84	83	5 2000
.	2005	106.02	1.35	1.60	1.60	9.0	343	232	240	64	84	84	4 2001
.	2010	109.49	1.45	1.60	1.60	9.0	343	230	241	63	83	83	3 2002
.	2015	113.14	1.45	1.60	1.60	9.0	342	237	240	63	84	84	2 2003
.	2020	116.76	1.30	1.60	1.60	9.0	342	239	244	62	85	85	1 2004
End	2025	120.590	1.40	←	—	—	341	—	—	—	—	—	B6 2006
			1.65				341						5 2007
			1.65				341						4 2008
			1.65				340						3 2009
			1.65				340						2 2010
			1.60				341						1 2011
			1.25				341						C6 2013
			1.50				340						5 2014
			1.70				339						4 2015
			1.70				339						3 2016
			1.55				339						2 2017
			1.55				338						1 2018

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 22.366 ✓ ft³
Water Collected V_w 36.4 ✓ ml
Time of Test T_t 30 ✓ min.
Stack Pressure P_s -17.6 ✓ "H_2O

Pitot Tube No. M5 ✓
Baro. Press. P_b 29.90 ✓ "Hg
Probe Tip Dia. D_n — in.
% CO_2 11.6 ✓ % CO 0.0 ✓
% O_2 8.2 ✓ % N_2 80.2 ✓
Area Stack A_s ~~9408~~ 9312 ✓ in²

Barometer No. 19-1 ✓ Probe Tip No. —
Total Volume of Leak Checks After Start: — ✓ ft³
V_m = Dry Gas Meter Calibration Factor 21.736 X 1.029

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

Impinger Box No. 19-3

			Water Weight Gain		
Impinger 1	Final Weight	774.5		Impinger 1	25.8
	Initial Weight	748.7			
	Increase	25.8		Impinger 2	2.7
Impinger 2	Final Weight	754.9		Impinger 3	0.1
	Initial Weight	752.2			
	Increase	2.7		Impinger 4	~~0~~ 8.0
Impinger 3	Final Weight	645.0	V_w =	Impinger 5	–
	Initial Weight	644.9	g SO_2 = -		
	Increase	0.1	V_w =	Impinger 6	–
Impinger 4	Final Weight	1043.6		Impinger 7	–
	Initial Weight	1035.6			
	Increase	8.0		Total	36.6 = V_w

Impinger 5	Final Weight		P_b = 29.90		$\%CO_2$ = 11.6	
	Initial Weight		V_m = 22.366		$\%O_2$ = 8.2	
	Increase		V_w = 36.6		%CO = 0.0	
			P_m = 1.600		$\%N_2$ = 80.2	
Impinger 6	Final Weight		Avg ΔP = 1.405		A_s = ~~9408~~ 9312	
	Initial Weight				D_n = –	
	Increase		Avg$\sqrt{\Delta P}$ = 1.179		T_t = 30	
			C_p = 0.808			
Impinger 7	Final Weight		P_s = -17.6	"H_2O	28.61	"Hg
	Initial Weight		T_m = 84	°F	544	°R
	Increase		T_s = 340	°F	800	°R

Moisture Content: %M = 7.35 M_d = 0.9265 MW_d = 30.184 MW = 29.29

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 22.366 \left[\frac{29.90 + \frac{1.600}{13.6}}{84 + 460}\right] = \frac{21.783\ \text{sft}^3}{0.726\ \text{scfm}}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 36.6 = 1.728 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{1.728}{21.783 + 1.728}$ x 100 = 7.35 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{800}{29.29 \times 28.61}}$ x 1.179 = 4769 fpm

ACFM: ~~311586~~ 308,407

SCFM: ~~182853~~ 180,988

%I = $\frac{1{,}039 \times \quad \times}{\cancel{3} \times \quad \times \quad \times \quad \times (\quad)^2}$ = – %

%EA: 62.8

Run Number 99-955HW3

Unit Unit 3 Baghouse Inlet Duct B

Date 10/28/99

H2O / Vel. FIELD DATA

			ΔP_s			P_m	T_s					T_m	
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
			1.10				336						D6 2020
			1.20				336						5 2021
			1.30				335						4 2022
			1.55				337						3 2023
			1.30				336						2 2024
			1.10				336						1 2025

METCO ENVIRONMENTAL

Job Number 99-95 SHW3 ✓
Job Name EPRI / TVA ✓
Run Number 2 ✓
Unit 3 Baghouse Inlet B Duct ✓
Date 10/29/99 ✓
Operator Brown / Hart / Hefley ✓
Sample Box No. 19-3 Meter Box No. 27-2 ✓

Velocity 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
Probe Length 8'
C Factor — to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 10.50 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H2O	Orifice ΔH "H2O Desired	Orifice ΔH "H2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Point	Remarks	Time
			ΔPs			Pm	Ts					Tm			
B2	0737	144.271	1.10	1.60	1.60	8.00	335	261	259	63	68	67	A6		0737
	0742	147.39	1.40	1.60	1.60	8.00	335	260	258	63	68	67	5		0738
	0747	150.90	1.50	1.60	1.60	8.00	334	258	260	62	68	67	4		0739
	0752	154.39	1.50	1.60	1.60	8.50	334	259	260	62	69	67	3		0740
	0757	157.87	1.40	1.60	1.60	8.50	334	258	261	60	69	68	2		0741
	0802	161.34	1.30	1.60	1.60	8.50	333	259	260	60	70	68	1		0742
END	0807	164.617	—	—	—	—	—	—	—	—	—	—	—		—
			1.20				337						B6		0744
			1.50				335						5		0745
			1.50				335						4		0746
			1.50				334						3		0747
			1.60				334						2		0748
			1.40				333						1		0749
			—				—						—		—
			1.20				339						C6		0751
			1.50				339						5		0752
			1.50				339						4		0753
			1.50				338						3		0754

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 90.936 ✓ ft³
Water Collected V_w 26.0 ✓ ml
Time of Test T_t 30 ✓ min.
Stack Pressure P_s -18.0 ✓ "H2O

Pitot Tube No. M5
Baro. Press. P_b 29.89 ✓ "Hg
Probe Tip Dia. D_n — in.
% CO_2 11.6 ✓ % CO 0.0 ✓
% O_2 8.2 ✓ % N_2 80.2
Area Stack A_s ~~9408~~ 9312 ✓ in²

Barometer No. 19-1
Probe Tip No. —
Total Volume of Leak Checks After Start: — ft³
V_m = Dry Gas Meter Calibration Factor 20.346 ✓ X 1.029

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

Impinger Box No. 19.3

Impinger 1	Final Weight	848.7		Impinger 1	74.2
	Initial Weight	774.5			
	Increase	74.2		Impinger 2	-54.1
Impinger 2	Final Weight	700.5		Impinger 3	1.2
	Initial Weight	754.6			
	Increase	-54.1		Impinger 4	4.7
Impinger 3	Final Weight	645.9	V_w =	Impinger 5	-
	Initial Weight	644.7	g SO_2 = -		
	Increase	1.2	V_w =	Impinger 6	-
Impinger 4	Final Weight	1044.4		Impinger 7	-
	Initial Weight	1039.7			
	Increase	~~-3~~ 4.7		Total	26.0 = V_w
Impinger 5	Final Weight		P_b = 29.89	$\%CO_2$ =	11.6
	Initial Weight		V_m = 20.936	$\%O_2$ =	8.2
	Increase		V_w = ~~29.0~~ 26.0	%CO =	0.0
			P_m = 1.600	$\%N_2$ =	80.2
Impinger 6	Final Weight		Avg ΔP = 1.375	A_s =	~~9408~~ 931
	Initial Weight			D_n =	-
	Increase		Avg$\sqrt{\Delta P}$ = 1.171	T_t =	30
			C_p = 0.808		
Impinger 7	Final Weight		P_s = ~~17.90~~ 18.0 "H_2O	~~28.58~~ 28.57	"Hg
	Initial Weight		T_m = 68 °F	528	°R
	Increase		T_s = 337 °F	797	°R

Moisture Content: %M = ~~6.12~~ 5.52 M_d = ~~0.9388~~ 0.9448 MW_d = 30.184 MW = 29.51

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 20.936 \left[\frac{29.89 + \frac{1.600}{13.6}}{68 + 460}\right] = \frac{21.001}{0.700} \text{ sft}^3 \text{ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x ~~29.0~~ 26.0 = ~~1.369~~ 1.227 sft³

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{\cancel{1.369}\ 1.227}{21.001 + \cancel{1.369}\ 1.227}$ x 100 = ~~6.12~~ 5.52 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{797}{\cancel{28.58}\ 28.57 \times 29.51}}$ x 1.171 = ~~4713~~ 4714 fpm

ACFM: ~~307099~~ 304,811

SCFM: ~~184775~~ 182,865

%I = $\frac{1{,}039 \times \quad \times}{\times \quad \times \quad \times \quad \times (\quad)^2}$ = - %

%EA: 62.8

Run Number 2

Unit 3 Baghouse Inlet B Pad

Date 10/29/99

Velocity FIELD DATA

			ΔP_s			P_m	T_s					T_m		
Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Point	Remarks	Time
			1.60				338						C2		0755
			1.50				338						1		0756
			—				—						Ex	—	—
			1.00				339						D6		0758
			1.30				341						5		0759
			1.20				341						4		0800
			1.30				340						3		0801
			1.20				340						2		0802
			1.30				340						1		0803
													END		—

METCO ENVIRONMENTAL

Job Number 99-95 HW 3 ✓
Job Name EPRI / TVA ✓
Run Number 3 ✓
Unit Unit 3 Baghouse Inlet Duct B ✓
Date 10-29-99 ✓
Operator Hart / Bass / Hefley ✓
Sample Box No. 19-3 Meter Box No. 27-2 ✓

Velocity Field Data

Read and record at the start of each test point.

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

Ambient Temp. °F —
Assumed Moisture % —
Probe Length —
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.000 cfm
Final Leak @ 15.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF (ΔP_s)	"Pitot" "H_2O" (P_m)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	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)	Pitot	ΔP_s Remarks	Time
B2	1209	~~31.694~~	~~1.20~~	1.75	1.75	9.5	335	250	245	66	79	79	A6	1.20	1213
	1214	235.67	~~1.50~~	1.75	1.75	9.5	335	249	245	66	79	79	5	1.50	1214
	1219	239.30	~~1.60~~	1.75	1.75	10.5	335	247	250	65	84	80	4	1.60	1215
	1224	242.98	~~1.30~~	1.75	1.75	11.0	339	246	255	64	84	82	3	1.60	1216
	1229	246.55	~~1.43~~	1.75	1.75	12.5	340	250	255	64	88	84	2	1.50	1217
	1234	249.90	~~1.30~~	1.75	~~1.50~~ 1.75	13.5	340	262	257	63	88	85	1	1.50	1218
END	1239	~~253.130~~	—	—	—	—	—	—	—	—	—	—	—	—	—
							336						B4	1.20	1220
							334						5	1.50	1221
							335						4	1.50	1222
							335						3	1.60	1223
							335						2	1.40	1224
							336						1	1.40	1225
			—				—						—	—	—
							341						C4	1.20	1227
							340						5	1.50	1228
							341						4	1.50	1229
							~~340~~						3	1.60	1230

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 22.058 ✓ ft^3
Water Collected V_w 32.4 ✓ ml
Time of Test T_t 30 ✓ min.
Stack Pressure P_s ~ 18.10 ✓ H_2O

Pitot Tube No. M5
Baro. Press. P_b 29.93 "Hg
Probe Tip Dia. D_n — in.
% CO_2 11.0 % CO 0.0
% O_2 8.3 % N_2 80.7
Area Stack A_s ~~9405~~ 9312 ✓ in^2

Barometer No. 19-1 Probe Tip No. —
Total Volume of Leak Checks After Start: — ft^3
V_m = Dry Gas Meter Calibration Factor 21.436 ✓ X 1.029

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

Impinger Box No. 19-3

			Water Weight Gain		
Impinger 1	Final Weight	796.1		Impinger 1	25.0
	Initial Weight	771.1			
	Increase	25.0 ✓		Impinger 2	2.4
Impinger 2	Final Weight	771.9		Impinger 3	0.0
	Initial Weight	769.5			
	Increase	2.4 ✓		Impinger 4	5.0
			V_w =		
Impinger 3	Final Weight	645.9	g SO_2 =	Impinger 5	
	Initial Weight	645.9 ✓	V_w =		
	Increase	0.0		Impinger 6	
Impinger 4	Final Weight	1049.4		Impinger 7	
	Initial Weight	1044.4 ✓			
	Increase	5.0 ✓		Total	32.4 ✓ = V_w
Impinger 5	Final Weight		P_b = 29.93 ✓	$\%CO_2$ =	11.0 ✓
	Initial Weight		V_m = 22.058 ✓	$\%O_2$ =	8.3 ✓
	Increase		V_w = 32.4 ✓	%CO =	0.0 ✓
			P_m = 1.750 ✓	$\%N_2$ =	80.7 ✓
Impinger 6	Final Weight		Avg ΔP = 1.413	A_s =	9408 9312 ✓
	Initial Weight			D_n =	—
	Increase		Avg $\sqrt{\Delta P}$ = ~~1.191~~ 1.187 ✓	T_t =	30 ✓
			C_p = 0.808 ✓		
Impinger 7	Final Weight		P_s = -18.10 H_2O		28.60 ✓ "Hg
	Initial Weight		T_m = 83 ✓ °F		543 ✓ °R
	Increase		T_s = ~~338~~ °F		798 ✓ °R

Moisture Content: %M = 6.63 ✓ M_d = 0.9337 ✓ MW_d = 30.092 ✓ MW = 29.29 ✓

$$Vm_{std} = 17.65\ Vm\left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 22.058\left[\frac{29.93 + \frac{1.750}{13.6}}{83 + 460}\right] = \frac{21.552}{0.718}\ \text{scfm}$$ ✓

Vw_{gas} = 0.0472 x Vw = 0.0472 x 32.4 = 1.529 ✓ sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{1.529}{21.552 + 1.529} \times 100$ = 6.63 ✓ %

V_s = 5123.8 x 0.808 $\sqrt{\frac{798}{28.60 \times 29.29}} \times \frac{1.191}{1.187}$ = ~~4813~~ 4796 ✓ fpm

ACFM: ~~314419~~ 310,165 ✓

SCFM: ~~186375~~ 183,822 ✓

%I = $\frac{1{,}039 \times \quad \times}{\quad x \quad x \quad x \quad x(\quad)^2}$ = — %

%EA: 63.4 ✓

Run Number 3

Unit 3 Baghouse Inlet B Duct

Date 10-29-99

Velocity FIELD DATA

			ΔP_s			P_m	T_s					T_m				
Point	Clock Time	Dry Gas Mefer, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Point	ΔP_s Remarks	Time
							338						C2	1.50	1231
							339						1	1.60	1232
			—				—						—	—	—
							339						DG	1.10	1234
							339						5	1.20	1235
							342						4	1.20	1236
							340						3	1.30	1237
							340						2	1.40	1238
							341						1	1.30	1239
			—				—						END		—

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-95 SHA3

Job Name Epri / TVA

Stack Height — ft.

Sampling Location Aduct Inlet

Sampling Port Height Above Ground ~~488"~~ 40' 8" ft.

Date 10-27-99 Time 0915

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)	~~110.5~~	~~110.5~~	~~110.5~~	~~110.5~~	~~110.5~~
Port & Wall Thickness (in.)	13.5" ✓	13.5" ✓	13.5" ✓	13.5" ✓	13.5" ✓
Inside Stack Diameter (in.)	~~88"~~ ~~97"~~	~~88"~~ ~~97"~~	~~88"~~ ~~97"~~	~~88"~~ ~~97"~~	~~88"~~ ~~97"~~ ~~98~~ 97" ✓

Sampling Ports are 30 ✓ ft. ~~368~~ 8 ✓ in.

~~3.79~~ 3.83 ✓ stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are 22 ✓ ft. ~~272~~ 8 in.

~~2.80~~ 2.83 ✓ stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

De = 16

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port ~~A~~ D $\Delta P/T_s/\alpha$	Port ~~B~~ C $\Delta P/T_s/\alpha$	Port ~~C~~ B $\Delta P/T_s/\alpha$	Port ~~D~~ A $\Delta P/T_s/\alpha$
1		6.0625 ✓	6 1/16 ✓	0.80/311/0	1.10/313/0	1.35/310/0	0.90/305/0
2		18.1875 ✓	18 3/16 ✓	1.15/315/-2	1.50/315/-5	1.25/308/0	0.90/308/0
3		30.3125 ✓	30 5/16 ✓	1.10/318/0	1.40/315/-5	1.25/308/0	0.85/309/0
4		42.4375 ✓	42 7/16 ✓	1.05/321/0	1.50/317/-2	1.40/308/0	0.95/312/0
5		54.5625 ✓	54 9/16 ✓	1.05/325/0	1.40/321/2	1.30/316/0	1.30/315/0
6		66.6875 ✓	66 11/16 ✓	1.20/326/3	1.30/323/-2	1.30/321/-5	1.20/317/0
7		78.8125 ✓	78 13/16 ✓	~~1.15~~ 1.20/324/0	1.25/321/0	1.25/322/-2	1.15/316/0
8		90.9375 ✓	90 15/16 ✓	~~0.80~~ 1.05/323/0	1.40/320/0	1.00/329/2	0.66/313/0
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12				/ /	/ /	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. M5 ✓

C_p = 0.808 ✓

P_b = 29.94 ✓ "Hg

P_s = -18.0 "H_2O ~~29.9~~ 28.62 ✓ "Hg

A_s = ~~9408~~ 9312 ✓ in.²

Average ΔP 1.171 ✓

Average $\Delta P^{1/2}$ ~~1.042~~ 1,078 ✓

Average T_x 316 ✓ °F

Average α 0.94 ✓ degrees

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-95 SHW3
Job Name EPRI - TVA
Sampling Location Unit 3 Bghouse Outlet Duct A (East)
Date 10-28-99 Time 0930

Stack Height — ft.
Sampling Port Height Above Ground 35'8" ✓ ft.

	~~Port A~~ Duct A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)					128 1/2
Port & Wall Thickness (in.)	on back				13
Inside Stack Diameter (in.)					115 1/2

Sampling Ports are 2 ✓ ft. ~~8~~ 32 ✓ in. 0.21 ✓ (~~0.19~~ stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are 1 ✓ ft. ~~6~~ 18 ✓ in. (0.12 ✓ stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

B D H K M

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			14 7/16	0.50 12821 ~~+32~~	0.58 12821 +18	0.48 12961 +25	0.40 12774 +15
2			43 5/16	0.42 12851 +13	0.55 12581 ⊗	0.46 12981 +24	0.40 12881 +29
3			72 3/16	0.29 12891 +29	0.51 12971 +20	0.45 13021 +14	0.39 12891 +21
4			101 1/16	0.16 12941 +30	0.25 13021 +29	0.44 13061 +44	0.37 12951 +50
5				Port 1 E	1 1 F	1 1 G	1 1 H ✓
~~6~~ 1				0.30 12801 ⊗	0.27 12851 +14	1 1	0.15 12901 +16
~~7~~ 2				0.30 12891 +30	0.16 12881 +21	1 1	0.15 12841 -16
~~8~~ 3				0.29 12921 +24	0.18 12931 +20	1 1	0.17 12961 -27
~~9~~ 4				0.28 12991 +21	0.19 12981 +10	1 1	0.16 13021 -27
10				Port 1 L	1 1 J	1 1 K ✓	1 1 L
~~11~~ 1				0.20 12791 +6	0.29 13861 +15	0.48 12811 -10	0.40 12881 +2
~~12~~ 2				0.24 12891 -25	0.32 12901 +15	0.42 12891 -14	0.45 12921 ⊗
~~13~~ 3				0.26 12941 -19	0.30 12951 ⊗	0.42 12951 ⊗	0.45 12981 -10
~~14~~ 4				0.22 12991 -25	0.31 13001 +29	0.37 12991 -10	0.45 13031 +5
15				Port 1 M ✓	1 1 N	1 1	1 1
~~16~~ 1				0.62 12891 +14	0.35 12941 +69	1 1	1 1
~~17~~ 2				0.78 13001 +6	0.35 12961 +55	1 1	1 1
~~18~~ 3				0.41 13041 -12	0.46 13021 +21	1 1	1 1
~~19~~ 4				0.30 13081 +47	0.13 13021 +30	1 1	1 1
20				1 1	1 1	1 1	1 1
21				1 1	1 1	1 1	1 1
22				1 1	1 1	1 1	1 1
23				1 1	1 1	1 1	1 1
24				1 1	1 1	1 1	1 1

Pitot Tube No. M-17 ✓
C_p = 0.811 ✓
P_b = 29.84 "Hg
P_s = -24.3 "H_2O 28.09 ✓ "Hg
A_s = 27.518 ✓ in.²

Average ΔP ~~0.348~~ 0.351 ✓
Average $\Delta P^{1/2}$ ~~0.576~~ 0.581 ✓
Average T_s 293 ✓ °F
Average α 19.7 ✓ degrees
Total = 22.7 ✓

~~On back~~
~~22.7 Total~~

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-95 SHW 3
Job Name EPRI - TVA
Sampling Location Unit 3 Baghouse Outlet Duct B (West)
Stack Height — ft.
Sampling Port Height Above Ground 35'8" ft.
Date 10-28-99 Time 1030

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)					128 1/2
Port & Wall Thickness (in.)	on back				13
Inside Stack Diameter (in.)					115 1/2

$D_e = 115\ 1/2$

Sampling Ports are — ft. 29 in.
(0.19 stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are 1 ft. 18 in.
(0.12 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			14 9/16	0.24 1269 1-77	1.10 1295 1+35	0.24 1293 1+21	0.37 1296 1+36
2			42 5/16	0.23 1278 1-46	0.74 1279 1+20	0.35 1300 1+20	0.25 1298 1+20
3			72 3/16	0.29 1284-49	0.32 1302 1 ⊘	0.31 1303 1 ⊘	0.25 1302 1 ⊘
4			101 1/16	0.25 1291 1-42	0.51 1305 1+15	0.28 1306 1+35	0.27 1305 1+50
5				Port 1E ✓	1 ✓ 1 F	1 1G	1 1H
6 1				0.26 1292 1+8	0.12 1298 1 ⊘	0.05 1232 1 ⊘	0.05 1240 1 ⊘
7 2				0.28 1295 1+17	0.15 1293 1+29	0.10 1270 1 ⊘	0.05 1262 1-90
8 3				0.26 1300 1+14	0.18 1295 1+34	0.11 1277 1+44	0.12 1280 1 ⊘
9 4				0.24 1302 1+25	0.18 1298 1+40	0.13 1281 1+45	0.10 1291 1-28
10				Port 1I	1 ✓ 1 J	1 1K	1 1L
11 1				0.36 1280 1-70	0.29 1267 1-40	0.30 1281 1-40	0.39 1266 1-15
12 2				0.26 1292 1-17	0.28 1281 1-33	0.29 1284 1-25	0.39 1274 1 ⊘
13 3				0.22 1292 1-25	0.28 1290 1-40	0.32 1291 1-31	0.35 1286 1-30
14 4				0.21 1294 1-35	0.27 1296 1-40	0.31 1293 1-25	0.35 1292 1-40
15				Port ✓ M	↓ 1 1N	1 1	1 1
16 1				0.40 1255 1 ⊘	0.37 1269 1+20	1 1	1 1
17 2				0.38 1268 1-16	0.35 1274 1 ⊘	1 1	1 1
18 3				0.35 1281 1-25	0.29 1288 1+8	1 1	1 1
19 4				0.20 1295 1-20	0.15 1300 1 ⊘	1 1	1 1
20				1 1	1 1	1 1	1 1
21				1 1	1 1	1 1	1 1
22				1 1	1 1	1 1	1 1
23				1 1	1 1	1 1	1 1
24				1 1	1 1	1 1	1 1

Pitot Tube No. M-7
C_p = 0.811
P_b = 29.88 "Hg
P_s = -24.7 "H_2O 28.06 "Hg
A_s = ~~27.549~~ 27.489 ✓ in.²

Average ΔP 0.281 ✓
Average $\Delta P^{1/2}$ 0.512 ✓
Average T_x 286 ✓ °F ✓
Average α ~~25.3~~ 25.6 ~~24.5~~ degrees

~~On back~~

B E F J M

METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-95SHW3 Sample Location: Unit 3 Baghouse Inlet A

Job Name: TVA / EPRI Analytical Method: 3B

Location: Paducah, KY Sample Type: Single point or Multi point; Grab or Integrated

Date: 10/28/99 Leak Check: Time: 4:00 (min. 4 minutes) Rate: 0.000

Operator: Hefley Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	~~80.1~~ 79.1

Run Number 1 Run Time 1615-1839	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.6	11.6	11.6	11.6
O_2 - % Vol.	8.2	8.2	8.2	8.2
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.2	80.2	80.2	80.2

Fo = 1.095

Run Number 2 Run Time 0855-1119	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.2	11.2	11.2	11.2
O_2 - % Vol.	8.2	8.2	8.2	8.2
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.6	80.6	80.6	80.6

Fo = 1.134

Run Number 3 Run Time 1435-1654	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.0	11.0	11.0	11.0
O_2 - % Vol.	8.6	8.6	8.6	8.6
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.4	80.4	80.4	80.4

Fo = 1.118

METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-955HW3 Sample Location: Unit 3 Baghouse Outlet

Job Name: EPRI /TVA Analytical Method: 3B

Location: ~~Kent~~ Paducah, KY Sample Type: Single point or Multi point; Grab or Integrated

Date: 10/28/99 Leak Check: Time: 4:00 (min. 4 minutes) Rate: 0.00

Operator: Hefley Ambient Air Check:

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

Run Number 1 Run Time 1605-1735	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	11.0	11.0	11.0	11.0
O_2 - % Vol.	8.8	8.8	8.8	8.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.2	80.2	80.2	80.2

$F_o = 1.100$

Run Number 2 Run Time 0855-1144	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	10.0	10.0	10.0	10.0
O_2 - % Vol.	9.0	9.0	9.0	9.0
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.0	81.0	81.0	81.0

$F_o = 1.190$

Run Number 3 Run Time 1435-1725	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	10.4	10.4	10.4	10.4
O_2 - % Vol.	9.0	9.0	9.0	9.0
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.6	80.6	80.6	80.6

$F_o = 1.144$

METCO ENVIRONMENTAL

APPENDIX C

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #M-3	0.808	10/04/99
Pitot Tube #M-5	0.808	10/04/99
Pitot Tube #M-6	0.808	10/04/99
Pitot Tube #M-7	0.811	10/04/99
Pitot Tube #M-8	0.810	10/04/99
Probe Tip #TFE-1-6	0.174	10/04/99
Probe Tip #TFE-1-8	0.226	10/04/99
Dry Gas Meter #27-2	1.029	08/13/99
Stack Unit Orifice #27-2		08/14/99
Digital Temperature Indicator #27-2		08/13/99
Dry Gas Meter #29-1	1.000	10/04/99
Stack Unit Orifice #29-1		10/05/99
Digital Temperature Indicator #29-1		10/04/99
Barometer #19-1		10/04/99
Barometer #19-2		10/04/99

METCO ENVIRONMENTAL

APPENDIX C

Post Test

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #M-3	0.808	11/22/99
Pitot Tube #M-5	0.806	11/19/99
Pitot Tube #M-6	0.807	11/19/99
Pitot Tube #M-7	0.810	11/22/99
Pitot Tube #M-8	0.810	11/22/99
Probe Tip #TFE-1-6	0.174	11/19/99
Probe Tip #TFE-1-8	0.235	11/19/99
Dry Gas Meter #27-2	1.015	11/07/99
Stack Unit Orifice #27-2		11/08/99
Digital Temperature Indicator #27-2		11/07/99
Dry Gas Meter #29-1	1.000	11/22/99
Stack Unit Orifice #29-1		11/22/99
Digital Temperature Indicator #29-1		11/22/99
Barometer #19-1		11/22/99
Barometer #19-2		11/22/99

PITOT TUBE CALIBRATION

Date: 10-4-99 Time: 1130

Pitot No.: M3 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: Jam Brom 274

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 10-4-99 Time: 1330

Pitot No.: M5 T_s: 72 °F

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

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

Summary of Results:

Normal high side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Normal low side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Calibrator: Jason Brown 274

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 10-4-99 Time: 1400

Pitot No.: M6 T_s: 72 °F

Pitot Dimensions: 3/8" hp's 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 Dixon 274

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 10-4-99 Time: 1430

Pitot No.: M7 T_s: 72 °F

Pitot Dimensions: 3/8" hy.s C_{pstd}: 0.990

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

Summary of Results:

Normal high side calibration factor 0.811

variation + 1.23%

variation - 0.37%

Normal low side calibration factor 0.811

variation + 1.23%

variation - 0.37%

Calibrator: Jim Brown 274

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 10-4-99 Time: 1450

Pitot No.: 118 T_s: 72 °F

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

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	√Standard √Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.32	0.566	0.821	0.32	0.566	0.821
20	40	0.34	0.34	0.583	0.51	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							0.810			0.810

Summary of Results:

Normal high side calibration factor 0.810

variation + 1.36%

variation - 0.25%

Normal low side calibration factor 0.810

variation + 1.36%

variation - 0.25%

Calibrator: Jason Brown 274

Checked By: Jason Cowley #273

METCO ENVIRONMENTAL

✓ HM107

NOZZLE CALIBRATION

Nozzle Set No. TFE-1

Date 10-4-99 Calibrator: Jason Brown 374

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

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

METCO ENVIRONMENTAL

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 Lee

Date: 8-13-99

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

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

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 @ 1.0 "H_2O

P_b: 29.20 "Hg

Control Module Vacuum: 5 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading		Temp.		P_m	
End	1419	5.168	cf	73	°F	-1.80	"H_2O
Start	1412	0.000	cf	73	°F	-1.80	"H_2O
Avg.	9'	5.168'	cf	73	°F	-1.80	"H_2O

Dry Gas Meter

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 Calibrator: Shane Lee

Date: 8-13-99

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

Run No.: 1 @ 20" 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

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

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

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

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 @ 30" H_2O

P_b: 29.20 "Hg

Control Module Vacuum: 5 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading	Temp.	P_m
End	1618	11.961 cf	73 °F	-3.60 "H_2O
Start	1607	0.000 cf	73 °F	-3.60 "H_2O
Avg.	11	11.961 cf	73 °F	-3.60 "H_2O

Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	355.643 cf	83 °F	75 °F	3.00 "H_2O
Start	344.157 cf	78 °F	74 °F	3.00 "H_2O
Avg.	11.486 cf	78 °F		3.00 "H_2O

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 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 @ 4.0 / 4.0 P_b: 29.20 "Hg

Control Module Vacuum: 5.0 "Hg

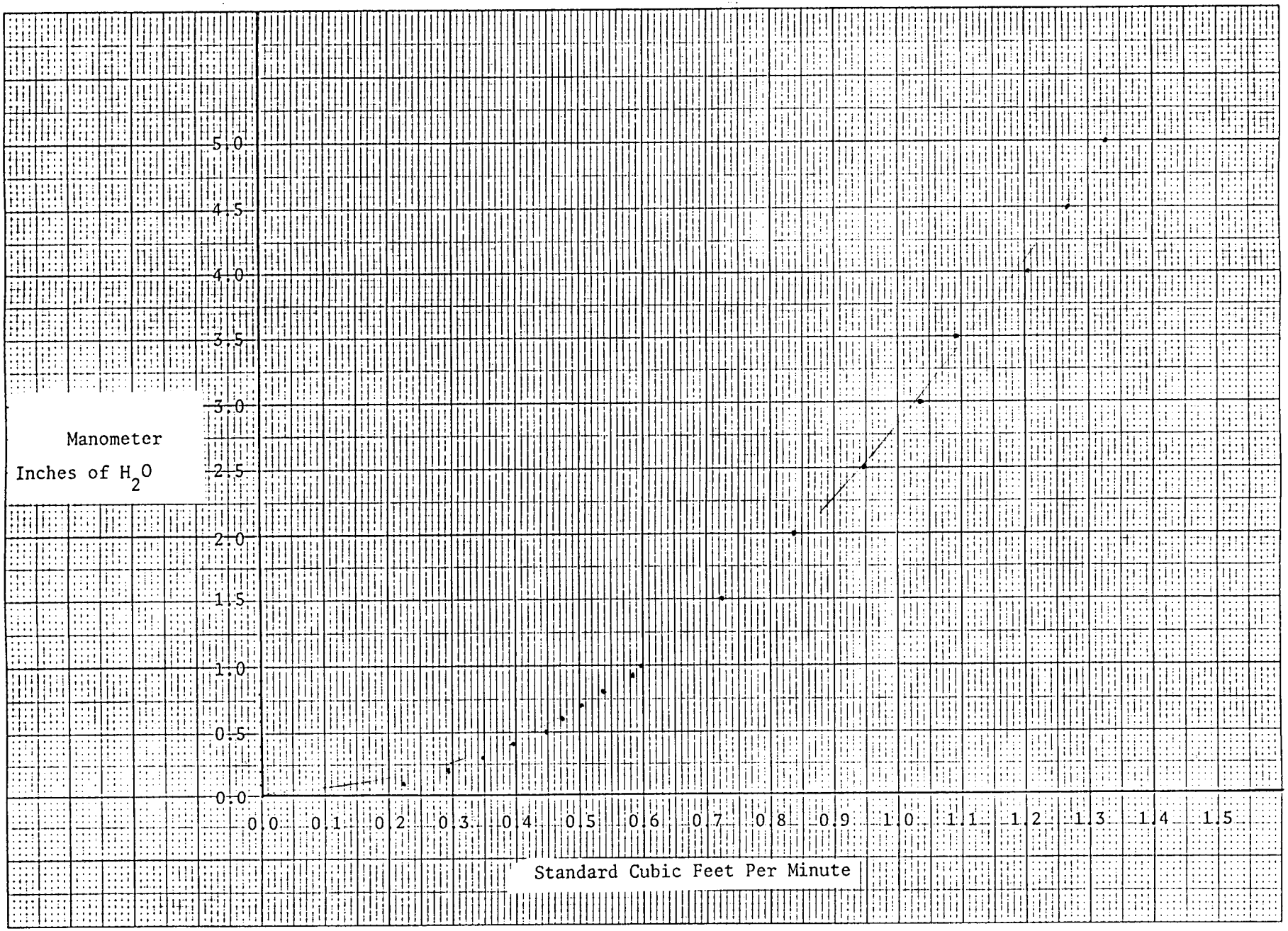
	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1630	10.708 cf	93 °F	-4.30 "H_2O	366.588 cf	84 °F	95 °F	4.00 "H_2O
Start	1620	0.000 cf	93 °F	-4.30 "H_2O	356.234 cf	81 °F	95 °F	4.00 "H_2O
Avg.	10	10.708 cf	93 °F	-4.30 "H_2O	10.354 cf	79 °F		4.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.708 \left[\frac{29.20 + \frac{-4.30}{13.6}}{93 + 460} \right] \times 1.000 \ (C_f) = 10.242 \text{ dcsf}$$

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

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

Cm 27-2 1029


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

METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 27-2

CALIBRATION DATA

Date: 8-13-99

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

Meter Adjusted? Yes _____ No ✓

Calibrator: Shane Lee 261

Checked By: Mike Bass 263

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 29-1

Date: 10-4-99

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

Variation: + 0.90%

- 0.50%

Calibrator: Shane Lee 261

Checked By: Bill Lyles #107

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Shane Lee

Date: 10-4-99

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

Run No.: 1 @ 0.5" H_2O P_b: 29.28 "Hg

Control Module Vacuum: 50 "Hg

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Shane Lee

Date: 10-4-99

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

Run No.: 1 @ 1.0" H_2O

P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Shane Lee

Date: 10-4-99

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

Run No.: 1 @ 1.5 H.O P_b: 29.28 "Hg

Control Module Vacuum: 5 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1454	10.668 cf	75 °F	-2.10 "H_2O"	394.790 cf	93 °F	94 °F	1.50 "H_2O"
Start	1438	0.000 cf	75 °F	-1.90 "H_2O"	384.223 cf	92 °F	93 °F	1.50 "H_2O"
Avg.	16	10.668 cf	75 °F	-2.00 "H_2O"	10.567 cf		94 °F	1.50 "H_2O"

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

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.567 \left[\frac{29.28 + \frac{1.50}{13.6}}{94 + 460} \right] = 10.265 \text{ dcsf}$$

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Shane Lee

Date: 10-4-99

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

Run No.: 1 @ 2.0 "H_2O P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Shane Lee

Date: 10-4-99

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

Run No.: 1 @ 3.0 "H_2O

P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1524	10.800 cf	75 °F	-3.00 "H_2O	417.690 cf	67 °F	77 °F	3.00 "H_2O
Start	1513	0.000 cf	75 °F	-3.00 "H_2O	409.045 cf	75 °F	76 °F	3.00 "H_2O
Avg.	11	10.800 cf	75 °F	-3.00 "H_2O	10.645 cf	74 °F		3.00 "H_2O

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Shane Lee

Date: 10-4-99

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

Run No.: 1 @ 4.0 4.0 P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1547	10.947 cf	75 °F	-4.00 "H_2O"	430.335 cf	68 °F	77 °F	4.00 "H_2O"
Start	1537	0.000 cf	75 °F	-3.60 "H_2O"	419.698 cf	78 °F	77 °F	4.00 "H_2O"
Avg.	10	10.947 cf	75 °F	-3.90 "H_2O"	10.637 cf	75 °F		4.00 "H_2O"

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Shane Lee

Date: 10-4-99

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

Run No.: 1 @ 2.8 L/min

P_b: 29.28 "Hg

Control Module Vacuum: 50 "Hg

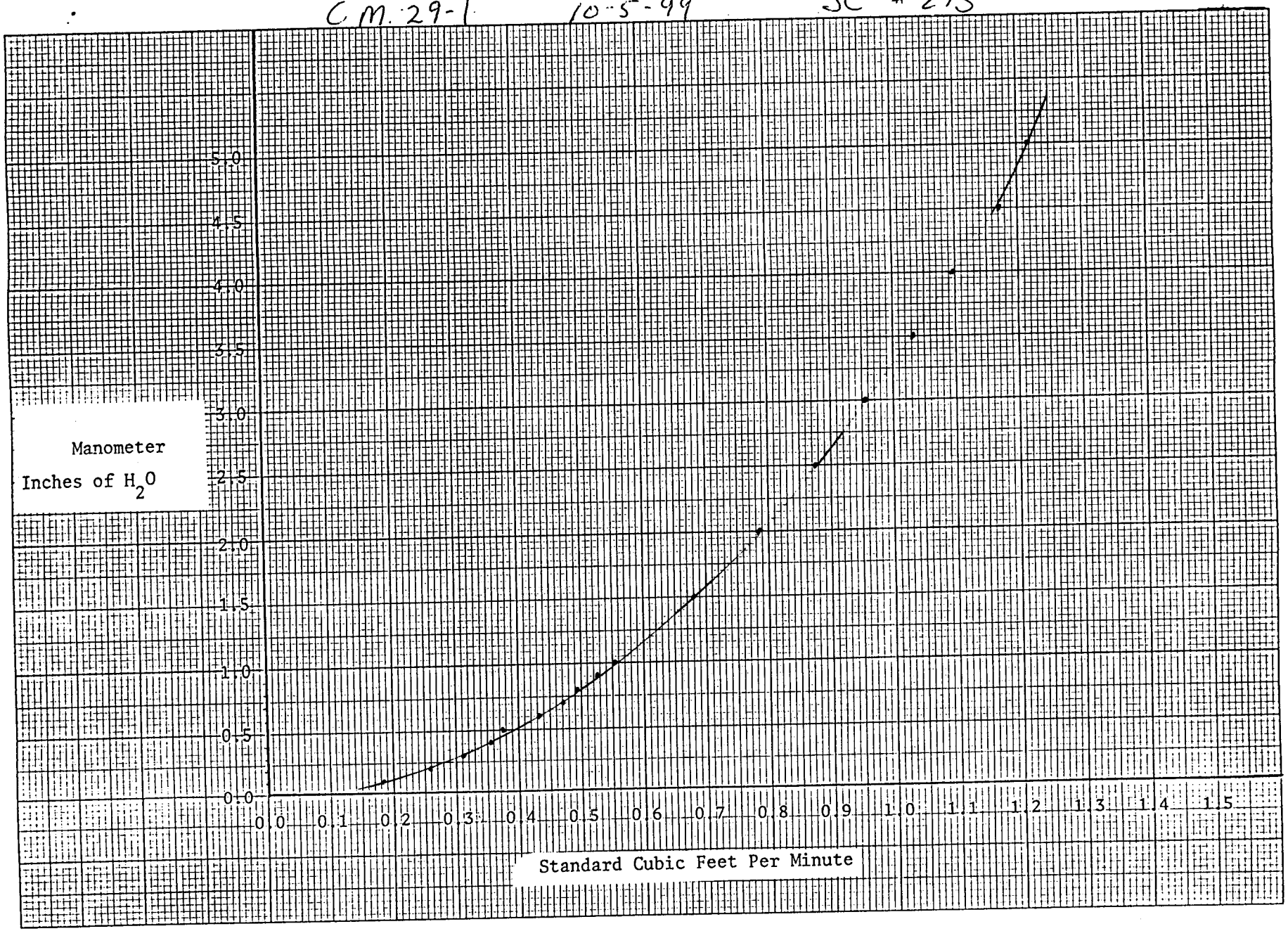
	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1622	2.210 cf	75 °F	-0.20 "H_2O	432.153 cf	81 °F	76 °F	0.01 "H_2O
Start	1606	0.000 cf	75 °F	-0.20 "H_2O	430.968 cf	78 °F	76 °F	0.01 "H_2O
Avg.	16	2.210 cf	75 °F	-0.20 "H_2O	2.185 cf	78 °F		0.01 "H_2O

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

$$Vm_{std} = 17.65 \times 2.185 \left[\frac{29.28 + \frac{0.01}{13.6}}{75 + 460}\right] = 2.099 \text{ dcsf}$$

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

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



METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 29-1

CALIBRATION DATA

Date: 10-4-99

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

Meter Adjusted? Yes _____ No ✓

Calibrator: Shane Lee 261

Checked By: Bill Hufford #101

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 19-1

Date: 10-4-99

Time: 1520

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

Barometer Adjusted? Yes ✓ No _____

Shane Lee 261

Signature of Calibrator

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

PITOT TUBE CALIBRATION

Date: 11-22-99 Time: 1330

Pitot No.: M3 T_s: 68 °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	0.15	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: Scott Hart #248

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 11-19-99 Time: 1500

Pitot No.: M5 T_s: 69 °F

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

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

Summary of Results:

Normal high side calibration factor 0.806

variation + 0.25%

variation - -1.24%

Normal low side calibration factor 0.805

variation + 0.37%

variation - -1.12%

Calibrator: Scott Hart

Checked By: Mike Bass

PITOT TUBE CALIBRATION

Date: 11-19-99 Time: 1400

Pitot No.: M6 T_s: 68 °F

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

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	√Standard Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.34	0.583	0.796	0.34	0.583	0.796
20	40	0.34	0.34	0.583	0.51	0.714	0.808	0.51	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							0.807			0.807

Summary of Results:

Normal high side calibration factor 0.807

variation + 0.12 %

variation - 1.36 %

Normal low side calibration factor 0.807

variation + 0.12 %

variation - 1.36 %

Calibrator: Scott Hart #268

Checked By: Mike Bass

PITOT TUBE CALIBRATION

Date: 11-22-99 Time: 1000

Pitot No.: M7 T_s: 70 °F

Pitot Dimensions: 3/8" tips C_{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 ✓	0.15	0.387 ✓	0.808 ✓	0.15	0.387 ✓	0.808 ✓
14	30	0.22	0.22	0.469 ✓	0.33	0.574 ✓	0.808 ✓	0.33	0.574 ✓	0.808 ✓
20	40	0.34	0.34	0.583 ✓	0.51	0.714 ✓	0.808 ✓	0.51	0.714 ✓	0.808 ✓
28	50	0.54	0.54	0.735 ✓	0.81	0.900 ✓	0.808 ✓	0.81	0.900 ✓	0.808 ✓
35	60	0.80	0.80	0.894 ✓	1.20	1.095 ✓	0.808 ✓	1.20	1.095 ✓	0.808 ✓
41	70	1.00	1.00	1.000 ✓	1.45	1.204 ✓	0.822 ✓	1.45	1.204 ✓	0.822 ✓
50	80	1.30	1.30	1.140 ✓	1.95	1.396 ✓	0.808 ✓	1.95	1.396 ✓	0.808 ✓
62	90	1.66	1.60	1.265 ✓	2.40	1.549 ✓	0.808 ✓	2.40	1.549 ✓	0.808 ✓
28	50	0.54	0.54	0.735 ✓	0.81	0.900 ✓	0.808 ✓	0.81	0.900 ✓	0.808 ✓
28	50	0.54	0.54	0.735 ✓	0.81	0.900 ✓	0.808 ✓	0.81	0.900 ✓	0.808 ✓
Average							0.810 ✓			0.810 ✓

Summary of Results:

Normal high side calibration factor 0.810 ✓

variation + 1.48% ✓

variation - 0.25% ✓

Normal low side calibration factor 0.810 ✓

variation + 1.48% ✓

variation - 0.25% ✓

Calibrator: Scott Hart #268

Checked By: Jason Conway #273

PITOT TUBE CALIBRATION

Date: 11-22-99 Time: 0925

Pitot No.: m8 T_s: 70 °F

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

Motor Setting	fps mark	Calibration Standard Start	Calibration Standard End	√Standard Average	High	√High	Cal. Factor	Low	√Low	Cal. Factor
7	20	0.10	0.10	0.316	0.15	0.387	0.808	0.15	0.387	0.808
14	30	0.22	0.22	0.469	0.32	0.566	0.821	0.32	0.566	0.821
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							0.810			0.810

Summary of Results:

Normal high side calibration factor 0.810

variation + 1.36%

variation - 0.25%

Normal low side calibration factor 0.810

variation + 1.36%

variation - 0.25%

Calibrator: SCOH Hart # 268

Checked By: Jason Comins #273

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-1

Date 11-19-99 Calibrator: Shane Dec 261

	4	6	7	8	10	12
Reading 1	0.117	0.175	0.200	0.234	0.309	0.362
Reading 2	0.116	0.174	0.200	0.232	0.308	0.360
Reading 3	0.118	0.173	0.198	0236	0.308	0.359
Reading 4	0.118	0.173	0.196	0.235	0.307	0.363
Reading 5	0.120	0.174	0.199	0.235	0.308	0.362
Reading 6	0.119	0.173	0.200	0.235	0.306	0.359
Reading 7	0.117	0.173	0.199	0.234	0.306	0.360
Reading 8	0.116	0.174	0.199	0.236	0.308	0.359
Reading 9	0.117	0.175	0.200	0.235	0.308	0.361
Reading 10	0.118	0.175	0.200	0.236	0.306	0.360
Average	0.118 ✓	0.174 ✓	0.199 ✓	0.235 ✓	0.307 ✓	0.361 ✓

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

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 27-2

Date: 11-07-99

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

Variation: + 0.69%

- 1.28%

Calibrator: M. Bass

Checked By: Sam 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)

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

Dry Gas Meter

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 22-2 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

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

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

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

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 ✓

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

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

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

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 @ 3.0" H_2O P_b: 29.32 "Hg

Control Module Vacuum: 3.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1409	10.330 cf	74 °F	-2.90 "H_2O	608.602 cf	89 °F	79 °F	3.00 "H_2O
Start	1358	0.000 cf	74 °F	-2.90 "H_2O	598.364 cf	85 °F	78 °F	3.00 "H_2O
Avg.	10	10.330 cf ✓	74 °F ✓	-2.900 "H_2O ✓	10.238 cf ✓	83 °F ✓		3.000 "H_2O ✓

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 Calibrator: M. Buss

Date: 11-07-99

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

Run No.: 1 @ 4.0" H_2O P_b: 29.32 "Hg

Control Module Vacuum: 3.00 "Hg

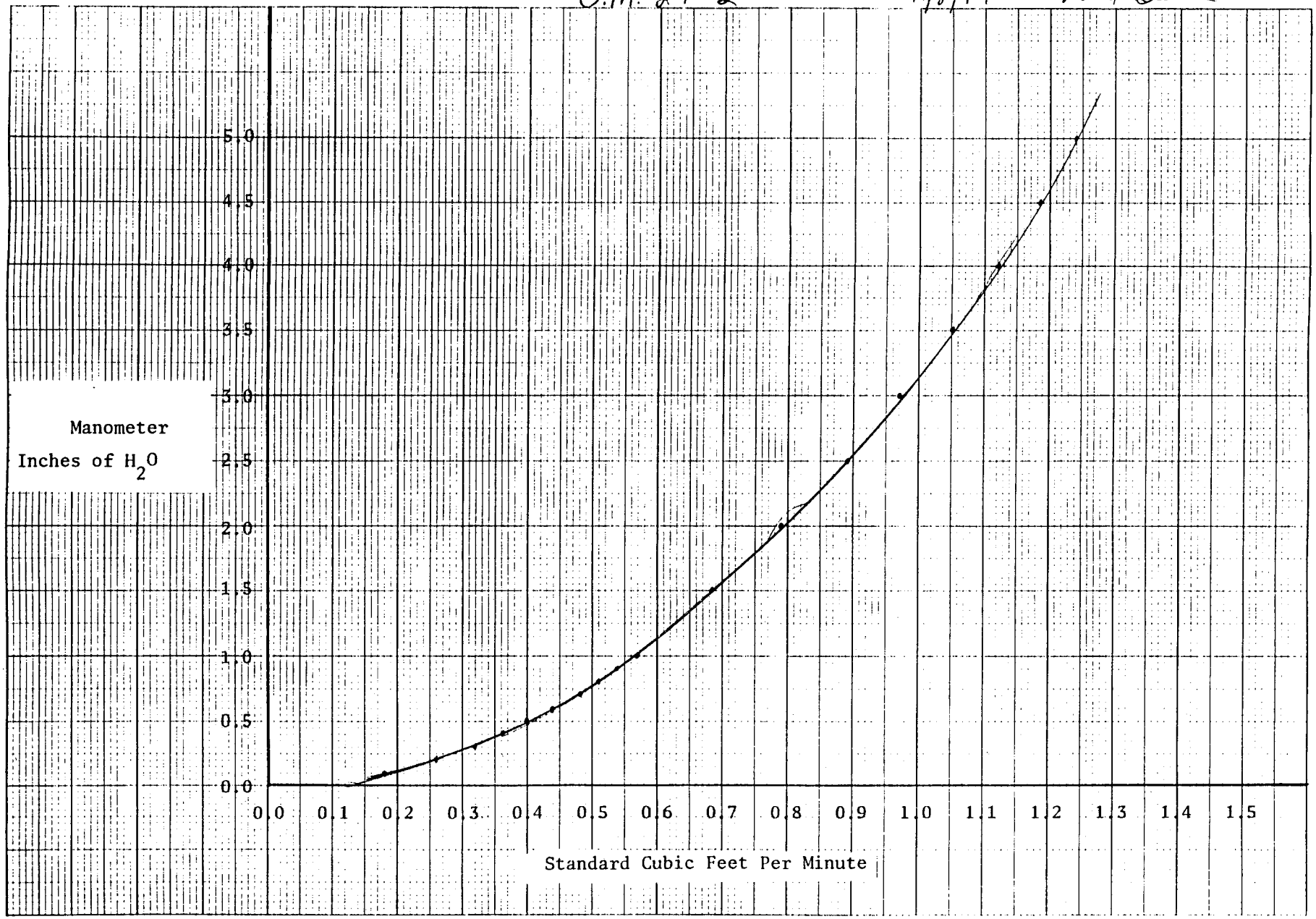
	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1419	10.130 cf	74 °F	-3.70 "H_2O	619.031 cf	91 °F	80 °F	4.00 "H_2O
Start	1410	0.000 cf	74 °F	-3.70 "H_2O	608.926 cf	87 °F	79 °F	4.00 "H_2O
Avg.	9	10.130 cf ✓	74 °F ✓	-3.700 "H_2O ✓	10.105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

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

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

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

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



METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 27-2

CALIBRATION DATA

Date: 11-07-99

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

Meter Adjusted? Yes _____ No ✓

Calibrator: Mike Bass

Checked By: Jason Brown

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 29-1

Date: 11-22-99

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

Variation: + 0.5% ✓

- 0.6% ✓

Calibrator: Jason Conning #273

Checked By: Scott Hart #368

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 0.50 "H2O

P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	0935	5.003 cf	69 °F	-0.8 "H_2O	738522 cf	87 °F	71 °F	0.5 "H_2O
Start	0922	0.000 cf	69 °F	-0.8 "H_2O	733.505 cf	72 °F	71 °F	0.5 "H_2O
Avg.	13 ✓	5.0031 ✓ cf	69 ✓ °F	-0.8 ✓ "H_2O	5.017 ✓ cf	75 ✓ °F	✓ 0.5 "H_2O	

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.003 \left[\frac{29.24 + \frac{-0.8}{13.6}}{69 + 460} \right] \times 1.000 \quad (C_f) = 4.871 \text{ ✓ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.017 \left[\frac{29.24 + \frac{0.5}{13.6}}{75 + 460} \right] = 4.846 \text{ ✓ dcsf}$$

$$C_{DG} = \frac{4.871}{4.846} = \boxed{1.005 \text{ ✓}}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 1.00 "H2O P_b: 29.24 "Hg

Control Module Vacuum: 0.06 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading	Temp.	P_m
End	1031	5.004 cf	69 °F	-13 "H_2O
Start	1021	0.000 cf	69 °F	-13 "H_2O
Avg.	10 ✓	5.004 ✓ cf	69 ✓ °F	-13 ✓ "H_2O

Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	744.777 cf	68 °F	71 °F	1.0 "H_2O
Start	739.786 cf	70 °F	71 °F	1.0 "H_2O
Avg.	4.991 ✓ cf	70 ✓ °F	✓ 1.0	"H_2O

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 1.50 "H2O P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading	Temp.	P_m
End	1049	10,009 cf	69 °F	-16 "H_2O
Start	1034	0.000 cf	69 °F	-16 "H_2O
Avg.	15 ✓	10.009 ✓ cf	69 ✓ °F	-16 ✓ "H_2O

Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	755874 cf	65 °F	71 °F	1.50 "H_2O
Start	745.977 cf	69 °F	71 °F	1.50 "H_2O
Avg.	9.897 ✓ cf	69 ✓ °F	✓ 1.50	"H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.009 \left[\frac{29.24 + \frac{-16}{13.6}}{69 + 460} \right] \times 1.000 \ (C_f) = 9.725 \text{ ✓ dcsf}$$

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29.1 Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 2.00 "H2O P_b: 29.24 "Hg

Control Module Vacuum: 8.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1103	10.088 cf	69 °F	-25 "H_2O	766.667 cf	69 °F	72 °F	2.0 "H_2O
Start	1051	0.000 cf	69 °F	-20 "H_2O	756.663 cf	68 °F	72 °F	2.0 "H_2O
Avg.	12	10.088 ✓ cf	69 ✓ °F	-25 ✓ "H_2O	10.004 ✓ cf	70 ✓ °F		✓2.0 "H_2O

$$Vm_{std} = 17.65 \times 10.088 \left[\frac{29.24 + \frac{-25}{13.6}}{69 + 460}\right] \times 1.000\,(C_f) = 9.792^{\checkmark}\ dcsf$$

$$Vm_{std} = 17.65 \times 10.004 \left[\frac{29.24 + \frac{2.0}{13.6}}{70 + 460}\right] = 9.790^{\checkmark}\ dcsf$$

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 3.00 "H2O P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1134	10.011 cf	69 °F	-3.0 "H_2O	789.042 cf	69 °F	73 °F	3.0 "H_2O
Start	1124	0.000 cf	69 °F	-3.0 "H_2O	779.107 cf	66 °F	73 °F	3.0 "H_2O
Avg.	10.0	10.011 cf	69 °F	-3.0 "H_2O	9.935 cf	70 °F		3.0 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.011 \left[\frac{29.24 + \frac{-3.0}{13.6}}{69 + 460}\right] \times 1{,}000\ (C_f) = 9.693\ \text{dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 9.935 \left[\frac{29.24 + \frac{3.0}{13.6}}{70 + 460}\right] = 9.747\ \text{dcsf}$$

$$C_{DG} = \frac{9.693}{9.747} = \boxed{0.994}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-21-99

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

Run No.: 2 @ 4.00 "H2O

P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1 Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 2 L/min P_b: 29.15 "Hg

