7 APPENDICES

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APPENDIX A

Nomenclature and Equations
for
Calculation of Source Emissions

METCO ENVIRONMENTAL

NOMENCLATURE FOR PARTICULATE CALCULATIONS

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

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

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

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

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.

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

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.

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

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

13. Particulate - probe, cyclone, and filter.

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

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

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

14. Particulate total.

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

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

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

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

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

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

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

16. Particulate - total, at stack conditions.

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

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

17. Particulate - probe, cyclone, and filter.

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

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

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

18. Particulate - total.

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

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

19. Mercury – ug/dscm

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

20. Mercury – lbs/10^{12} Btu

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

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

* 29.92 "Hg, 68°F (760 mm Hg, 20°C)

METCO ENVIRONMENTAL

SOURCE EMISSION SURVEY

JOB NUMBER:	99-95LAC1
JOB NAME:	KANSAS CITY POWER & LIGHT COMPANY
LOCATION:	LA CYGNE, KANSAS
UNIT TESTED:	UNIT NUMBER 1 SCRUBBER A INLET DUCT

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			11/17/99	11/17/99	11/18/99
BEGIN TIME			0856	1415	0915
END TIME			1220	1645	1140
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	28.98 (736)	28.85 (733)	28.73 (730)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	0.835 (21.2)	0.746 (18.9)	0.702 (17.8)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	62.019 (1.756)	59.589 (1.687)	57.390 (1.625)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	73 (23.00)	84 (29.00)	75 (24.00)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	59.643 (1.689)	55.883 (1.582)	54.493 (1.543)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	152.0	143.0	141.7
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	7.174 (0.203)	6.750 (0.191)	6.688 (0.189)
%M	MOISTURE IN STACK GAS BY VOLUME	%	10.74	10.78	10.93
Tt	NET TIME OF TEST	MINUTES	120	120	120

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

SOURCE EMISSION CALCULATIONS

KANSAS CITY POWER & LIGHT COMPANY
LA CYGNE, KANSAS
UNIT NUMBER 1 SCRUBBER A INLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.8926	0.8922	0.8907
CO2		%	14.0	14.1	14.0
O2		%	5.4	5.3	5.6
CO		%	0.0	0.0	0.0
N2		%	80.6	80.6	80.4
%EA	EXCESS AIR @ SAMPLING POINT	%	33.8	33.0	35.7
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.46 (30.46)	30.47 (30.47)	30.46 (30.46)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	29.12 (29.12)	29.12 (29.12)	29.10 (29.10)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	0.890 (22.6)	0.835 (21.2)	0.805 (20.4)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	292 (144)	291 (144)	292 (144)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	27.72 (704)	27.43 (697)	27.10 (688)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	3,757 (19.09)	3,654 (18.56)	3,615 (18.36)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	17,220 (11.11)	17,220 (11.11)	17,220 (11.11)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	261,825 (444,841)	252,206 (428,498)	245,770 (417,563)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	449,332 (763,415)	436,963 (742,400)	432,305 (734,486)

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

METCO ENVIRONMENTAL

Job Number 99-95 LAC 1 ✓
Job Name KCP+L - EPRI ✓
Run Number 1 ✓
Unit Unit 1 Stack ✓
Date 11-17-99 ✓
Operator Lee/Conway/Brown/Hefley ✓
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 55
Assumed Moisture % 13%
Probe Length 10'
C Factor 1.10 ⇒ 2.0 to reference
Initial Leak @ 16.0 "Hg = 0.001 cfm
Final Leak @ 20.0 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
C1	0850	462.972	2.10	1.15	1.15	9.0	165	281	260	42	58	57	Rate Orsat
1	0855	465.91	2.80	1.60	1.60	11.5	165	270	262	42	60	56	Multi-Point
2	0900	469.13	3.20	1.80	1.80	13.5	166	257	264	41	60	55	Filter 88QH53
2	0905	472.49	3.20	1.80	1.80	13.5	164	252	262	37	60	55	
3	0910	475.86	3.20	1.80	1.80	13.5	161	271	261	37	61	56	
3	0915	479.21	3.20	1.80	1.80	13.5	153	273	255	37	62	56	
End	0920	482.507	—	—	—	—	—	—	—	—	—	—	leak ✓ to 482.728; 16.0 @ 0.003
D1	1048	483.010	2.60	1.40	1.40	11.5	165	277	263	51	63	60	leak ✓ to 483.010; 16.0 @ 0.002
1	1053	485.98	2.80	1.60	1.60	14.0	165	279	269	46	63	60	Δ to shorter probe
2	1058	489.24	3.20	1.80	1.80	15.0	166	278	273	43	66	60	0.503
2	1103	492.43	3.20	1.75	1.75	15.0	167	268	279	43	67	60	
3	1108	495.60	3.20	1.75	1.75	15.0	168	268	280	44	68	61	
3	1113	498.75	3.20	1.75	1.75	15.0	153	260	271	41	68	61	
End	1118	501.865	—	—	—	—	—	—	—	—	—	—	leak ✓ to 502.100; 17.0 @ 0.002
A1	1132	502.391	2.10	1.15	1.15	13.0	164	275	250	51	71	62	leak ✓ to 502.391; 17.0 @ 0.002
1	1137	505.29	2.10	1.15	1.15	13.0	164	278	251	47	70	62	0.526
2	1142	508.19	2.60	1.40	1.40	15.0	161	276	271	41	70	62	
2	1147	511.21	2.80	1.60	1.60	16.0	161	274	276	43	70	63	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m ~~83.834~~ ~~81.854~~ 80.331 ✓ ft^3
Water Collected V_w 269.2 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -2.00 ✓ "H_2O

Pitot Tube No. M-1 ✓
Baro. Press. P_b 28.78 ✓ "Hg
Probe Tip Dia. D_n 0.172 ✓ in.
% CO_2 ~~1.8~~ 12.4 ✓ % CO 0 ✓
% O_2 ~~6.8~~ 7.4 % N_2 80.2 ✓
Area Stack A_s ~~56.410~~ 56,437 ✓ in^2

Barometer No. 19-1 ✓
Probe Tip No. TFE 2-6a ✓
Total Volume of Leak Checks After Start: 1.523 ✓ ft^3
V_m = Dry Gas Meter Calibration Factor 1.000 ✓ X ~~83.854~~ ~~81.854~~ 80.331

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

Impinger Box No. Hg 4

			Water Weight Gain	
Impinger 1	Final Weight	901.6	Pmp. 8	Impinger 1 146.2
	Initial Weight	755.4	final 948.5	
	Increase	146.2	Init 934.5	Impinger 2 96.8
Impinger 2	Final Weight	746.6	14.0	
	Initial Weight	649.8		Impinger 3 6.4
	Increase	96.8		Impinger 4 3.9
			V_w =	
Impinger 3	Final Weight	665.7	g SO_2 = -	Impinger 5 0.9
	Initial Weight	659.3	V_w =	
	Increase	6.4		Impinger 6 1.0
Impinger 4	Final Weight	679.5		Impinger 7 0
	Initial Weight	675.6		Pmp. 8 14.0
	Increase	3.9		Total 269.2 = V_w
Impinger 5	Final Weight	753.9	P_b = 28.78	%CO_2 = ~~12.4~~ 12.4
	Initial Weight	753.0	V_m = ~~93.854~~ 81.854	%O_2 = ~~6.8~~ 7.4
	Increase	0.9	V_w = 269.2	%CO = 0
			P_m = 1.617	%N_2 = 80.2
Impinger 6	Final Weight	755.0	Avg ΔP = 2.913	A_s = ~~56,418~~ 56,437
	Initial Weight	754.0		D_n = 0.172
	Increase	1.0	Avg $\sqrt{\Delta P}$ = 1.703	T_t = 120
			C_p = 0.808	
Impinger 7	Final Weight	737.8	P_s = -2.00 "H_2O	28.63 "Hg
	Initial Weight	737.8	T_m = 64 °F	524 °R
	Increase	0	T_s = 162 °F	622 °R

Moisture Content: %M = ~~13.75~~ 13.98 M_d = ~~0.8625~~ 0.8602 MW_d = 28.280 MW = ~~28.59~~ 28.56

$$Vm_{std} = 17.65\ Vm\left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times \text{~~81.854~~ 80.331}\left[\frac{28.78 + \frac{1.617}{13.6}}{64 + 460}\right] = \frac{\text{~~79.677~~ 78.195}}{\text{~~79.389~~ 77.911}}\ \text{sft}^3 = 0.595\ \text{scfm}$$

0.652

Vw_{gas} = 0.0472 x Vw = 0.0472 x 269.2 = 12.706 sft³

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{12.706}{78.195\ \text{~~79.677~~} + 12.706} \times 100 = \text{~~13.75~~ 13.98}$ %

6149

$V_s = 5123.8 \times 0.808 \sqrt{\frac{622}{28.63 \times 28.59}} \times 1.703 = 6146$ fpm

78.195 28.56 94.0

ACFM: ~~2409627~~ 2,410,044

SCFM: ~~1690,067~~ 1692,949

%I = $\frac{1,039 \times \text{~~79.677~~ 78.195} \times 622}{120 \times \text{~~0.8625~~ 0.8602} \times 28.63 \times 6146 \times (0.172)^2}$ = 95.6 %

6149

%EA: 53.4

Run Number 1

Unit Unit 1 Stack

Date 11-17-99

Hg FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
A3	1152	514.38	3.20	1.80	1.80	16.5	153	274	272	40	70	63	
3	1157	517.63	3.20	1.80	1.80	16.5	152	272	271	39	70	63	
End	1202	520.721	—	—	—	—	—	—	—	—	—	—	leak/to 520.961; 19.0 20.002
B1	1220	521.215	2.60	1.40	1.40	15.0	165	250	255	57	71	64	leak/to 521.215; 20.020.002
1	1225	524.38	2.60	1.40	1.40	15.0	165	272	273	50	71	64	0.494
2	1230	527.61	3.20	1.75	1.75	16.0	165	275	269	47	70	64	
2	1235	530.69	3.20	1.75	1.75	16.0	166	273	268	48	70	64	
3	1240	534.86	3.20	1.80	1.80	16.5	159	267	264	44	70	64	
3	1245	538.99	3.20	1.80	1.80	16.5	161	274	265	44	70	65	
End	1250	542.826	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-95LAC1 ✓
Job Name KCP&L-EPRD ✓
Run Number 2 ✓
Unit Unit 1 Stack ✓
Date 11-17-99 ✓
Operator Lee/Conway/Brown/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 62
Assumed Moisture % 14%
Probe Length 18'
C Factor 1.18 ⇒ 2.00 to reference
Initial Leak @ 15.0 "Hg = 0.001 cfm
Final Leak @ 20.0 "Hg = 0.003 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	Remarks
B1	1415	543.003	2.60	1.40	1.40	12.0	165	276	259	50	69	66	Multi-Point
1	1420	546.79	2.60	1.40	1.40	12.0	165	274	268	46	70	67	Pitot Orifice
2	1425	550.92	2.90	1.60	1.60	14.0	165	270	271	44	71	67	
2	1430	554.27	3.00	1.65	1.65	14.0	165	260	276	43	72	67	
3	1435	557.55	3.30	1.80	1.80	15.0	157	259	274	39	72	67	
3	1440	560.81	3.30	1.80	1.80	15.0	156	254	276	39	73	67	
End	1445	564.230	—	—	—	—	—	—	—	—	—	—	leak Vac to 564.504; 17.00 0.002
A1	1500	564.744	2.40	1.30	1.30	14.0	164	254	252	56	73	68	leak Vac to 564.744; 17.00 0.002
1	1505	568.67	2.50	1.40	1.40	14.0	165	271	273	48	73	68	0.514
2	1510	571.47	2.60	1.40	1.40	14.0	162	276	271	43	75	68	
2	1515	574.88	2.60	1.40	1.40	14.0	162	279	271	44	74	68	
3	1520	577.93	3.30	1.80	1.80	15.0	155	276	270	39	74	68	
3	1525	581.36	3.30	1.80	1.80	15.0	154	275	272	38	75	69	
End	1530	584.398	—	—	—	—	—	—	—	—	—	—	leak Vac to 584.664; 17.0 0.002
D1	1546	584.922	2.60	1.40	1.40	14.0	164	268	253	58	76	69	leak Vac to 584.922; 17.00 0.001
1	1551	588.54	2.60	1.40	1.40	14.0	165	274	263	50	76	69	0.524
2	1556	591.38	3.30	1.80	1.80	16.0	164	276	278	44	76	69	
2	1601	594.62	3.30	1.80	1.80	16.0	161	277	278	43	76	69	

Pitot Tube Calibration Factor C_p 0.808 ✓
Volume Collected V_m 79.299 ✓ ft³
Water Collected V_w 278.6 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s −2.00 ✓ "H₂O

Pitot Tube No. M-1 ✓
Baro. Press. P_b 28.65 ✓ "Hg
Probe Tip Dia. D_n 0.172 ✓ in.
% CO_2 12.0 ✓ % CO 0 ✓
% O_2 7.2 ✓ % N_2 80.8 ✓
Area Stack A_s ~~56.418~~ 56.437 ✓ in²

Barometer No. 19-1 ✓
Probe Tip No. TFE 2-6a ✓
Total Volume of Leak Checks After Start: 1.582 ✓ ft³
V_m = Dry Gas Meter Calibration Factor 1.000 X 79.299

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

Impinger Box No. Hg 2

			Water Weight Gain		
Impinger 1	Final Weight	911.0	Imp 8	Impinger 1	159.1
	Initial Weight	751.9	Final 952.9		
	Increase	159.1	Init. 941.5	Impinger 2	89.7
			16.4		
Impinger 2	Final Weight	834.8		Impinger 3	6.1
	Initial Weight	745.1			
	Increase	89.7		Impinger 4	3.9
			V_w =		
Impinger 3	Final Weight	759.1	g SO_2 = -	Impinger 5	0.3
	Initial Weight	753.0	V_w =		
	Increase	6.1		Impinger 6	0.2
Impinger 4	Final Weight	663.0		Impinger 7	-0.1
	Initial Weight	659.1		Imp. 8	16.4
	Increase	3.9		Total	275.6 = V_w
Impinger 5	Final Weight	751.0	P_b = 28.65	$\%CO_2$ =	12.0
	Initial Weight	750.7	V_m = 79.399	$\%O_2$ =	7.2
	Increase	0.3	V_w = 275.6	%CO =	0
			P_m = 1.594	$\%N_2$ =	80.8
Impinger 6	Final Weight	746.8	Avg ΔP = 2.925	A_s = ~~56.410~~	56,437
	Initial Weight	746.6		D_n =	0.172
	Increase	0.2	Avg $\sqrt{\Delta P}$ = 1.706	T_t =	120
			C_p = 0.848		
Impinger 7	Final Weight	764.5	P_s = -2.000 "H_2O		28.50 "Hg
	Initial Weight	764.6	T_m = 72 °F		532 °R
	Increase	-0.1	T_s = 161 °F		621 °R

Moisture Content: %M = 14.65 M_d = 0.8535 MW_d = 30.208 MW = 28.42

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 79.399 \left[\frac{28.65 + \frac{1.594}{13.6}}{72 + 460}\right] = \frac{75.798\ sft^3}{0.631\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 275.6 = 13.008 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{13.008}{75.798 + 13.008}$ x 100 = 14.65 %

V_s = 5123.8 x 0.849 $\sqrt{\frac{621}{28.50 \times 28.42}}$ x 1.706 = 6184 fpm

ACFM: ~~2,422,632~~ 2,423,792

SCFM: ~~1,680,689~~ 1,681,494

%I = $\frac{1{,}039 \times 75.798 \times 621}{120 \times 0.8535 \times 28.50 \times 6184 \times (0.172)^2}$ = 91.6 %

%EA: 50.7

Run Number 2

Unit Unit 1 Stack

Date 11-17-99

Hs 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
D 3	1606	597.76	3.30	1.80	1.80	16.5	156	275	279	40	77	70	
3	1611	600.24	3.30	1.80	1.80	16.5	154	274	278	40	77	70	
End	1616	603.492	—	—	—	—	—	—	—	—	—	—	leak ✓ to 603.783; 19.0 @ 0.003
C 1	1630	604.036	2.10	1.15	1.15	14.0	167	257	250	59	77	70	leak ✓ to 604.036; 19.0 @ 0.003
1	1635	607.91	2.10	1.15	1.15	14.0	166	268	277	53	77	70	0.54H
2	1640	611.51	3.30	1.80	1.80	16.0	158	271	277	48	78	71	
2	1645	614.57	3.30	1.80	1.80	16.0	162	273	275	46	78	71	
3	1650	617.29	3.30	1.80	1.80	16.5	156	274	273	42	78	71	
3	1655	620.90	3.30	1.80	1.80	16.5	155	276	268	42	78	71	
End	1700	622.984	—	—	—	—	—	—	—	—	—	—	