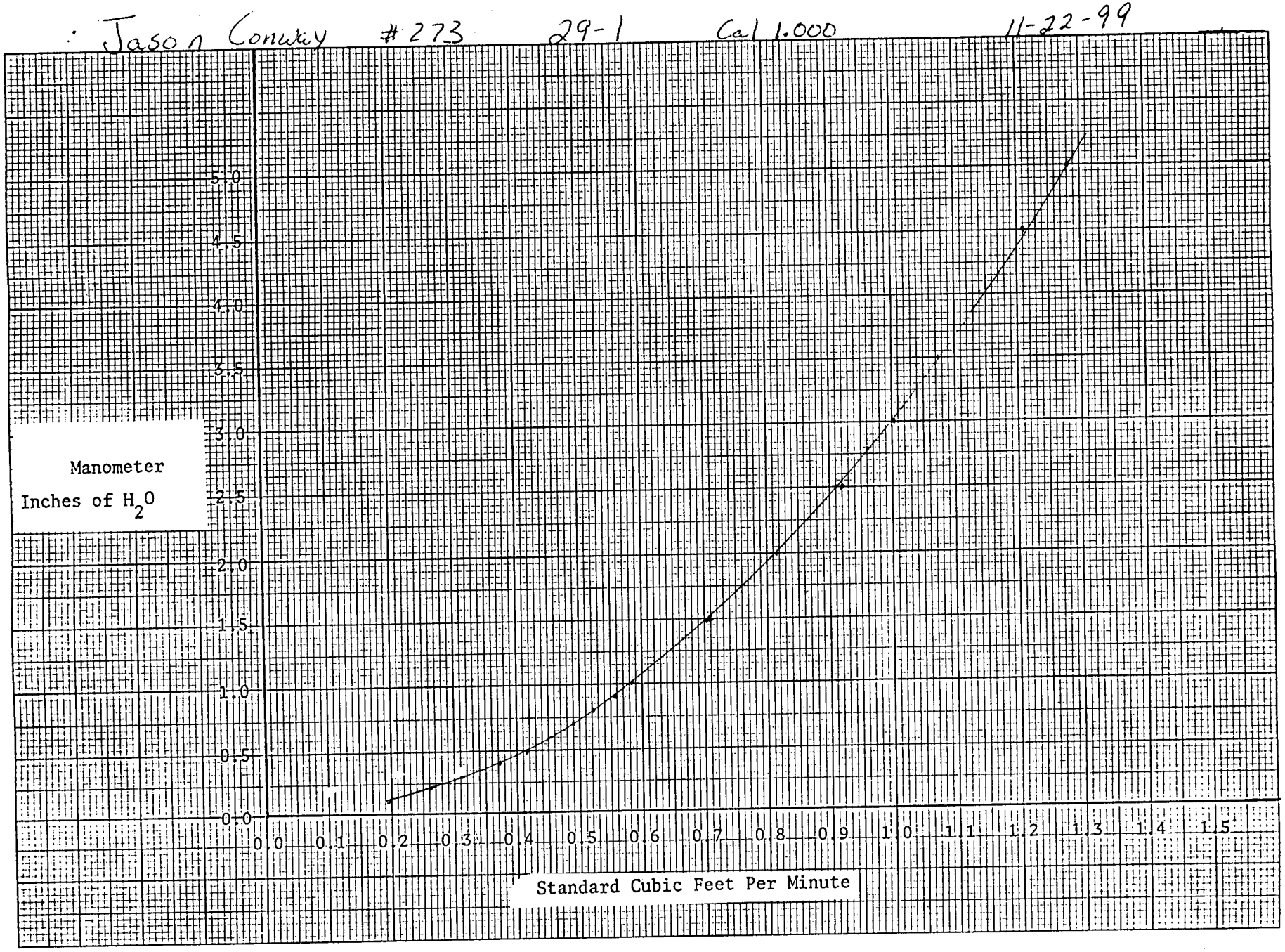
Control Module Vacuum: 0.00 "Hg

	Wet Test Meter (No. 1)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1637	2.229 cf	70 °F	-0.6 "H_2O	873.468 cf	77 °F	72 °F	0.04 "H_2O
Start	1605	0.000 cf	70 °F	-0.6 "H_2O	871.246 cf	72 °F	72 °F	0.04 "H_2O
Avg.	32 ✓	2.229 ✓ cf	70 ✓ °F	-0.6 ✓ "H_2O	2.222 ✓ cf	73 ✓ °F	✓ 0.04	"H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 2.229 \left[\frac{29.15 + \frac{-0.6}{13.6}}{70 + 460} \right] \times 1.006\,(C_f) = 2.173 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 2.222 \left[\frac{29.15 + \frac{0.04}{13.6}}{73 + 460} \right] = 2.145 \text{ dcsf}$$

$$C_{DG} = \frac{2.173}{2.145} = \boxed{1.013}$$


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

CALIBRATION DATA

Date: 11-22-99

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

Meter Adjusted? Yes _____ No ✓

Calibrator: Jason Conway #273

Checked By: Scott Hall #362

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 19-1

Date: 11-22-99

Time: 1115

Barometric Pressure @ Addison Airport @ 719 ft.	=	29.26
	-	0.719
Absolute Pressure @ Addison Airport	=	29.141
	+	0.083
Absolute Pressure @ METCO @ 636 ft.	=	29.224
Barometer Reading	=	29.18
Variation	=	0.044

Barometer Adjusted? Yes ✓ No _____

Scott Hess #268 ✓

Signature of Calibrator

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 99-2

Date: 11-22-99

Time: 1050

Barometric Pressure @ Addison Airport @ 719 ft.	=	29.86
	-	0.719
Absolute Pressure @ Addison Airport	=	29.141
	+	0.083
Absolute Pressure @ METCO @ 636 ft.	=	29.224
Barometer Reading	=	29.37
Variation	=	0.146

Barometer Adjusted? Yes ✓ No _____

Brad Hutt #368
Signature of Calibrator

APPENDIX D

Analytical Data

TestAmerica
INCORPORATED

December 20, 1999

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 Shawnee Fossil Plant samples submitted to TestAmerica for analysis. The samples were analyzed following the SOP based on the Ontario-Hydro Method.

Case Narrative

TestAmerica received the samples on October 30, 1999. All samples were intact when received. Please note the following:

- All Duplicate and Triplicate sample results had a Relative Percent Difference of <10 %.
- All Matrix Spike sample results had a % Recovery between 75 % and 125 %.
- All other Quality Control Indicators were within acceptance limits.

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

Sincerely,

James A. Davis

James A. Davis
QA Coordinator

TestAmerica
INCORPORATED

Sample ID: TVA
Shawnee Fossil Plant
Paducah, Kentucky

Hg Analysis
Ontario Hydro Method

Summary Report

	Unit 3 Baghouse Outlet Duct A Run 1	Unit 3 Baghouse Outlet Duct A Run 2	Unit 3 Baghouse Outlet Duct A Run 3	Unit 3 Baghouse Inlet Duct A Run 1	Unit 3 Baghouse Inlet Duct A Run 2	Unit 3 Baghouse Inlet Duct A Run 3
Particle Bound Hg (ug)	0.021	0.012	0.000	3.850	3.900	4.308
Oxidized Hg (ug)	0.00	0.00	0.00	0.00	1.28	0.00
Elemental Hg (ug)	0.83	0.00	0.00	0.00	0.00	0.00
Total Hg (ug)	0.85	0.012	0.00	3.85	5.18	4.31

	Unit 3 Baghouse Outlet Duct A Blank Train	Unit 3 Baghouse Outlet Duct A Blank Train
Particle Bound Hg (ug)	0.000	0.000
Oxidized Hg (ug)	0.00	0.00
Elemental Hg (ug)	0.00	0.00
Total Hg (ug)	0.00	0.00

	Reagent Blanks
Container # 7 (ug/L)	<0.2
Container # 8 (ug/L)	<2.0
Container # 9 (ug/L)	<4.0
Container # 10 (ug/L)	<2.0
Container # 11 (ug/L)	<0.2
Container # 12A (ug)	---
Container # 12B (ug)	<0.01

TestAmerica
INCORPORATED

Sample ID: TVA
Shawnee Fossil Plant
Paducah, Kentucky

Hg Analysis
Ontario Hydro Method

Duplicate Summary Report

	Unit 3 Baghouse Outlet Duct A Run 1	Unit 3 Baghouse Outlet Duct A Run 2	Unit 3 Baghouse Outlet Duct A Run 3	Unit 3 Baghouse Inlet Duct A Run 1	Unit 3 Baghouse Inlet Duct A Run 2	Unit 3 Baghouse Inlet Duct A Run 3
Particle Bound Hg (ug)	0.020	0.012	0.000	3.850	3.710	4.001
Oxidized Hg (ug)	0.00	0.00	0.00	0.00	1.23	0.00
Elemental Hg (ug)	0.83	0.00	0.00	0.00	0.00	0.00
Total Hg (ug)	0.85	0.01	0.00	3.85	4.94	4.00

	Unit 3 Baghouse Outlet Duct A Blank Train	Unit 3 Baghouse Outlet Duct A Blank Train
Particle Bound Hg (ug)	0.000	0.000
Oxidized Hg (ug)	0.00	0.00
Elemental Hg (ug)	0.00	0.00
Total Hg (ug)	0.00	0.00

	Reagent Blanks
Container # 7 (ug/L)	<0.2
Container # 8 (ug/L)	<2.0
Container # 9 (ug/L)	<4.0
Container # 10 (ug/L)	<2.0
Container # 11 (ug/L)	<0.2
Container # 12A (ug)	---
Container # 12B (ug)	<0.01

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Outlet Duct A Run 1

Hg Analysis
Ontario Hydro Method

Collected On: 10/28/99
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	47Q85	12/07/99	12/08/99	jpp	0.021	0.020	4.4	---	---	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2PD-4	12/03/99	12/06/99	jpp	<0.110	<0.110	0	---	---	ug		
Container # 3	3PD-4	12/03/99	12/06/99	jpp	<1.24	<1.24	0	---	---	ug		
Container # 4	4PD-4	12/04/99	12/04/99	jpp	<0.68	<0.68	0	---	---	ug		
Container # 5	5PD-4	12/04/99	12/04/99	jpp	0.83	0.83	0	---	---	ug		

Particle Bound Hg (ug) **0.021**
(Containers 1A, 1B, and 2)

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

Elemental Hg (ug) **0.83**
(Containers 4 and 5)

Total Hg (ug) **0.85**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.020**
(Containers 1A, 1B, and 2)

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

Dup. Elemental Hg (ug) **0.83**
(Containers 4 and 5)

Dup. Total Hg (ug) **0.85**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Outlet Duct A Run 2

Hg Analysis
Ontario Hydro Method

Collected On: 10/29/99
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	47Q89	12/07/99	12/08/99	jpp	0.012	0.012	0	---	---	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2PD-6	12/03/99	12/06/99	jpp	<0.230	<0.230	0	---	---	ug		
Container # 3	3PD-6	12/03/99	12/06/99	jpp	<1.33	<1.33	0	---	---	ug		
Container # 4	4PD-6	12/04/99	12/04/99	jpp	<0.70	<0.70	0	---	---	ug		
Container # 5	5PD-6	12/04/99	12/04/99	jpp	<0.96	<0.96	0	---	---	ug		

Particle Bound Hg (ug) **0.012**
(Containers 1A, 1B, and 2)

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

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

Total Hg (ug) **0.01**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.012**
(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) **0.01**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Outlet Duct A Run 3

Hg Analysis
Ontario Hydro Method

Collected On: 10/29/99
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	47Q87	12/07/99	12/08/99	jpp	<0.01	<0.01	0	<0.01	0	ug		
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2PD-8	12/03/99	12/06/99	jpp	<0.136	<0.136	0	---	---	ug		
Container # 3	3PD-8	12/03/99	12/06/99	jpp	<1.35	<1.35	0	---	---	ug		
Container # 4	4PD-8	12/04/99	12/04/99	jpp	<0.62	<0.62	0	---	---	ug		
Container # 5	5PD-8	12/04/99	12/04/99	jpp	<0.92	<0.92	0	---	---	ug		

Particle Bound Hg (ug) **0.000**
(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) **0.000**
(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:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Inlet Duct A Run 1

Hg Analysis
Ontario Hydro Method

Collected On: 10/28/99
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	Q70	12/07/99	12/08/99	jpp	3.85	3.85	0	---	---	ug		
Container # 1B	47Q86	12/07/99	12/08/99	jpp	<0.01	<0.01	0	<0.01	0	ug		
Container # 2	2PD-3	12/03/99	12/06/99	jpp	<0.182	<0.182	0	---	---	ug		
Container # 3	3PD-3	12/03/99	12/06/99	jpp	<1.40	<1.40	0	---	---	ug		
Container # 4	4PD-3	12/04/99	12/04/99	jpp	<0.66	<0.66	0	---	---	ug		
Container # 5	5PD-3	12/04/99	12/04/99	jpp	<1.10	<1.10	0	---	---	ug		

Particle Bound Hg (ug) **3.85**
(Containers 1A, 1B, and 2)

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

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

Total Hg (ug) **3.85**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **3.85**
(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) **3.85**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Inlet Duct A Run 2

Hg Analysis
Ontario Hydro Method

Collected On: 10/29/99
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	Q71	12/07/99	12/08/99	jpp	3.90	3.71	4.8	---	---	ug		
Container # 1B	47Q88	12/07/99	12/08/99	jpp	<0.01	<0.01	0	---	---	ug		
Container # 2	2PD-5	12/03/99	12/06/99	jpp	<0.154	<0.154	0	<0.154	0	ug		
Container # 3	3PD-5	12/03/99	12/06/99	jpp	1.28	1.23	4.0	---	---	ug		
Container # 4	4PD-5	12/04/99	12/04/99	jpp	<0.70	<0.70	0	---	---	ug		
Container # 5	5PD-5	12/04/99	12/04/99	jpp	<1.02	<1.02	0	---	---	ug		

Particle Bound Hg (ug) **3.90**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **1.28**
(Containers 3)

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

Total Hg (ug) **5.18**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **3.71**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **1.23**
(Containers 3)

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

Dup. Total Hg (ug) **4.94**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Inlet Duct A Run 3

Hg Analysis
Ontario Hydro Method

Collected On: 10/29/99
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	Q72	12/07/99	12/08/99	jpp	4.10	3.98	3.0	---	---	ug		
Container # 1B	47Q90	12/07/99	12/08/99	jpp	<0.01	<0.01	0	---	---	ug		
Container # 2	2PD-7	12/03/99	12/06/99	jpp	0.208	0.214	3.0	---	---	ug		
Container # 3	3PD-7	12/03/99	12/06/99	jpp	<1.44	<1.44	0	<1.44	0	ug		
Container # 4	4PD-7	12/04/99	12/04/99	jpp	<0.72	<0.72	0	<0.72	0	ug		
Container # 5	5PD-7	12/04/99	12/04/99	jpp	<0.96	<0.96	0.0	<0.96	0	ug		

Particle Bound Hg (ug) **4.31**
(Containers 1A, 1B, and 2)

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

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

Total Hg (ug) **4.31**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **4.00**
(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) **4.00**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Outlet Duct A Blank Train

Hg Analysis
Ontario Hydro Method

Collected On: 10/29/99
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	3PD-2	12/03/99	12/06/99	jpp	<0.87	<0.87	0	---	---	ug		
Container # 4	4PD-2	12/04/99	12/04/99	jpp	<0.60	<0.60	0	<0.60	0	ug		
Container # 5	5PD-2	12/04/99	12/04/99	jpp	<0.89	<0.89	0	---	---	ug		

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

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

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

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

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

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

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

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

Notes:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Unit 3 Baghouse Outlet Duct A Blank Train

Hg Analysis
Ontario Hydro Method

Collected On: 10/29/99
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	3PD-1	12/03/99	12/06/99	jpp	<0.88	<0.88	0	---	---	ug		
Container # 4	4PD-1	12/04/99	12/04/99	jpp	<0.64	<0.64	0	---	---	ug		
Container # 5	5PD-1	12/04/99	12/04/99	jpp	<0.89	<0.89	0	---	---	ug		

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

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

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

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

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

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

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

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

Notes:

TestAmerica
INCORPORATED

Sample ID: **TVA**
Shawnee Fossil Plant
Paducah, Kentucky
Reagent Blanks

Hg Analysis
Ontario Hydro Method

Collected On: 10/29/99
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	RBPD-7	---	12/04/99	jpp	<0.2	<0.2	0	---	---	ug/L		
Container # 8	RBPD-8	12/03/99	12/06/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 9	RBPD-9	12/04/99	12/04/99	jpp	<4.0	<4.0	0	---	---	ug/L		
Container # 10	RBPD-10	12/04/99	12/04/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 11	RBPD-11	---	12/04/99	jpp	<0.2	<0.2	0	---	---	ug/L		
Container # 12A	Q72	---	---	jpp	---	---	---	---	---	ug	*1	
Container # 12B	Q91	12/07/99	12/08/99	jpp	<0.01	<0.01	0	---	---	ug		

*1 It was not neceassy to analyze a thimble balnk as only the particulate matter was digested.

Mercury Sample Train Receipt Records

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3 BAGHOUSE
INLET DUCT A
BLANK TRAIN

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☒ 3 (1)	436 + — + — = 436.	3PD-1	
☒ 4 (1)	157 + — + — = 157.	4PD-1	
☒ 5 (1)	445 + — + — = 445.	5PD-1	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

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

Notes: _____

Checked By: SGS

Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3
BAGHOUSE OUTLET DUCT
BLANK TRAIN

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☒ 3 (1)	434 + — + — = 434.	3PD-2	
☒ 4 (1)	149 + — + — = 149.	4PD-2	
☒ 5 (1)	443 + — + — = 443.	5PD-2	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

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

Notes: _____

Checked By: SGS

Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3
BAGHOUSE INLET DUCT A
RUN #1

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	91 + — + — = 91.	2PO-3	
☒ 3 (2)	449 + 251 + — = 700.	3PO-3A+B	
☒ 4 (1)	166 + — + — = 166.	4PO-3	
☒ 5 (2)	493 + 56 + — = 549.	5PO-3A+3B	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (1)	SHIPPER Q70		
☒ 1B (1)	FILTER 47Q86		
☐ 12A ( )			
☐ 12B ( )			

Notes: _____

Checked By: JGS/
Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3 BAGHOUSE
INDUCT DUCT A
RUN #2

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	77 + — + — = 77.	2PO-5	
☒ 3 (2)	485 + 195 + — = 680.	3PO-5A+5B	
☒ 4 (1)	174 + — + — = 174.	4PO-5	
☒ 5 (1)	510 + — + — = 510.	5PO-5	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (1) THIMBLE	Q71		
☒ 1B ( ) FILTER	47Q88		
☐ 12A ( )			
☐ 12B ( )			

Notes: _____

Checked By: SSJ

Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3 BAGHOUSE
INLET DUCT A
RUN #3

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	90 + — + — = 90.	2PO-7	
☒ 3 (2)	464 + 256 + — = 720.	3PO-7A+B	
☒ 4 (1)	178 + — + — = 178.	4PO-7	
☒ 5 (1)	480 + — + — = 480.	5PO-7	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (1) THIMBLE	Q72		
☒ 1B (1) FILTER	47290		
☐ 12A ( )			
☐ 12B ( )			

Notes: _____

Checked By: SGS/
Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3 BAGHOUSE
OUTLET DUCT
RUN #1

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	55 + — + — = 55.	2PO-4	
☒ 3 (2)	475 + 145 + — = 620.	3PO-4A+4O	
☒ 4 (1)	166 + — + — = 166.	4PO-4	
☒ 5 (1)	416 + — + — = 416.	5PO-4	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
JMD 12/20 ☒ 1B (1)	FILTER 47085		
☐ 12A ( )			
☐ 12B ( )			

Notes: _____

Checked By: SGS
Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3 BAGHOUSE
OUTLET DUCT
RUN #2

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	112 + — + — = 112.	2PO-R6	
☒ 3 (2)	441 + 222 + — = 663.	3PO-6A+6B	
☒ 4 (1)	174 + — + — = 174.	4PO-6	
☒ 5 (1)	480 + — + — = 480.	5PO-6	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☒ 1B (1)	FILTER 47089		
☐ 12A ( )			
☐ 12B ( )			

Notes: _____

Checked By: SGS

Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT #3 BAGHOUSE
OUTLET DUCT
RUN #3

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	68 + — + — = 68.	2PD-8	
☒ 3 (2)	450 + 223 + — = 673.	3PD-8A+8B	
☒ 4 (1)	153 + — + — = 153.	4PD-8	
☒ 5 (1)	457 + — + — = 457.	5PD-8	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☒ 1B (1) FILTER	47Q87		
☐ 12A ( )			
☐ 12B ( )			

12/20 [illegible]

Notes:

Checked By: SGS/
Date: 11-23-99

TestAmerica

Mercury Sample Train Receipt Record

Client ID
TVA
SHAWNEE FOSSIL PLANT
PADUCAH, KY

Location ID/Run #
UNIT # 3
REAGENT BLANK

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☐ 3 ( )	___ + ___ + ___ = ___.		
☐ 4 ( )	___ + ___ + ___ = ___.		
☐ 5 ( )	___ + ___ + ___ = ___.		
☒ 7 (1)	49 + – + – = 49.	RGPO-7	
☒ 8 (1)	52 + – + – = 52.	RGPO-8	
☒ 9 (1)	50 + – + – = 50.	RGPO-9	
☒ 10 (1)	49 + – + – = 49.	RGPO-10	
☒ 11 (1)	103 + – + – = 103.	RGPO-11	

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☐ 1B ( )			
☒ 12A (3) THIMBLES	Q73, Q74, Q75		
☒ 12B (3) FILTERS	Q91, Q92, Q93		

Notes: _____

Checked By: SGS

Date: 11-23-99

TestAmerica

Sample Preparation Batch Sheets

LAWRENCE, KS
PADUCAH, KY FILTERS

NONAQUEOUS MERCURY BATCH SHEET

weigh: 12/6/99

Analyst: CRP Date: RUN: 12/8/99 Water Bath: start mid end

Prep: 11/7/99

Standard Reference: 65-41-17 temp: _____

ICV Reference: 65-41-18 date: _____

Crucible #	Sample # / Client	Weight	MS	MSD
12	NIST 1633b	0.5167	96.77	
11	~~HQ82~~ (Lawrence)			
10	Q70 (Paducah)	0.5116		
9	~~47986~~ TRP			
8	47985 SPK			
7	Q71	0.5260		
6	47988			
5	47989			
4	Q72	0.5265		
3	47990			
2	47987 TRP			
1	Q91 SPK			

MB

ICV

MS

MSD

RPD

FLAG

HCl - 65-44-10
HNO_3 - 65-44-15
HF 65-37-17
Boric Acid - 65-45-2
$SnCl_2$ - 65-45-10

SECONDARY DATA CHECK: analyst:
date:

Comments: _____

AQUEOUS MERCURY BATCH SHEET

analyst: SGS/ date: 12-3-99 WATER BATH: start mid end

temp: _____

standard reference #: _____

time: _____

icv reference #: _____

sample # / client		prep info
BLANK		
MS		
MSD		
~~2PD-3~~ DUP 12/6/99		
2PD-3	91 mL	
2PD-4	55 mL	
2PD-5 TMP	77 mL	
2PD-6 SPK	115 mL	
2PD-7	90 mL	
2PD-8	68 mL	
3PD-1	440 mL	
3PD-2	435 mL	
3PD-3 A+B	700 mL	
3PD-4 A+B	620 mL	
3PD-5 A+B	630 mL	
3PD-6 A+B	665 mL	
3PD-7 A+B TMP	720 mL	
3PD-8 A+B SPK	675 mL	
RBPD-8	52 mL	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

comments: H_2SO_4 = 65-38-9 / HNO_3 = 65-41-8 / $KMnO_4$ = 65-42-10 / $K_2S_2O_8$ = 65-45-12

SnCl2

AQUEOUS MERCURY BATCH SHEET

analyst: SGS / JBP date: 12-4-99 WATER BATH: start mid end

temp: _____

standard reference #: 65-41-17

time: _____

icv reference #: 65-41-18

sample # / client		prep info
BLANK		
MS		
MSD		
4PO-1	140 mL	
4PO-2 TRP	150 mL	
4PO-3 SPK	165 mL	
4PO-4	170 mL	
4PO-5	175 mL	
4PO-6	175 mL	
4PO-7 TRP	180 mL	
4PO-8 SPK	155 mL	
XBPO-9	50 mL	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

comments: HCl = 65-35-4 / $KMnO_4$ = 65-42-10 / Hydrox. HCl = 65-41-3 / SnCl2 65-43-19

AQUEOUS MERCURY BATCH SHEET

analyst: SGS/JW date: 12-4-99 WATER BATH: start mid end

temp: _____

standard reference #: 65-41-7

time: _____

icv reference #: 65-41-18

sample # / client		prep info
BLANK		
MS		
MSD		
SPD-1	445 mL	
SPD-2	445 mL	
SPD-3	550 mL	
SPD-4	415 mL	
SPD-5	510 mL	
SPD-6	480 mL	
SPD-7 TRIP	480 mL	
SPD-8 SPIKE	460 mL	
RBSPD-10	49	
RBSPD-7	49	
RBSPD-11	103	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

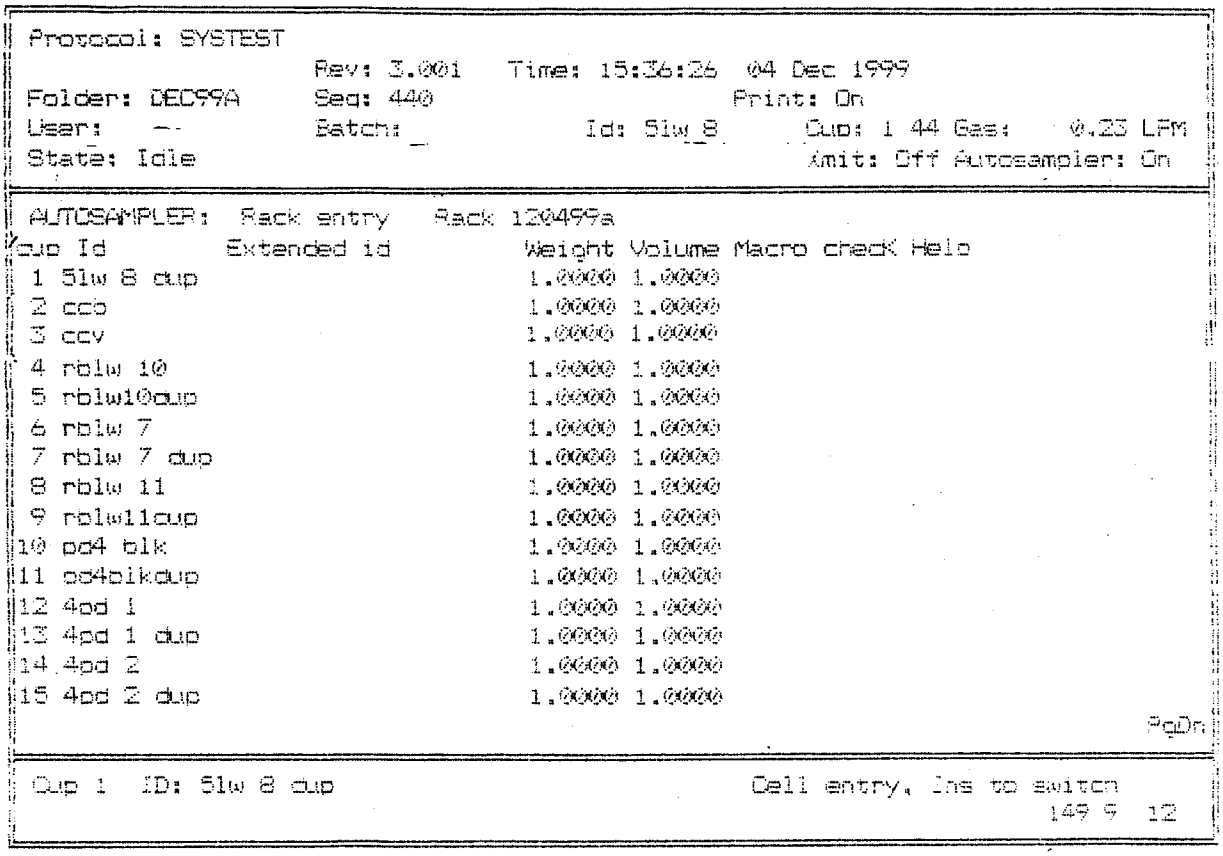
ANALYST:

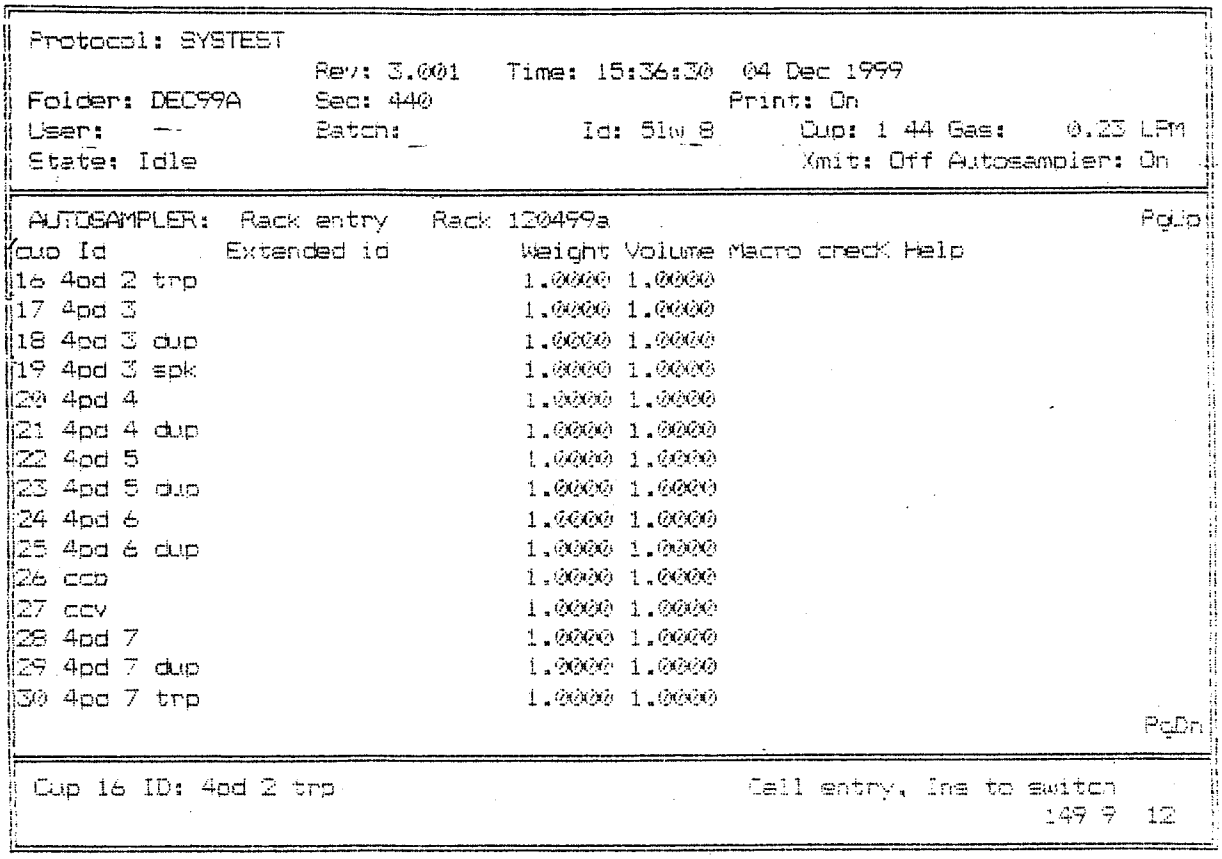
DATE:

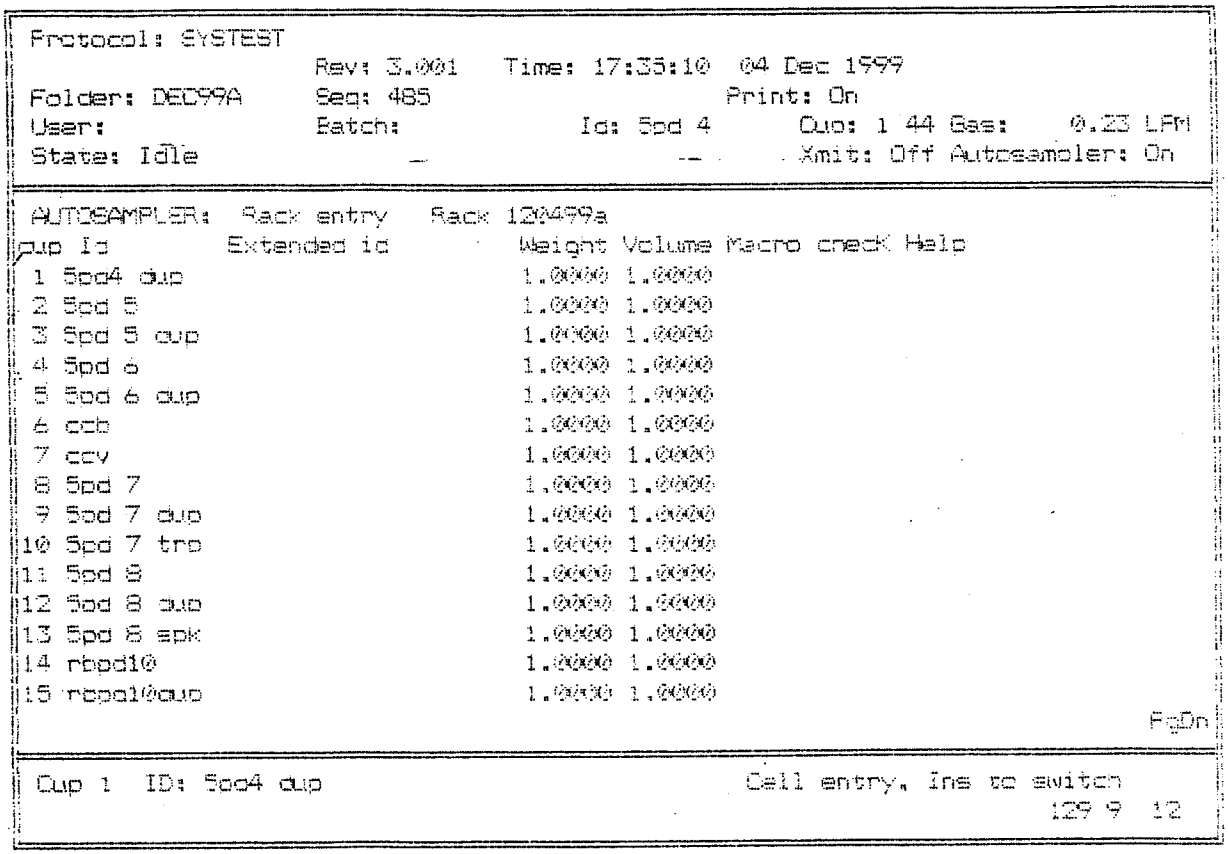
comments: HYDROX. HCl = 65-41-2

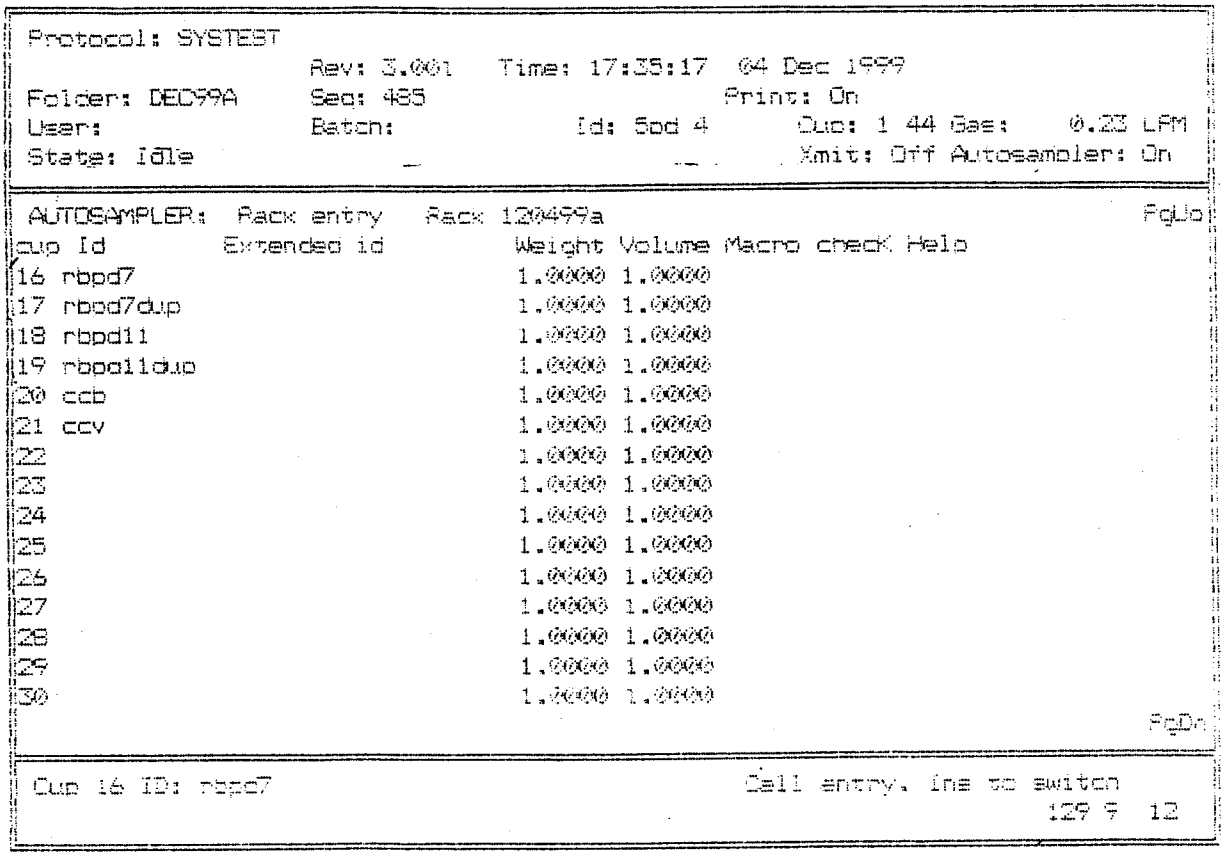
Spike 65-43-19

12/4/99 Analytical Run


Protocol: SYSTEST
Rev: 3.001 Time: 15:36:26 04 Dec 1999
Folder: DEC99A Seq: 440 Print: On
User: -- Batch: _ Id: Slw_8 Cup: 1 44 Gas: 0.25 LPM
State: Idle Xmit: Off Autosampler: On
AUTOSAMPLER: Rack entry Rack 120499a
Cup Id Extended id Weight Volume Macro check Help
1 Slw 8 dup 1.0000 1.0000
2 ccb 1.0000 1.0000
3 ccv 1.0000 1.0000
4 rblw 10 1.0000 1.0000
5 rblw10dup 1.0000 1.0000
6 rblw 7 1.0000 1.0000
7 rblw 7 dup 1.0000 1.0000
8 rblw 11 1.0000 1.0000
9 rblw11dup 1.0000 1.0000
10 pd4 blk 1.0000 1.0000
11 pd4blkdup 1.0000 1.0000
12 4pd 1 1.0000 1.0000
13 4pd 1 dup 1.0000 1.0000
14 4pd 2 1.0000 1.0000
15 4pd 2 dup 1.0000 1.0000
PgDn
Cup 1 ID: Slw 8 dup Cell entry, Ins to switch
149 9 12


Protocol: SYSTEST
Rev: 3.001 Time: 15:36:30 04 Dec 1999
Folder: DEC99A Seq: 440 Print: On
User: -- Batch: _ Id: Slw_8 Cup: 1 44 Gas: 0.23 LPM
State: Idle Xmit: Off Autosampler: On
AUTOSAMPLER: Rack entry Rack 120499a PgUp
Cup Id Extended id Weight Volume Macro Check Help
16 4pd 2 trp 1.0000 1.0000
17 4pd 3 1.0000 1.0000
18 4pd 3 dup 1.0000 1.0000
19 4pd 3 spk 1.0000 1.0000
20 4pd 4 1.0000 1.0000
21 4pd 4 dup 1.0000 1.0000
22 4pd 5 1.0000 1.0000
23 4pd 5 dup 1.0000 1.0000
24 4pd 6 1.0000 1.0000
25 4pd 6 dup 1.0000 1.0000
26 ccb 1.0000 1.0000
27 ccv 1.0000 1.0000
28 4pd 7 1.0000 1.0000
29 4pd 7 dup 1.0000 1.0000
30 4pd 7 trp 1.0000 1.0000
PgDn
Cup 16 ID: 4pd 2 trp Cell entry, Ins to switch
149 9 12


Protocol: SYSTEST
Rev: 3.001 Time: 17:35:10 04 Dec 1999
Folder: DEC99A Seq: 485 Print: On
User: Batch: Id: 5pd 4 Cup: 1 44 Gas: 0.23 LPM
State: Idle Xmit: Off Autosampler: On
AUTOSAMPLER: Rack entry Rack 120499a
Cup Id Extended id Weight Volume Macro cneck Help
1 5pd4 dup 1.0000 1.0000
2 5pd 5 1.0000 1.0000
3 5pd 5 dup 1.0000 1.0000
4 5pd 6 1.0000 1.0000
5 5pd 6 dup 1.0000 1.0000
6 ccb 1.0000 1.0000
7 ccv 1.0000 1.0000
8 5pd 7 1.0000 1.0000
9 5pd 7 dup 1.0000 1.0000
10 5pd 7 trp 1.0000 1.0000
11 5pd 8 1.0000 1.0000
12 5pd 8 dup 1.0000 1.0000
13 5pd 8 spk 1.0000 1.0000
14 rbpd10 1.0000 1.0000
15 rbpd10dup 1.0000 1.0000
PgDn
Cup 1 ID: 5pd4 dup Cell entry, Ins to switch
129 9 12


Protocol: SYSTEST
Rev: 3.001 Time: 17:35:17 04 Dec 1999
Folder: DEC99A Seq: 485 Print: On
User: Batch: Id: Sod 4 Cup: 1 44 Gas: 0.23 LPM
State: Idle Xmit: Off Autosampler: On
AUTOSAMPLER: Rack entry Rack 120499a PgUp
Cup Id Extended id Weight Volume Macro check Help
16 rbpd7 1.0000 1.0000
17 rbpd7dup 1.0000 1.0000
18 rbpd11 1.0000 1.0000
19 rbpd11dup 1.0000 1.0000
20 ccb 1.0000 1.0000
21 ccv 1.0000 1.0000
22 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
PgDn
Cup 16 ID: rbpd7
Cell entry, ins to switch
129 9 12

```
*** Standard: 1 Rep: 1                Seq:  384     12:44:41 04 Dec 1999 HG

Hg     .000    ug/L      107
                Ave. Int. =      107 S. D. =        0

*** Standard: 2 Rep: 1                Seq:  385     12:47:03 04 Dec 1999 HG

Hg     .200    ug/L     8258
                Ave. Int. =     8258 S. D. =        0

*** Standard: 3 Rep: 1                Seq:  386     12:49:25 04 Dec 1999 HG

Hg     .500    ug/L    20040
                Ave. Int. =    20040 S. D. =        0

*** Standard: 4 Rep: 1                Seq:  387     12:51:48 04 Dec 1999 HG

Hg    1.00     ug/L    39816
                Ave. Int. =    39816 S. D. =        0

*** Standard: 5 Rep: 1                Seq:  388     12:54:12 04 Dec 1999 HG

Hg    2.00     ug/L    79699
                Ave. Int. =    79699 S. D. =        0

*** Standard: 6 Rep: 1                Seq:  389     12:58:23 04 Dec 1999 HG

Hg    3.00     ug/L   116274
                Ave. Int. =   116274 S. D. =        0
```

Protocol: SYSTEST

Rev: 3.001 Time: 12:58:45 04 Dec 1999

Folder: DEC99A Seq: 390 Print: On

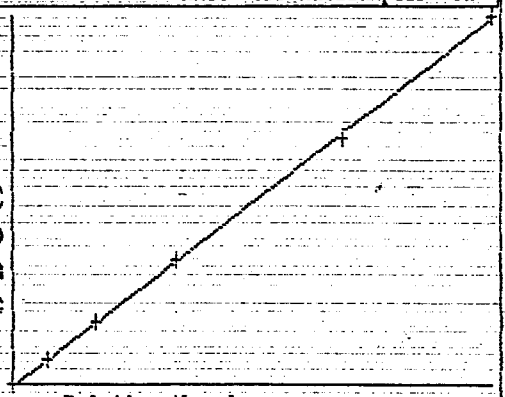
User: Batch: Id: Std6Rep1 Cup: 1 29 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

CALIBRATION: Line Calibration

Line: Hg Accepted

	Conc.	Calc.	Dev.	LiNear
S1	.000	-.013	-.013	Quadratic
S2	.200	.197	-.003	WtdLinear
S3	.500	.500	-.000	C
S4	1.00	1.01	.008	Accept o
S5	2.00	2.03	.034	n
S6	3.00	2.97	-.026	StdAdd c
A	.0000000	r	.999850	
B	2.57141e-5	C	-1.55846e-2	



Relative Absorbance

	Mean	%RSD	
S1	107	0	107
S2	8258	0	8258
S3	20040	0	20040
S4	39816	0	39816
S5	79699	0	79699
S6	116274	0	116274

33?

New calibration coefficients stored 149 2 5

Protocol: SYSTEST

Rev: 3.001 Time: 15:36:32 04 Dec 1999

Folder: DEC99A Seq: 440 Print: On

User: Batch: Id: Slw 8 Cup: 1 44 Gas: 0.25 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 120499a PgUp

Cup	Id	Extended id	Weight	Volume	Macro	check	Help
31	4pd 8		1.0000	1.0000			
32	4pd 8 dup		1.0000	1.0000			
33	4pd 8 spk		1.0000	1.0000			
34	rbpd 9		1.0000	1.0000			
35	rbpd 9 dup		1.0000	1.0000			
36	pd5 blk		1.0000	1.0000			
37	pd5blkdup		1.0000	1.0000			
38	5pd 1		1.0000	1.0000			
39	5pd 1 dup		1.0000	1.0000			
40	5pd 2		1.0000	1.0000			
41	5pd 2 dup		1.0000	1.0000			
42	5pd 3		1.0000	1.0000			
43	5pd 3 dup		1.0000	1.0000			
44	5pd 4		1.0000	1.0000			

PgDn

Cup 31 ID: 4pd 8 Cell entry, Ins to switch

149 9 12

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

*** Check Standard: 2 Ck2 Seq: 440 15:43:40 04 Dec 1999 H5

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		108.	.652	.604	ug/L	.000

*** Sample ID: 5lw 8 dup Seq: 441 15:47:32 04 Dec 1999 HG

Hg 1.80 ug/L .000 1.80

*** Sample ID: ccb Seq: 442 15:50:00 04 Dec 1999 HG

Hg -.026 ug/L .000 -.026 <0.2ug/L

*** Sample ID: ccv Seq: 443 15:52:18 04 Dec 1999 HG

Hg 2.02 ug/L .000 2.02 TV=2.0 101%

*** Sample ID: rblw 10 Seq: 444 15:54:46 04 Dec 1999 HG

Hg -.026 ug/L .000 -.026

*** Sample ID: rblw10dup Seq: 445 15:57:04 04 Dec 1999 HG

Hg -.015 ug/L .000 -.015

*** Sample ID: rblw 7 Seq: 446 15:59:22 04 Dec 1999 HG

Hg -.017 ug/L .000 -.017

*** Sample ID: rblw 7 dup Seq: 447 16:01:40 04 Dec 1999 HG

Hg -.017 ug/L .000 -.017

*** Sample ID: rblw 11 Seq: 448 16:03:58 04 Dec 1999 HG

Hg -.013 ug/L .000 -.013

*** Sample ID: rblw11dup Seq: 449 16:06:16 04 Dec 1999 HG

Hg -.017 ug/L .000 -.017

*** Sample ID: pd4 blk Seq: 450 16:08:34 04 Dec 1999 HG

Hg -.008 ug/L .000 -.008 <0.2ug/L

*** Sample ID: pd4blkdup Seq: 451 16:10:53 04 Dec 1999 HG RPD-NVA

Hg -.005 ug/L .000 -.005 <0.2ug/L

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

Hg .002 ug/L .000 .002 <0.32 µg x 2 = <0.64 µg

*** Sample ID: 4pd 1 dup Seq: 453 16:15:27 04 Dec 1999 HG RPD-NA

Hg .004 ug/L .000 .004 <0.32 µg x2 = <0.64 µg

*** Sample ID: 4pc 2 Seq: 454 16:17:44 04 Dec 1999 HG

Hg .012 ug/L .000 .012 <0.30 µg x2 = <0.60 µg

*** Sample ID: 4pd 2 dup Seq: 455 16:20:02 04 Dec 1999 HG RPD-NA

Hg .008 ug/L .000 .008 <0.30 µg x2 = <0.60 µg

*** Sample ID: 4pd 2 trp Seq: 456 16:22:20 04 Dec 1999 HG RPD-N/A

Hg .010 ug/L .000 .010 <0.30 µg x2 = <0.60 µg

*** Sample ID: 4pd 3 Seq: 457 16:24:38 04 Dec 1999 HG

Hg .020 ug/L .000 .020 <0.33 µg x2 = <0.66 µg

*** Sample ID: 4pd 3 dup Seq: 458 16:26:56 04 Dec 1999 HG RPD-NA

Hg .016 ug/L .000 .016 <0.33 µg x2 = <0.66 µg

*** Sample ID: 4pd 3 spk Seq: 459 16:29:14 04 Dec 1999 HG

Hg .915 ug/L .000 .915 TV=1.0 92%

*** Sample ID: 4pc 4 Seq: 460 16:31:34 04 Dec 1999 HG

Hg .007 ug/L .000 .007 <0.34 µg x2 = <0.68 µg

*** Sample ID: 4pd 4 dup Seq: 461 16:33:52 04 Dec 1999 HG RPD-NA

Hg .014 ug/L .000 .014 <0.34 µg x2 = <0.68 µg

*** Sample ID: 4pd 5 Seq: 462 16:36:10 04 Dec 1999 HG

Hg .014 ug/L .000 .014 <0.35 µg x2 = <0.70 µg

*** Sample ID: 4pd 5 dup Seq: 463 16:38:28 04 Dec 1999 HG RPD-NA

Hg .012 ug/L .000 .012 <0.35 µg x2 = <0.70 µg

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

*** Sample ID: 4pd 6 Seq: [illegible] [illegible]

Hg .013 ug/L .000 .013 <0.35µg x2 = <0.70µg

*** Sample ID: 4pd 6 dup Seq: 465 16:43:06 04 Dec 1999 HG RPD-NA

Hg .018 ug/L .000 .018 <0.35µg x2 = <0.70µg

*** Sample ID: ccb Seq: 466 16:45:25 04 Dec 1999 HG

Hg -.021 ug/L .000 -.021 <0.2µg/L

*** Sample ID: ccv Seq: 467 16:47:44 04 Dec 1999 HG

Hg 2.02 ug/L .000 2.02 N=20 101%

*** Sample ID: 4pd 7 Seq: 468 16:50:14 04 Dec 1999 HG

Hg -.002 ug/L .000 -.002 <0.36µg x2 = <0.72µg

*** Sample ID: 4pd 7 dup Seq: 469 16:52:33 04 Dec 1999 HG RPD-NA

Hg .015 ug/L .000 .015 <0.36µg x2 = <0.72µg

*** Sample ID: 4pd 7 trp Seq: 470 16:54:52 04 Dec 1999 HG RPD-NA

Hg .013 ug/L .000 .013 ~~<0.36µg x2 = <0.72~~ RPD 12/13/99

<0.72µg

*** Sample ID: 4pd 8 Seq: 471 16:57:11 04 Dec 1999 HG

Hg .013 ug/L .000 .013 <0.31µg x2 = <0.62µg

*** Sample ID: 4pd 8 dup Seq: 472 16:59:30 04 Dec 1999 HG RPD-NA

Hg .012 ug/L .000 .012 <0.31µg x2 = <0.62µg

*** Sample ID: 4pd 8 spk Seq: 473 17:01:49 04 Dec 1999 HG

Hg 1.00 ug/L .000 1.00 N=1.0 100%

*** Sample ID: rpdc 9 Seq: 474 17:04:13 04 Dec 1999 HG

Hg -.014 ug/L .000 -.014 <2.0µg/L x2 = <4.0µg

*** Sample ID: rpdc 9 dup Seq: 475 17:06:33 04 Dec 1999 HG RPD-NA

Hg -.004 ug/L .000 -.004 <2.0µg/L x2 = <4.0µg

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

*** Sample ID: pd5 blk Seq: 476 17:08:53 04 Dec 1999 HG

Hg -.017 ug/L .000 -.017 <0.2ug/L

*** Sample ID: pd5blkdup Seq: 477 17:11:13 04 Dec 1999 HG

Hg -.018 ug/L .000 -.018 <0.2ug/L

*** Sample ID: 5pd 1 Seq: 478 17:13:33 04 Dec 1999 HG

Hg -.012 ug/L .000 -.012 <0.89ug

*** Sample ID: 5pd 1 dup Seq: 479 17:15:54 04 Dec 1999 HG RPD-N/A

Hg -.017 ug/L .000 -.017 <0.89ug

*** Sample ID: 5pc 2 Seq: 480 17:18:15 04 Dec 1999 HG

Hg -.002 ug/L .000 -.002 <0.89ug

*** Sample ID: 5pc 2 dup Seq: 481 17:20:36 04 Dec 1999 HG RPD-N/A

Hg -.004 ug/L .000 -.004 <0.89ug

*** Sample ID: 5pc 3 Seq: 482 17:22:57 04 Dec 1999 HG

Hg -.001 ug/L .000 -.001 <1.10ug

*** Sample ID: 5pd 3 dup Seq: 483 17:25:18 04 Dec 1999 HG RPD-N/A

Hg .000 ug/L .000 .000 <1.10ug

*** Sample ID: 5pc 4 Seq: 484 17:27:39 04 Dec 1999 HG

Hg -.002 ug/L .000 -.002 0.83ug

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: Spd4 dup				Seq: 485		17:36:58 04 Dec 1999 HG			RPD-NA
Hg	.001	ug/L	.000	.001					0.83 ug
*** Sample ID: Spd 5				Seq: 486		17:39:15 04 Dec 1999 HG			
Hg	.038	ug/L	.000	.038					<1.02 ug
*** Sample ID: Spd 5 dup				Seq: 487		17:41:33 04 Dec 1999 HG			RPD-NA
Hg	.034	ug/L	.000	.034					<1.02 ug
*** Sample ID: Spd 6				Seq: 488		17:43:51 04 Dec 1999 HG			
Hg	.010	ug/L	.000	.010					<0.96 ug
*** Sample ID: Spd 6 dup				Seq: 489		17:46:09 04 Dec 1999 HG			RPD-NA
Hg	.007	ug/L	.000	.007					<0.96 ug
*** Sample ID: ccb				Seq: 490		17:48:27 04 Dec 1999 HG			
Hg	-.016	ug/L	.000	-.016					<0.2 ug IC
*** Sample ID: ccv				Seq: 491		17:50:45 04 Dec 1999 HG			TV=2.00
Hg	2.02	ug/L	.000	2.02					101%
*** Sample ID: Spd 7				Seq: 492		17:53:14 04 Dec 1999 HG			
Hg	.001	ug/L	.000	.001					<0.96 ug
*** Sample ID: Spd 7 dup				Seq: 493		17:55:32 04 Dec 1999 HG			RPD-NA
Hg	.015	ug/L	.000	.015					<0.96 ug
*** Sample ID: Spd 7 trp				Seq: 494		17:57:50 04 Dec 1999 HG			RPD-NA
Hg	.017	ug/L	.000	.017					<0.96 ug
*** Sample ID: Spd 8				Seq: 495		18:00:08 04 Dec 1999 HG			
Hg	.004	ug/L	.000	.004					<0.92 ug
*** Sample ID: Spd 8 dup				Seq: 496		18:02:25 04 Dec 1999 HG			RPD-NA
Hg	.005	ug/L	.000	.005					<0.92 ug

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 5ca 8 sok				Seq: 497	18:04:42 04 Dec 1999 HG			
Hg	1.04	ug/L	.000	1.04				
*** Samole ID: rapd10				Seq: 498	18:07:03 04 Dec 1999 HG			
Hg	-.019	ug/L	.000	-.019				
*** Sample ID: rbpd10dup				Seq: 499	18:09:21 04 Dec 1999 HG			
Hg	-.015	ug/L	.000	-.015				
*** Samole ID: rbpd7				Seq: 500	18:11:39 04 Dec 1999 HG			
Hg	-.019	ug/L	.000	-.019				
*** Sample ID: rbpd7dup				Seq: 501	18:13:57 04 Dec 1999 HG			
Hg	-.019	ug/L	.000	-.019				
*** Sample ID: rbpd11				Seq: 502	18:16:15 04 Dec 1999 HG			
Hg	-.013	ug/L	.000	-.013				
*** Sample ID: rbpd11dup				Seq: 503	18:18:33 04 Dec 1999 HG			
Hg	-.014	ug/L	.000	-.014				
*** Sample ID: ccb				Seq: 504	18:20:51 04 Dec 1999 HG			
Hg	-.016	ug/L	.000	-.016				
*** Sample ID: ccv				Seq: 505	18:23:09 04 Dec 1999 HG			
Hg	1.98	ug/L	.000	1.98				

TV=1.0 104%

<2.0ug/L

RPD NA <2.0ug/L

<0.2ug/L ~~<2.0ug/L~~ RPD 12/13/99

RPD-NA <0.2ug/L ~~<2.0ug/L~~ RPD 12/13/99

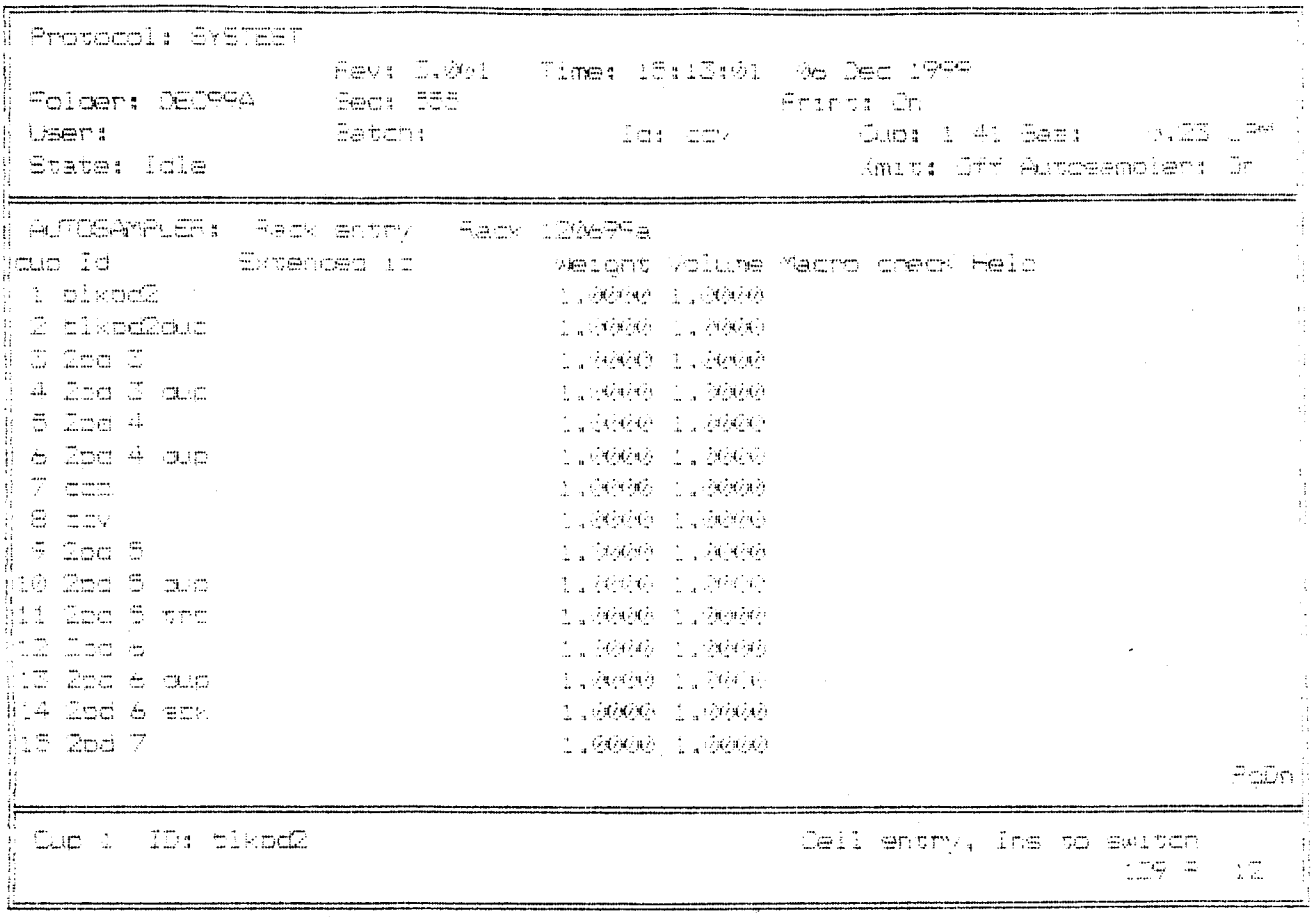
<0.2ug/L

<0.2ug/L

<0.2ug/L

TV=2.0 99%

12/6/99 Analytical Run



```
Protocol: SYSTEST
                    Rev: 3.001   Time: 15:13:01  06 Dec 1999
Folder: DEC99A      Seq: 555                    Print: On
User:               Batch:            Id: ccv        Cup: 1 41 Gas:    0.23 LPM
State: Idle                                         Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 120699a

Cup	Id	Extended id	Weight	Volume	Macro check	Help
1	blkpd2		1.0000	1.0000		
2	blkpd2dup		1.0000	1.0000		
3	2pd 3		1.0000	1.0000		
4	2pd 3 dup		1.0000	1.0000		
5	2pd 4		1.0000	1.0000		
6	2pd 4 dup		1.0000	1.0000		
7	ccc		1.0000	1.0000		
8	ccv		1.0000	1.0000		
9	2pd 5		1.0000	1.0000		
10	2pd 5 dup		1.0000	1.0000		
11	2pd 5 trc		1.0000	1.0000		
12	2pd 6		1.0000	1.0000		
13	2pd 6 dup		1.0000	1.0000		
14	2pd 6 sck		1.0000	1.0000		
15	2pd 7		1.0000	1.0000		

PgDn