METCO ENVIRONMENTAL

Job Number 99-95LAC1 ✓
Job Name KCP&L - EPRI ✓
Run Number 3 ✓
Unit Unit 1 Stack ✓
Date 11-18-99 ✓
Operator Lee/Conway/Brown/Hefley ✓
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 60
Assumed Moisture % 13
Probe Length 10'
C Factor 1.10 ⇒ 2.0 to reference
Initial Leak @ 17.0 "Hg = 0.003 cfm
Final Leak @ 20.0 "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	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
			ΔPs			Pm	Ts				Tm		
C 1	0915	636.266	2.30	1.25	1.25	14.0	166	272	268	61	67	66	Multi-Point
1	0920	640.06	2.30	1.25	1.25	14.0	166	264	268	60	67	66	Pat. Orifice
2	0925	643.98	3.20	1.80	1.80	15.0	166	257	269	57	67	66	
2	0930	647.34	3.20	1.80	1.80	15.0	167	262	270	53	67	66	
3	0935	650.19	3.25	1.80	1.80	15.0	163	255	268	46	68	66	
3	0940	653.67	3.20	1.80	1.80	15.0	167	254	267	45	68	66	
End	0945	656.433	—	—	—	—	—	—	—	—	—	—	leak/t/o 656.641; 17.0 @ 0.003
D 1	1000	656.893	2.50	1.40	1.40	14.5	166	253	266	57	69	67	leak/t/o 656.893; 17.0 @ 0.003
1	1005	660.898	2.60	1.45	1.45	14.5	165	261	264	48	69	67	0.460
2	1010	664.46	3.10	1.70	1.70	15.0	166	268	266	48	69	68	
2	1015	668.13	3.30	1.80	1.80	15.5	167	264	266	50	70	68	
3	1020	672.21	3.30	1.80	1.80	15.5	166	257	269	51	70	68	
3	1025	676.24	3.30	1.80	1.80	16.0	166	259	270	53	71	68	0.503
End	1030	680.504	—	—	—	—	—	—	—	—	—	—	leak/t/o 680.755; 17.0 @ 0.002
A 1	1045	681.007	2.60	1.45	1.45	16.0	164	252	258	57	74	69	leak/t/o 681.007; 19.0 @ 0.003
1	1050	685.22	2.70	1.50	1.50	16.0	164	257	261	52	74	69	Filters (blinded)
2	1055	689.145	2.70	1.50	1.50	14.0	165	255	249	61	74	69	pump off 1053; leak/t/o 689.323; 19.0 @ 0.003
2	1100	693.04	2.90	1.60	1.60	14.5	165	253	251	55	75	70	pump on 1110 @ 689.323

0.171

Pitot Tube Calibration Factor C_p 0.8008 ✓
Volume Collected V_m 86.101 ft³
Water Collected V_w 274.0 ml ✓
Time of Test T_t 120 min.
Stack Pressure P_s ~~2.90~~ 2.10 "H_2O

Pitot Tube No. M-1 ✓
Baro. Press. P_b 28.53 ✓ "Hg
Probe Tip Dia. D_n 0.172 ✓ in.
% CO_2 12.4 ✓ % CO 0 ✓
% O_2 6.8 ✓ % N_2 80.8 ✓
Area Stack A_s ~~56,410~~ 56,437 ✓ in²

Barometer No. 19-1 ✓
Probe Tip No. TFE 2-6a ✓
Total Volume of Leak Checks After Start: 1.719 ✓ ft³
V_m = Dry Gas Meter Calibration Factor 1.0000 ✓ X 86.101

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

R-17

Impinger Box No. Hg 4

			Water Weight Gain		
Impinger 1	Final Weight	926.4	Emp. 8 final 964.9	Impinger 1	167.4
	Initial Weight	759.0	Emp. with 948.2	Impinger 2	81.8
	Increase	167.4	16.7	Impinger 3	5.7
Impinger 2	Final Weight	734.4		Impinger 4	2.9
	Initial Weight	652.6	V_w =	Impinger 5	0.5
	Increase	81.8	g SO_2 =	Impinger 6	6.5
Impinger 3	Final Weight	668.4	V_w =	Impinger 7	-7.5
	Initial Weight	662.7		Emp. 8	16.7
	Increase	5.7		Total	274.8 = V_w
Impinger 4	Final Weight	681.7			
	Initial Weight	678.8			
	Increase	2.9			
Impinger 5	Final Weight	760.6	P_b = 28.53	$\%CO_2$ = 12.4	
	Initial Weight	760.1	V_m = 86.141	$\%O_2$ = 6.8	
	Increase	0.5	V_w = 274.8	%CO = 0	
			P_m = 1.652	$\%N_2$ = 80.8	
Impinger 6	Final Weight	761.7	Avg ΔP = ~~2.792~~ .985	A_s = ~~56,440~~ 56,437	
	Initial Weight	755.2		D_n = 0.172	
	Increase	6.5	Avg $\sqrt{\Delta P}$ = ~~1.769~~ 1.725	T_t = 120	
			C_p = 0.808		
Impinger 7	Final Weight	732.7	P_s = ~~29.92~~ 29.10 "H_2O	28.38 "Hg	
	Initial Weight	740.2	T_m = 70 °F	530 °R	
	Increase	-7.5	T_s = 166 °F	626 °R	

Moisture Content: %M = 13.60 M_d = 0.8648 MW_d = 30.256 MW = 28.59

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 86.141 \left[\frac{28.53 + \frac{1.652}{13.6}}{70 + 460}\right] = \frac{82.153}{0.685} \text{ sft}^3 \text{ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 274.8 = 12.933 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{12.933}{82.153 + 12.933}$ x 100 = 13.60 %

V_s = 5123.8 x 0.808 $\sqrt{\frac{626}{28.38 \times 28.59}}$ x $\frac{1.769}{1.725}$ = ~~6433~~ 6273 fpm

ACFM: ~~2519990~~ 2,458,487 ~~1,705,674~~

SCFM: ~~1948343~~

$$\%I = \frac{1{,}039 \times 82.153 \times 626}{120 \times 0.8648 \times 28.38 \times 6433 \times (0.172)^2} = \frac{6273}{97.8} = 95.4\ \%$$

%EA: 46.5

Run Number 3

Unit Unit 1 Stack

Date 11-18-99

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
A3	~~1150~~ 1150	696.82	3.30	1.80	1.80	14.5	165	252	258	54	75	70	
3	~~1155~~ 1155	699.96	3.20	1.80	1.80	14.5	165	255	267	55	75	70	
End	~~1155~~ 1130	703.202	—	—	—	—	—	—	—	—	—	—	leak check to 703.422; 19.0 20.001
B1	1145	703.780	2.70	1.50	1.50	14.0	166	272	256	62	75	70	leak check to 703.780; 19.0 20.001
1	1150	707.98	3.00	1.65	1.65	15.0	166	276	265	55	75	70	0.578
2	1155	712.06	3.20	1.80	1.80	15.0	166	279	270	55	76	70	
2	1200	715.74	3.20	1.80	1.80	15.0	167	278	274	56	76	70	
3	1205	718.99	3.30	1.80	1.80	15.0	166	277	278	57	76	70	
3	1210	721.75	3.30	1.80	1.80	15.0	166	277	281	57	76	71	
End	1215	724.086	—	—	—	—	—	—	—	—	—	—	

D-10

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-95LAC1
Job Name EPRI / KCP&L
Sampling Location Unit 1 Scrubber Inlet Duct
Date 11-16-99 Time 1630

Stack Height ~~360~~ ft.
Sampling Port Height Above Ground 83 ✓ ft.

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)					~~150.95~~ ~~160~~ 160 ✓
Port & Wall Thickness (in.)	~~20~~ 22	2022	~~20~~22	~~2022~~	~~20~~22 ✓
Inside Stack Diameter (in.)					~~130.95~~ 140 ✓

Sampling Ports are 4 ✓ ft. 9 ✓ in. (0.44 ✓ eq duct ~~upstream~~ down stack diameters) ~~downstream~~ from disturbance (inlet, constriction, (bend) expansion)

Sampling Ports are 4 ✓ ft. 2 ✓ in. (0.38 ✓ eq. duct up ~~downstream~~ 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		~~10.9125~~	1 ~~3/4 10 15/16~~	0.78/280/ -5	1.10/272/ -5	0.95/280/ -8	0.90/280/ -6
2		~~32.7375~~	35 ~~1/16 32 3/4~~	0.75/285/ -5	0.75/283/ 0	0.82/289/ -2	0.82/285/ -2
3		~~54.5625~~	58 ~~3/8 54 9/16~~	0.83/282/ -2	0.95/290/ -2	0.84/294/ -5	0.93/298/ -2
4		~~76.3875~~	81 ~~11/16 76 7/16~~	0.75/287/ 0	0.58/291/ 0	0.62/293/ 0	0.65/297/ 0
5		~~98.2125~~	105 ~~98 1/4~~	0.90/287/ 0	0.70/291/ 0	0.59/292/ 0	0.54/293/ 2
6		~~120.0375~~	128 ~~5/8 120 1/16~~	0.55/284/ -2	0.38/288/ 0	0.40/288/ 0	0.30/293/ 0
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12				/ /	/ /	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. 19-12-1
C_p = 0.812
P_b = 29.04 "Hg
P_s = -19.0 "H_2O 27.66 ✓ "Hg
A_s = 17220 ✓ in.²

Average ΔP 0.725 ✓
Average $\Delta P^{1/2}$ 0.842 ✓
Average T_s 288 ✓ °F
Average α 2.0 ✓ degrees
ACFM = 403,493
DSCFM = 241,509

EA = 57.8

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 99-95 LAC1
Job Name KCL&P-EPRI
Sampling Location Unit 1 Stack
Date 11-16-99 Time 1500

Stack Height ~~413~~ 698 ✓ ft.
Sampling Port Height Above Ground 285 ✓ ft.

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)	~~274 5/8~~	~~275 5/8~~	~~274 3/4~~	~~275 5/8~~	275 1/16
Port & Wall Thickness (in.)	6 5/8	7 3/8	6 3/4	2 1/8	7
Inside Stack Diameter (in.)	~~268~~	~~268~~	~~268~~	~~268~~	~~268 1/16~~ 268 1/16

Sampling Ports are 221 ✓ ft. 0 in. — 9.9 ~~9.89~~ ✓ stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are 413 ✓ ft. 0 in. — ~~18.5~~ 18.49 ✓ stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port A ΔP/T_d/α	Port B ΔP/T_d/α	Port C ΔP/T_d/α	Port D ΔP/T_d/α
1	2.1 ✓	~~5.623~~ 0.469 ✓	~~1/2 + 5 5/8~~ ✓	1.70 11381 +3	2.40 11441 +2	2.00 11611 +5	2.20 11481 -5
2	6.7 ✓	~~17.369~~ 1.406 ✓	~~1/2 + 17 15/16~~ ✓	2.20 11471 +5	2.90 11501 +7	2.70 11591 +8	2.80 11521 -10
3	11.8 ✓	~~31.624~~ 31.624 ✓	31 5/8 ✓	2.50 11531 +10	2.90 11541 +5	2.90 11501 +10	2.80 11551 -12
4	17.7 ✓	~~47.436~~ 47.436 ✓	47 7/16 ✓	2.60 11461 +8	2.80 11491 +7	2.90 11441 +10	2.90 11511 -2
5	25.0 ✓	67.016 ✓	67 ✓	2.60 11411 +8	2.80 11411 +6	2.90 11391 +10	3.00 11551 -10
6	35.6 ✓	95.430 ✓	95 7/16 ✓	2.60 11381 +6	2.60 11451 +5	2.90 11381 +10	2.80 11521 -5
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12		* Calculated		/ /	/ /	/ /	/ /
13		as half of a		/ /	/ /	/ /	/ /
14		12 point		/ /	/ /	/ /	/ /
15		Traverse.		/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21	4.4 ✓	11.795 ✓	11 13/16 ✓	/ /	/ /	/ /	/ /
22	14.6 ✓	~~39.128~~ 39.137 ✓	39 1/8 ✓	/ /	/ /	/ /	/ /
23	29.6 ✓	~~79.328~~ 79.347 ✓	79 5/16 3/8 ✓	/ /	/ /	/ /	/ /
24	*	Calculated as 1/2 of a six point Traverse		/ /	/ /	/ /	/ /

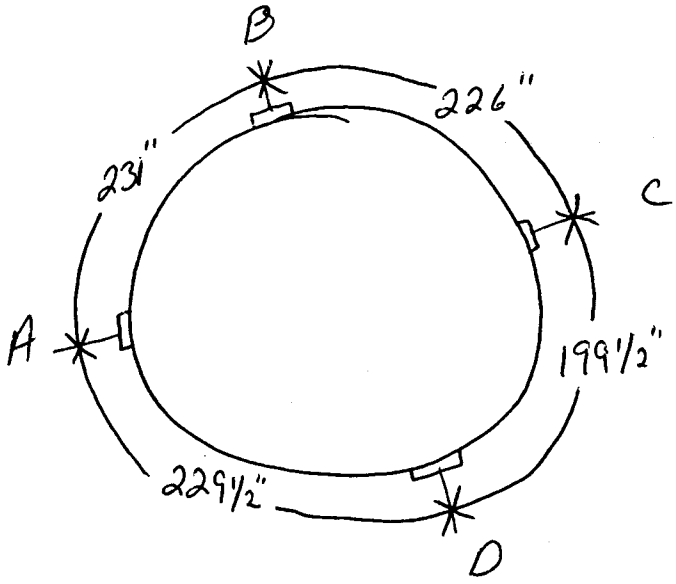
Pitot Tube No. M-1 ✓
C_p = 0.808 ✓
P_b = 29.06 "Hg
P_s = -2.00 "H_2O ~~28.91~~ "Hg
A_s = ~~56.410~~ 56.437 ✓ in.²

Average ΔP 2.642 ✓
Average $\Delta P^{1/2}$ 1.622 ✓
Average T_x 148 ✓ °F
Average α 7.04 ✓ degrees

~~244'~~ (28)
285'

O. Circ = 886" ✓

I.D. = ~~268'~~ 268 1/16

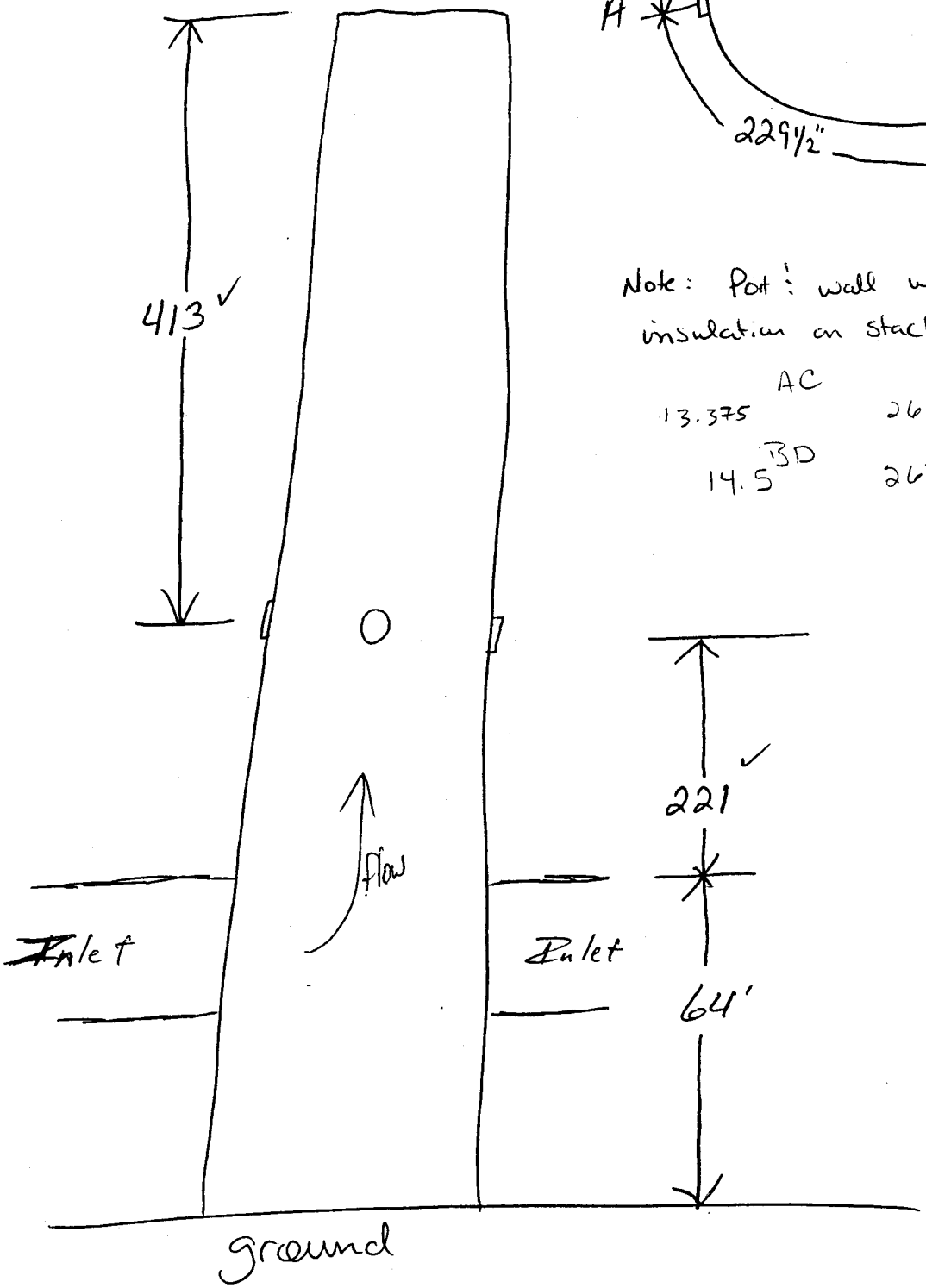


Note: Port wall was flush with insulation on stack wall.

AC
13.375 — 268 5/8
14.5 BD — 267 1/2

268 1/16

As = 56,437



METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-95LAC1 Sample Location: Unit 1 Stack

Job Name: EPRI / KCPL Analytical Method: 3B

Location: LaCygne, KS Sample Type: Single point or ~~Multi point~~; Grab or ~~Integrated~~

Date: 11-17-99 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.	79.1

Run Number 1 Run Time 0850-1250	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.4	12.4	12.4	12.4
O_2 - % Vol.	7.4	7.4	7.4	7.4
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.2	80.2	80.2	80.2

Fo= 1.089

Run Number 2 Run Time 1415-1700	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.0	12.0	12.0	12.0
O_2 - % Vol.	7.2	7.2	~~7~~.2	7.2
CO - % Vol.	(BH) ~~7~~ 0.0	0.0	0.0	0.0
N_2 - % Vol.	80.8	80.8	80.8	80.8

Fo= 1.142

Run Number 3 Run Time 0915-1215	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	12.4	12.4	12.4	12.4
O_2 - % Vol.	6.8	6.8	6.8	6.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.4	80.8	80.8	80.8

Fo= 1.137

METCO ENVIRONMENTAL

ORSAT ANALYSIS DATA FORM

Job Number: 99-95LAC1 Sample Location: Unit 1 Scrubber A Inlet Duct

Job Name: EPRI / KCPL Analytical Method: 3B

Location: LaCygne, KS Sample Type: Single point or Multi point; Grab or Integrated

Date: 11-17-99 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.	79.1

Run Number 1 Run Time 0856-1220	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	14.0	14.0	14.0	14.0
O_2 - % Vol.	5.4	5.4	5.4	5.4
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.6	80.6	80.6	80.6

Fo= 1.107

Run Number 2 Run Time 1415-1645	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	14.1	14.2	14.1	14.1
O_2 - % Vol.	5.3	5.2	5.3	5.3
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.6	80.6	80.6	80.6

Fo= 1.106

Run Number 3 Run Time 0915-1140	Analysis 1	Analysis 2	Analysis 3	Average - % Vol.
CO_2 - % Vol.	14.0	14.0	14.0	14.0
O_2 - % Vol.	5.6	5.6	5.6	5.6
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.4	80.4	80.4	80.4

Fo= 1.093

METCO ENVIRONMENTAL

APPENDIX C

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #19-12-1	0.810*	12/13/99*
Pitot Tube #M-1	0.808	11/12/99
Probe Tip #TFE-1-7	0.200	10/04/99
Probe Tip #TFE-2-6a	0.172	10/11/99
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	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

* Calibration data for pitot tube #19-12-1 for November 1999 was not available. The post test calibration factor was applied to the inlet test data.

APPENDIX C

Post Test

Calibration Data

Equipment	Calibration Factor	Calibration Date
Pitot Tube #19-12-1	0.810	12/13/99
Pitot Tube #M-1	0.808	11/22/99
Probe Tip #TFE-1-7	0.199	11/19/99
Probe Tip #TFE-2-6a	0.172	11/19/99
Dry Gas Meter #27-2	1.008	01/10/00
Stack Unit Orifice #27-2		01/14/00
Digital Temperature Indicator #27-2		01/10/00
Dry Gas Meter #29-1	1.000	11/22/99
Stack Unit Orifice #29-1		11/22/99
Digital Temperature Indicator #29-1		11/22/99
Barometer #19-1		11/22/99

PITOT TUBE CALIBRATION

Date: 11-12-99 Time: 1530

Pitot No.: M1 T_s: 75 °F

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

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

Summary of Results:

Normal high side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Normal low side calibration factor 0.808

variation + 0.00%

variation - 0.00%

Calibrator: Jason Brown 274

Checked By: Jason Conway 273

METCO ENVIRONMENTAL

✓ AM107

NOZZLE CALIBRATION

Nozzle Set No. TFE-1

Date 10-4-99 Calibrator: JASON BROWN 374

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

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

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-2

Date 10-11-99 Calibrator: Shane Lee

	1 (6a)	2	3	4	5	6
Reading 1	0.173					
Reading 2	0.169					
Reading 3	0.173					
Reading 4	0.173					
Reading 5	0.170					
Reading 6	0.173					
Reading 7	0.173					
Reading 8	0.173					
Reading 9	0.169					
Reading 10	0.169					
Average	0.172					

	7	8	9	10	11	12
Reading 1						
Reading 2						
Reading 3						
Reading 4						
Reading 5						
Reading 6						
Reading 7						
Reading 8						
Reading 9						
Reading 10						
Average						

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 27-2

Date: 11-07-99

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

Variation: + 0.69%

- 1.28%

Calibrator: M. Buss

Checked By: 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
	572.057 cf	77 °F	76 °F	0.50 "H_2O
	567.114 cf	76 °F	75 °F	0.50 "H_2O
	4.943 cf	76 °F		0.500 "H_2O

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 Calibrator: M. Bass

Date: 11-07-99

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

Run No.: 1 @ 1.0" H_2O P_b: 29.32 "Hg

Control Module Vacuum: 2.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1323	5.122 cf	74 °F	-1.30 "H_2O	577.407 cf	78 °F	77 °F	1.00 "H_2O
Start	1314	0.000 cf	74 °F	-1.30 "H_2O	572.377 cf	77 °F	76 °F	1.00 "H_2O ✓
Avg.	9	5.122 cf ✓	74 °F	-1.300 "H_2O	5.030 cf ✓	77 °F ✓		1.000 "H_2O

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

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

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

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 @ 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	1408	10.330 cf	74 °F	-2.90 "H_2O	608.602 cf	89 °F	79 °F	3.00 "H_2O
Start	1358	0.000 cf	74 °F	-2.90 "H_2O	598.364 cf	85 °F	78 °F	3.00 "H_2O
Avg.	10	10.330 cf ✓	74 °F ✓	-2.900 "H_2O ✓	10.238 cf ✓	83 °F ✓		3.000 "H_2O ✓

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 Calibrator: M. Bass

Date: 11-07-99

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

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

Control Module Vacuum: 3.00 "Hg

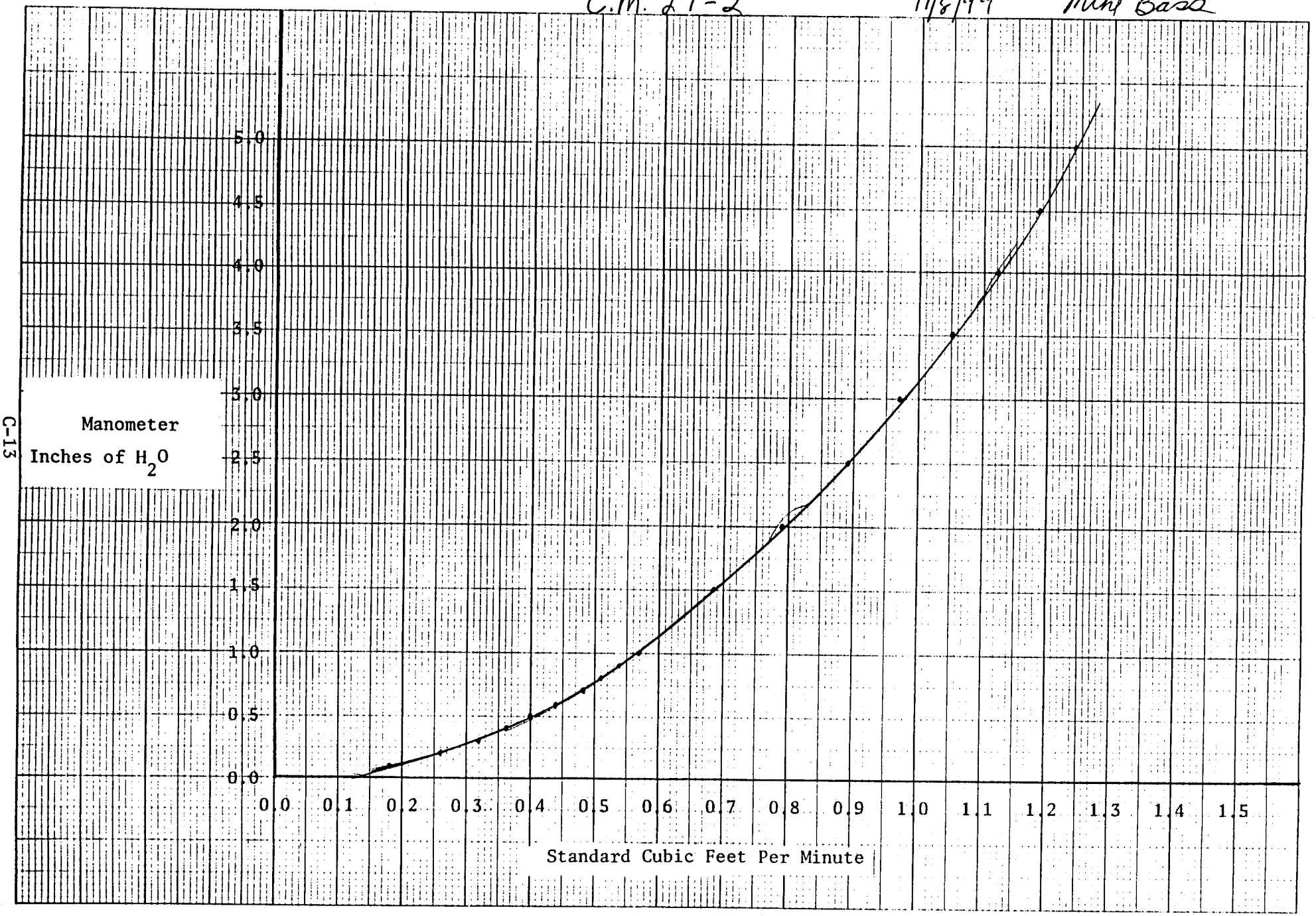
	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1419	10.130 cf	74 °F	-3.70 "H_2O	619.031 cf	91 °F	80 °F	4.00 "H_2O
Start	1410	0.000 cf	74 °F	-3.70 "H_2O	608.926 cf	87 °F	79 °F	4.00 "H_2O
Avg.	9	10.130 cf ✓	74 °F ✓	-3.700 "H_2O ✓	10.105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

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

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

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

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: John Brown

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 29-1

Date: 10-21-99

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 Lipsey #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)

	Time	Meter Reading		Temp.		P_m	
End	1423	5.380	cf	75	°F	-1.10	"H_2O
Start	1409	0.000	cf	75	°F	-1.10	"H_2O
Avg.	14	5.380	cf	75	°F	-1.10	"H_2O

Dry Gas Meter

	Meter Reading		Temp. In		Temp. Out		P_m	
End	377.116	cf	75	°F	73	°F	0.50	"H_2O
Start	371.767	cf	74	°F	72	°F	0.50	"H_2O
Avg.	5.349	cf	74	°F			0.50	"H_2O

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

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

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

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

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	384.790 cf	73 °F	74 °F	1.50 "H_2O
Start	1438	0.000 cf	75 °F	-1.90 "H_2O	384.223 cf	73 °F	73 °F	1.50 "H_2O
Avg.	16	10.668 cf	75 °F	-2.00 "H_2O	10.567 cf		74 °F	1.50 "H_2O

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

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

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

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	-240 "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	-240 "H_2O	11.300 cf	74 °F		2.00 "H_2O

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Date: 10-4-99

Calibrator: Shane Lee

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

Run No.: 1 @ 30 "H2O

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" H2O P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Date: 10-4-99

Calibrator: Shane Lee

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

Run No.: 1 @ 2.8 L/min

P_b: 29.28 "Hg

Control Module Vacuum: 5.0 "Hg

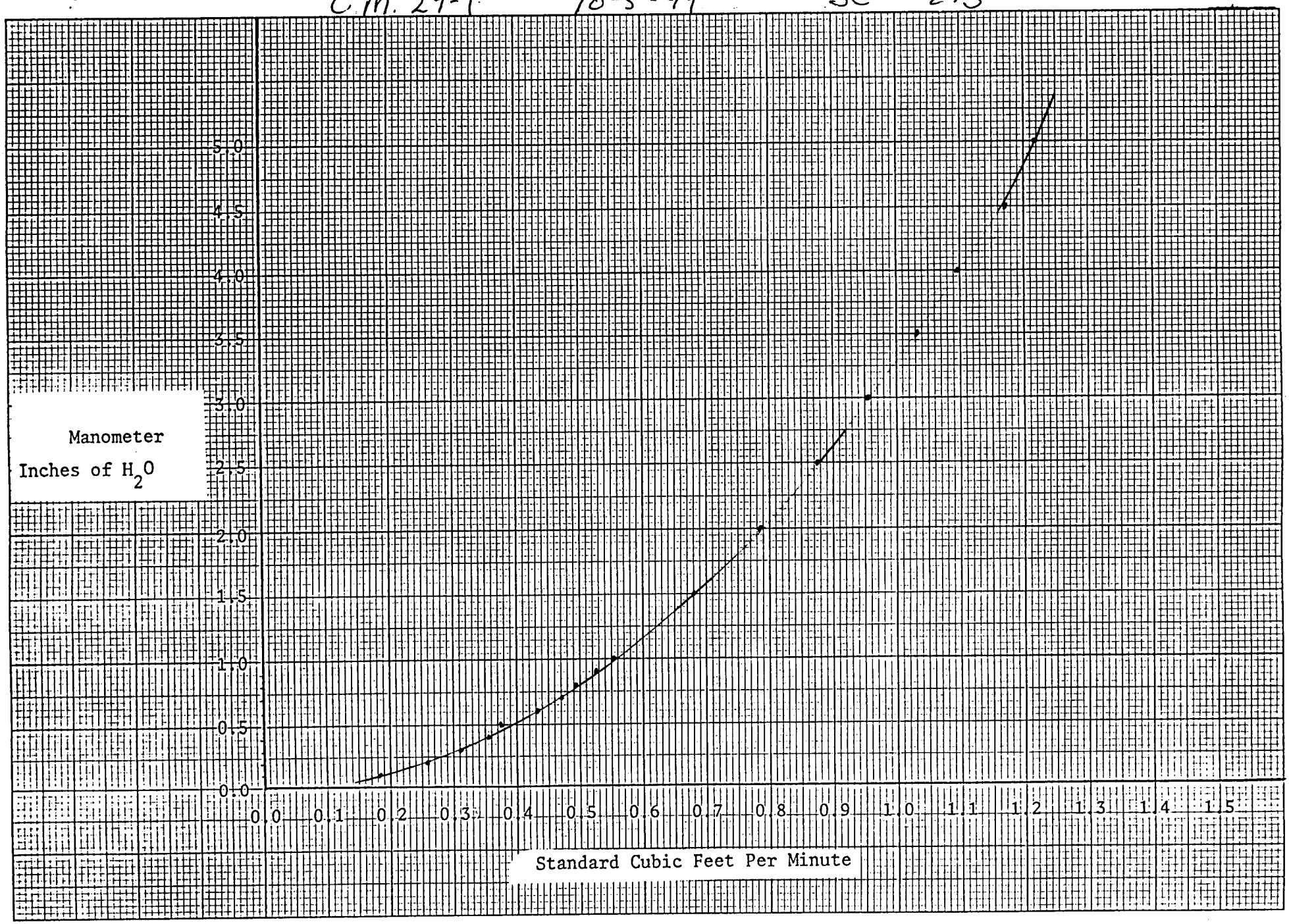
	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1622	2.210 cf	75 °F	-0.20 "H_2O	432.153 cf	81 °F	76 °F	0.01 "H_2O
Start	1606	0.000 cf	75 °F	-0.20 "H_2O	430.968 cf	78 °F	76 °F	0.01 "H_2O
Avg.	16	2.210 cf	75 °F	-0.20 "H_2O	2.185 cf	78 °F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