```
Cup 1  ID: blkpd2                          Cell entry, Ins to switch
                                                                  139 F  12
```

Protocol: SYSTEST

Rev: 1.001 Time: 15:12:08 06 Dec 1999

Folder: DEC99A Seq: 555 Print: On

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

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 120699s Pgup

Cup Id	Extended id	Weight	Volume	Macro check	Help
16 2pd 7 dup		1.0000	1.0000		
17 2pd 8		1.0000	1.0000		
18 2pd 8 dup		1.0000	1.0000		
19 3pd 1		1.0000	1.0000		
20 3pd 1 dup		1.0000	1.0000		
21 3pd 2		1.0000	1.0000		
22 3pd 2 dup		1.0000	1.0000		
23 3pd 3		1.0000	1.0000		
24 3pd 3 dup		1.0000	1.0000		
25 3pd 4		1.0000	1.0000		
26 3pd 4 dup		1.0000	1.0000		
27 3pd 5		1.0000	1.0000		
28 3pd 5 dup		1.0000	1.0000		
29 3pd 6		1.0000	1.0000		
30 3pd 6 dup		1.0000	1.0000		

PgDn

Cup 16 ID: 2pd 7 dup Cell entry, Ins to switch

129 9 12

Protocol: SYSTEST

Rev: 3.001 Time: 15:13:10 06 Dec 1999

Folder: DEC99A Seq: 555 Print: On

User: Batch: Id: ccv Cup: 1 41 Gas: 0.25 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 120699a PgUp

cup Id	Extended id	Weight	Volume	Macro check	Help
31 ccb		1.0000	1.0000		
32 ccv		1.0000	1.0000		
33 3pd 7		1.0000	1.0000		
34 3pd 7 dup		1.0000	1.0000		
35 3pd 7 trp		1.0000	1.0000		
36 3pd 8		1.0000	1.0000		
37 3pd 8 dup		1.0000	1.0000		
38 3pd 8 spk		1.0000	1.0000		
39 rpod 8		1.0000	1.0000		
40 rpod8dup		1.0000	1.0000		
41 ccb		1.0000	1.0000		
42 ccv		1.0000	1.0000		
43		1.0000	1.0000		
44		1.0000	1.0000		

PgDn

Cup 31 ID: ccb Cell entry, Ins to switch

129 9 12

*** Standard: 1 Rep: 1 Seq: 506 12:22:58 06 Dec 1999 HG

Hg .000 ug/L -307
Ave. Int. = -307 S. D. = 0

*** Standard: 2 Rep: 1 Seq: 507 12:25:20 06 Dec 1999 HG

Hg .200 ug/L 8015
Ave. Int. = 8015 S. D. = 0

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

*** Standard: 3 Rep: 1 Seq: 508 12:27:43 06 Dec 1999 HG

Hg .500 ug/L 19671
Ave. Int. = 19671 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 509 12:30:07 06 Dec 1999 HG

Hg 1.00 ug/L 39586
Ave. Int. = 39586 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 510 12:32:34 06 Dec 1999 HG

Hg 2.00 ug/L 79872
Ave. Int. = 79872 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 511 13:13:17 06 Dec 1999 HG

Hg 3.00 ug/L 112164
Ave. Int. = 112164 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 13:13:40 06 Dec 1999

Folder: DEC99A Seq: 512 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 21 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

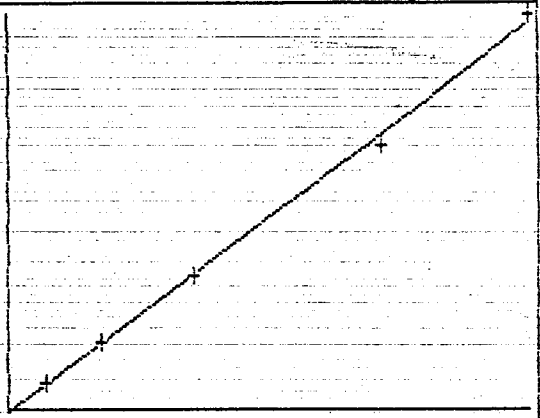
CALIBRATION: Line Calibration

Line: Hg Accepted

	Conc.	Calc.	Dev.	LiNear
S1	.000	-.028	-.028	Quadratic
S2	.200	.191	-.009	WtdLinear
S3	.500	.498	-.002	C
S4	1.00	1.02	.022	Accept o
S5	2.00	2.00	.003	n
S6	3.00	2.93	-.066	StdAdd c

A .0000000 r .999066

B 2.63352e-5 C -2.01423e-2



Relative Absorbance

	Mean	%RSD	
S1	-307	0	-307
S2	8015	0	8015
S3	19671	0	19671
S4	39586	0	39586
S5	79872	0	79872
S6	112164	0	112164

33?

New calibration coefficients stored 149 2 5

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

*** Check Standard: 2 Ck2 Seq: 512 13:23:14 06 Dec 1999 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		100.	.607	.604	ug/L	.000

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

*** Check Standard: 2 [illegible] Seq: 555 15:14:37 06 Dec 1999 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		97.9	.592	.604	ug/L	.000

*** Sample ID: [illegible] Seq: 556 15:16:56 06 Dec 1999 HG

Hg -.015 ug/L .000 -.015 <0.2ug/L

*** Sample ID: [illegible] Seq: 557 15:19:13 06 Dec 1999 HG RPD-N/A

Hg -.006 ug/L .000 -.006 <0.2ug/L.

*** Sample ID: 2pd 3 Seq: 558 15:21:31 06 Dec 1999 HG

Hg .180 ug/L .000 .180 <0.182ug

*** Sample ID: 2pd 3 dup Seq: 559 15:23:49 06 Dec 1999 HG RPD-NA

Hg .178 ug/L .000 .178 <0.182ug

*** Sample ID: 2pd 4 Seq: 560 15:26:07 06 Dec 1999 HG

Hg -.011 ug/L .000 -.011 <0.11ug

*** Sample ID: 2pd 4 dup Seq: 561 15:28:25 06 Dec 1999 HG RPD-NA

Hg -.009 ug/L .000 -.009 <0.11ug

*** Sample ID: [illegible] Seq: 562 15:30:43 06 Dec 1999 HG

Hg -.022 ug/L .000 -.022 <0.2ug/L

*** Sample ID: [illegible] Seq: 563 15:33:01 06 Dec 1999 HG

TV=2.0

Hg 1.95 ug/L .000 1.95 98%

*** Sample ID: 2pd 5 Seq: 564 15:35:31 06 Dec 1999 HG

Hg .027 ug/L .000 .027 <0.154ug

*** Sample ID: 2pd 5 dup Seq: 565 15:37:49 06 Dec 1999 HG RPD-NA

Hg .037 ug/L .000 .037 <0.154ug

*** Sample ID: 2pd 5 trp Seq: 566 15:40:07 06 Dec 1999 HG RPD-NA

Hg .036 ug/L .000 .036 <0.154ug

Line	Conc.	Units	SD/PSD	1	2	3	4	5	
*** Sample ID: Zpa 6					Seq: 567	15:42:24 06 Dec 1999 HG			
Hg	-.006	ug/L	.000	-.006					<0.23 µg
*** Sample ID: Zpa 6 dup					Seq: 568	15:44:41 06 Dec 1999 HG			RPD-NA
Hg	-.005	ug/L	.000	-.005					<0.23 µg
*** Sample ID: Zpa 6 scv					Seq: 569	15:46:59 06 Dec 1999 HG			
Hg	1.03	ug/L	.000	1.03					TR=1.0 103%
*** Sample ID: Zpa 7					Seq: 570	15:49:17 06 Dec 1999 HG			
Hg	.231	ug/L	.000	.231					0.208 µg
*** Sample ID: Zpa 7 dup					Seq: 571	15:51:35 06 Dec 1999 HG			RPD=2.98%
Hg	.238	ug/L	.000	.238					0.214 µg
*** Sample ID: Zpa 8					Seq: 572	15:53:53 06 Dec 1999 HG			
Hg	-.013	ug/L	.000	-.013					<0.136 µg
*** Sample ID: Zpa 8 dup					Seq: 573	15:56:11 06 Dec 1999 HG			RPD-NA
Hg	-.008	ug/L	.000	-.008					<0.136 µg
*** Sample ID: Zpa 1					Seq: 574	15:58:29 06 Dec 1999 HG			
Hg	-.016	ug/L	.000	-.016					<0.88 µg
*** Sample ID: Zpa 1 dup					Seq: 575	16:00:47 06 Dec 1999 HG			RPD-NA
Hg	-.016	ug/L	.000	-.016					<0.88 µg
*** Sample ID: Zpa 2					Seq: 576	16:03:05 06 Dec 1999 HG			
Hg	-.015	ug/L	.000	-.015					<0.87 µg
*** Sample ID: Zpa 2 dup					Seq: 577	16:05:23 06 Dec 1999 HG			RPD-NA
Hg	-.015	ug/L	.000	-.015					<0.87 µg
*** Sample ID: Zpa 3					Seq: 578	16:07:42 06 Dec 1999 HG			
Hg	.014	ug/L	.000	.014					<1.40 µg

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: Scc 3 dup				Seq: 577			16:10:01 06 Dec 1999 HG		RPD-NA
Hg	.014	ug/L	.000	.014					<1.40 µg
*** Sample ID: Scc 4				Seq: 581			16:12:20 06 Dec 1999 HG		
Hg	.013	ug/L	.000	.013					<1.24 µg
*** Sample ID: Scc 4 dup				Seq: 581			16:14:39 06 Dec 1999 HG		RPD-NA
Hg	.013	ug/L	.000	.013					<1.24 µg
*** Sample ID: Scc 5				Seq: 582			16:16:58 06 Dec 1999 HG		
Hg	.202	ug/L	.000	.202					1.28 µg
*** Sample ID: Scc 5 dup				Seq: 582			16:19:17 06 Dec 1999 HG		RPD = 4.02%
Hg	.195	ug/L	.000	.195					1.23 µg
*** Sample ID: Scc 6				Seq: 584			16:21:36 06 Dec 1999 HG		
Hg	-.005	ug/L	.000	-.005					<1.33 µg
*** Sample ID: Scc 6 dup				Seq: 585			16:23:56 06 Dec 1999 HG		RPD-NA
Hg	.003	ug/L	.000	.003					<1.33 µg
*** Sample ID: ccb				Seq: 586			16:26:15 06 Dec 1999 HG		
Hg	-.016	ug/L	.000	-.016					<0.2 µg/L
*** Sample ID: ccv				Seq: 587			16:28:34 06 Dec 1999 HG		
Hg	1.93	ug/L	.000	1.93					TV=2.0 97%
*** Sample ID: Scc 7				Seq: 588			16:31:05 06 Dec 1999 HG		
Hg	-.017	ug/L	.000	-.017					<1.44 µg
*** Sample ID: Scc 7 dup				Seq: 589			16:33:25 06 Dec 1999 HG		RPD-N/A
Hg	-.006	ug/L	.000	-.006					<1.44 µg
*** Sample ID: Scc 7 trp				Seq: 590			16:35:45 06 Dec 1999 HG		RPD-N/A
Hg	-.006	ug/L	.000	-.006					<1.44 µg

Line	Conc.	Units	SD/%SD	1	2	3	4	5	
*** Sample ID: Icc 5				Seq: 591			16:38:05 06 Dec 1999 Hg		
Hg	.003	ug/L	.000	.003					
*** Sample ID: Icc 5 dup				Seq: 592			16:40:25 06 Dec 1999 Hg		
Hg	.001	ug/L	.000	.001					
*** Sample ID: Icc 5 spk				Seq: 593			16:42:46 06 Dec 1999 Hg		
Hg	.960	ug/L	.000	.960					
*** Sample ID: rccc 5				Seq: 594			16:45:10 06 Dec 1999 Hg		
Hg	-.024	ug/L	.000	-.024					
*** Sample ID: rccc5dup				Seq: 595			16:47:32 06 Dec 1999 Hg		
Hg	-.015	ug/L	.000	-.015					
*** Sample ID: ccb				Seq: 596			16:49:53 06 Dec 1999 Hg		
Hg	-.022	ug/L	.000	-.022					
*** Sample ID: ccv				Seq: 597			16:52:14 06 Dec 1999 Hg		
Hg	1.95	ug/L	.000	1.95					

RPD-N/A

12/8/99 Analytical Run

Protocol: SYSTEST

Rev: 3.001 Time: 16:12:47 08 Dec 1999

Folder: DEC99A Seq: 771 Print: On

User: Batch: — Id: StdRepl Cup: 1 29 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 120899b

cup	Id	Extended id	Weight	Volume	Macro check	Help
1	icp		1.0000	1.0000		
2	nist1633b		1.0000	1.0000		
3	1633bdup		1.0000	1.0000		
4	47Q82		1.0000	1.0000		
5	47Q82dup		1.0000	1.0000		
6	Q70 1:10		1.0000	1.0000		
7	Q70dup 1:10		1.0000	1.0000		
8	47Q86		1.0000	1.0000		
9	47Q86dup		1.0000	1.0000		
10	47Q86trp		1.0000	1.0000		
11	47Q85		1.0000	1.0000		
12	47Q85dup		1.0000	1.0000		
13	47Q85spk		1.0000	1.0000		
14	Q71 1:10		1.0000	1.0000		
15	Q71dup 1:10		1.0000	1.0000		

PgDn

Cup 1 ID: icp Cell entry, Ins to switch

149 9 12

Protocol: SYSTEST

Rev: 3.001 Time: 17:51:28 08 Dec 1999

Folder: 5EC99A Seq: S11 Print: On

User: Batch: Id: ccv Cup: 1 33 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 120899b Range 1-44 Clear saQ Undo eXit PgUp

cup	Id	Extended id	Weight	Volume	Macro check	Help
16	47Q88		1.0000	1.0000		
17	47Q88cup		1.0000	1.0000		
18	47Q89		1.0000	1.0000		
19	47Q89cup		1.0000	1.0000		
20	Q72 1:10		1.0000	1.0000		
21	Q72cup 1:10		1.0000	1.0000		
22	47Q90		1.0000	1.0000		
23	47Q90cup		1.0000	1.0000		
24	ccp		1.0000	1.0000		
25	ccv		1.0000	1.0000		
26	47Q87		1.0000	1.0000		
27	47Q87cup		1.0000	1.0000		
28	47Q87trp		1.0000	1.0000		
29	Q91		1.0000	1.0000		
30	Q91cup		1.0000	1.0000		

PgDn

Column entry, Ins to switch

129 9 3

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 16:13:08  08 Dec 1999
Folder: DEC99A      Seq: 771                    Print: On
User:               Batch: -          Id: StdCRep1  Cup: 1 29 Gas:    0.23 LPM
State: Idle                                        Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 120899p PgUp

cup Id	Extended id	Weight	Volume	Macro check	Help
31 Q91spk		1.0000	1.0000		
32 ccp		1.0000	1.0000		
33 ccv		1.0000	1.0000		
34		1.0000	1.0000		
35		1.0000	1.0000		
36		1.0000	1.0000		
37		1.0000	1.0000		
38		1.0000	1.0000		
39		1.0000	1.0000		
40		1.0000	1.0000		
41		1.0000	1.0000		
42		1.0000	1.0000		
43		1.0000	1.0000		
44		1.0000	1.0000		

PgDn

Cup 31 ID: Q91spk Call entry, Ins to switch
149 9 12

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

*** Standard: 1 Rep: 1 Seq: 765 15:56:27 08 Dec 1999 HG

Hg .000 ug/L -162
Ave. Int. = -162 S. D. = 0

*** Standard: 2 Rep: 1 Seq: 766 15:58:50 08 Dec 1999 HG

Hg .200 ug/L 6893
Ave. Int. = 6893 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 767 16:01:13 08 Dec 1999 HG

Hg .500 ug/L 18173
Ave. Int. = 18173 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 768 16:03:36 08 Dec 1999 HG

Hg 1.00 ug/L 33794
Ave. Int. = 33794 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 769 16:06:00 08 Dec 1999 HG

Hg 2.00 ug/L 70339
Ave. Int. = 70339 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 770 16:08:34 08 Dec 1999 HG

Hg 3.00 ug/L 104311
Ave. Int. = 104311 S. D. = 0

Protocol: SYSTEST
Rev: 3.001 Time: 16:09:02 08 Dec 1999
Folder: DEC99A Seq: 771 Print: On
User: Batch: Id: Std6Rep1 Cup: 1 29 Gas: 0.23 LPM
State: Idle Xmit: Off Autosampler: On

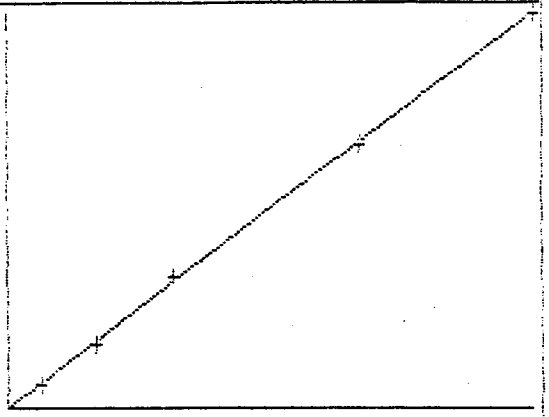
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.
S1	.000	-.004	-.004
S2	.200	.199	-.001
S3	.500	.522	.022
S4	1.00	.970	-.030
S5	2.00	2.02	.019
S6	3.00	2.99	-.007

Accepted
LiNear
Quadratic
WtdLinear
Accept
StdAdd

A .0000000 r .999869
B 2.86835e-5 C 1.12597e-3



	Mean	%RSD	
S1	-162	0	-162
S2	6893	0	6893
S3	18173	0	18173
S4	33794	0	33794
S5	70339	0	70339
S6	104311	0	104311

33?

New calibration coefficients stored 149 2 5

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

*** Check Standard: 2 Ck2 Seq: 771 16:15:13 08 Dec 1999 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		109.	.656	.604	ug/L	.000

*** Sample ID: icb Seq: 772 16:17:32 08 Dec 1999 HG

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

*** Sample ID: nist1633b Seq: 773 16:19:50 08 Dec 1999 HG

Hg 1.64 ug/L .000 1.64 0.159ug/g

T.V. 0.141 ± 0.019

*** Sample ID: 1633bdup Seq: 774 16:22:18 08 Dec 1999 HG RPD = 5.64%

Hg 1.55 ug/L .000 1.55 0.150ug/g

*** Sample ID: 47082 Seq: 775 16:24:48 08 Dec 1999 HG

Hg .041 ug/L .000 .041

*** Sample ID: 47082dup Seq: 776 16:27:05 08 Dec 1999 HG

Hg .053 ug/L .000 .053

*** Sample ID: Q70 Seq: 777 16:29:24 08 Dec 1999 HG

Hg 8.45 ug/L .000 8.45 NODATA, > LR

*** Sample ID: Q70dup Seq: 778 16:32:03 08 Dec 1999 HG

Hg 8.53 ug/L .000 8.53 NODATA, > LR

*** Sample ID: 47086 Seq: 779 16:34:42 08 Dec 1999 HG

Hg .043 ug/L .000 .043 <0.01ug

*** Sample ID: 47086dup Seq: 780 16:37:00 08 Dec 1999 HG RPD-N/A

Hg .052 ug/L .000 .052 <0.01ug

*** Sample ID: 47086trp Seq: 781 16:39:18 08 Dec 1999 HG RPD-N/A

Hg .063 ug/L .000 .063 <0.01ug

*** Sample ID: 47085 Seq: 782 16:41:37 08 Dec 1999 HG

Hg .417 ug/L .000 .417 0.021ug

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: 47Q85dup				Seq: 783		16:43:55 08 Dec 1999 HG			RPD=4.41%
Hg	.399	ug/L	.000	.399					0.020mg
*** Sample ID: 47Q85spk				Seq: 784		16:46:12 08 Dec 1999 HG			TV-LO
Hg	1.41	ug/L	.000	1.41					99%
*** Sample ID: Q71				Seq: 785		16:48:41 08 Dec 1999 HG			
Hg	8.30	ug/L	.000	8.30					NO DATA, >LR
*** Sample ID: Q71dup				Seq: 786		16:51:24 08 Dec 1999 HG			
Hg	8.13	ug/L	.000	8.13					NO DATA, > LR
*** Sample ID: 47Q88				Seq: 787		16:54:12 08 Dec 1999 HG			
Hg	.090	ug/L	.000	.090					<0.01mg
*** Sample ID: 47Q88dup				Seq: 788		16:56:30 08 Dec 1999 HG			RPD-NA
Hg	.095	ug/L	.000	.095					<0.01mg
*** Sample ID: 47Q89				Seq: 789		16:58:48 08 Dec 1999 HG			
Hg	.244	ug/L	.000	.244					0.012mg
*** Sample ID: 47Q89dup				Seq: 790		17:01:05 08 Dec 1999 HG			RPD-N/A
Hg	.244	ug/L	.000	.244					0.012mg
*** Sample ID: Q72				Seq: 791		17:03:25 08 Dec 1999 HG			
Hg	8.95	ug/L	.000	8.95					NO DATA, >LR
*** Sample ID: Q72dup				Seq: 792		17:06:05 08 Dec 1999 HG			
Hg	8.94	ug/L	.000	8.94					NO DATA, >LR
*** Sample ID: 47Q90				Seq: 793		17:08:45 08 Dec 1999 HG			
Hg	.080	ug/L	.000	.080					<0.01mg
*** Sample ID: 47Q90dup				Seq: 794		17:11:05 08 Dec 1999 HG			RPD-NA
Hg	.094	ug/L	.000	.094					<0.01mg

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: ccb				Seq: 795		17:13:23 08 Dec 1999 HG			
Hg	-.006	ug/L	.000	-.006					<0.2 ug/L
*** Sample ID: ccv				Seq: 796		17:15:42 08 Dec 1999 HG			
Hg	2.10	ug/L	.000	2.10					TV=2.0 105%
*** Sample ID: 47087				Seq: 797		17:18:14 08 Dec 1999 HG			
Hg	.127	ug/L	.000	.127					<0.010 ug
*** Sample ID: 47087dup				Seq: 798		17:20:33 08 Dec 1999 HG			RPD-NA
Hg	.143	ug/L	.000	.143					<0.010 ug
*** Sample ID: 47087trp				Seq: 799		17:22:52 08 Dec 1999 HG			RPD-NA
Hg	.140	ug/L	.000	.140					<0.010 ug
*** Sample ID: Q91				Seq: 800		17:25:11 08 Dec 1999 HG			
Hg	.043	ug/L	.000	.043					<0.01 ug
*** Sample ID: Q91dup				Seq: 801		17:27:30 08 Dec 1999 HG			RPD-NA
Hg	.039	ug/L	.000	.039					<0.01 ug
*** Sample ID: Q91spk				Seq: 802		17:29:49 08 Dec 1999 HG			
Hg	1.06	ug/L	.000	1.06					TV=1.0 106%
*** Sample ID: Q70		1:10		Seq: 803		17:32:14 08 Dec 1999 HG			
Hg	.912	ug/L	.000	.912					3.85 ug
*** Sample ID: Q70dup		1:10		Seq: 804		17:34:34 08 Dec 1999 HG			RPD=NA
Hg	.912	ug/L	.000	.912					3.85 ug
*** Sample ID: Q71		1:10		Seq: 805		17:37:02 08 Dec 1999 HG			
Hg	.895	ug/L	.000	.895					3.90 ug
*** Sample ID: Q71dup		1:10		Seq: 806		17:39:23 08 Dec 1999 HG			RPD=4.80%
Hg	.853	ug/L	.000	.853					3.71 ug

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 072			1:10		Seq: 807	17:42:37 08 Dec 1999 HG		
Hg	.973	ug/L	.000	.973			4.10 µg	
*** Sample ID: 072dup			1:10		Seq: 808	17:45:06 08 Dec 1999 HG	RPD = 3.0%	
Hg	.944	ug/L	.000	.944			3.98 µg	
*** Sample ID: ccb					Seq: 809	17:47:26 08 Dec 1999 HG		
Hg	-.018	ug/L	.000	-.018			< 0.2 µg/L	
*** Sample ID: ccv					Seq: 810	17:49:45 08 Dec 1999 HG		
Hg	2.09	ug/L	.000	2.09		R = 2.0	105%	

METCO Particulate Analysis Record

METCO Environmental

Particulate Analysis EPA Method 17

Thimbles and Backup Filters

Job Number 99-95SHW3 Location Paducah, Kt.

Job Name EPRI Unit Tested #3 Baghouse Inlet Duct

Desiccator Time In	900 11/2					
Desiccator Time Out	1335 11/3	840 11/4				

Run No. 1	Thimble No. Q70		Filter No. 47Q86		
Thimble Final Weight (g)	7.2136	7.2141	✓		
Thimble Initial Weight (g)	2.8945	2.8945	✓		
Particulate (g)	4.3191	4.3196	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1048	0.1047	✓		

Filter and Particulate Average (g) 0.1048 ✓

Initial Filter Weight (g) 0.1071 ✓

Filter Particulate Average (mg) 0 ✓

Thimble Particulate Average (mg) 4319.4 ✓

Total Particulate (mg) 4,319.4 ✓

Run No. 2	Thimble No. Q71		Filter No. 47Q88		
Thimble Final Weight (g)	8.4720	8.4725	✓		
Thimble Initial Weight (g)	3.8895	3.8895	✓		
Particulate (g)	4.5825	4.5830	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1054	0.1053	✓		

Filter and Particulate Average (g) 0.1054 ✓

Initial Filter Weight (g) 0.1082 ✓

Filter Particulate Average (mg) 0 ✓

Thimble Particulate Average (mg) 4582.8 ✓

Total Particulate (mg) 4,582.8 ✓

Run No. 3	Thimble No. Q72		Filter No. 47Q90		
Thimble Final Weight (g)	7.3878	7.3879	✓		
Thimble Initial Weight (g)	2.9460	2.9460	✓		
Particulate (g)	4.4418	4.4419	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1045	0.1045	✓		

Filter and Particulate Average (g) 0.1045 ✓

Initial Filter Weight (g) 0.1085 ✓

Filter Particulate Average (mg) 0 ✓

Thimble Particulate Average (mg) 4,441.9 ✓

Total Particulate (mg) 4,441.9 ✓

MA

Analyst

METCO Environmental

Particulate Analysis EPA Method 5

Stack Filters

Job Number 99-95 SHW 3 Location Paducah, Kt.

Job Name EPRI Unit Tested #3 Baghouse Outlet

Desiccator Time In	930 11/2					
Desiccator Time Out	1344 11/3	850 11/4				

Run No. 1	Filter No. 47085					
Filter & Particulate + Tare Weight (g)						
Tare Weight (g)						
Filter & Particulate (g)	0.1285	0.1284	✓			

Filter & Particulate Average (g) 0.1285 ✓

Initial Filter Weight (g) 0.1083 ✓

Total Particulate (mg) 20.2 ✓

Run No. 2	Filter No. 47089					
Filter & Particulate + Tare Weight (g)						
Tare Weight (g)						
Filter & Particulate (g)	0.1544	0.1539	✓			

Filter & Particulate Average (g) 0.1542 ✓

Initial Filter Weight (g) 0.1072 ✓

Total Particulate (mg) 47.0 ✓

Run No. 3	Filter No. 47087					
Filter & Particulate + Tare Weight (g)						
Tare Weight (g)						
Filter & Particulate (g)	0.1091	0.1092	✓			

Filter & Particulate Average (g) 0.1092 ✓

Initial Filter Weight (g) 0.1076 ✓

Total Particulate (mg) 1.6 ✓

MLL

Analyst

PHILIP
ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

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

ANALYTICAL REPORT

Client: METCO Environmental

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

Project: 188427
Received: 24-NOV-99
Reported: 16-DEC-99

PURCHASE ORDER: 99-95-SHW3

Project Description: Shawnee-Unit 3 Paducah

Sampled: 29-OCT-99

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Run 1 Coal Sample (U3 Coal)						
Lab Sample: 1384787						
Moisture, Total	12.2		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	7.71	8.78	%	D 3174	08-DEC-99	VJO
Sulfur	0.42	0.48	%	D 4239	08-DEC-99	VJO
Heating Value	11310	12880	BTU/lb	D 3286	02-DEC-99	VJO
Chloride, Total	0.02	0.02	%	E776/300.0	14-DEC-99	DRK
Run 2 Coal Sample (U3 Coal)						
Lab Sample: 1384788						
Moisture, Total	13.4		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	8.39	9.69	%	D 3174	08-DEC-99	VJO
Sulfur	0.43	0.50	%	D 4239	08-DEC-99	VJO
Heating Value	11010	12720	BTU/lb	D 3286	02-DEC-99	VJO
Chloride, Total	0.02	0.02	%	E776/300.0	14-DEC-99	DRK
Run 3 Coal Sample (U3 Coal)						
Lab Sample: 1384789						
Moisture, Total	12.5		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	8.47	9.68	%	D 3174	08-DEC-99	VJO
Sulfur	0.43	0.49	%	D 4239	08-DEC-99	VJO
Heating Value	11180	12780	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: 188427

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Run 3 Coal Sample (U3 Coal)						
Lab Sample: 1384789 - continued						
Chloride, Total	0.01	0.01	%	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) 921-9667

Sample Container Information

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

PADUCAH

188427

Report Results To:
PO # 99-95-SHW3 Job ID SHAWNEE-UNIT 3
Name DOUG SAATHOFF
Company METCO ENVIRONMENTAL
Mailing Address P.O. Box 598
City ADDISON State TX Zip 75025
Telephone # 972/931/7127 Fax # 972/931/3398

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

Analysis Requested

BTU CONTENT — ASTM-D-3286
FLY ASH — ASTM-D-3174
SULFUR — ASTM-D-3016
CHLORIDE — ASTM-?

Page 1 of 1
PAS Quote#

	Sampled by: SAMPLE DESCRIPTION	Air Vol. (L or m/n)	Matrix Type	Date Sampled	Time Sampled					Comments/Hazard/Location Details
1	RUN1 COAL SAMP.			10/29/99		X	X	X	X	ATTN: CHRIS WEATHINGTON
2	RUN2 COAL SAMP.			10/29/99		X	X	X	X	TEST AMERICA, INC.
3	RUN3. COAL SAMP			10/29/99		X	X	X	X	3601 S. DIXIE DRIVE
4										DAYTON, OH 45439
5										PH: 1-800-572-9839
6	*SEE ATTACHED									* AFTER SAMPLE HAS BEEN
7	INSTRUCTIONS									PREPPED. PLEASE RETURN A
8	→									4 oz. JAR SAMPLE TO TEST
9										AMERICA AT THE ABOVE
10										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	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:

Bass labelled #3 Coal. (Tag) 11-24-99

NOV-19-1999 11:18 FROM TO 19372947816500000 P.06
TOTAL P.06

TestAmerica
INCORPORATED

Sample ID: TVA
Shawnee Fossil Plant
Paducah, Kentucky
Coal Samples

Hg Analysis
ASTM D6414-99

Collected On: 10/28/99 for Run 1, 10/29/99 for Run 2 and Run 3 Composites
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	0.022	0.022	<1.0	ug/g	95.0		
Run 2 Composite	12/20/99	12/21/99	jpp	0.039	0.039	<1.0	ug/g	96.5		
Run 3 Composite	12/20/99	12/21/99	jpp	0.024	0.025	2.1	ug/g	97.0		

Notes:

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: 12/6/09 Time: 9:30 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, STRAITON, 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 SHW 3 Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 11

Facility Name/Location
TVA
Shawnee ~~Generating Stn~~ Fossil Plant
Paducah, K

Collected By/Company
TVA

SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	SAMPLE ANALYSIS REQUIRED: RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	Sniffer POHC's	BE METALS	FLY ASH	Cl_2	Hg	REMARKS (Specific Compounds/Methods)
Run 1 Coal Sample	10/28/99				X		II	BO							X	X	X	X	X	Analyze according to the Ontario Hydro Method. Ship one container to EERC
Run 2 Coal Sample	10/29/99				X		II	BO							X	X	X	X	X	
Run 3 Coal Sample	10/29/99				X		II	B.O.							X	X	X	X	X	↓
Fly Ash Run 1	10/28/99					X	III	B.O.												Ship to EERC Analyze Fly Ash for Major Elements
																				11/15/99 shipped as listed above Douglas R Smith

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jason Conway	10/29/99		Jason Brown	11/6/99	2300	John Pellegrini	11/8/99	1300
Analyzed by:	Date:	Time:	Data Reviewed by:	Date:	Time:	Remarks:		

Ship to: TestAmerica / METCO

Rcvd TestAm 11/16/99 1100 Rusty

METCO ENVIRONMENTAL

PHILIP ANALYTICAL SERVICES

Chain of Custody Record

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

Sample Container Information

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

Report Results To:

PO # 99-95-SHW3 Job ID SHAWNEE-UNIT 3 PADUCAH
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

Page 1 of 1
PAS Quote#

Sampled by:

	SAMPLE DESCRIPTION	Air Vol. (L or min)	Matrix Type	Date Sampled	Time Sampled	BTU CONTENT ASTM-D-3286	FLY ASH ASTM-D-3174	SULFUR ASTM-D-5016	CHLORIDE ASTM-?
1.	RUN1 COAL SAMP.			10/29/99		X	X	X	X
2	RUN2 COAL SAMP.			10/29/99		X	X	X	X
3	RUN3. COAL SAMP			10/29/99		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:

ASRAL # 122194

COALS

NONAQUEOUS MERCURY BATCH SHEET

Analyst: JRP Date: 12/10/99 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 [redacted]	1.0724 g		
76.7	1384802 SPL	1.0081 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 Shawnee	1.0110 g		
96.5	1384788	1.0059 g		
97.0	1384789	1.0816 g		
100	1384796 [redacted]	1.0090 g		
100	1384797 TRI	1.0203 g		
99.9	1384798 SPL	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 1630a	1.0044 g		
	Blank			

MB

ICV

MS

MSD

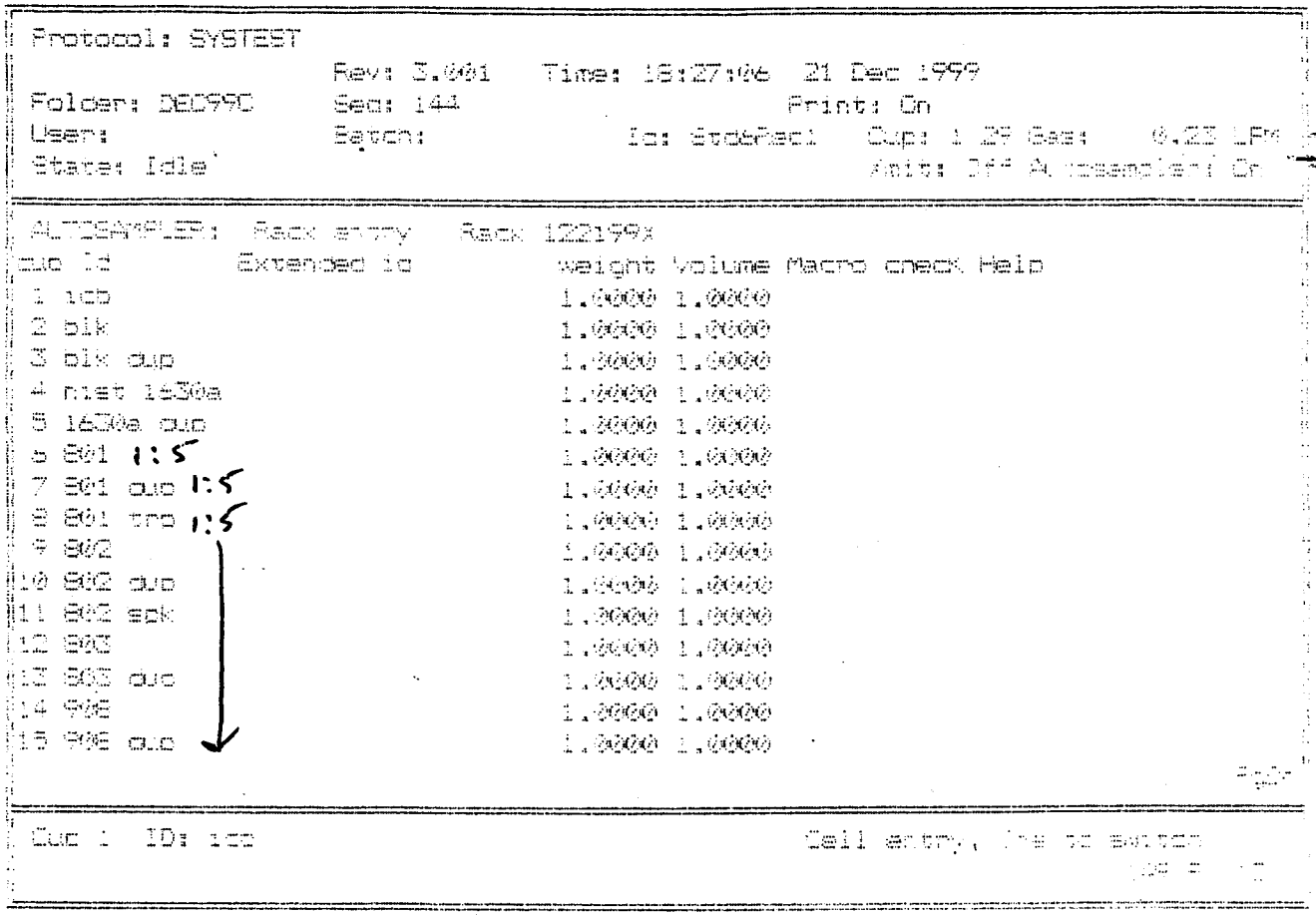
RPD

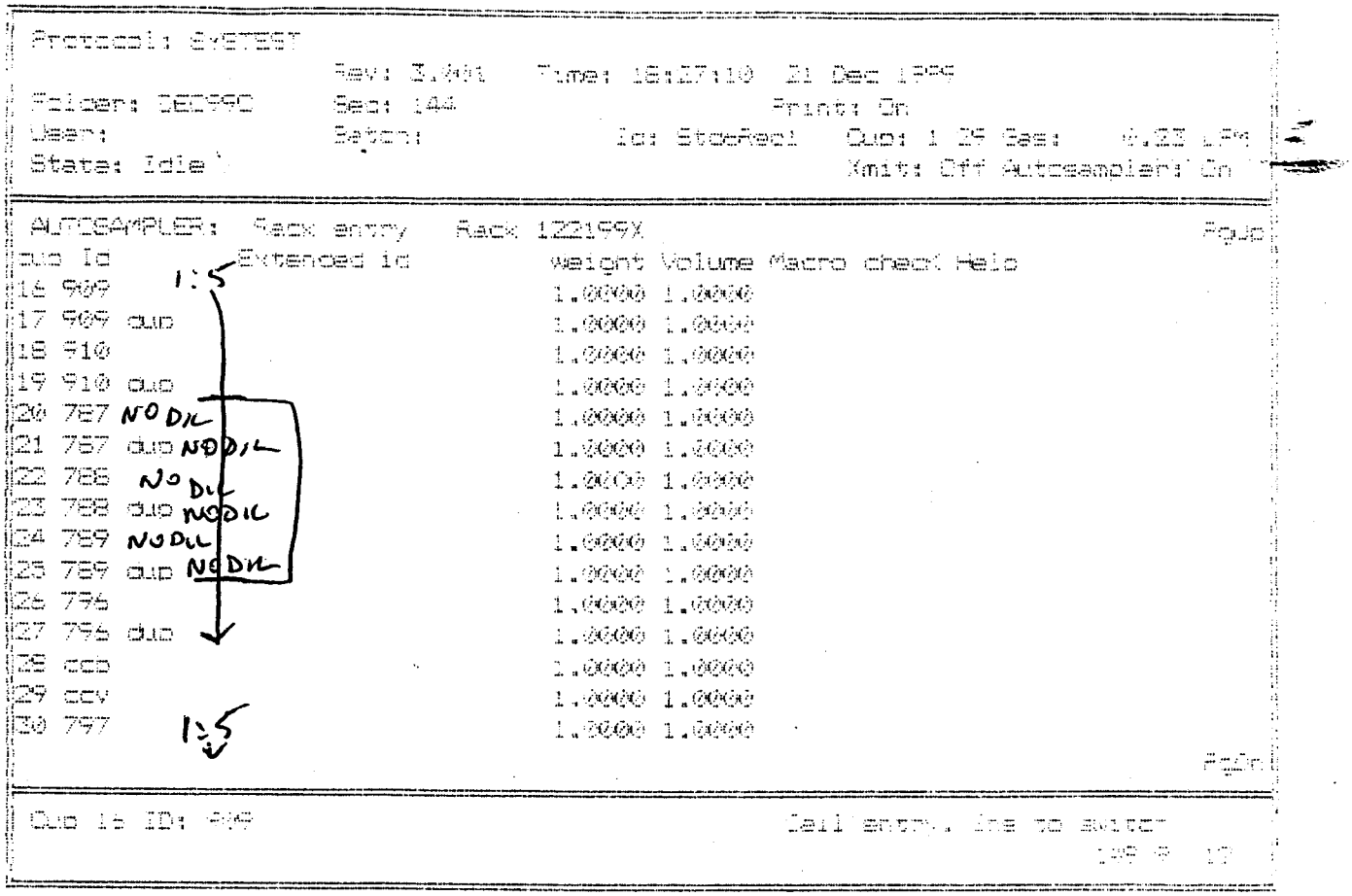
FLAG

SECONDARY DATA CHECK: analyst:
date:

HNO_3 - 65-48-14
HCl - 65-46-1
$KMnO_4$ - 65-33-1
12/21 ~~$SnCl_2$ - 65-50-6~~
MH_2OH - 65-50-6
$SnCl_2$ - 65-50-16

Comments: _____


Protocol: SYSTEST
Rev: 3.001 Time: 18:27:06 21 Dec 1999
Folder: DEC99C Seq: 141 Print: On
User: Batch: Io: StorPac1 Cup: 1.29 Gas: 0.23 LPM
State: Idle
ALTOSAMPLER: Rack entry Rack 122199x
cuo Id Extended Id weight Volume Macro check Help
1 icb 1.0000 1.0000
2 blk 1.0000 1.0000
3 blk cup 1.0000 1.0000
4 niet 1630a 1.0000 1.0000
5 1630a cuo 1.0000 1.0000
6 801 1:5 1.0000 1.0000
7 801 cuo 1:5 1.0000 1.0000
8 801 tro 1:5 1.0000 1.0000
9 802 1.0000 1.0000
10 802 cuo 1.0000 1.0000
11 802 epk 1.0000 1.0000
12 803 1.0000 1.0000
13 803 cuo 1.0000 1.0000
14 996 1.0000 1.0000
15 996 cuo 1.0000 1.0000
Cuc 1 ID: icb
Cell entry, [illegible]



Protocol: SYSTEST

Rev: 3.001 Time: 16:27:10 21 Dec 1999

Folder: DEC99C Seq: 144 Print: On

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

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 122199X PgUp

cup Id	Extended id	weight	Volume	Macro check	Help
16 909	1:5	1.0000	1.0000		
17 909 dup		1.0000	1.0000		
18 910		1.0000	1.0000		
19 910 dup		1.0000	1.0000		
20 787 NO DIL		1.0000	1.0000		
21 787 dup NO DIL		1.0000	1.0000		
22 788 NO DIL		1.0000	1.0000		