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

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

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

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 Hughey #101

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 19-1

Date: 10-4-99

Time: 1520

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

Barometer Adjusted? Yes ✓ No _____

Shane Lee 261

Signature of Calibrator

PITOT TUBE CALIBRATION

Date: 12-13-99

Time: 10:00

Pitot No.: 19-12-1

T_s: 65 °F

Pitot Dimensions: 1/4" x 12'

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	0.80	0.894	0.813	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	2.00	1.414	0.798	2.00	1.414	0.798
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				0.809

Summary of Results:

Normal high side calibration factor 0.810

variation + 1.36%

variation - 1.48%

Normal low side calibration factor 0.809

variation + 1.48%

variation - 1.36%

Calibrator: Jason Conway #273

Checked By: Mike Buss #263

PITOT TUBE CALIBRATION

Date: 11-22-99 Time: 1300

Pitot No.: M1 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	0.33	0.574	0.808	0.33	0.574 ~~0.587~~	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 #868

Checked By: Juan Conway #273

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-1

Date 11-19-99 Calibrator: Shane Dee 261

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

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

METCO ENVIRONMENTAL

NOZZLE CALIBRATION

Nozzle Set No. TFE-2

Date 11-19-99 Calibrator: Mike Bass

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

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

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 27-2

Date: 1-10-00

ΔH ("H_2O)	C_{DG}
0.5	1.003 ✓
1.0	1.002 ✓
1.5	1.014 ✓
2.0	1.015 ✓
3.0	1.011 ✓
4.0	1.005 ✓
Average	1.008 ✓

Variation: + 0.69% ✓

- 0.60% ✓

Calibrator: Jason Brown 274

Checked By: Jason Conway #273

C_{DG} @ 2 liters/min. = 1.059

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: JASON BROWN 274

Date: 01-10-00

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

Run No.: 1 @ 0.5 "H_2O

P_b: 29.25 "Hg

Control Module Vacuum: 6.00 "Hg

Wet Test Meter (No. 3)

	Time	Meter Reading	Temp.	P_m
End	1520	5.0 cf	70 °F	-0.8 "H_2O
Start	1508	0.0 cf	70 °F	-0.6 "H_2O
Avg.	12✓	5.0✓ cf	70✓ °F	-0.7✓ "H_2O

Dry Gas Meter

	Meter Reading	Temp. In	Temp. Out	P_m
End	107.484 cf	78 °F	77 °F	0.5 "H_2O
Start	102.449 cf	77 °F	76 °F	0.5 "H_2O
Avg.	5.035✓ cf	77✓ °F		0.5 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.0 \left[\frac{29.25 + \frac{-0.7}{13.6}}{70 + 460}\right] \times 1.000\,(C_f) = 4.862\text{✓ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.035 \left[\frac{29.25 + \frac{0.5}{13.6}}{77 + 460}\right] = 4.847\text{✓ dcsf}$$

$$C_{DG} = \frac{4.862}{4.847} = \boxed{1.003\text{✓}}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Date: 1-10-00

Calibrator: Jason Brown

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

Run No.: 1 @ 1.00" H_2O

P_b: 29.25 "Hg

Control Module Vacuum: 6.90 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1532	5.0 cf	70 °F	-1.4 "H_2O	112.714 cf	80 °F	78 °F	1.00 "H_2O
Start	1523	0.0 cf	70 °F	-1.3 "H_2O	107.676 cf	78 °F	77 °F	1.00 "H_2O
Avg.	9	5.0 cf	70 °F	-1.35 "H_2O	5.038 cf	78 °F		1.00 "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 5.0 \left[\frac{29.25 + \frac{-1.35}{13.6}}{70 + 460}\right] \times 1.000(C_f) = 4.854 \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 5.038 \left[\frac{29.25 + \frac{1.00}{13.6}}{78 + 460}\right] = 4.847 \text{ dcsf}$$

$$C_{DG} = \frac{4.854}{4.847} = \boxed{1.002}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: JASON BROWN

Date: 01-10-00

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

Run No.: 1 @ 1.50

P_b: 29.25 "Hg

Control Module Vacuum: 6.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1613	10.0 cf	70 °F	-1.80 "H_2O	135.128 cf	85 °F	80 °F	1.50 "H_2O
Start	1557	0.0 cf	70 °F	-1.80 "H_2O	125.130 cf	82 °F	79 °F	1.50 "H_2O
Avg.	16 ✓	10.0 ✓ cf	70 ✓ °F	-1.80 ✓ "H_2O	9.998 ✓ cf	82 ✓ °F		1.50 ✓ "H_2O

$$Vm_{std} = 17.65 \times 10.00 \left[\frac{29.25 + \frac{-1.80}{13.6}}{70 + 460}\right] \times 1.000\ (C_p) = 9.697\ \text{dcsf}$$

$$Vm_{std} = 17.65 \times 9.998 \left[\frac{29.25 + \frac{1.50}{13.6}}{82 + 460}\right] = 9.559\ \text{dcsf}$$

$$C_{DG} = \frac{9.697}{9.559} = \boxed{1.014}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: Jason Brown

Date: 1-10-00

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

Run No.: 1 @ 2.00" H_2O

P_b: 29.25 "Hg

Control Module Vacuum: 6.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1628	10.0 cf	70 °F	-2.3 "H_2O	145.335 cf	88 °F	83 °F	2.00 "H_2O
Start	1614	0.0 cf	70 °F	-2.4 "H_2O	135.310 cf	86 °F	81 °F	2.00 "H_2O
Avg.	14✓	10.0✓ cf	70✓ °F	-2.35✓ "H_2O	10.025 cf	85✓ °F		2.00✓ "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.0 \left[\frac{29.25 + \frac{-2.35}{13.6}}{70 + 460}\right] \times 1.000\ (C_f) = 9.683\text{✓ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.025 \left[\frac{29.25 + \frac{2.00}{13.6}}{85 + 460}\right] = 9.544\text{✓ dcsf}$$

$$C_{DG} = \frac{9.683}{9.544} = \boxed{1.015\text{✓}}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 Calibrator: Jason Brown

Date: 1-10-00

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

Run No.: 1 @ 3.00" H_2O P_b: 29.25 "Hg

Control Module Vacuum: 6.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1640	10.0 cf	70 °F	-3.10 "H_2O	155.984 cf	90 °F	83 °F	3.00 "H_2O
Start	1629	0.0 cf	70 °F	-3.10 "H_2O	145.950 cf	88 °F	82 °F	3.00 "H_2O
Avg.	11 ✓	10.0 ✓ cf	70 ✓ °F	-3.10 ✓ "H_2O	10.034 ✓ cf	86 ✓ °F		3.00 ✓ "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times \frac{10.0}{29.25} \left[\frac{29.25 + \frac{-3.10}{13.6}}{70 + 460} \right] \times 1.000\ (C_p) = 9.665 \checkmark \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.034 \left[\frac{29.25 + \frac{3.00}{13.6}}{86 + 460} \right] = 9.559 \checkmark \text{ dcsf}$$

$$C_{DG} = \frac{9.665}{9.559} = \boxed{1.011 \checkmark}$$

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2 Calibrator: Jason Brown

Date: 1-10-00

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

Run No.: 1 @ 4.00" H_2O P_b: 29.25 "Hg

Control Module Vacuum: 6.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1651	10.0 cf	70 °F	-4.00 "H_2O	166.410 cf	93 °F	84 °F	4.00 "H_2O
Start	1641	0.0 cf	70 °F	-4.10 "H_2O	156.330 cf	91 °F	83 °F	4.00 "H_2O
Avg.	10✓	10.0✓ cf	70✓ °F	-4.05 "H_2O	10.080✓ cf	88✓ °F		4.00✓ "H_2O

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.0 \left[\frac{29.25 + \frac{-4.05}{13.6}}{70 + 460}\right] \times 1.000\,(C_p) = 9.642\checkmark \text{ dcsf}$$

$$\text{Dry Gas Meter } Vm_{std} = 17.65 \times 10.080 \left[\frac{29.25 + \frac{4.00}{13.6}}{88 + 460}\right] = 9.592\checkmark \text{ dcsf}$$

$$C_{DG} = \frac{9.642}{9.592} = \boxed{1.005\checkmark}$$

SOURCE EMISSION CALCULATIONS

KANSAS CITY POWER & LIGHT COMPANY
LA CYGNE, KANSAS
UNIT NUMBER 1 SCRUBBER A INLET DUCT

SYMBOL	DESCRIPTION	UNITS			
Tt	NET TIME OF TEST	MINUTES	120	120	120
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.200 (0.005)	0.200 (0.005)	0.200 (0.005)
%I	PERCENT ISOKINETIC	%	104.4	101.6	101.7
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:	99-95LAC1
JOB NAME:	KANSAS CITY POWER & LIGHT COMPANY
LOCATION:	LA CYGNE, KANSAS
UNIT TESTED:	UNIT NUMBER 1 STACK

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS			
RUN #			1	2	3
DATE			11/17/99	11/17/99	11/18/99
BEGIN TIME			0850	1415	0915
END TIME			1250	1700	1215
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	28.78 (731)	28.65 (728)	28.53 (725)
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	1.617 (41.1)	1.594 (40.5)	1.652 (42.0)
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS	ft.^3 (m^3)	80.331 (2.275)	79.399 (2.248)	86.101 (2.438)
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	64 (18.00)	72 (22.00)	70 (21.00)
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	78.195 (2.214)	75.778 (2.146)	82.153 (2.326)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	269.2	275.6	274.0
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	12.706 (0.360)	13.008 (0.368)	12.933 (0.366)
%M	MOISTURE IN STACK GAS BY VOLUME	%	13.98	14.65	13.60
Tt	NET TIME OF TEST	MINUTES	120	120	120

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

SOURCE EMISSION CALCULATIONS

KANSAS CITY POWER & LIGHT COMPANY
LA CYGNE, KANSAS
UNIT NUMBER 1 STACK

SYMBOL	DESCRIPTION	UNITS			
Md	MOL FRACTION OF DRY GAS		0.8602	0.8535	0.8640
CO2		%	12.4	12.0	12.4
O2		%	7.4	7.2	6.8
CO		%	0.0	0.0	0.0
N2		%	80.2	80.8	80.8
%EA	EXCESS AIR @ SAMPLING POINT	%	53.4	50.7	46.5
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.28 (30.28)	30.21 (30.21)	30.26 (30.26)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.56 (28.56)	28.42 (28.42)	28.59 (28.59)
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	2.913 (74.0)	2.925 (74.3)	2.985 (75.8)
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	162 (72)	161 (72)	166 (74)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg)	28.63 (727)	28.50 (724)	28.38 (721)
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	6,149 (31.24)	6,184 (31.41)	6,273 (31.87)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	56,437 (36.41)	56,437 (36.41)	56,437 (36.41)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	1,690,067 (2,871,424)	1,681,494 (2,856,858)	1,705,674 (2,897,940)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	2,410,044 (4,094,665)	2,423,792 (4,118,023)	2,458,487 (4,176,969)

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

SOURCE EMISSION CALCULATIONS

KANSAS CITY POWER & LIGHT COMPANY
LA CYGNE, KANSAS
UNIT NUMBER 1 STACK

SYMBOL	DESCRIPTION	UNITS			
Tt	NET TIME OF TEST	MINUTES	120	120	120
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.172 (0.004)	0.172 (0.004)	0.172 (0.004)
%I	PERCENT ISOKINETIC	%	94.0	91.6	97.8
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	----	----	----
Mt	PARTICULATE - TOTAL	mg	----	----	----
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	----	----	----
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	----	----	----
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	----	----	----
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	----	----	----
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	----	----	----
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	----	----	----

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

APPENDIX B

Field Data

METCO ENVIRONMENTAL

Job Number 99-95LAC1 ✓
Job Name EPRI / KCP&L ✓
Run Number 1 ✓
Unit #1 Scrubber Inlet Duct ✓
Date 11-17-99 ✓
Operator Bass / Hart / Hefley ✓
Sample Box No. Hg3 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 75
Assumed Moisture % 8.61
Probe Length ~~#~~ 131
C Factor 10 to 2.95 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 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 Tm	Heated Line °F	Remarks
	~~0850~~	~~897.539~~						~~281~~	~~250~~					thimble Q79
D6	0856	898.168	0.45	0.43	0.43	7.00	290	282	251	68	71	71	262	filter 47Q121
5	0901	900.14	0.75	0.72	0.72	9.00	292	288	252	68	70	71	270	int. orsat
4	0906	902.51	0.88	0.84	0.84	9.50	299	270	251	67	70	71	262	CST
3	0911	905.11	1.20	1.15	1.15	11.50	297	292	253	66	70	71	261	
2	0916	908.01	1.10	1.05	1.05	11.00	293	281	254	66	69	70	260	
1	0921	910.92	1.10	1.05	1.05	11.00	285	284	253	66	69	70	257	
C6	0926	913.14	0.63	0.60	0.60	8.50	289	268	253	66	69	70	263	
5	0931	915.72	0.75	0.72	0.72	9.50	292	258	252	66	69	70	269	
4	0936	918.13	0.78	0.75	0.75	10.00	293	255	254	66	69	69	263	
3	0941	920.61	0.98	0.94	0.94	11.50	295	254	253	66	69	69	260	
2	0946	923.36	0.93	0.89	0.89	11.00	296	253	255	66	69	69	262	
1	0951	926.08	1.05	1.00	1.00	12.00	289	255	254	65	69	69	261	
END	0956	928.741	—	—	—	—	—	—	—	—	—	—	—	0.161
B6	1120	928.~~890~~2	0.68	0.63	0.63	8.50	291	252	253	68	74	74	254	2 to 0.57
5	1125	931.07	0.78	0.72	0.72	10.00	294	258	254	68	75	74	256	leak ✓ 0.001 @ 14.00 "Hg
4	1130	933.50	0.68	0.63	0.63	9.50	294	276	252	67	75	74	258	
3	1135	935.80	1.10	1.00	1.00	12.00	297	278	253	67	74	75	259	

Pitot Tube Calibration Factor C_p ~~0.812~~ 0.810
Volume Collected V_m 62.019 ✓ ft³
Water Collected V_w 152.0 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -17.2 ✓ "H_2O

Pitot Tube No. 19-12-1
Baro. Press. P_b 28.98 ✓ "Hg
Probe Tip Dia. D_n 0.200 ✓ in.
% CO_2 14.0 ✓ % CO 0.0 ✓
% O_2 5.4 ✓ % N_2 80.6 ✓
Area Stack A_s 17220 ✓ in²

Barometer No. 19-1 ✓
Probe Tip No. TFE 1-7 ✓
Total Volume of Leak Checks After Start: 0.161 ft³
V_m = Dry Gas Meter Calibration Factor 61.102 X 1.015 ✓

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

D-5

Impinger Box No. Hg 3

			Water Weight Gain		
Impinger 1	Final Weight	862.0	Imp 3 Final 862.2	Impinger 1	112.5
	Initial Weight	749.5	Initial 849.3		
	Increase	112.5	12.9	Impinger 2	17.8
Impinger 2	Final Weight	762.8		Impinger 3	3.6
	Initial Weight	745.0			
	Increase	17.8		Impinger 4	5.3
			V_w =		
Impinger 3	Final Weight	759.1	g SO_2 = -	Impinger 5	0.1
	Initial Weight	755.5	V_w =		
	Increase	3.6		Impinger 6	0.0
Impinger 4	Final Weight	752.0		Impinger 7	-0.2
	Initial Weight	746.7		Impinger 8	12.9
	Increase	5.3		Total	152.0 = V_w
Impinger 5	Final Weight	770.7	P_b = 28.98	$\%CO_2$ =	14.0
	Initial Weight	770.6	V_m = 62.019	$\%O_2$ =	5.4
	Increase	0.1	V_w = 152.0	%CO =	0.0
			P_m = 0.835	$\%N_2$ =	80.6
Impinger 6	Final Weight	751.7	Avg ΔP = 0.890	A_s =	17220
	Initial Weight	751.7		D_n =	0.200
	Increase	0.0	Avg $\sqrt{\Delta P}$ = 0.938	T_t =	120
			C_p = ~~0.812~~ 0.810		27.72
Impinger 7	Final Weight	6666.2	P_s = -17.20 H_2O		27.22 "Hg
	Initial Weight	6666.4	T_m = 73 °F		533 °R
	Increase	-0.2	T_s = 292 °F		752 °R

Moisture Content: %M = 10.74 M_d = 0.8926 MW_d = 30.456 MW = 29.12

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 62.019 \left[\frac{28.98 + \frac{0.835}{13.6}}{73 + 460}\right] = \frac{59.643}{0.497}\ \text{sft}^3\ \text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 152.0 = 7.174 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{7.174}{59.643 + 7.174}$ x 100 = 10.74 %

$V_s = 5123.8 \times \frac{0.810}{\sqrt{0.812}} \sqrt{\frac{752}{27.72 \times 29.12}} \times 0.938 = \frac{3757}{3767}$ fpm

ACFM: $\frac{449,332}{450441}$

SCFM: $\frac{261,825}{262522}$

%I = $\frac{1,039 \times 59.443 \times 752}{0.8926 \times 27.72 \times \frac{3767}{3757} \times 120 \times (0.200)^2} = \frac{104.4}{104.2}$ %

%EA: 33.8

Run Number 1 — Hg — FIELD DATA

Unit 1 Scrubber Inlet Duct

Date 11-17-99

			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
B2	1140	938.65	0.85	0.79	0.79	11.50	295	277	252	67	76	75	260
1	1145	941.24	1.05	0.97	0.97	12.50	290	272	254	66	77	75	260
A6	1150	943.84	0.80	0.74	0.74	10.50	291	261	253	66	77	76	258
5	1155	946.24	1.20	1.10	1.10	13.50	293	260	253	66	77	76	260
4	1200	949.14	0.85	0.79	0.79	12.00	295	260	252	67	78	76	261
3	1205	951.75	0.98	0.90	0.90	13.00	291	260	253	67	78	77	262
2	1210	954.47	0.83	0.77	0.77	12.50	286	257	253	66	78	77	261
1	1215	957.04	0.95	0.87	0.87	13.00	282	255	254	67	79	77	262
END	1220	959.431	–	–	–	–	–	–	–	–	–	–	–

METCO ENVIRONMENTAL

Job Number 99-95 LAC 1 ✓
Job Name EPRI / KCP+L ✓
Run Number 2 ✓
Unit 1 Scrubber Inlet Duct ✓
Date 11-17-99 ✓
Operator Bass / 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 90
Assumed Moisture % 10.74
Probe Length 13'
C Factor 10 to 2.75 to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 14.00 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A~~B~~6	1415	962.720	0.65	0.59	0.59	8.00	289	250	251	68	82	82	255	thimble Q78
5	1420	964.92	1.20	1.10	1.10	10.00	291	251	252	67	82	82	256	filter 47Q125
4	1425	967.83	0.86	0.78	0.78	9.00	288	260	252	57	82	82	258	int orsat
3	1430	970.43	0.95	0.85	0.85	9.50	288	276	253	57	83	82	258	CST
2	1435	973.11	0.85	0.77	0.77	9.50	287	283	253	55	83	82	258	
1	1440	975.67	0.93	0.83	0.83	9.50	283	278	251	56	83	82	257	
B~~C~~6	1445	978.17	0.70	0.63	0.63	8.50	289	270	253	52	83	83	259	
5	1450	980.42	0.82	0.74	0.74	9.00	293	270	252	53	83	83	260	
4	1455	982.91	0.75	0.67	0.67	9.00	291	270	254	54	84	83	258	
3	1500	985.31	1.10	0.99	0.99	11.00	291	270	253	57	84	83	259	
2	1505	988.16	0.87	0.78	0.78	10.00	290	268	254	53	84	83	259	
1	1510	990.74	1.05	0.95	0.95	11.00	284	265	254	54	84	83	259	
END	1515	993.372	–	–	–	–	–	–	–	–	–	–	–	leak ✓ ~~good~~ 0.001 @ 14.00"Hg
C~~B~~6	1545	993.559	0.55	0.49	0.49	8.00	289	252	254	~~65~~ 68	84	84	260	0.187
5	1550	995.54	0.68	0.60	0.60	8.50	292	253	253	67	84	84	262	10 to 2.7
4	1555	997.78	0.68	0.60	0.60	8.50	296	258	254	58	85	85	262	
3	1600	000.03	0.88	0.78	0.78	10.50	298	270	254	56	85	85	260	
2	1605	002.59	0.82	0.73	0.73	10.50	295	277	255	56	85	85	262	

Pitot Tube Calibration Factor C_p ~~0.812~~ 0.810
Volume Collected V_m 59.589 ✓ ft^3
Water Collected V_w 143.0 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -19.30 ✓ "H_2O

Pitot Tube No. 19-12-1
Baro. Press. P_b 28.85 ✓ "Hg
Probe Tip Dia. D_n 0.200 ✓ in.
% CO_2 14.1 ✓ % CO 0.0 ✓
% O_2 5.3 ✓ % N_2 80.6 ✓
Area Stack A_s 17220 ✓ in^2

Barometer No. 19-1 ✓
Probe Tip No. TFE1-7 ✓
Total Volume of Leak Checks After Start: 0.187 ft^3
V_m = Dry Gas Meter Calibration Factor 58.708 X 1.015 ✓

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

Impinger Box No. Hg 1

			Water Weight Gain		
Impinger 1	Final Weight	825.2	Imp 8	Impinger 1	88.4
	Initial Weight	736.8	Final 925.4	Impinger 2	36.4
	Increase	88.4	Init - 913.6	Impinger 3	1.9
Impinger 2	Final Weight	786.7	11.8	Impinger 4	4.9
	Initial Weight	750.3	V_w =	Impinger 5	-0.1
	Increase	36.4	g SO_2 = -	Impinger 6	-0.5
Impinger 3	Final Weight	662.7	V_w =	Impinger 7	0.2
	Initial Weight	660.8		Impinger 8	11.8
	Increase	1.9		Total	143.0 ✓ = V_w
Impinger 4	Final Weight	750.0			
	Initial Weight	745.1			
	Increase	4.9			
Impinger 5	Final Weight	761.0	P_b = 28.85 ✓	$\%CO_2$ = 14.1 ✓	
	Initial Weight	761.1	V_m = 59.589 ✓	$\%O_2$ = 5.3 ✓	
	Increase	-0.1	V_w = 143.0 ✓	%CO = 0.0 ✓	
			P_m = 0.746 ✓	$\%N_2$ = 80.6 ✓	
Impinger 6	Final Weight	757.7	Avg ΔP = 0.835 ✓	A_s = 17220 ✓	
	Initial Weight	758.2		D_n = 0.200 ✓	
	Increase	-0.5	Avg $\sqrt{\Delta P}$ = 0.908 ✓	T_t = 120 ✓	
			0.819 C_p = ~~0.812~~ ✓		
Impinger 7	Final Weight	773.2	P_s = -19.30 ✓ "H_2O	27.43 ✓ "Hg	
	Initial Weight	773.0	T_m = 84 ✓ °F	544 ✓ °R	
	Increase	0.2	T_s = 291 ✓ °F	751 ✓ °R	

Moisture Content: %M = 10.78 ✓ M_d = 0.8922 ✓ MW_d = 30.468 ✓ MW = 29.12 ✓

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 59.589 \left[\frac{28.85 + \frac{0.746}{13.6}}{84 + 460}\right] = \frac{55.883}{0.466} \text{ sft}^3/\text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 143.0 = 6.750 ✓ sft^3 ✓

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{6.750}{55.883 + 6.750}$ x 100 = 10.78 %

$V_s = 5123.8 \times \frac{0.810}{\sqrt{\text{~~0.812~~}}} \sqrt{\frac{751}{27.43 \times 29.12}} \times 0.908 =$ ~~3663~~ 3654 ✓ fpm

ACFM: ~~438042~~ 436,963 ✓

SCFM: ~~252827~~ 252,206 ✓

$\%I = \frac{1,039 \times 55.883 \times 751}{0.8922 \times 27.43 \times \text{~~3663~~} 3654 \times 120 \times (0.200)^2} =$ ~~101.3~~ 101.6 ✓ %

%EA: 33.0 ✓

Run Number 2 Hg FIELD DATA

Unit 1 Scrubber Inlet Duct

Date 10-17-99

			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
CB1	1610	005.06	1.15	1.00	1.00	12.00	291	273	254	55	85	85	262	
DUP	1615	007.76	0.42	0.37	0.37	8.00	291	267	253	55	85	85	262	
5	1620	009.49	0.65	0.57	0.57	9.50	292	265	253	56	85	85	260	
4	1625	011.66	0.82	0.72	0.72	11.00	295	261	254	58	85	85	262	
3	1630	014.11	0.88	0.78	0.78	11.50	298	257	254	59	85	85	262	
2	1635	016.65	0.88	0.78	0.78	11.50	296	256	253	58	85	85	261	
1	1640	019.20	0.90	0.80	0.80	12.00	291	253	251	58	85	85	260	
END	1645	021.615	-	-	-	-	-	-	-	-	-	-	-	

METCO ENVIRONMENTAL

Job Number 99-95LAC1 ✓
Job Name KCP&L - EPRI ✓
Run Number 3 ✓
Unit Unit 1 Scrubber Inlet Duct ✓
Date 11-18-99 ✓
Operator Bass / Hart / 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 81
Assumed Moisture % 10.71
Probe Length 13'
C Factor 10 to 2.7 to reference
Initial Leak @ 15.00 "Hg = 0.001 cfm
Final Leak @ 16.00 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	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 (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
D6	0915	033.262	0.52	0.46	0.46	7.00	287	253	250	64	73	72	260	thimble Q80
5	0920	035.19	0.65	0.58	0.58	7.50	289	273	253 ~~273~~	66	73	72	261	filter 47Q120
4	0925	037.35	0.78	0.69	0.69	8.50	293	271	252	57	73	72	262	Dft. circuit
3	0930	039.73	0.90	0.80	0.80	9.00	296	267	254	56	73	72	261	CST
2	0935	042.27	0.88	0.78	0.78	9.00	292	262	254	55	73	73	262	
1	0940	044.79	0.98	0.87	0.87	9.50	289	256	253	54	74	73	262	
C6	0945	047.28	0.52	0.46	0.46	7.00	290	253	254	52	74	73	261	
5	0950	049.17	0.68	0.60	0.60	8.00	292	262	254	52	74	73	262	
4	0955	051.39	0.68	0.60	0.60	8.00	296	264	255	53	74	73	262	
3	1000	053.61	0.90	0.80	0.80	10.00	297	262	253	53	74	73	262	
2	1005	056.17	0.78	0.69	0.69	9.50	295	263	254	54	75	74	261	
1	1010	058.59	1.05	0.93	0.93	11.00	291	260	254	55	75	74	261	
END	1015	061.216	—	—	—	—	—	—	—	—	—	—	—	leak ✓ @ 13.00"Hg 0.001cfm
B6	1040	061.323	0.58	0.50	0.50	8.00	289	250	254	64	76	75	262	0.107
5	1045	063.30	0.70	0.60	0.60	9.00	293	251	253	62	76	75	262	1 to 0.27
4	1050	065.52	0.77	0.66	0.66	9.50	296	253	254	60	76	76	259	
3	1055	067.85	0.97	0.83	0.83	10.50	297	255	254	59	76	76	263	
2	1100	070.48	0.75	0.65	0.65	10.00	295	260	255	57	76	76	263	

Pitot Tube Calibration Factor C_p ~~0.812~~ 0.810
Volume Collected V_m 57.390 ✓ ft³
Water Collected V_w 141.7 ✓ ml
Time of Test T_t 120 ✓ min.
Stack Pressure P_s -22.20 ✓ H_2O

Pitot Tube No. M-12-1
Baro. Press. P_b 28.73 "Hg
Probe Tip Dia. D_n 0.200 ✓ in.
% CO_2 14.0 ✓ % CO 0.0 ✓
% O_2 5.6 ✓ % N_2 80.4 ✓
Area Stack A_s 17220 ✓ in²

Barometer No. 19-1 ✓ Probe Tip No. TFE1-7 ✓
Total Volume of Leak Checks After Start: 0.107 ft³
V_m = Dry Gas Meter Calibration Factor 56.542 X 1.015 ✓

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

Impinger Box No. Hg 3

			Water Weight Gain		
Impinger 1	Final Weight	855.8	Impinger 8	Impinger 1	107.7
	Initial Weight	748.1	Final 874.3		
	Increase	107.7	Int' 862.4	Impinger 2	14
			11.9		
Impinger 2	Final Weight	760.5		Impinger 3	3.2
	Initial Weight	746.5			
	Increase	14		Impinger 4	4.8
			V_w =		
Impinger 3	Final Weight	761.2	g SO_2 =	Impinger 5	-0.4
	Initial Weight	758.0	V_w =		
	Increase	3.2		Impinger 6	0.6
Impinger 4	Final Weight	751.6		Impinger 7	-0.1
	Initial Weight	746.8		Impinger 8	11.9
	Increase	4.8		Total	141.7 = V_w
Impinger 5	Final Weight	772.5	P_b = 28.73	%CO_2 =	14.0
	Initial Weight	772.9	V_m = 57.390	%O_2 =	5.6
	Increase	-0.4	V_w = 141.7	%CO =	0.0
			P_m = 0.702	%N_2 =	80.4
Impinger 6	Final Weight	753.6	Avg ΔP = 0.805	A_s =	17220
	Initial Weight	753.0		D_n =	0.200
	Increase	0.6	Avg $\sqrt{\Delta P}$ = 0.892	T_t =	120
			C_p ≅ 0.80 ~~0.812~~		
Impinger 7	Final Weight	667.5	P_s = -22.20 "H_2O		27.10 "Hg
	Initial Weight	667.6	T_m = ~~292~~ 75 °F		535 °R
	Increase	-0.1	T_s = 292 °F		752 °R

Moisture Content: %M = 10.93 M_d = 0.8907 MW_d = 30.464 MW = 29.10

$$Vm_{std} = 17.65\ Vm\left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 57.390\left[\frac{28.73 + \frac{0.702}{13.6}}{75 + 460}\right] = \frac{54.493}{0.454}\ \text{sft}^3/\text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 141.7 = 6.688 sft³

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{6.688}{54.493 + 6.688} \times 100$ = 10.93 %

V_s = 5123.8 x ~~0.812~~ 0.810 $\sqrt{\frac{752}{27.10 \times 29.10}}$ x 0.892 = ~~3624~~ 3615 fpm

ACFM: ~~433573~~ 432,305

SCFM: ~~246382~~ 245,770

%I = $\frac{1{,}039 \times 54.493 \times 752}{3615 \times 27.10 \times 0.8907 \times 120 \times (0.200)^2}$ = ~~101.4~~ 101.7 %

%EA: 35.7

Run Number 3

Unit 1 Scrubber Inlet Duct

Date 11Ø-18-99

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
B1	1105	072.83	0.95	0.91	0.81	11.50	291	261	253	56	76	76	262
A6	1110	075.29	0 68	0 58	0.58	9.50	290	259	254	56	77	76	261
5	1115	077.37	1.05	0 90	0.90	12.00	291	264	255	57	77	76	261
4	1120	080.08	0.73	0 63	0.63	10.50	293	265	255	58	77	76	262
2	1125	082.42	0.93	0.80	0.80	12.00	290	266	253	59	77	77	262
2	1130	084.98	0.78	0.67	0.67	11.00	287	264	253	60	78	77	261
1	1135	087.38	1.10	0.95	0.95	13.50	284	259	252	59	78	77	261
END	1140	089.911	—	—	—	—	—	—	—	—	—	—	—

METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 29-1

CALIBRATION DATA

Date: 11-22-99

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

Meter Adjusted? Yes _____ No ✓

Calibrator: Jason Conway #273

Checked By: Scott Hall #268

METCO ENVIRONMENTAL

BAROMETER CALIBRATION

Barometer No. 99-1

Date: 11-22-99

Time: 1115

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	=	29.18
Variation	=	0.044

Barometer Adjusted? Yes ✓ No _____

Scott Hart #268 ✓

Signature of Calibrator

APPENDIX D

Analytical Data

TestAmerica
INCORPORATED

January 6, 2000 1/7/00

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 EPRI/KCPL samples submitted to TestAmerica for analysis. The samples were analyzed following the SOP based on the Ontario-Hydro Method.