23 788 dup NO DIL		1.0000	1.0000		
24 789 NO DIL		1.0000	1.0000		
25 789 dup NO DIL		1.0000	1.0000		
26 796		1.0000	1.0000		
27 796 dup		1.0000	1.0000		
28 ccb		1.0000	1.0000		
29 ccv		1.0000	1.0000		
30 797	1:5	1.0000	1.0000		

PgDn

Cup 16 ID: 909 Call entry, line to switch

109 9 17

Protocol: SYSTEST

Rev: 3.001 Time: 15:27:12 21 Dec 1999

Folder: DEC99C Seq: 144 Print: On

User: Batch: Id: StockRecl Dup: 1 29 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 122199X Pglo

Cup	Id	Extended Id	Weight	Volume	Macro	Check	Hole
31	797	dup	1.0000	1.0000			
32	797	trp	1.0000	1.0000			
33	798		1.0000	1.0000			
34	798	dup	1.0000	1.0000			
35	798	spk	1.0000	1.0000			
36	774		1.0000	1.0000			
37	774	dup	1.0000	1.0000			
38	775		1.0000	1.0000			
39	775	dup	1.0000	1.0000			
40	776		1.0000	1.0000			
41	776	dup	1.0000	1.0000			
42	554		1.0000	1.0000			
43	554	dup	1.0000	1.0000			
44			1.0000	1.0000			

1:5

NODIL

NODIL

1:5 (L=1.44 mg/L)

Pg2n

Cup 1: ID: 797 dup Cell entry, Ins to switch

149 < 12

Protocol: SYSTEST

Rev: 3.001 Time: 21:34:42 21 Dec 1999

Folder: DEC99C Seq: 198 Print: On

User: Batch: Id: ccv Cup: 1 06 Gas: 0.33 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 122199x Range 1-44 Clear seQ Undo exit

cup	Id	Extended id	Weight	Volume	Macro check Help
1	555	1:5	1.0000	1.0000	
2	555 cup		1.0000	1.0000	
3	556		1.0000	1.0000	
4	556 cup		1.0000	1.0000	
5	ccb		1.0000	1.0000	
6	ccv		1.0000	1.0000	
7			1.0000	1.0000	
8			1.0000	1.0000	
9			1.0000	1.0000	
10			1.0000	1.0000	
11			1.0000	1.0000	
12			1.0000	1.0000	
13			1.0000	1.0000	
14			1.0000	1.0000	
15			1.0000	1.0000	

PgDn

Column entry, Ins to switch

129 9 3

*** Standard: 1 Rep: 1 Seq: 138 18:03:55 21 Dec 1999 HG

Hg .000 ug/L 1096
Ave. Int. = 1096 S. D. = 0

*** Standard: 2 Rep: 1 Seq: 139 18:06:17 21 Dec 1999 HG

Hg .200 ug/L 9335
Ave. Int. = 9335 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 140 18:08:40 21 Dec 1999 HG

Hg .500 ug/L 20394
Ave. Int. = 20394 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 141 18:11:02 21 Dec 1999 HG

Hg 1.00 ug/L 46366
Ave. Int. = 46366 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 142 18:13:25 21 Dec 1999 HG

Hg 2.00 ug/L 85028
Ave. Int. = 85028 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 143 18:15:55 21 Dec 1999 HG

Hg 3.00 ug/L 125926
Ave. Int. = 125926 S. D. = 0

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

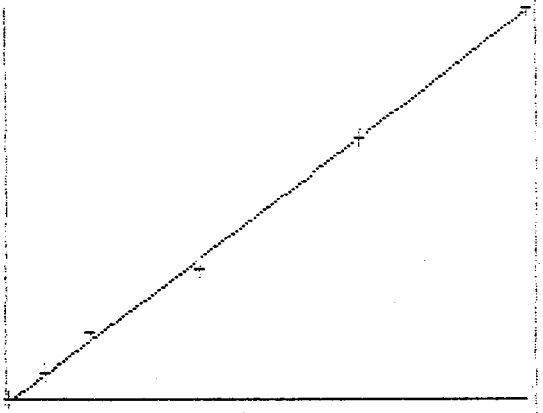
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear
S1	.000	-.005	-.005	Quadratic
S2	.200	.192	-.008	UtdLinear
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 2.39012e-5 C -3.11681e-2



Relative Absorbance

	Mean	%RSD	
S1	1096	0	1096
S2	9335	0	9335
S3	28394	0	28394
S4	46366	0	46366
S5	85028	0	85028
S6	125926	0	125926

33?

New calibration coefficients stored 149 2 5

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

*** Check Standard: 2 CX2 Seq: 144 18:28:37 21 Dec 1999 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		104.	.624	.604	ug/L	.000

*** Sample ID: icb Seq: 145 18:32:36 21 Dec 1999 HG

Hg -.010 ug/L .000 -.010 <0.0002 mg/L

*** Sample ID: blk Seq: 146 18:34:50 21 Dec 1999 HG

Hg .087 ug/L .000 .087 <0.0002 mg/L

*** Sample ID: blk dup Seq: 147 18:37:11 21 Dec 1999 HG

Hg .090 ug/L .000 .090 <0.0002 mg/L

*** Sample ID: nist 1630a Seq: 148 18:45:49 21 Dec 1999 HG

Hg 1.82 ug/L .000 1.82 TV = 0.106 ± 0.032 0.091 mg/kg

*** Sample ID: 1630a dup Seq: 149 18:48:11 21 Dec 1999 HG

Hg 1.80 ug/L .000 1.80 0.090 mg/kg

*** Sample ID: 801 Seq: 151 19:38:47 21 Dec 1999 HG

Hg 4.64 ug/L .000 4.64 NO DATA

*** Sample ID: 801 1:5 Seq: 151 19:38:47 21 Dec 1999 HG

Hg .926 ug/L .000 .926 0.222 ug/g

*** Sample ID: 801 dup 1:5 Seq: 152 19:41:05 21 Dec 1999 HG RPD = 3.3%

Hg .932 ug/L .000 .932 0.208 ug/g

*** Sample ID: 801 trp 1:5 Seq: 153 19:43:22 21 Dec 1999 HG RPD = <1.0%

Hg .917 ug/L .000 .917 0.225 ug/g

*** Sample ID: 802 1:5 Seq: 154 19:46:42 21 Dec 1999 HG

Hg .552 ug/L .000 .552 0.180 ug/kg

*** Sample ID: 802 dup 1:5 Seq: 155 19:48:01 21 Dec 1999 HG RPD = <1.0%

Hg .555 ug/L .000 .555 0.180 ug/g

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 807 aqc				Seq: 156	19:50:19 21 Dec 1999			
Hg	1.88	ug/L	.000	1.88				
*** Sample ID: 807 [redacted]				Seq: 157	19:52:02 21 Dec 1999 HG			
Hg	1.16	ug/L	.000	1.16				
*** Sample ID: 807 dup				Seq: 158	19:54:37 21 Dec 1999 HG			
Hg	1.17	ug/L	.000	1.17				
*** Sample ID: 90[redacted]				Seq: 159	19:57:16 21 Dec 1999 HG			
Hg	.377	ug/L	.000	.377				
*** Sample ID: 908 dup				Seq: 160	19:59:24 21 Dec 1999 HG			
Hg	.387	ug/L	.000	.387				
*** Sample ID: 90[redacted]				Seq: 161	20:01:50 21 Dec 1999 HG			
Hg	.328	ug/L	.000	.328				
*** Sample ID: 909 [redacted]				Seq: 162	20:04:10 21 Dec 1999 HG			
Hg	.400	ug/L	.000	.400				
*** Sample ID: 910[redacted]				Seq: 163	20:06:28 21 Dec 1999 HG			
Hg	.247	ug/L	.000	.247				
*** Sample ID: 910 dup				Seq: 164	20:08:46 21 Dec 1999 HG			
Hg	.357	ug/L	.000	.357				
*** Sample ID: 787				Seq: 165	20:11:04 21 Dec 1999 HG			
Hg	.056	ug/L	.000	.056				
*** Sample ID: 787				Seq: 166	20:14:37 21 Dec 1999 HG			
Hg	.419	ug/L	.000	.419				
*** Sample ID: 787 dup				Seq: 167	20:16:55 21 Dec 1999 HG			
Hg	.417	ug/L	.000	.417				

1:5 TV=1.0 99.8%

1:5 0.362 µg/g

1:5 RPD = 21.0% 0.365 µg/g

1:5 0.110 µg/g

1:5 RPD = 2.6% 0.113 µg/g

1:5 0.102 µg/g

1:5 RPD = 3.8% 0.106 µg/g

1:5 0.098 µg/g

1:5 RPD = 1.7% 0.099 µg/g

1:5 SHAWNEE NO DATA

1:5 0.022 µg/g

RPD = 21.0% 0.022 µg/g

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 788 1:5				Seq: 168	20:19:14 21 Dec 1999 HG			
Hg	.122	ug/L	.000	.122	NO DATA			
*** Sample ID: 788 SHAWNEE				Seq: 169	20:22:25 21 Dec 1999 HG			
Hg	.759	ug/L	.000	.759	0.039 ug/g			
*** Sample ID: 788 dup				Seq: 170	20:24:43 21 Dec 1999 HG	RPD = <1.0%		
Hg	.759	ug/L	.000	.759	0.039 ug/g			
*** Sample ID: 789 SHAWNE				Seq: 171	20:27:02 21 Dec 1999 HG			
Hg	.514	ug/L	.000	.514	0.024 ug/g			
*** Sample ID: 789 duc				Seq: 172	20:29:21 21 Dec 1999 HG	RPD = 2.1%		
Hg	.525	ug/L	.000	.525	0.025 ug/g			
[illegible] 1:5				Seq: 173	20:31:39 21 Dec 1999 HG			
Hg	.388	ug/L	.000	.388	0.096 ug/g			
*** Sample ID: 79[illegible] 1:5				Seq: 174	20:33:59 21 Dec 1999 HG	RPD = <1.0%		
Hg	[illegible]	ug/L	[illegible]	[illegible]	0.097 ug/g			
*** Sample ID: ccb				Seq: 175	20:36:18 21 Dec 1999 HG			
Hg	-.027	ug/L	.000	-.027	<0.2 ug/L			
*** Sample ID: ccv				Seq: 176	20:38:37 21 Dec 1999 HG			
Hg	1.98	ug/L	.000	1.98	TV = 2.00	99%		
[illegible] 1:5				Seq: 177	[illegible]			
Hg	.322	ug/L	.000	.322	0.079 ug/g			
*** Sample ID: 797 duc 1:5				Seq: 178	20:43:20 21 Dec 1999 HG	RPD = <1.0%		
Hg	.323	ug/L	.000	.323	0.079 ug/g			
*** Sample ID: 797 trp 1:5				Seq: 179	20:45:39 21 Dec 1999 HG	RPD = 2.5%		
Hg	.330	ug/L	.000	.330	0.082 ug/g			

Line	Conc.	Units	SD/REP	1	2	3	4	5
*** [redacted]					Seq: 180	20:47:52 21 Dec 1999 HG		
Hg	-.032	ug/L	.000	-.032				
*** Sample ID: 796					Seq: 181	20:56:07 21 Dec 1999 HG		
Hg	2.20	ug/L	.000	2.20				
*** Sample ID: 796 dup					Seq: 182	20:58:53 21 Dec 1999 HG		
Hg	2.22	ug/L	.000	2.22				
*** Sample ID: 798 spk					Seq: 183	21:00:57 21 Dec 1999 HG		
Hg	1.44	ug/L	.000	1.44				
*** Sample ID: 774 [redacted]					Seq: 184	21:03:19 21 Dec 1999 HG		
Hg	.535	ug/L	.000	.535				
*** Sample ID: 774 dup					Seq: 185	21:05:39 21 Dec 1999 HG		
Hg	.531	ug/L	.000	.531				
*** Sample ID: 77[redacted]					Seq: 186	21:08:00 21 Dec 1999 HG		
Hg	.570	ug/L	.000	.570				
*** Sample ID: 775 dup					Seq: 187	21:10:21 21 Dec 1999 HG		
Hg	.576	ug/L	.000	.576				
*** Sample ID: 776 [redacted]					Seq: 188	21:12:42 21 Dec 1999 HG		
Hg	.548	ug/L	.000	.548				
*** Sample ID: 776 dup					Seq: 189	21:15:03 21 Dec 1999 HG		
Hg	.544	ug/L	.000	.544				
*** Sample ID: 554 [redacted]					Seq: 190	21:17:24 21 Dec 1999 HG		
Hg	1.07	ug/L	.000	1.07				
*** Sample ID: 554 dup					Seq: 191	21:19:45 21 Dec 1999 HG		
Hg	1.07	ug/L	.000	1.07				

1:5

NO DATA

0.103 µg/g ~~0.516 µg/g~~ mm 1/6/00

RPD = <1.0%

0.104 µg/g ~~0.520 µg/g~~ mm 1/6/00

1:5

TV=1.0

100%

1:5

0.134 µg/g

1:5

RPD = <1.0%

0.133 µg/g

1:5

0.142 µg/g

1:5

RPD = 1.0%

0.143 µg/g

1:5

0.141 µg/g

1:5

RPD = <1.0%

0.139 µg/g

1:5

0.287 µg/g

1:5

RPD = <1.0%

0.289 µg/g

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** S[illegible] ID: [illegible]					Sec: [illegible]	[illegible]		
Hg	.995	ug/L	.000	.995				
*** Sample ID: 555 dup					Sec: [illegible]	21:24:31 21 Dec 1999 HG		
Hg	1.00	ug/L	.000	1.00				
*** Sample ID: 556 [illegible]					Sec: 194	21:27:09 21 Dec 1999 HG		
Hg	.962	ug/L	.000	.962				
*** Sample ID: 556 dup					Sec: 195	21:29:27 21 Dec 1999 HG		
Hg	.942	ug/L	.000	.942				
*** Sample ID: ccb					Sec: 196	21:31:45 21 Dec 1999 HG		
Hg	-.038	ug/L	.000	-.038				
*** Sample ID: ccv					Sec: 197	21:34:05 21 Dec 1999 HG		
Hg	1.99	ug/L	.000	1.99				

0.290 µg/g

RPD = <1.0%

0.291 µg/g

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]	1384787	1384788	1384789	1384801	1384802
Client/Pan #	CINCPG 33 R3	SHAUNEE 34 R1	→ 35 R2	→ 36 R3	TXNM 37 R1	→ 38 R2
Wt of Pan + Sample	9.0850	8.3805	10.3059	9.3575	8.7531	10.5154
Wt after Drying	8.2347	8.0144	9.9785	9.1045	8.3732	EQUIP 12/22/14 AP
Wt of Pan or Wt After Ignition	0.9866	0.9868	0.9835	0.9852	0.9797	0.9781
Difference	7.2481	7.0276	8.9950	8.1193	7.3935	
Sample amount g	8.0484	7.3937	9.3224	8.3723	7.7734	9.5373
Result	[illegible]1%	95.0%	96.5%	97.0%	[illegible]%	

Sample Number/ Test (DW/TVS)	1384803	1384804
Client/Pan #	TXNM 39 R1	→ 40 R3
Wt of Pan + Sample	10.8145	9.8011
Wt after Drying	8.5361	7.7567
Wt of Pan or Wt After Ignition	0.9777	0.9737
Difference	7.5584	6.7830
Sample amount g	9.1374	8.8274
Result	[illegible]%	76.8%

Sample Number/ Test (DW/TVS)				
Client/Pan #				
Wt of Pan + Sample				
Wt after Drying				
Wt of Pan or Wt After Ignition				
Difference				
Sample amount g				
Result				

Batch Number —
TVS -
DW - 3395

Note:
Metco Coals

Analyst: RP Date: 12/21/14

TestAmerica INCORPORATED

APPENDIX E

Unit Operational Data

SHAWNEE FOSSIL PLANT - UNIT 3
EPA Mercury ICR Test, Unit Data Summary

Parameter	Units	Run 1	Run 2	Run 3
AIR ENTERING APH A TEMP	Deg F	140	133	139
AIR LEAVING APH A TEMP	Deg F	645	641	644
GAS ENTERING APH A TEMP	Deg F	703	701	704
GAS LEAVING APH A TEMP	Deg F	358	353	355
AIR ENTERING APH B TEMP	Deg F	144	138	143
AIR LEAVING APH B TEMP	Deg F	654	655	657
GAS ENTERING APH B TEMP	Deg F	715	719	722
GAS LEAVING APH B TEMP	Deg F	370	366	369
TOTAL AIR FLOW	%	82.5	84.0	85.0
COMBUSTION TOTAL AIR FLOW	KPPH	989.8	1007.7	1020.4
MAIN STEAM FLOW	KPPH	974.8	970.7	932.0
CONDENSATE FLOW	KPPH	784.2	787.1	763.4
BOILER FEEDWATER FLOW	KPPH	1026.5	1027.7	990.6
MAIN STEAM TEMP	Deg F	999	997	999
GAS DISCHARGE A OXYGEN	%	3.0	4.3	4.8
GAS DISCHARGE B OXYGEN	%	2.8	2.6	3.2
UNIT C.E.M.S. NOx EMISSIONS	lb/MMBtu	0.419	0.384	0.411
UNIT C.E.M.S. CO EMISSIONS	ppm	269.9	243.1	91.4
UNIT C.E.M.S. NOx EMISSIONS	ppm	209.7	188.7	197.7
UNIT C.E.M.S. CO2 EMISSIONS	%	10.7	10.5	10.3
GROSS MEGAWATT LOAD	MW	141.2	140.8	136.6
AVERAGE REHEAT STEAM TEMP	Deg F	1014	1004	1009
TOTAL COAL FLOW	LB/HR	123,157	126,017	123,078
BAGHOUSE PRESSURE DROP	in H2O	7	7.1	7.5
BAGHOUSE INLET FLUE GAS TEMPERATURE	Deg F	343	338	340
BAGHOUSE OUTLET FLUE GAS TEMPERATURE	Deg F	332	327	287

Data represents the average of 15 minute data points taken during each of the test runs. All four mills were in service throughout each test although the coal scale on mill D is out of service. Therefore, the coal flowrate is an estimate. The average coal flowrate for the other 3 mills was assumed for mill D.
The unit started to drop load during the last 20 minutes of the outlet sample train on run 1. The load droped from 141 MW to 134 MW by the end of the outlet sample train.The inlet sample was completed before the unit started to drop load and was not effected.
At the very beginning of Run 2 the unit experienced feeder problems and drop load from 142 to 135 MW. The problem was quickly resolved and fixed within 20 minutes. Sample trains continued during this 20 minutes.

SHAWNEE FOSSIL PLANT - UNIT 3

Mercury Run 1 Coal Calculations

Using Coal Scales - Electrical Integrators

	Mill A	Mill B	Mill C	Mill D
Integrator Reading	68173687	12336365	5406384	-----
Time	16 3 9	16 6 9	16 7 39	
Integrator Reading	68201143	12366378	5434847	-----
Time	16 59 3	17 1 12	17 2 52	
Elapsed Time	0.931667	0.9175	0.920278	-----
Integrator Coal Flow	29470	32712	30929	-----
Integrator Reading	68231143	12400366	5465845	-----
Time	18 0 56	18 3 13	18 5 1	
Elapsed Time	1.031389	1.033611	1.035833	-----
Integrator Coal Flow	29087	32883	29926	-----
Integrator Reading	68260661	12433376	5495854	-----
Time	19 1 41	19 3 22	19 5 0	
Elapsed Time	1.0125	1.0025	0.999722	-----
Integrator Coal Flow	29154	32928	30017	-----
Average	29237	32841	30291	
Total	**123157**			

Using Mechanical Integrators

	Mill A	Mill B	Mill C	Mill D
Integrator Reading	386739	683567	957352	-----
Time	16 11 22	16 11 34	16 11 49	
Integrator Reading	386794	683628	957409	-----
Time	17 7 37	17 7 50	17 8 23	
Elapsed Time	0.9375	0.937778	0.942778	-----
Integrator Coal Flow	29333	32524	30230	-----
Integrator Reading	386853	683695	957470	-----
Time	18 8 3	18 3 13	18 8 35	
Elapsed Time	1.007222	0.923056	1.003333	-----
Integrator Coal Flow	29288	36293	30399	-----
Integrator Reading	386912	683761	957530	-----
Time	19 8 10	19 3 22	19 8 39	
Elapsed Time	1.001944	1.0025	1.001111	-----
Integrator Coal Flow	29443	32918	29967	-----
Average	29355	33911	30198	
Total	124619			

Total assumes coal flow in Mill D is the average of the other three mills.

Plant Personnel feel that the Electronic Integrators are more accurate. Electronic Integrator data should be used as the Coal Flowrate.

SHAWNEE FOSSIL PLANT - UNIT 3
Mercury Run 2 Coal Calculations

Using Coal Scales - Electrical Integrators

	Mill A	Mill B	Mill C	Mill D
Integrator Reading	68653152	12873218	5902206	-----
Time	9 0 20	9 1 54	9 3 51	
Integrator Reading	68684139	12905226	5933706	-----
Time	9 59 48	10 1 35	10 3 14	
Elapsed Time	0.991111	0.994722	0.989722	-----
Integrator Coal Flow	31265	32178	31827	-----
Integrator Reading	68715631	12937193	5964704	-----
Time	10 59 45	11 1 12	11 2 30	
Elapsed Time	0.999167	0.993611	0.987778	-----
Integrator Coal Flow	31518	32173	31382	-----
Integrator Reading	68741628	12963204	5990210	-----
Time	11 50 40	11 51 3	11 51 28	
Elapsed Time	0.848611	0.830833	0.816111	-----
Integrator Coal Flow	30635	31307	31253	-----
Average	31139	31886	31487	
Total	**126017**			

Using Mechanical Integrators

	Mill A	Mill B	Mill C	Mill D
Integrator Reading	387697	684640	958343	-----
Time	9 6 42	9 7 2	9 7 16	
Integrator Reading	387759	684703	958406	-----
Time	10 6 18	10 6 32	10 6 45	
Elapsed Time	0.993333	0.991667	0.991389	-----
Integrator Coal Flow	31208	31765	31774	-----
Integrator Reading	387821	684767	958468	-----
Time	11 5 23	11 5 37	11 5 50	
Elapsed Time	0.984722	0.984722	0.984722	-----
Integrator Coal Flow	31481	32496	31481	-----
Integrator Reading	387870	684818	958519	-----
Time	11 52 46	11 53 47	11 53 58	
Elapsed Time	0.789722	0.802778	0.802222	-----
Integrator Coal Flow	31024	31765	31787	-----
Average	31238	32009	31680	
Total	126569			

Total assumes coal flow in Mill D is the average of the other three mills.

Plant Personnel feel that the Electronic Integrators are more accurate. Electronic Integrator data should be used as the Coal Flowrate.

SHAWNEE FOSSIL PLANT - UNIT 3

Mercury Run 3 Coal Calculations

Using Coal Scales - Electrical Integrators

	Mill A	Mill B	Mill C	Mill D
Integrator Reading	68837142	13062659	6089774	-----
Time	14 59 29	15 0 58	15 2 32	
Integrator Reading	68867163	13094198	6121253	-----
Time	15 59 37	16 1 36	16 3 0	
Elapsed Time	1.002222	1.010556	1.007778	-----
Integrator Coal Flow	29954	31210	31236	-----
Integrator Reading	68897152	13125196	6152213	-----
Time	16 59 29	17 1 0	17 2 25	
Elapsed Time	0.997778	0.99	0.990278	-----
Integrator Coal Flow	30056	31311	31264	-----
Integrator Reading	68918155	13147186	6173205	-----
Time	17 42 19	17 42 49	17 43 9	
Elapsed Time	0.713889	0.696944	0.678889	-----
Integrator Coal Flow	29421	31552	30921	-----
Average	29810	31358	31140	
Total	**123078**			

Using Mechanical Integrators

	Mill A	Mill B	Mill C	Mill D
Integrator Reading	388064	685018	958718	-----
Time	15 5 35	15 5 50	15 6 3	
Integrator Reading	388184	685143	958843	-----
Time	17 5 6	17 5 20	17 5 34	
Elapsed Time	1.991944	1.991667	1.991944	-----
Integrator Coal Flow	30121	31381	31376	-----
Integrator Reading	388222	685184	958883	-----
Time	17 43 59	17 44 30	17 44 30	
Elapsed Time	0.648056	0.652778	0.648889	-----
Integrator Coal Flow	29318	31404	30822	-----
Integrator Reading				-----
Time				
Elapsed Time				-----
Integrator Coal Flow				-----
Average	29720	31393	31099	
Total	122949			

Total assumes coal flow in Mill D is the average of the other three mills.

Plant Personnel feel that the Electronic Integrators are more accurate. Electronic Integrator data should be used as the Coal Flowrate.

SHAWNEE FOSSIL PLANT - UNIT 3
EPA Mercury ICR Test, Baghouse Data

Run 1 - 10/28/99

Time	dP in H2O	Inlet Temp F	Outlet Temp F
1615	6.9	342	333
1630	6.8	342	334
1700	8	346	332
1720	8.2	345	331
1740	6.3	344	331
1810	7.1	342	332
1830	6.2	342	331
1900	7.2	342	331
1930	5.9	342	331
Averages	**7.0**	**343**	**332**

Run 2 - 10/29/99

Time	dP in H2O	Inlet Temp F	Outlet Temp F
900	6.8	338	328
930	7.5	335	324
1025	7.2	339	328
1100	7.4	340	330
1130	6.4	339	325
	7.1	**338**	**327**

Run 3 - 10/29/99

Time	dP in H2O	Inlet Temp F	Outlet Temp F
1430	8.2	340	330
1500	7.9	341	30
1530	6.3	341	329
1600	7.8	340	331
1630	7.5	339	330
1700	7	339	330
1730	8	343	332
	7.5	**340**	**287**

SHAWNEE FOSSIL PLANT - UNIT 3 COAL FLOW DATA

Data/Samples Collected By: James Brewer

DATE 10/28/99 Test # 1

Sample Times	Coal Scale	Mill A	Mill B	Mill C	Mill D *
start 1600	Integrator Reading	6B173687	12336365	05406384	N/A
	Time (HH:MM:SS)	16:03:09	16:06:09	16:07:39	16:09:20
1630	Integrator Reading				
	Time (HH:MM:SS)				
1700	Integrator Reading	6B201143	12366378	05434B47	N/A
	Time (HH:MM:SS)	16:59:03	17:01:12	17:02:52	17:04:31
1730	Integrator Reading				
	Time (HH:MM:SS)				
1800	Integrator Reading	6B231143	12400366	05465BC5	N/A
	Time (HH:MM:SS)	18:00:56	18:03:13	18:05:01	18:06:38
1830	Integrator Reading				
	Time (HH:MM:SS)				
stop 1900	Integrator Reading	6B260661	12433376	05495854	N/A
	Time (HH:MM:SS)	19:01:41	19:03:22	19:05:00	19:05:49
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				

* D Coal scale bypassed (sampled every 30 minutes, no integrator readings available.

Note: Samples taken from each coal scale every 30 minutes. Integrator readings recorded every 60 minutes.

SHAWNEE FOSSIL PLANT - UNIT 3 COAL FLOW DATA

Data / Samples Collected By: James Brewer

DATE 10/29/99 Test #2

Sample Times	Coal Scale	Mill A	Mill B	Mill C	Mill D *
	Integrator Reading	6B653152	12873218	05902206	N/A
start 0900	Time (HH:MM:SS)	09:00:20	09:01:57	09:03:51	09:05:20
	Integrator Reading				
0930	Time (HH:MM:SS)				
	Integrator Reading	6B6B4139	12905226	05933706	N/A
1000	Time (HH:MM:SS)	09:59:48	10:01:35	10:03:14	10:04:44
	Integrator Reading				
1030	Time (HH:MM:SS)				
	Integrator Reading	68715631	12937193	05964704	N/A
1100	Time (HH:MM:SS)	10:59:45	11:01:12	11:02:30	11:03:52
	Integrator Reading				
stop 1130	Time (HH:MM:SS)				
	Integrator Reading	68741628	12963209	05990210	N/A
	Time (HH:MM:SS)	11:50:40	11:51:03	11:51:28	N/A
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				

* D coal scale bypassed (sampled every 30 minutes, no integrator readings available.

Note: Samples taken from each coal scale every 30 minutes. Integrator readings recorded every 60 minutes.

SHAWNEE FOSSIL PLANT - UNIT 3 COAL FLOW DATA

Data / Samples Collected By: James Brewer

DATE 10/29/99 Test #3

Sample Times	Coal Scale	Mill A	Mill B	Mill C	Mill D *
Start 1500	Integrator Reading	68837142	13062659	06089774	N/A
	Time (HH:MM:SS)	14:59:29	15:00:58	15:02:32	15:04:05
1530	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading	68867163	13094198	06121253	N/A
1600	Time (HH:MM:SS)	15:59:37	16:01:36	16:03:00	16:04:40
	Integrator Reading				
1630	Time (HH:MM:SS)				
	Integrator Reading	68897152	13125196	06152213	N/A
1700	Time (HH:MM:SS)	16:59:29	17:01:00	17:02:25	17:03:52
	Integrator Reading				
stop 1730	Time (HH:MM:SS)				
	Integrator Reading	68918155	13147186	06173205	N/A
	Time (HH:MM:SS)	17:42:19	17:42:49	17:43:29	N/A
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				
	Integrator Reading				
	Time (HH:MM:SS)				

* D coal scale bypassed (sampled every 30 minutes, no integrator readings available

Note: Samples taken from each coal scale every 30 minutes. Integrator readings recorded every 60 minutes.

SHF — U3 Cool Flow Data

Date: 10/28/79

Control Room Integrator Readings

Test #1

	Control Room	MILL A	MILL B	MILL C	MILL D
	Integrator Reading	386739	683567	957352	531147
1600	Time	16:11:22	16:11:34	16:11:49	16:12:04
	Int. Reading	386794	683628	957409	531147
1700	Time	17:07:37	17:07:50	17:08:23	17:08:37
	Int. Reading	386853	683695	957470	531147
1800	Time	18:08:03	18:08:19	18:08:35	18:08:49
	Int. Reading	386912	683761	957530	531147
1900	Time	19:08:10	19:08:23	19:08:39	19:09:00

SHF - U3 Coal Flow Data

Date: 10/29/99

Control Room Integrator Readings
Test # 2

	Control Room	Mill A	Mill B	Mill C	Mill D
	Integrator Reading	387697	684640	958343	531147
0900	Time	09:06:42	09:07:02	09:07:16	09:07:30
	Int Reading	387759	684703	958406	531147
1000	Time	10:06:18	10:06:32	10:06:45	10:06:59
	Int. Reading	387821	684767	958468	531147
1100	Time	11:05:23	11:05:37	11:05:50	11:06:01
	Int. Reading	387870	684818	958519	531147
1200	Time	11:52:46	11:53:47	11:53:58	11:54:09
		197			

SFF- U3 Coal Flow Data

Date: 10/29/99

Control Room Integrator Readings
Test #3

	Control Room	Mill A	Mill B	Mill C	Mill D
1500	Integrator Reading	388064	685018	958718	531147
	Time	15:05:35	15:05:50	15:06:03	15:06:19
	Int. Reading	388184	685143	958843	531147
1700	Time	17:05:06	17:05:20	17:05:34	17:05:49
	Int. Reading	388222	685184	958883	531147
	Time	17:43:59	17:44:19	17:44:30	17:44:47
	Int. Reading				
	Time				

FUMES data 10/28/1999 16:00 to 10/28/1999 19:30

Average	140.0349091	645.1665202	703.4921468	358.3824097	144.2356547	654.1466878	715.1897705	370.3090617	82.48170115
Minumum	138.7583923	640.2445068	697.1617432	355.8119202	142.8451843	652.1262817	711.9665527	368.3312073	78.94861603
Maximum	140.5735016	646.5361328	704.8954468	361.8363342	144.8245239	656.1434937	718.2609863	375.2826233	83.74893951

Sample Time	SH3-114 AIR ENTERING APH A TEMP (DEG F)	SH3-115 AIR LEAVING APH A TEMP (DEG F)	SH3-116 GAS ENTERING APH A TEMP (DEG F)	SH3-117 GAS LEAVING APH A TEMP (DEG F)	SH3-118 AIR ENTERING APH B TEMP (DEG F)	SH3-119 AIR LEAVING APH B TEMP (DEG F)	SH3-120 GAS ENTERING APH B TEMP (DEG F)	SH3-121 GAS LEAVING APH B TEMP (DEG F)	SH3-251 TOTAL AIR FLOW (%)
10/28/1999 16:00	140.5428772	645.7427368	704.619751	358.2117004	144.7298889	656.1434937	717.9101563	370.6417847	82.62574005
10/28/1999 16:15	140.5456543	645.7149658	704.3916016	358.2757263	144.7410126	655.9625854	717.6903076	370.6585388	82.72037506
10/28/1999 16:30	140.451004	645.4476929	704.6281738	357.4822998	144.6853485	655.8846436	718.2609863	369.9430847	82.99401093
10/28/1999 16:45	140.5178223	646.5361328	704.3247681	359.6982422	144.8245239	655.6173096	715.1068115	375.2826233	82.54282379
10/28/1999 17:00	140.5735016	646.0852661	703.5452271	360.8285217	144.8106079	652.8084106	712.4816284	372.9580383	82.48760223
10/28/1999 17:15	140.4203796	645.2946167	703.2863159	358.4344177	144.6630859	652.1346436	712.9158936	369.6229553	82.39529419
10/28/1999 17:30	140.3730621	644.9799194	704.619873	357.354187	144.6046448	652.1262817	714.3384399	368.3312073	83.74893951
10/28/1999 17:45	140.2728577	646.0489502	704.8954468	358.2923889	144.4932556	653.6825562	715.2515259	369.4169312	82.90523529
10/28/1999 18:00	140.256134	645.7455444	704.5251465	357.743927	144.4208679	653.5042725	715.1846924	369.1134338	83.1311264
10/28/1999 18:15	140.072403	645.8374634	704.2467651	357.5685425	144.2677612	653.8466797	715.2125854	369.0215759	82.67929077
10/28/1999 18:30	139.8329926	645.9432983	704.4082031	357.6687927	144.0589752	654.2727051	715.4771118	369.519928	82.48889923
10/28/1999 18:45	139.4320984	646.0157471	704.2327881	357.9833679	143.7137756	654.1864014	715.1207275	369.8233337	82.58159637
10/28/1999 19:00	139.387558	645.6815186	703.854248	361.8363342	143.5467377	655.1830444	716.6268311	371.2292175	83.04269409
10/28/1999 19:15	139.0868988	642.1794434	699.6421509	358.5457764	143.1291504	654.0500488	714.3023071	370.5555725	81.93327332
10/28/1999 19:30	138.7583923	640.2445068	697.1617432	355.8119202	142.8451843	652.7972412	711.9665527	368.5177002	78.94861603

FUMES data 10/28/1

Average	989.7876302	974.7981771	784.2271729	1026.454016	998.7315796	2.979722738	2.761895053	0.418649632	269.8798269
Minumum	947.3834839	932.2509766	765.6860962	998.6450806	993.338562	2.836507082	2.616577148	0.408935547	131.2255859
Maximum	1004.987244	989.9414063	803.7109375	1045.699097	1003.582397	3.236083984	2.910359621	0.427775055	405.131012

Sample Time	SH3-252 COMBUSTION TOTAL AIR FLOW (KPPH)	SH3-253 MAIN STEAM FLOW (KPPH)	SH3-254 CONDENSATE FLOW (KPPH)	SH3-256 BOILER FEEDWATER FLOW (KPPH)	SH3-299 MAIN STEAM TEMP (DEG F)	SH3-324 GAS DISCHARGE A OXYGEN (%)	SH3-325 GAS DISCHARGE B OXYGEN (%)	SH3-341 UNIT C.E.M.S. NOx EMISSIONS (LB/MB)	SH3-342 UNIT C.E.M.S. CO EMISSIONS (PPM)