Case Narrative

TestAmerica received on December 2,1999. All samples were intact when received. Please note the following:

- The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias.
- For Unit 1 Stack Run 3, two filters for Container #1A were provided. Both filters were analyzed separately and combined as part of the final results.
- 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
QA Coordinator

TestAmerica
INCORPORATED

Sample ID: EPRI/KCPL
Lacygne, Kansas

Hg Analysis
Ontario Hydro Method

Summary Report

	Unit #1 Stack Run 1	Unit #1 Stack Run 2	Unit #1 Stack Run 3	Unit #1 Scrubber A Inlet Duct Run 1	Unit #1 Scrubber A Inlet Duct Run 2	Unit #1 Scrubber A Inlet Duct Run 3
Particle Bound Hg (ug)	0.07	0.09	0.16	9.82	9.00	7.90
Oxidized Hg (ug)	0.00	0.00	0.00	5.84	4.61	0.00
Elemental Hg (ug)	14.62	12.18	9.36	1.91	0.00	0.00
Total Hg (ug)	14.69	12.27	9.52	17.57	13.61	7.90

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

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

TestAmerica
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Sample ID: EPRI/KCPL
Lacygne, Kansas

Hg Analysis
Ontario Hydro Method

Duplicate Summary Report

	Unit #1 Stack Run 1	Unit #1 Stack Run 2	Unit #1 Stack Run 3	Unit #1 Scrubber A Inlet Duct Run 1	Unit #1 Scrubber A Inlet Duct Run 2	Unit #1 Scrubber A Inlet Duct Run 3
Particle Bound Hg (ug)	0.07	0.09	0.16	10.01	9.22	7.91
Oxidized Hg (ug)	0.00	0.00	0.00	5.59	4.56	0.00
Elemental Hg (ug)	14.53	12.23	9.23	1.89	0.00	0.00
Total Hg (ug)	14.60	12.32	9.39	17.49	13.78	7.91

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

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

TestAmerica
INCORPORATED

Sample ID: EPRI/KCPL
Lacygne, Kansas

Unit #1 Stack Run 1

Hg Analysis
Ontario Hydro Method

Collected On: 11/17/99
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	QH53	12/30/99	01/03/00	jpp	0.070	0.067	<1.0	---	---	ug	*1	
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2LC-4	12/16/99	12/17/99	jpp	<0.450	<0.450	0	<0.450	0	ug		
Container # 3	3LC-4	12/16/99	12/17/99	jpp	<1.48	<1.48	0	---	---	ug		
Container # 4	4LC-4	12/18/99	12/19/99	jpp	<0.740	<0.740	0	---	---	ug		
Container # 5	5LC-4	12/18/99	12/19/99	jpp	14.62	14.53	<1.0	14.72	<1.0	ug		

Particle Bound Hg (ug) **0.07**
(Containers 1A, 1B, and 2)

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

Elemental Hg (ug) **14.62**
(Containers 4 and 5)

Total Hg (ug) **14.69**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.07**
(Containers 1A, 1B, and 2)

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

Dup. Elemental Hg (ug) **14.53**
(Containers 4 and 5)

Dup. Total Hg (ug) **14.60**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: * 1 - The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias. All other quality control indicators were within control limits.

TestAmerica
INCORPORATED

Sample ID: EPRI/KCPL
Lacygne, Kansas

Unit #1 Stack Run 2

Hg Analysis
Ontario Hydro Method

Collected On: 11/17/99
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	QH57	12/30/99	01/03/00	jpp	0.087	0.086	<1.0	---	---	ug	*1	
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2LC-6	12/16/99	12/17/99	jpp	<0.240	<0.240	0	---	---	ug		
Container # 3	3LC-6	12/16/99	12/17/99	jpp	<1.42	<1.42	0	---	---	ug		
Container # 4	4LC-6	12/18/99	12/19/99	jpp	<0.640	<0.640	0	---	---	ug		
Container # 5	5LC-6	12/18/99	12/19/99	jpp	12.18	12.23	<1.0	12.38	1.6	ug		

Particle Bound Hg (ug) 0.09
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) 0.00
(Containers 3)

Elemental Hg (ug) 12.18
(Containers 4 and 5)

Total Hg (ug) 12.27
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) 0.09
(Containers 1A, 1B, and 2)

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

Dup. Elemental Hg (ug) 12.23
(Containers 4 and 5)

Dup. Total Hg (ug) 12.3
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: * 1 - The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias. All other quality control indicators were within control limits.

TestAmerica
INCORPORATED

Sample ID: **EPRI/KCPL**
Lacygne, Kansas

Unit #1 Stack Run 3

Hg Analysis
Ontario Hydro Method

Collected On: 11/18/99
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	QH59	12/30/99	01/03/00	jpp	0.088	0.087	1.7	---	---	ug	*1,*2	
Container # 1A	QH60	12/30/99	01/03/00	jpp	0.072	0.070	2.9	---	---	ug	*1,*2	
Container # 1B		Not Provided		jpp	---	---	---	---	---	ug		
Container # 2	2LC-8	12/16/99	12/17/99	jpp	<0.420	<0.420	0	---	---	ug		
Container # 3	3LC-8	12/16/99	12/17/99	jpp	<1.48	<1.48	0	---	---	ug		
Container # 4	4LC-8	12/18/99	12/19/99	jpp	<0.560	<0.560	0	---	---	ug		
Container # 5	5LC-8	12/18/99	12/19/99	jpp	9.36	9.23	1.6	---	---	ug		

Particle Bound Hg (ug) **0.16**
(Containers 1A, 1B, and 2)

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

Elemental Hg (ug) **9.36**
(Containers 4 and 5)

Total Hg (ug) **9.52**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **0.16**
Containers 1A, 1B, and 2)

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

Dup. Elemental Hg (ug) **9.23**
(Containers 4 and 5)

Dup. Total Hg (ug) **9.39**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes:
* 1 - The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias. All other quality control indicators were within control limits.
* 2 - Two filters were provided for Container #1A.

TestAmerica
INCORPORATED

Sample ID: EPRI/KCPL
Lacygne, Kansas

Hg Analysis
Ontario Hydro Method

Unit #1 Scrubber A Inlet Duct Run 1

Collected On: 11/17/99
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	Q79	12/30/99	01/03/00	jpp	9.82	10.01	1.8	---	---	ug	*1	
Container # 1B	Q121	12/30/99	01/03/00	jpp	<0.01	<0.01	0	---	---	ug	*1	
Container # 2	2LC-3	12/16/99	12/17/99	jpp	<0.260	<0.260	0	---	---	ug		
Container # 3	3LC-3	12/16/99	12/17/99	jpp	5.84	5.59	4.4	---	---	ug		
Container # 4	4LC-3	12/18/99	12/19/99	jpp	<0.600	<0.600	0	---	---	ug		
Container # 5	5LC-3	12/18/99	12/19/99	jpp	1.91	1.89	1.3	---	---	ug		

Particle Bound Hg (ug) **9.82**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **5.84**
(Containers 3)

Elemental Hg (ug) **1.91**
(Containers 4 and 5)

Total Hg (ug) **17.57**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **10.01**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **5.59**
(Containers 3)

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

Dup. Total Hg (ug) **17.49**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: * 1 - The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias. All other quality control indicators were within control limits.

TestAmerica
INCORPORATED

Sample ID: **EPRI/KCPL**
Lacygne, Kansas

Hg Analysis
Ontario Hydro Method

Unit #1 Scrubber A Inlet Duct Run 2

Collected On: 11/17/99
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	Q78	12/30/99	01/03/00	jpp	9.00	9.22	2.4	---	---	ug	*1	
Container # 1B	Q125	12/30/99	01/03/00	jpp	<0.010	<0.010	0	---	---	ug	*1	
Container # 2	2LC-5	12/16/99	12/17/99	jpp	<0.220	<0.220	0	---	---	ug		
Container # 3	3LC-5	12/16/99	12/17/99	jpp	4.61	4.56	1.2	---	---	ug		
Container # 4	4LC-5	12/18/99	12/19/99	jpp	<0.720	<0.720	0	---	---	ug		
Container # 5	5LC-5	12/18/99	12/19/99	jpp	<0.930	<0.930	0	---	---	ug		

Particle Bound Hg (ug) **9.00**
(Containers 1A, 1B, and 2)

Oxidized Hg (ug) **4.61**
(Containers 3)

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

Total Hg (ug) **13.61**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **9.22**
(Containers 1A, 1B, and 2)

Dup. Oxidized Hg (ug) **4.56**
(Containers 3)

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

Dup. Total Hg (ug) **13.78**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: * 1 - The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias. All other quality control indicators were within control limits.

TestAmerica
INCORPORATED

Sample ID: **EPRI/KCPL**
Lacygne, Kansas

Hg Analysis
Ontario Hydro Method

Unit #1 Scrubber A Inlet Duct Run 3

Collected On: 11/18/99
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	Q80	12/30/99	01/03/00	jpp	7.90	7.91	<1.0	---	---	ug	*1	
Container # 1B	Q126	12/30/99	01/03/00	jpp	<0.01	<0.01	0	---	---	ug	*1	
Container # 2	2LC-7	12/16/99	12/17/99	jpp	<0.200	<0.200	0	---	---	ug		
Container # 3	3LC-7	12/16/99	12/17/99	jpp	<1.56	<1.56	0	---	---	ug		
Container # 4	4LC-7	12/18/99	12/19/99	jpp	<0.680	<0.680	0	<0.680	0	ug		
Container # 5	5LC-7	12/18/99	12/19/99	jpp	<0.940	<0.940	0	---	---	ug		

Particle Bound Hg (ug) **7.90**
(Containers 1A, 1B, and 2)

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

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

Total Hg (ug) **7.90**
(Containers 1A, 1B, 2, 3, 4, and 5)

Dup. Part. Bound Hg (ug) **7.91**
(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) **7.91**
(Containers 1A, 1B, 2, 3, 4, and 5)

Notes: * 1 - The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias. All other quality control indicators were within control limits.

TestAmerica
INCORPORATED

Sample ID: EPRI/KCPL
Lacygne, Kansas

Unit #1 Stack Blank Train

Hg Analysis
Ontario Hydro Method

Collected On: 11/18/99
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	3LC-2	12/16/99	12/17/99	jpp	<0.940	<0.940	0	<0.940	0	ug		
Container # 4	4LC-2	12/18/99	12/19/99	jpp	<0.620	<0.620	0	---	---	ug		
Container # 5	5LC-2	12/18/99	12/19/99	jpp	<0.940	<0.940	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: **EPRI/KCPL**
Lacygne, Kansas

Hg Analysis
Ontario Hydro Method

Unit #1 Scrubber A Inlet Duct Blank Train

Collected On: 11/18/99
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	3LC-1	12/16/99	12/17/99	jpp	<0.820	<0.820	0	---	---	ug		
Container # 4	4LC-1	12/18/99	12/19/99	jpp	<0.580	<0.580	0	---	---	ug		
Container # 5	5LC-1	12/18/99	12/19/99	jpp	<0.950	<0.950	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: **EPRI/KCPL**
Lacygne, Kansas

Hg Analysis
Ontario Hydro Method

Reagent Blanks

Collected On: 11/17/99
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	RBLC7	---	12/19/99	jpp	<0.2	<0.2	0	---	---	ug/L		
Container # 8	RBLC8	12/16/99	12/17/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 9	RBLC9	12/18/99	12/19/99	jpp	<4.0	<4.0	0	---	---	ug/L		
Container # 10	RBLC10	12/18/99	12/19/99	jpp	<2.0	<2.0	0	---	---	ug/L		
Container # 11	RBLC11	---	12/19/99	jpp	<0.2	<0.2	0	---	---	ug/L		
Container # 12A	QH54	12/30/99	01/03/00	jpp	<0.010	<0.010	0	---	---	ug	*1	88 mm
Container # 12B	Q122	12/30/99	01/03/00	jpp	<0.010	<0.010	0	---	---	ug	*1	47 mm

Notes: * 1 - The NIST ash reference standards that were prepared with the filter samples from this sample set had recoveries that were slightly above the uncertainties provided by NIST. The certified value provided by NIST is 0.141ug/g +/- 0.019ug/g. The results for the two prep batches that are associated with this sample set were 0.167 ug/g (118 %) and 0.177 ug/g (126 %). The filter sample results may have a slightly high bias. All other quality control indicators were within control limits.

Mercury Sample Train Receipt

Mercury Sample Train Receipt Record

Client ID
EPRI | KCPL
LACYGNE, KS

Location ID/Run #
UNIT 1
STACK
RUN 1

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	225 + ___ + ___ = 225.	2LC-4	
☒ 3 (2)	500 + 240 + ___ = 740.	3LC-4	
☒ 4 (1)	185 + ___ + ___ = 185.	4LC-4	
☒ 5 (1)	485 + ___ + ___ = 485.	5LC-4	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (1)	QH53		
☐ 1B ( )			
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: SGS
Date: 12/4/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EPRI | KCPL
LACYGNE, KS

Location ID/Run #
UNIT 1
STACK
RUN #2

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	120 + ___ + ___ = 120.	2LC-6	
☒ 3 (2)	435 + 275 + ___ = 710.	3LC-6	
☒ 4 (1)	160 + ___ + ___ = 160.	4LC-6	
☒ 5 (1)	495 + ___ + ___ = 495.	5LC-6	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (1)	QH57		
☐ 1B ( )			
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: _____

Date: _____

TestAmerica
INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EPRI / KCPL
LACYGNE, KS

Location ID/Run #
UNIT 1
STACK
RUN #3

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	210 + ___ + ___ = 210.	2LC-8	
☒ 3 (2)	460 + 280 + ___ = 740.	3LC-8	
☒ 4 (1)	140 + ___ + ___ = 140.	4LC-8	
☒ 5 (1)	485 + ___ + ___ = 485.	5LC-8	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (2)	QH59, QH60		
☐ 1B ( )			
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: SGS
Date: 12/4/99

TestAmerica
INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EPRI / KCPL
LACYGNE, KS

Location ID/Run #
UNIT 1
SCRUBBER
RUN 1

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	130 + ___ + ___ = 130.	2LC-3	
☒ 3 (2)	485 + 325 + ___ = 810.	3LC-3	
☒ 4 (1)	150 + ___ + ___ = 150.	4LC-3	
☒ 5 (1)	500 + ___ + ___ = 500.	5LC-3	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (1)	Q79		
☒ 1B (1)	Q121		
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: SCS
Date: 12/4/99

TestAmerica
INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EDR/KCDL
LACYGNE

Location ID/Run #
UNIT 1 SCRUBBER
RUN 2

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☒ 2 (1)	110 + ___ + ___ = 110.	ZLC-5	
☒ 3 (2)	450 + 340 + ___ = 790.	3LC-5	
☒ 4 (1)	180 + ___ + ___ = 180.	4LC-5	
☒ 5 (1)	460 + ___ + ___ = 460.	5LC-5	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☒ 1A (1)	Q78		
☒ 1B (1)	Q125		
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: SGS
Date: 12/4/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EPRI / KCPL
LACYGNE, KS

Location ID/Run #
UNIT 1
SCRUBBER
RUN 3

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☑ 2 (1)	100 + ___ + ___ = ___.	ZLC-7	
☑ 3 (2)	480 + 300 + ___ = 780.	3LC-7	
☑ 4 (1)	170 + ___ + ___ = 170.	4LC-7	
☑ 5 (1)	470 + ___ + ___ = 470.	5LC-7	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☑ 1A (1)	Q80		
☑ 1B (1)	Q126		
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: SGS
Date: 12/4/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EPRI | KCPL
LAC4 LONG

Location ID/Run #
UNIT 1
STACK
BLANK TRAIN

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☑ 3 (1)	470 + ___ + ___ = 470.	3LC-2	
☑ 4 (1)	155 + ___ + ___ = 155.	4LC-2	
☑ 5 (1)	470 + ___ + ___ = 470.	5LC-2	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☐ 1B ( )			
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: SLS
Date: 12/4/99

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EPRI / KCPL
LACYGNE, KS

Location ID/Run #
UNIT #1
SCRUBBER
BLANK TRAIN

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☒ 3 ( )	410 + ___ + ___ = 410.	3LC-1	
☒ 4 ( )	145 + ___ + ___ = 145.	4LC-1	
☒ 5 ( )	475 + ___ + ___ = 475.	5LC-1	
☐ 7 ( )	___ + ___ + ___ = ___.		
☐ 8 ( )	___ + ___ + ___ = ___.		
☐ 9 ( )	___ + ___ + ___ = ___.		
☐ 10 ( )	___ + ___ + ___ = ___.		
☐ 11 ( )	___ + ___ + ___ = ___.		