10/28/1999 16:00	991.5089111	972.2412109	789.7542725	1027.441528	998.7894287	3.013916016	2.683105469	0.415791839	351.4811096
10/28/1999 16:15	992.6446533	979.3945313	788.411438	1029.23584	998.4358521	3.008015871	2.616577148	0.410542816	361.3484802
10/28/1999 16:30	995.9280396	978.0273438	781.0669556	1031.258179	997.7935181	3.095499754	2.704671144	0.415690094	279.4596252
10/28/1999 16:45	990.6223145	982.5927734	803.7109375	1045.699097	993.338562	2.978108644	2.797241211	0.412780762	336.9547424
10/28/1999 17:00	989.8512573	972.0947266	773.8851318	1027.01416	1000.06488	2.896931887	2.749633789	0.408935547	405.131012
10/28/1999 17:15	988.7435913	981.1035156	787.3534546	1028.580688	1000.503235	2.931518555	2.672729492	0.410725921	326.6601563
10/28/1999 17:30	1004.987244	989.9414063	792.1345825	1039.831665	998.5784912	2.959798098	2.787272215	0.420369476	315.4296875
10/28/1999 17:45	994.862915	985.4248047	777.3843994	1027.811646	1001.573669	2.938232422	2.751668215	0.419331878	347.3714294
10/28/1999 18:00	997.5734253	981.5673828	795.7153931	1028.552246	997.4846802	2.946777344	2.825317383	0.424418122	272.0947266
10/28/1999 18:15	992.1513672	974.5361328	773.3154297	1018.867981	999.4810181	2.947387695	2.764485598	0.421122223	264.139801
10/28/1999 18:30	989.8668213	974.0966797	776.550354	1020.548645	998.8991089	2.997436523	2.802734375	0.427775055	178.8330078
10/28/1999 18:45	990.979126	971.7041016	786.7228394	1019.921875	998.262146	2.836507082	2.739664793	0.423868805	191.3452148
10/28/1999 19:00	996.512085	969.7998047	772.5829468	1026.672363	1003.582397	2.89449048	2.910359621	0.425557464	153.503418
10/28/1999 19:15	983.1992188	977.1972656	799.1333618	1026.729248	995.90979	3.015136719	2.718098879	0.422668457	133.2194061
10/28/1999 19:30	947.3834839	932.2509766	765.6860962	998.6450806	998.2769165	3.236083984	2.904866457	0.420166016	131.2255859

FUMES data 10/28/1

Average	209.7032338	10.72379564	141.2167816	1014.262634
Minumum	204.9763947	10.64656544	134.7607269	1002.437561
Maximum	213.5620117	10.82682323	142.9785004	1019.832275

Sample Time	SH3-343 UNIT C.E.M.S. NOx EMISSIONS (PPM)	SH3-344 UNIT C.E.M.S. CO2 EMISSIONS (%)	SH3-348 GROSS MEGAWATT LOAD (MW)	SH3-441 AVERAGE REHEAT STEAM TEMP (DEG F)
10/28/1999 16:00	209.6964569	10.79833984	141.6552582	1016.4729
10/28/1999 16:15	207.6009064	10.82682323	142.5585785	1016.590149
10/28/1999 16:30	207.1533203	10.6722002	142.1581879	1016.598755
10/28/1999 16:45	206.8888397	10.72672558	142.0068207	1009.118225
10/28/1999 17:00	204.9763947	10.73282909	139.9853363	1005.636841
10/28/1999 17:15	206.1970978	10.74381542	141.8603363	1013.726685
10/28/1999 17:30	211.2630157	10.75398731	142.9785004	1014.790466
10/28/1999 17:45	210.0016327	10.71777344	142.7636566	1019.746948
10/28/1999 18:00	212.9516602	10.7352705	141.9238129	1018.211914
10/28/1999 18:15	210.8561249	10.71818066	141.2597504	1019.048767
10/28/1999 18:30	213.5620117	10.69580078	141.1865082	1019.832275
10/28/1999 18:45	212.1582031	10.71818066	141.1962738	1019.437561
10/28/1999 19:00	211.5885468	10.64656544	140.5419769	1016.907104
10/28/1999 19:15	210.4085236	10.65673828	141.4160004	1005.383362
10/28/1999 19:30	210.2457733	10.71370411	134.7607269	1002.437561

FUMES data 10/29/1999 09:00 to 10/29/1999 11:45

Average	133.2469343	640.8936717	701.1596425	352.6062393	137.5615425	654.8280945	719.2189178	365.5760396	83.97496414
Minumum	131.9851379	637.2769165	695.4077759	350.374939	136.4421692	651.3914185	713.5449829	363.2449646	79.63424683
Maximum	134.4266052	644.1810303	703.3475952	356.7584229	138.7862244	657.5466309	721.5739136	369.6841736	85.73761749

Sample Time	SH3-114 AIR ENTERING APH A TEMP (DEG F)	SH3-115 AIR LEAVING APH A TEMP (DEG F)	SH3-116 GAS ENTERING APH A TEMP (DEG F)	SH3-117 GAS LEAVING APH A TEMP (DEG F)	SH3-118 AIR ENTERING APH B TEMP (DEG F)	SH3-119 AIR LEAVING APH B TEMP (DEG F)	SH3-120 GAS ENTERING APH B TEMP (DEG F)	SH3-121 GAS LEAVING APH B TEMP (DEG F)	SH3-251 TOTAL AIR FLOW (%)
10/29/1999 09:00	131.9851379	639.1978149	696.9223022	351.3353882	136.4421692	653.6769409	715.3045654	364.5450439	79.63424683
10/29/1999 09:15	132.2635193	637.2769165	695.4077759	351.0319214	136.6732483	651.3914185	713.5449829	363.9604492	81.49491882
10/29/1999 09:30	132.2857971	638.7858276	700.1099243	350.374939	136.7344818	654.1752319	719.7337036	363.7823181	84.89063263
10/29/1999 09:45	132.5864563	640.3642578	702.211731	351.6499634	137.0796814	654.9157715	720.538269	364.9069519	85.38105774
10/29/1999 10:00	132.9010162	640.5674438	702.7210693	351.4884949	137.4917145	655.4196777	721.2369995	365.2828064	85.73761749
10/29/1999 10:15	132.8843231	641.7784424	702.8130493	352.5408325	137.3859253	656.4886475	721.1841431	366.5021362	84.259758
10/29/1999 10:30	133.0263367	641.2216797	701.4684448	353.0252075	137.39151	655.0214844	719.0488892	366.335083	84.1199646
10/29/1999 10:45	133.5858765	642.9310303	703.0830688	354.6593933	137.6615448	657.2487183	721.5739136	367.3763123	83.93800354
10/29/1999 11:00	134.2595673	644.1810303	703.3475952	356.7584229	138.0930176	657.5466309	720.7080078	369.6841736	84.03481293
10/29/1999 11:15	134.3347626	642.8587036	702.548645	354.9851379	138.3241119	655.0299683	719.3356323	366.8668518	84.55480194
10/29/1999 11:30	134.4238129	641.1660767	702.036377	352.4405823	138.674881	653.7660522	719.555542	364.4253845	85.29043579
10/29/1999 11:45	134.4266052	640.3948364	701.2457275	350.9845886	138.7862244	653.2565918	718.8623657	363.2449646	84.3633194

FUMES data 10/29/1

Average	1007.728958	970.7438151	787.0805461	1027.657384	996.6773427	4.315270265	2.600046794	0.384090846	243.0996361
Minumum	955.7868652	926.5136719	756.7545776	989.3311157	990.013855	4.13248682	2.337036133	0.363037109	137.532547
Maximum	1028.851318	987.6464844	807.9019775	1045.471191	1002.637085	4.507039547	2.864990234	0.399454743	349.5483398

Sample Time	SH3-252 COMBUSTION TOTAL AIR FLOW (KPPH)	SH3-253 MAIN STEAM FLOW (KPPH)	SH3-254 CONDENSATE FLOW (KPPH)	SH3-256 BOILER FEEDWATER FLOW (KPPH)	SH3-299 MAIN STEAM TEMP (DEG F)	SH3-324 GAS DISCHARGE A OXYGEN (%)	SH3-325 GAS DISCHARGE B OXYGEN (%)	SH3-341 UNIT C.E.M.S. NOx EMISSIONS (LB/MB)	SH3-342 UNIT C.E.M.S. CO EMISSIONS (PPM)
10/29/1999 09:00	955.7868652	926.5136719	756.7545776	989.3311157	994.5176392	4.507039547	2.864990234	0.389078766	165.4256134
10/29/1999 09:15	977.939209	957.3486328	758.2803955	1002.347839	996.1554565	4.13248682	2.337036133	0.363037109	297.0581055
10/29/1999 09:30	1018.687622	986.0595703	794.1488037	1038.635254	1000.383179	4.310709476	2.491658449	0.381368011	273.8851013
10/29/1999 09:45	1024.572632	986.4501953	799.5198364	1044.018433	994.8162842	4.382730961	2.54699707	0.3888143	231.282547
10/29/1999 10:00	1028.851318	987.6464844	807.9019775	1045.471191	996.1398315	4.365030766	2.571207762	0.393880218	226.3386993
10/29/1999 10:15	1011.117065	966.0644531	790.3035278	1022.314453	999.1365967	4.474080563	2.714640379	0.399454743	174.3164063
10/29/1999 10:30	1009.616455	975.4638672	783.5692749	1033.59375	995.6014404	4.208374023	2.475178957	0.380533844	269.8364258
10/29/1999 10:45	1007.25592	965.9179688	798.9093628	1021.118103	1002.637085	4.363199711	2.69144702	0.390258789	221.7203827
10/29/1999 11:00	1008.417725	974.1455078	785.2987061	1035.131714	1001.602722	4.232177734	2.596435547	0.372578949	349.5483398
10/29/1999 11:15	1014.657532	977.5390625	799.4995728	1039.461304	995.3221436	4.241943359	2.58219409	0.377909333	303.853363
10/29/1999 11:30	1023.485229	982.9833984	793.0704956	1039.0625	993.8018799	4.261271	2.618001223	0.383341461	266.3981018
10/29/1999 11:45	1012.359924	962.7929688	777.710022	1021.402954	990.013855	4.304199219	2.71077466	0.388834625	137.532547

FUMES data 10/29/1

Average	188.6834043	10.51239014	140.8361664	1003.789703
Minumum	180.6030273	10.38085938	134.3603363	994.7615967
Maximum	193.8476563	10.64412403	143.066391	1009.131042

Sample Time	SH3-343 UNIT C.E.M.S. NOx EMISSIONS (PPM)	SH3-344 UNIT C.E.M.S. CO2 EMISSIONS (%)	SH3-348 GROSS MEGAWATT LOAD (MW)	SH3-441 AVERAGE REHEAT STEAM TEMP (DEG F)
10/29/1999 09:00	190.3279572	10.46875	134.3603363	1000.299133
10/29/1999 09:15	180.6030273	10.64412403	138.1493988	994.7615967
10/29/1999 09:30	188.293457	10.56274414	142.9785004	1009.086365
10/29/1999 09:45	191.1010742	10.51188183	142.9052582	1002.980774
10/29/1999 10:00	193.8476563	10.53263378	143.066391	1004.754028
10/29/1999 10:15	193.705246	10.38085938	140.6884613	1006.902771
10/29/1999 10:30	185.4451447	10.42602539	141.4160004	1000.848267
10/29/1999 10:45	190.7145233	10.45735645	140.5468597	1009.131042
10/29/1999 11:00	183.0240936	10.50415039	142.0556488	1007.316284
10/29/1999 11:15	187.0524139	10.58919239	141.8505707	1002.924805
10/29/1999 11:30	189.7583008	10.59366894	142.3144379	1004.371521
10/29/1999 11:45	190.3279572	10.47729492	139.7021332	1002.099854

FUMES data 10/29/1999 14:30 to 10/29/1999 17:45

Average	138.6307329	643.6870858	704.4464373	355.0282549	143.0195705	657.3556867	721.6520255	368.5447627	85.03118406
Minumum	137.733902	642.3269653	703.4783936	352.9444885	141.9181213	655.8066406	720.3740234	367.0227661	84.33827209
Maximum	139.6910095	644.9076538	705.6665649	356.6944275	143.8445892	658.289917	722.7263794	369.6647034	85.86506653

Sample Time	SH3-114 AIR ENTERING APH A TEMP (DEG F)	SH3-115 AIR LEAVING APH A TEMP (DEG F)	SH3-116 GAS ENTERING APH A TEMP (DEG F)	SH3-117 GAS LEAVING APH A TEMP (DEG F)	SH3-118 AIR ENTERING APH B TEMP (DEG F)	SH3-119 AIR LEAVING APH B TEMP (DEG F)	SH3-120 GAS ENTERING APH B TEMP (DEG F)	SH3-121 GAS LEAVING APH B TEMP (DEG F)	SH3-251 TOTAL AIR FLOW (%)
10/29/1999 14:30	137.733902	642.3269653	704.1298218	352.9444885	141.9181213	657.510437	722.6541138	368.1474609	85.66573334
10/29/1999 14:45	137.8759003	643.4822998	704.901062	354.2084045	142.1519928	657.7052002	721.9468994	369.2805481	85.07145691
10/29/1999 15:00	137.9621887	642.9923096	704.0825806	353.8827209	142.3078766	656.9313965	721.2232056	368.5038147	84.89793396
10/29/1999 15:15	138.0930176	643.1092529	703.5228882	354.2780151	142.3774719	657.1651001	721.1980591	368.526062	84.64108276
10/29/1999 15:30	138.2795563	643.3319092	703.4783936	354.8514404	142.6447449	657.5605469	720.9140625	369.6647034	84.37827301
10/29/1999 15:45	138.5997009	642.7695313	703.6453857	354.3252869	142.984375	656.9675293	721.1061401	368.7960815	85.22196198
10/29/1999 16:00	138.8669739	643.8079834	704.269104	355.0184937	143.2766876	657.9279785	722.1501465	368.6095581	84.65373993
10/29/1999 16:15	138.8029633	644.2784424	704.5419312	356.0736389	143.3017426	657.0872192	721.1283569	368.5149231	84.7209549
10/29/1999 16:30	138.8307953	644.1726685	704.6421509	355.7646484	143.2989655	656.8450317	721.0337524	367.7772217	84.33827209
10/29/1999 16:45	138.9198608	643.4043579	703.6148682	355.1270752	143.3768921	655.8066406	720.3740234	367.0227661	85.00691223
10/29/1999 17:00	138.9170837	643.8497314	705.2657471	354.9627991	143.4938354	657.4463501	722.4786377	367.9219666	85.86506653
10/29/1999 17:15	138.9922333	644.4622192	705.3186035	355.5836487	143.5996399	658.289917	722.7263794	369.091217	85.55104065
10/29/1999 17:30	139.2650757	644.9076538	705.6665649	356.6944275	143.697052	657.8527832	722.0220947	368.915802	85.10121918
10/29/1999 17:45	139.6910095	644.723877	705.1710205	356.680481	143.8445892	657.8834839	722.1724854	368.8545532	85.32292938

FUMES data 10/29/1

Average	1020.389988	932.0417132	763.426287	990.555821	998.7285636	4.822111641	3.171241386	0.41145833	91.44374275
Minumum	1012.059143	922.265625	749.4710693	975.8584595	996.5761719	4.682006836	2.993977785	0.403442383	59.10237503
Maximum	1030.380615	939.7705078	779.0731812	1001.407776	1000.187744	4.991048336	3.301798582	0.418884277	130.4931641

Sample Time	SH3-252 COMBUSTION TOTAL AIR FLOW (KPPH)	SH3-253 MAIN STEAM FLOW (KPPH)	SH3-254 CONDENSATE FLOW (KPPH)	SH3-256 BOILER FEEDWATER FLOW (KPPH)	SH3-299 MAIN STEAM TEMP (DEG F)	SH3-324 GAS DISCHARGE A OXYGEN (%)	SH3-325 GAS DISCHARGE B OXYGEN (%)	SH3-341 UNIT C.E.M.S. NOx EMISSIONS (LB/MB)	SH3-342 UNIT C.E.M.S. CO EMISSIONS (PPM)
10/29/1999 14:30	1027.98877	929.5166016	769.4498901	992.9484253	999.6865845	4.911905766	3.225097656	0.416809082	59.10237503
10/29/1999 14:45	1020.857544	932.4462891	765.6046753	989.8153076	999.008667	4.838867188	3.176269531	0.416625977	68.64420319
10/29/1999 15:00	1018.775208	929.6630859	750.7730713	991.0116577	999.218689	4.85534668	3.167317629	0.411254883	80.26123047
10/29/1999 15:15	1015.693054	923.7060547	755.6965942	985.2009888	998.230896	4.897460938	3.224894285	0.412068695	75.54117584
10/29/1999 15:30	1012.539246	930.1025391	767.8018188	988.5335693	998.8629761	4.815470219	3.090820313	0.406860352	105.0008163
10/29/1999 15:45	1022.663513	935.9619141	773.1323853	991.8945313	998.0509033	4.765218258	3.059895754	0.404215485	130.4931641
10/29/1999 16:00	1015.844788	923.7792969	749.4710693	982.4951172	999.5842285	4.991048336	3.167317629	0.413187653	71.63492584
10/29/1999 16:15	1016.778381	937.4267578	760.6201782	996.7081299	997.6918335	4.853108883	3.076578856	0.403442383	106.9742813
10/29/1999 16:30	1012.059143	922.265625	754.7404175	975.8584595	1000.187744	4.901937008	3.21105957	0.413370758	71.12630463
10/29/1999 16:45	1020.082886	937.5244141	779.0731812	994.9992065	996.5761719	4.682006836	2.993977785	0.40411377	109.7412109
10/29/1999 17:00	1030.380615	935.4248047	754.1706543	989.7297974	999.9450684	4.756673336	3.237915039	0.41221109	111.2060547
10/29/1999 17:15	1026.612549	935.2294922	766.5811157	996.850647	998.0076294	4.831136227	3.301798582	0.418884277	83.15023041
10/29/1999 17:30	1021.214539	939.7705078	777.0386963	1001.407776	997.4933472	4.706014156	3.247273684	0.415934235	94.54345703
10/29/1999 17:45	1023.969604	935.7666016	763.81427	990.3278809	999.6551514	4.703369141	3.217163086	0.411437988	112.7929688

FUMES data 10/29/1

Average	197.6797943	10.28552825	136.5893402	1009.356284
Minumum	195.0480194	10.21036816	135.0829926	1007.120483
Maximum	200.2766876	10.43457031	137.8954926	1012.383423

Sample Time	SH3-343 UNIT C.E.M.S. NOx EMISSIONS (PPM)	SH3-344 UNIT C.E.M.S. CO2 EMISSIONS (%)	SH3-348 GROSS MEGAWATT LOAD (MW)	SH3-441 AVERAGE REHEAT STEAM TEMP (DEG F)
10/29/1999 14:30	199.0153046	10.22298145	136.1816254	1011.925964
10/29/1999 14:45	198.7101288	10.21036816	136.8652191	1008.98114
10/29/1999 15:00	197.1232147	10.25960255	136.3183441	1008.426758
10/29/1999 15:15	197.5301056	10.25594044	135.2197113	1008.611511
10/29/1999 15:30	195.0480194	10.26285839	136.3915863	1008.653625
10/29/1999 15:45	195.5973358	10.3584795	137.2021332	1008.281311
10/29/1999 16:00	198.404953	10.28116894	135.1367035	1009.53595
10/29/1999 16:15	196.5738983	10.43457031	137.4169769	1007.962524
10/29/1999 16:30	198.0997772	10.26489258	135.0829926	1009.177185
10/29/1999 16:45	195.9635468	10.37923145	137.0068207	1007.120483
10/29/1999 17:00	198.4456329	10.30395508	137.2509613	1012.383423
10/29/1999 17:15	200.2766876	10.234375	137.1093597	1010.671082
10/29/1999 17:30	198.9542694	10.23966503	137.8954926	1009.102722
10/29/1999 17:45	197.7742462	10.28930664	137.1728363	1010.154297

METCO ENVIRONMENTAL

APPENDIX F

Chain of Custody Records

Job# 99-95SHW3 Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
TVA
Shawnee Fossil Plant
Paducah, KY

Collected By/Company
METCO Environmental

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 3 Baghouse Inlet Duct A (East) Run 2																				Analyze according to the Ontario Hydro Method.
Container 1 Filter	10/29/99	1215	X				II	BH									X			Ship to METCO for weight Thimble QFI Filter 47088
Container 2 0.1 N HNO_3 F.W.	10/29/99	1216	X				I	BH									X			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	10/29/99	1310	X				II	BH									X			
Container 4 0.1 N HNO_3 Rinse Imp 4	10/29/99	1313	X				I	BH									X			
Container 5 0.1 N HNO_3 Rinse Imps 5,6,7	10/29/99	1326	X				I	BH									X			Used Hydroxylamine Sulfate / Sodium Chloride

Received by: Joan Conway	Date: 10/29/99	Time:	Transported by:	Date:	Time:	Received at Lab by: Michael H. Ramsey	Date: 10/30	Time: 1103
Analyzed by:	Date:	Time:	Data Reviewed by: JRm	Date: 01/08/00	Time: 0730	Remarks:		

Ship to: TestAmerica

METCO ENVIRONMENTAL

Job# 99-95 SHW 7 Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location: TVA Shawnee Fossil Plant Paducah, KY

Collected By/Company: METCO Environmental

Unit 3 Baghouse Inlet Duct A (East) Run 3

SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS (Specific Compounds/Methods)
Container 1 Filter	10/29/99	1802	X				II	BH									X			Ship to METCO for weight. Filter 47Q90 Thimble Q72
Container 2 0.1 N HNO_3 F.W.	10/29/99	1803	X				I	BH									X			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	10/29/99	1750	X				II	BH									X			
Container 4 0.1 N HNO_3 Rinse Imp 4	10/29/99	1752	X				I	BH									X			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	10/29/99	1759	X				I	BH									X			Used Hydroxylamine Sulfate/Sodium Chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jason Conway	10/29/99					Michael H. Rosselot	10/30	6:03
Analyzed by:	Date:	Time:	Data Reviewed by: Jem	Date: 01/08/00	Time: 0730	Remarks:		

Ship to: Test America

METCO ENVIRONMENTAL

Job# 99-95 SHWS Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
TVA
Shawnee ~~Generating Station~~ Fossil Plant
Paducah, KY

Collected By/Company
METCO Environmental

Unit Number 3 Baghouse Outlet Duct ~~A (Feet)~~ SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS (Specific Compounds/Methods)
																				Analyze according to the Ontario Hydro method.
Run 1																				
Container 1 Filter	10/28/99	2101	X				I	BH									X			Ship to METCO for weight. Filter 47@85
Container 2 0.1 N HNO_3 F.W.	10/28/99	2053	X				I	BH									X			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	10/28/99	2115	X				II	BH									X			
Container 4 0.1 N HNO_3 Rinse Imp 4	10/28/99	2118	X				I	BH									X			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	10/28/99	2132	X				I	BH									X			Used Hydroxylamine Sulfate / Sodium ~~Hydroxy~~ Chloride.

SAMPLE ANALYSIS REQUIRED

Received by: Jason Conway	Date: 10/29/99	Time:	Transported by:	Date:	Time:	Received at Lab by: Michael H. Rose	Date: 10/30	Time: 6:05
Analyzed by:	Date:	Time:	Data Reviewed by: JRM	Date: 01/08/00	Time: 0730	Remarks:		

Ship to: TestAmerica

METCO ENVIRONMENTAL

Job# 99455HW Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
TVA
Shawnee Fossil Plant
Paducah, KY

Collected By/Company
METCO Environmental

SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	REMARKS (Specific Compounds/Methods)
Unit 3 Baghouse Outlet Duct Run 2																	Analyze according to the Ontario Hydro method.
Container 1 Filter	10/24/99	1324	X				I	BH									Ship to METCO for weight. Filter 47089
Container 2 0.1 N HNO_3 FW	10/24/99	1330	X				I	BH									Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1, 2, 3	10/24/99	1355	X				II	BH									
Container 4 0.1 N HNO_3 Rinse Imp 4	10/24/99	1338	X				I	BH									
Container 5 0.1 N HNO_3 Rinse Imp 5 & 7	10/24/99	1352	X				I	BH									Used hydroxylamine sulfate / Sodium Chloride

Received by: Jason Conway	Date: 10/29/99	Time:	Transported by:	Date:	Time:	Received at Lab by: Michael A. Crowley	Date: 10/30	Time: 6:03
Analyzed by:	Date:	Time:	Data Reviewed by: JCm	Date: 01/08/00	Time: 0730	Remarks:		

Ship to: TestAmerica

METCO ENVIRONMENTAL

Job# 99-95 SHW3 Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location: TVA Shawnee Fossil Plant Paducah, KY

Collected By/Company: METCO Environmental

Unit 3 Baghouse Outlet Duct

SAMPLE I.D. Run 3	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	10/29/99	1817	X				I	MB									X			Analyze according to to Ontario Hydro method. Ship to METCO for weight. Filter 47Q87
Container 2 0.1 N HNO3 F.W.	10/29/99	1818	X				I	MB									X			Container 2A not recovered.
Container 3 10% HNO3 Rinse Imp 1,2,3	10/29/99	1825	X				II	BB									X			
Container 4 0.1 N HNO3 Rinse Imp 4	10/29/99	1827	X				I	MB									X			
Container 5 0.1 N HNO3 Rinse Imp 5,6,7	10/29/99	1835	X					BB									X			Used Hydroxylamine Sulfate / Sodium chloride.

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jason Conway	10/29/99					Michael H. Rosell	10/30	6:4
Analyzed by:	Date:	Time:	Data Reviewed by: JEM	Date: 01/08/00	Time: 0730	Remarks:		

Ship to: TestAmerica

METCO ENVIRONMENTAL

Job# 99-95SH03 Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
TVA
Shawnee Fossil Plant
Paducah, KY

Collected By/Company
METCO Environmental

Unit Number 3 (East)
Baghouse Inlet Duct A
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 3 10% HNO_3 Rinse Imp 1,2,3	10/29/99	1570	X				I	BH									X			Analyze according to the Ontario Hydro method.
Container 4 0.1 N HNO_3 Rinse Imp 4	10/29/99	1515	X				I	BH									X			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	10/29/99	1523	X				I	BH									X			Used Hydroxylamine Sulfate/Sodium Chloride

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jason Conway	10/29/99					Michael H. Rossell	10/30	6:03
Analyzed by:	Date:	Time:	Data Reviewed by: JRN	Date: 01/08/00	Time: 0730	Remarks:		

Ship to: TestAmerica

METCO ENVIRONMENTAL

Job# 9995-SHW3 Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location
TVA
Shawnee Fossil Plant
Paducah, KY

Collected By/Company
METCO Environmental

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 3 Baghouse Outlet Duct, Blank Train																				Analyze according to the Ontario Hydro method.
Container 3 10% HNO_3 Rinse Imp 1,2,3	10/24/99	1532	X				I	BH									X			Container 1, 2, 2A not recovered.
Container 4 0.1 N HNO_3 Rinse Imp 4	10/24/99	1534	X				I	BH									X			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	10/24/99	1541	X				I	BH									X			Used Hydroxylamine Sulfate/Sodium Chloride

Received by: Joann Conway	Date: 10/29/99	Time:	Transported by:	Date:	Time:	Received at Lab by: Michael A. Woods	Date: 6:04	Time: 1030
Analyzed by:	Date:	Time:	Data Reviewed by: RM	Date: 01/08/00	Time: 0745	Remarks:		

Ship to: TestAmerica.

METCO ENVIRONMENTAL

Job# 99-95SHW3 Unit Tested Unit 3

CHAIN OF CUSTODY RECORD

Page # 1/1

Facility Name/Location: TVA Shawnee Fossil Plant Paducah, K

Collected By/Company: METCO Environmental

SAMPLE ANALYSIS REQUIRED

REMARKS (Specific Compounds/Methods): Analyze according to the Ontario Hydro method.

SAMPLE I.D. Reagent Blanks	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	POHC's	METALS	Hg			REMARKS
Container 7 0.1 N HNO_3	10/29/99	1543	X				I	BH									X			Vol. = 50 ml
Container 8 1 M KCl	10/29/99	1544	X				I	BH									X			Vol. = 51 ml
Container 9 5% HNO_3 - 10% H_2O_2	10/29/99	1545	X				I	BH									X			Vol. = 50
Container 10 $KMnO_4$ - H_2SO_4	10/29/99	1546	X				I	BH									X			Vol. = 50
Container 11 NH_2OH - H_2SO_4	10/29/99	1547	X				I	BH									X			Vol. = 100
Container 12 Filters	10/29/99	1556	X				IV	BH									X			Filters 47Q91, 47Q92, 47Q93 Thimbles Q73, Q74, Q75

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:
Jason Conway	10/29/99					[signature]	10/30	0:05
Analyzed by:	Date:	Time:	Data Reviewed by: KM	Date: 01/08/00	Time: 0745	Remarks:		

Ship to: TestAmerica

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

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.

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

MULLINS

Teaching Experience (Cont'd)

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.

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

MULLINS

Research Projects

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

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

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

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

Related Projects

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

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

BILLY L. HEFLEY; Project Supervisor II

Education	B.S. 1991, East Central University; Ada, Oklahoma, in Environmental Science with a concentration in Environmental Management.
Professional Training Course	Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1993. Also attended an 8-hour refresher course January 1994, February 1995, and January 1996. Attended 8-hour Safe Hazardous Materials Transportation Training Program (HM-126F and HM-181) Dallas, Texas, October 1994. Attended Bill Mullins' Performing and Observing Source Sampling Short Course; Dallas, Texas, January 1995.
Certification	Certified 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 III

Education	B. S. Geography, August 1998; Texas A&M University, College Station, Texas
Technical Experience	Participated in the sampling of over 100 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 II

Education	Associate Degree-Environmental Science, March 1999; Texas State Technical College, Breckenridge, 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 procedures, 1999-present.

JASON CONWAY; Environmental Technician II

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

JASON BROWN; Environmental Technician II

Education	B. S. in Zoology, 1995; University of Oklahoma, Norman, Oklahoma.
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, 1999-present.