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☐ 1B ( )			
☐ 12	(47 mm)		
	(88 mm)		
	(Thimble)		

Notes: _____

Checked By: SGS
Date: 12/4/96

TestAmerica INCORPORATED

Mercury Sample Train Receipt Record

Client ID
EPRI | KCPL
LACYGNE, KS

Location ID/Run #
UNIT #1
REAGENT BLANKS

Solutions:

Cont. ID/(#)	Volumes (mL)	TestAmerica ID(s)	Comments
☐ 2 ( )	___ + ___ + ___ = ___.		
☐ 3 ( )	___ + ___ + ___ = ___.		
☐ 4 ( )	___ + ___ + ___ = ___.		
☐ 5 ( )	___ + ___ + ___ = ___.		
☑ 7 (1)	49 + ___ + ___ = 49.	RBLC-7	
☑ 8 (1)	51 + ___ + ___ = 51.	RBLC-8	
☑ 9 (1)	52 + ___ + ___ = 52.	RBLC-9	
☑ 10 (1)	49 + ___ + ___ = 49.	RBLC-10	
☑ 11 (1)	104 + ___ + ___ = 104.	RBLC-11	

Filters:

Cont. ID/(#)	Filter ID(s)		
☐ 1A ( )			
☐ 1B ( )			
☑ 12	Q122, Q123, Q124 (47 mm) QH54, QH55, QH56 (88 mm) Q81, Q82, Q83 (Thimble)		

Notes: _____

Checked By: SGS
Date: 12/4/99

TestAmerica INCORPORATED

Mercury Prep Batch Sheets

LaCygne, KS (S+10)

AQUEOUS MERCURY BATCH SHEET

analyst: SGS/JRP date: 12-18-99 WATER BATH: start mid end

temp:

standard reference #: 65-41-17

time:

icv reference #: 65-41-18

sample # / client	prep info
BLANK	
MS	
MSD	
SLC-1 475mL	
SLC-2 470mL	
SLC-3 500mL	
SLC-4 TRP 485mL	
SLC-5 SPK 465mL	
SLC-6 TRP 495	
SLC-7 SPK 470	
SLC-8 485	
RBLC-10 49	
RBLC-7	
RBLC-11	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

comments: HYDROX HCl = 65-47-16 / RBLC7 + RBLC11 NOT PREPPED, ANALYZED "AS IS"

SnCl2 ~~65-45-9~~ 65-49-9

JMP 2/12

LaCygne, KS. (419)

AQUEOUS MERCURY BATCH SHEET

analyst: SGS/JRP date: 12-18-97 WATER BATH: start mid end

temp: _____

standard reference #: 65-41-7

time: _____

icv reference #: 65-41-18

sample # / client	prep info
BLANK	
MS	
MSD	
4LC-1 145mL	2.5mL
4LC-2 155mL	
4LC-3 150mL	
4LC-4 185mL	
4LC-5 180mL	
4LC-6 160mL	
4LC-7 TRP 170mL	
4LC-8 SPK 160mL	
RBLC-9 52mL	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

comments: HCl = 65-45-15 / $KMnO_4$ = 65-49-1 / HYDROX. HCl = 65-41-3 /

$SnCl_2$ ~~65-45-9~~ 65-49-9
RPD: 2.1%

AQUEOUS MERCURY BATCH SHEET

analyst: SDP date: 12/16/09 WATER BATH: start mid end

temp: _____

standard reference #: 67-3-7

time: _____

icv reference #: 67-3-8

sample # / client		prep info
RBLC		
~~MS~~		
~~MSD~~		
2LC 3	130mL	
2LC 4 TRP	225mL	
2LC 5 SPK	110mL	
2LC 6	170mL	
2LC 7	100mL	
2LC 8	210mL	
RBLC 8	49mL	
RBDE 13	50mL	
3LC 1	410mL	
3LC 2 TRP	470mL	
3LC 3 SPK	~~470mL~~ 830mL	810mL
3LC 4	740mL	
3LC 5	MP ~~790mL~~	740mL
3LC 6	710mL	
3LC 7	780mL	
3LC 8	740mL	

MB	ICV

MS	MSD

RPD	FLAG

SECONDARY DATA CHECK:

ANALYST:

DATE:

$K_2S_2O_8$ - 65-43-12

HNO_3 - 65-48-14

H_2SO_4 - 65-38-9

$KMnO_4$ - 65-44-18

NH_4OH - 65-47-16

$SnCl_2$ - 65-49-8

comments: RBDE 13 NOT PREPPED. ANALYZED AS IS.

LACYGNE FILTERS

NONAQUEOUS MERCURY BATCH SHEET

Analyst: [illegible] Date: 12/30/95 Water Bath: start mid end

1/3/00 RUNDATE-SPP

Standard Reference: 67-3-7 temp: _____

ICV Reference: 67-3-8 date: _____

		Sample # / Client	Weight	MS	MSD
15 ~~16~~	4	BLANK			
14 ~~15~~	3	1633B	0.5131	97.44	
13 ~~14~~	2	47Q122 TRP			
* 1 ~~13~~	1	88QH60 SPK			

MB

ICV

MS

MSD

RPD

FLAG

HF - 65-27-17
HCl 65-50-15
HNO_3 67-1-22
$SnCl_2$ 67-3-9
Boric Acid 67-2-18

SECONDARY DATA CHECK: analyst:
date:

Comments: vessel #1 arced during digestion, due to H_2O on rim (?) or else metallic residue from filter sample.
Total digestion time not known.

LA CYGNE FILTERS

NONAQUEOUS MERCURY BATCH SHEET

Analyst: JRP Date: 12/30/99 Water Bath: start mid end
1/3/00 RUN DATE YYY

Standard Reference: 67-3-7 temp: _____

ICV Reference: 67-3-8 date: _____

	Sample # / Client	Weight	MS	MSD
12	BLANK			
11	NIST1633B	0.5393	92.71	
10	Q78	0.5416		
9	472125 PRP			
8	Q79 12/30 JRP	~~0.6144~~	0.5337	
7	472121 SPK			
6	Q80	0.5077		
5	472126			
4	882H54			
3	882H53			
2	882H57			
1	882H59			

MB

ICV

MS

MSD

RPD

FLAG

HF 65-27-17
HNO_3 67-1-22
HCl 65-50-15
$SnCl_2$ 67-3-9
Boric Acid 67-2-18

SECONDARY DATA CHECK: analyst:
date:

Comments: In Folder as 0103003

12/17/99 Analytical Run

```
Protocol: SYSTEST
                    Rev: 3.001    Time: 18:45:42  17 Dec 1999
Folder: DEC99B      Seq: 684                     Print: On
User:               Batch:            Id: ccv        Cup: 1 35 Gas:    0.23 LPM
State: Idle                                          Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 121799b

Cup	Id	Extended id	Weight	Volume	Macro check	Help
1	icb		1.0000	1.0000		
2	2,31cblk		1.0000	1.0000		
3	1cblkdup		1.0000	1.0000		
4	21c3		1.0000	1.0000		
5	21c3 dup		1.0000	1.0000		
6	21c4		1.0000	1.0000		
7	21c4 dup		1.0000	1.0000		
8	21c4 trp		1.0000	1.0000		
9	21c5		1.0000	1.0000		
10	21c5 dup		1.0000	1.0000		
11	21c5 spk		1.0000	1.0000		
12	21c6		1.0000	1.0000		
13	21c6 dup		1.0000	1.0000		
14	21c7		1.0000	1.0000		
15	21c7 dup		1.0000	1.0000		

PgDn

```
Cup 1  ID: icb                                  Cell entry, Ins to switch
                                                                129 9  12
```

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 18:45:50  17 Dec 1999
Folder: DEC99B      Seq: 684                    Print: On
User:               Batch:          Id: ccv        Cup: 1 35 Gas:    0.23 LPM
State: Idle                                        Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 121799b PgUp

cup Id	Extended id	Weight	Volume	Macro check	Help
16 21c8		1.0000	1.0000		
17 21c8 cup		1.0000	1.0000		
18 rblc8		1.0000	1.0000		
19 rblc8 cup		1.0000	1.0000		
20 31c1		1.0000	1.0000		
21 31c1 dup		1.0000	1.0000		
22 ccb		1.0000	1.0000		
23 ccv		1.0000	1.0000		
24 31c2		1.0000	1.0000		
25 31c2 cup		1.0000	1.0000		
26 31c2 trp		1.0000	1.0000		
27 31c3		1.0000	1.0000		
28 31c3 dup		1.0000	1.0000		
29 31c3 sox		1.0000	1.0000		
30 31c4		1.0000	1.0000		

PgDn

```
Cup 16 ID: 21c8                          Cell entry, Ins to switch
                                                          129 9  10
```

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 19:45:52  17 Dec 1999
Folder: DEC99B      Seq: 684                    Print: On
User:               Batch:            Id: ccv        Cup: 1 35 Gas:    0.23 LPM
State: Idle                                          Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 121799b PgUp

cup	Id	Extended id	Weight	Volume	Macro check	Help
31	31c4 dup		1.0000	1.0000		
32	31c5		1.0000	1.0000		
33	31c5 dup		1.0000	1.0000		
34	31c6		1.0000	1.0000		
35	31c6 dup		1.0000	1.0000		
36	31c7		1.0000	1.0000		
37	31c7 dup		1.0000	1.0000		
38	31c8		1.0000	1.0000		
39	31c8 dup		1.0000	1.0000		
40	ccb		1.0000	1.0000		
41	ccv		1.0000	1.0000		
42			1.0000	1.0000		
43			1.0000	1.0000		
44			1.0000	1.0000		

PgDn

```
Cup 31 ID: 31c4 dup                          Cell entry, Ins to switch
                                                                129 9  12
```

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

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

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

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

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

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

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

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

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

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

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

*** Standard: 6 Rep: 1 Seq: 642 16:15:55 17 Dec 1999 HG

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

Protocol: SYSTEST

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

Folder: DEC99B Seq: 643 Print: On

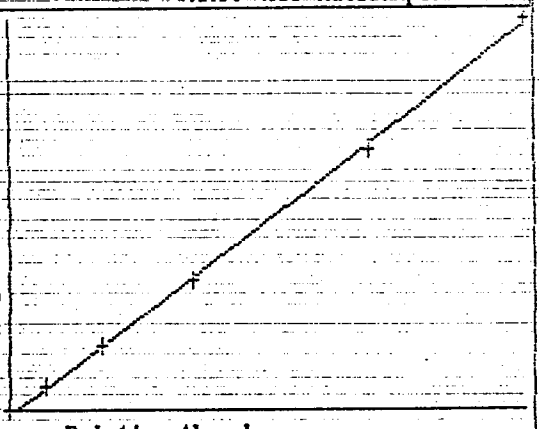
User: Batch: Id: Std6Rep1 Cup: 1 29 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

CALIBRATION: Line Calibration

Line: Hg Accepted

	Conc.	Calc.	Dev.	LiNear
S1	.000	-.020	-.020	Quadratic
S2	.200	.187	-.013	WtdLinear
S3	.500	.498	-.002	C
S4	1.00	1.03	.033	Accept o
S5	2.00	2.04	.040	n
S6	3.00	2.96	-.038	StdAdd c
A	.0000000	r	.999649	
B	2.21958e-5	C	-2.19523e-2	



Relative Absorbance

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

33?

New calibration coefficients stored 149 2 5

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

***Check Standard: 2 Ck2 Seq: 643 16:44:23 17 Dec 1999 HG

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

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: icb					Seq: 683	18:49:47 17 Dec 1999 HG			
Hg	-.022	ug/L	.000	-.022					<0.200 ng/L
*** Sample ID: 2.5lcblk					Seq: 685	18:52:05 17 Dec 1999 HG			
Hg	-.001	ug/L	.000	-.001					<0.200 ng/L
*** Sample ID: lcblkdup					Seq: 686	18:54:23 17 Dec 1999 HG			RPD=<1.00%
Hg	-.002	ug/L	.000	-.002					<0.200 ng/L
*** Sample ID: 2lc3					Seq: 687	18:56:41 17 Dec 1999 HG			
Hg	.120	ug/L	.000	.120					<0.260 ng
*** Sample ID: 2lc3 dup					Seq: 688	18:58:59 17 Dec 1999 HG			RPD=<1.00%
Hg	.116	ug/L	.000	.116					<0.260 ng
*** Sample ID: 2lc4					Seq: 689	19:01:17 17 Dec 1999 HG			
Hg	.008	ug/L	.000	.008					<0.450 ng
*** Sample ID: 2lc4 dup					Seq: 690	19:03:35 17 Dec 1999 HG			RPD=<1.00%
Hg	.007	ug/L	.000	.007					<0.450 ng
*** Sample ID: 2lc4 trp					Seq: 691	19:05:53 17 Dec 1999 HG			RPD=<1.00%
Hg	.009	ug/L	.000	.009					<0.450 ng
*** Sample ID: 2lc5					Seq: 692	19:08:11 17 Dec 1999 HG			
Hg	.104	ug/L	.000	.104					<0.220 ng
*** Sample ID: 2lc5 dup					Seq: 693	19:10:29 17 Dec 1999 HG			RPD=<1.00%
Hg	.103	ug/L	.000	.103					<0.220 ng
*** Sample ID: 2lcf spk					Seq: 694	19:12:47 17 Dec 1999 HG			
Hg	1.10	ug/L	.000	1.10					TV=1.0 110%
*** Sample ID: 2lcb					Seq: 695	19:15:04 17 Dec 1999 HG			
Hg	-.228	ug/L	.000	-.228					<0.240 ng

Line	Conc.	Units	EI/RED	1	2	3	4	5	
*** Sample ID: 21c6 dup				Seq: 696		19:17:21 17 Dec 1999 HG			RPD = <1.00%
Hg	-.013	ug/L	.000	-.013					<0.240 µg
*** Sample ID: 21c7				Seq: 697		19:19:38 17 Dec 1999 HG			
Hg	.039	ug/L	.000	.039					<0.200 µg
*** Sample ID: 21c7 dup				Seq: 698		19:21:56 17 Dec 1999 HG			RPD = <1.00%
Hg	.039	ug/L	.000	.039					<0.200 µg
*** Sample ID: 21c8				Seq: 699		19:24:14 17 Dec 1999 HG			
Hg	-.027	ug/L	.000	-.027					<0.420 µg
*** Sample ID: 21c8 dup				Seq: 700		19:26:32 17 Dec 1999 HG			RPD = <1.0%
Hg	-.025	ug/L	.000	-.025					<0.420 µg
*** Sample ID: rblc8				Seq: 701		19:28:50 17 Dec 1999 HG			
Hg	-.048	ug/L	.000	-.048					<2.0 µg/L
*** Sample ID: rblc8 dup				Seq: 702		19:31:08 17 Dec 1999 HG			RPD = <1.0%
Hg	-.051	ug/L	.000	-.051					<2.0 µg/L
*** Sample ID: 21c1				Seq: 703		19:33:26 17 Dec 1999 HG			
Hg	-.045	ug/L	.000	-.045					<0.820 µg ~~<0.940 µg~~ RPD 1/5/00
*** Sample ID: 21c1 dup				Seq: 704		19:35:44 17 Dec 1999 HG			RPD = <1.0%
Hg	-.044	ug/L	.000	-.044					<0.820 µg
*** Sample ID: ccb				Seq: 705		19:38:02 17 Dec 1999 HG			
Hg	-.057	ug/L	.000	-.057					<0.200 µg/L
*** Sample ID: ccv				Seq: 706		19:40:20 17 Dec 1999 HG			
Hg	1.93	ug/L	.000	1.93					TV = 2.0 96%
*** Sample ID: 21c2				Seq: 707		19:42:46 17 Dec 1999 HG			
Hg	-.046	ug/L	.000	-.046					<0.940 µg

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: 31c2 dup					Sec: 708	19:45:07 17 Dec 1999 HG			RPD=<1.0%
Hg	-.040	ug/L	.000	-.042					<0.940µg
*** Sample ID: 31c2 trp					Sec: 709	19:47:26 17 Dec 1999 HG			RPD=<1.0%
Hg	-.038	ug/L	.000	-.038					<0.940µg
*** Sample ID: 31c3					Sec: 710	19:49:45 17 Dec 1999 HG			
Hg	.721	ug/L	.000	.721					5.84µg
*** Sample ID: 31c3 dup					Sec: 711	19:52:05 17 Dec 1999 HG			RPD=4.4%
Hg	.690	ug/L	.000	.690					5.59µg
*** Sample ID: 31c3 spk					Sec: 712	19:54:25 17 Dec 1999 HG			
Hg	1.71	ug/L	.000	1.71					TV=1.0 99%
*** Sample ID: 31c4					Sec: 713	19:56:49 17 Dec 1999 HG			
Hg	.079	ug/L	.000	.079					<1.48µg
*** Sample ID: 31c4 dup					Sec: 714	19:59:08 17 Dec 1999 HG			RPD=<1.0%
Hg	.093	ug/L	.000	.093					<1.48µg
*** Sample ID: 31c5					Sec: 715	20:01:27 17 Dec 1999 HG			
Hg	.564	ug/L	.000	.564					4.61µg
*** Sample ID: 31c5 dup					Sec: 716	20:03:47 17 Dec 1999 HG			RPD=1.2%
Hg	.577	ug/L	.000	.577					4.56µg
*** Sample ID: 31c6					Sec: 717	20:06:07 17 Dec 1999 HG			
Hg	.086	ug/L	.000	.086					<1.42µg
*** Sample ID: 31c6 dup					Sec: 718	20:08:27 17 Dec 1999 HG			RPD=<1.0%
Hg	.094	ug/L	.000	.094					<1.42µg
*** Sample ID: 31c7					Sec: 719	20:10:47 17 Dec 1999 HG			
Hg	.193	ug/L	.000	.193					<1.56µg

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: 31c7 dup					Seq: 720	20:13:07 17 Dec 1999 HG			RPD = <1.00%
Hg	.186	ug/L	.000	.186					<1.56 µg
*** Sample ID: 31c8					Seq: 721	20:15:28 17 Dec 1999 HG			
Hg	-.006	ug/L	.000	-.006					<1.48 µg
*** Sample ID: 31c8 dup					Seq: 722	20:17:49 17 Dec 1999 HG			RPD = <1.00%
Hg	-.003	ug/L	.000	-.003					<1.48 µg
*** Sample ID: ccb					Seq: 723	20:20:10 17 Dec 1999 HG			
Hg	-.061	ug/L	.000	-.061					<0.200 µg/L
*** Sample ID: ccv					Seq: 724	20:22:31 17 Dec 1999 HG			
Hg	2.00	ug/L	.000	2.00					TV = 2.00
									100%

12/19/99 Analytical Run

Protocol: SYSTEST

Rev: 3.001 Time: 15:37:34 19 Dec 1999

Folder: DEC99B Seq: 767 Print: On

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

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 121999a

cup	Id	Extended id	Weight	Volume	Macro check	Help
1	icb		1.0000	1.0000		
2	lcblk4		1.0000	1.0000		
3	lcblk4 dup		1.0000	1.0000		
4	41c1		1.0000	1.0000		
5	41c1 dup		1.0000	1.0000		
6	41c2		1.0000	1.0000		
7	41c2 dup		1.0000	1.0000		
8	41c3		1.0000	1.0000		
9	41c3 dup		1.0000	1.0000		
10	41c4		1.0000	1.0000		
11	41c4 dup		1.0000	1.0000		
12	41c5		1.0000	1.0000		
13	41c5 dup		1.0000	1.0000		
14	41c6		1.0000	1.0000		
15	41c6 dup		1.0000	1.0000		

Cup 1 ID: icb Cell entry, Ins to switch

149 9 12

Protocol: SYSTEST

Rev: 3.001 Time: 15:37:37 19 Dec 1999

Folder: DEC99B Seq: 767 Print: On

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

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 121999a Pcup

cup Id	Extended id	Weight	Volume	Macro check	Help
16 41c7		1.0000	1.0000		
17 41c7 cup		1.0000	1.0000		
18 41c7 tro		1.0000	1.0000		
19 41c8		1.0000	1.0000		
20 41c8 cup		1.0000	1.0000		
21 41c8 spk		1.0000	1.0000		
22 rblc9		1.0000	1.0000		
23 rblc9 cup		1.0000	1.0000		
24 ccb		1.0000	1.0000		
25 ccv		1.0000	1.0000		
26		1.0000	1.0000		
27		1.0000	1.0000		
28		1.0000	1.0000		
29		1.0000	1.0000		
30		1.0000	1.0000		

PgDn

Cup 16 ID: 41c7 Cell entry, Ins to switch

149 9 12

```
Protocol: SYSTEST
                    Rev: 3.001    Time: 16:41:53  19 Dec 1999
Folder: DEC99B      Seq: 793                    Print: On
User:               Batch:            Id: ccv        Cup: 1 25 Gas:    0.23 LPM
State: Idle                                        Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 121999a PgUp

cup Id	Extended id	Weight	Volume	Macro check	Help
16 ccb		1.0000	1.0000		
17 ccv		1.0000	1.0000		
18 51c6		1.0000	1.0000		
19 51c6 dup		1.0000	1.0000		
20 51c6 trp		1.0000	1.0000		
21 51c7		1.0000	1.0000		
22 51c7 dup		1.0000	1.0000		
23 51c7 spk		1.0000	1.0000		
24 51c8		1.0000	1.0000		
25 51c8 dup		1.0000	1.0000		
26 rblc10		1.0000	1.0000		
27 rblc10 dup		1.0000	1.0000		
28 rblc7		1.0000	1.0000		
29 rblc7 dup		1.0000	1.0000		
30 rblc11		1.0000	1.0000		

PgDn

```
Cup 16 ID: ccb                                  Call entry, Ins to switch
                                                                  129 F  12
```

Protocol: SYSTEST

Rev: 3.001 Time: 16:42:06 19 Dec 1999

Folder: DEC99B Seq: 793 Print: On

User: Batch: Id: ccv Cup: 1 25 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 121999a

cup	Id	Extended id	Weight	Volume	Macro check	Help
1	icb		1.0000	1.0000		
2	icblk5		1.0000	1.0000		
3	icblk5 dup		1.0000	1.0000		
4	51c1		1.0000	1.0000		
5	51c1 dup		1.0000	1.0000		
6	51c2		1.0000	1.0000		
7	51c2 dup		1.0000	1.0000		
8	51c3		1.0000	1.0000		
9	51c3 dup		1.0000	1.0000		
10	51c4	1:5	1.0000	1.0000		
11	51c4 dup	1:5	1.0000	1.0000		
12	51c4 trp	1:5	1.0000	1.0000		
13	51c5		1.0000	1.0000		
14	51c5 dup		1.0000	1.0000		
15	51c5 spk		1.0000	1.0000		

PgDn

Cup 1 ID: icb Cell entry, Ins to switch

129 9 12

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 16:42:20  19 Dec 1999
Folder: DEC99B      Seq: 793                    Print: On
User:               Batch:            Id: ccv        Cup: 1 25 Gas:    0.23 LPM
State: Idle                                          Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 121999a PgUp

cup Id	Extended id	Weight	Volume	Macro check	Help
31 rplc11 cup		1.0000	1.0000		
32 ccb		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: rplc11 cup                    Cell entry, Ins to switch
                                                          129 9  12
```

*** Standard: 1 Rep: 1 Sec: 761 15:21:12 19 Dec 1999 HG

Hg .00% ug/L -7725
Ave. Int. = -7725 S. D. = 0

*** Standard: 2 Rep: 1 Sec: 762 15:23:34 19 Dec 1999 HG

Hg .20% ug/L 1232
Ave. Int. = 1232 S. D. = 0

*** Standard: 3 Rec: 1 Sec: 763 15:25:56 19 Dec 1999 HG

Hg .50% ug/L 13723
Ave. Int. = 13723 S. D. = 0

*** Standard: 4 Rep: 1 Sec: 764 15:28:20 19 Dec 1999 HG

Hg 1.0% ug/L 35268
Ave. Int. = 35268 S. D. = 0

*** Standard: 5 Rec: 1 Sec: 765 15:30:42 19 Dec 1999 HG

Hg 2.0% ug/L 78126
Ave. Int. = 78126 S. D. = 0

Line	Conc.	units	ED/RED	1	2	3	4	5

*** Standard: 6 Rec: 1 Sec: 766 15:33:10 19 Dec 1999 HG

Hg 3.00 ug/L 122138
Ave. Int. = 122138 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 15:33:49 19 Dec 1999

Folder: DEC99B Seq: 767 Print: On

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

State: Idle Xmit: Off Autosampler: On

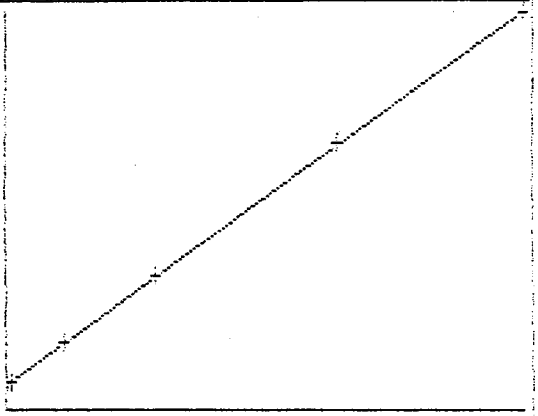
CALIBRATION: Line Calibration

Line: Hg

	Conc.	Calc.	Dev.	Accepted LiNear
S1	.000	.001	.001	Quadratic
S2	.200	.200	.000	WtdLinear
S3	.500	.498	-.002	C
S4	1.00	.996	-.004	Accept o
S5	2.00	1.99	-.011	n
S6	3.00	3.01	.008	StdAdd c

A .0000000 r .999980

B 2.31685e-5 C 1.79547e-1



Relative Absorbance

	Mean	%RSD	
S1	-7725	0	-7725
S2	1232	0	1232
S3	13733	0	13733
S4	35268	0	35268
S5	78126	0	78126
S6	122138	0	122138

33?

New calibration coefficients stored 149 2 5

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 27-2

Calibrator: Jason Conway # 273

Date: 1-14-00

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

Run No.: 1 @ 2 L/min

P_b: 30.50 "Hg

Control Module Vacuum: 0.00 "Hg

Wet Test Meter (No. 1)

	Time	Meter Reading	Temp.	P_m
End	1530	2.093 cf	68 °F	-0.7 "H_2O
Start	1500	0.000 cf	68 °F	-0.7 "H_2O
Avg.	30	2.093 cf	68 °F	-0.7 "H_2O

Dry Gas Meter

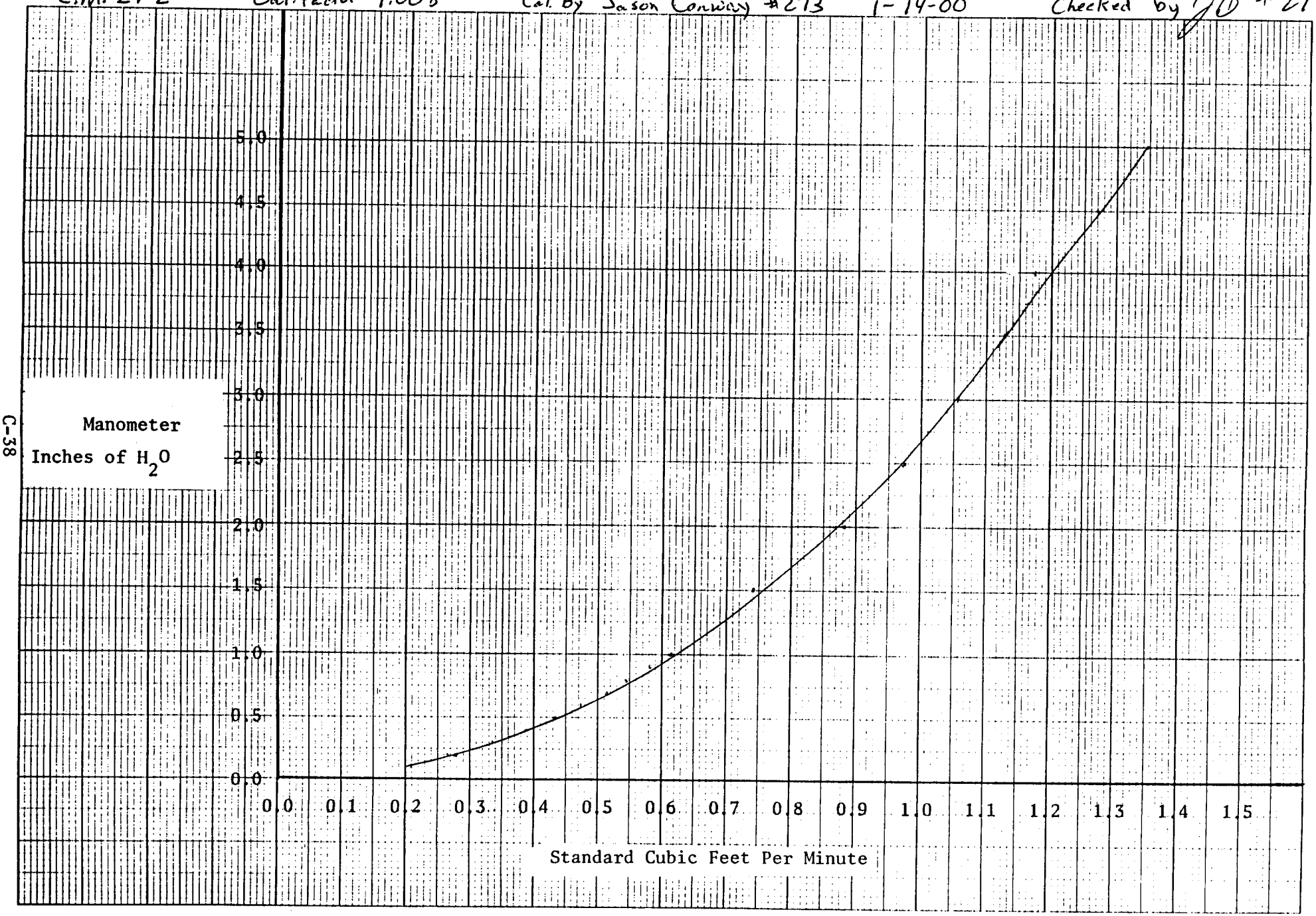
	Meter Reading	Temp. In	Temp. Out	P_m
End	255.920 cf	78 °F	76 °F	0.01 "H_2O
Start	253.905 cf	75 °F	75 °F	0.01 "H_2O
Avg.	2.015 cf	76 °F		0.01 "H_2O

$$Vm_{std} = 17.65 \times 2.093 \left[\frac{30.50 + \frac{-0.7}{13.6}}{68 + 460} \right] \times 1.006 (C_f) = 2.143 \text{ dcsf}$$

$$Vm_{std} = 17.65 \times 2.015 \left[\frac{30.50 + \frac{0.01}{13.6}}{76 + 460} \right] = 2.024 \text{ dcsf}$$

$$C_{DG} = \frac{2.143}{2.024} = \boxed{1.059}$$

C.M. 27-2 Cal. factor 1.008 Cal. by Jason Conway #273 1-14-00 Checked by JB #274



METCO ENVIRONMENTAL

DIGITAL TEMPERATURE INDICATOR NO. 27-2

CALIBRATION DATA

(NEW)

Date: 01-10-00

Media	Time	Mercury Temperature (°F)	DTI (°F)
Ambient Air	1425	72	75
Ice Bath	1428	37	40
Boiling Water	1434	212	214
Oven	1440	251	254
Oven	1445	300	298
Oven	1449	350	346
Oven	1454	376	371

Meter Adjusted? Yes _____ No ✓

Calibrator: JASON BROWN 274

Checked By: Jason Cowden #273

METCO ENVIRONMENTAL

Dry Gas Meter Calibration

Dry Gas Meter No.: 29-1

Date: 11-22-99

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

Variation: + 0.5% ✓

- 0.6% ✓

Calibrator: Jason Conway #273

Checked By: Scott Hart #268

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 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

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-22-99

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

Run No.: 1 @ 1.00 "H2O

P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1031	5.004 cf	69 °F	-13 "H_2O	744.777 cf	68 °F	71 °F	1.0 "H_2O
Start	1021	0.000 cf	69 °F	-13 "H_2O	739.786 cf	70 °F	71 °F	1.0 "H_2O
Avg.	10 ✓	5.004 ✓ cf	69 ✓ °F	-13 ✓ "H_2O	4.991 ✓ cf	70 ✓ °F		✓1.0 "H_2O

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

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

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

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 "H_2O P_b: 29.24 "Hg

Control Module Vacuum: 0.00 "Hg

	Wet Test Meter (No. 3)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1049	10,009 cf	69 °F	-1.6	755.874 cf	65 °F	71 °F	1.50 "H_2O
Start	1034	0.000 cf	69 °F	-1.6	745.977 cf	69 °F	71 °F	1.50 "H_2O
Avg.	15 ✓	10.009 ✓ cf	69 ✓ °F	-1.6 ✓	9.897 ✓ cf	69 ✓ °F		✓1.50 "H_2O

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

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 24.1

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: 4.00 "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

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.088 \left[\frac{29.24 + \frac{-2.0}{13.6}}{69 + 460}\right] \times 1.000\ (C_f) = 9.792\ dcsf$$

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

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

METCO ENVIRONMENTAL

DRY GAS METER CALIBRATION

Meter Number: 29-1

Calibrator: Jason Conway

Date: 11-22-99

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

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	788.042 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

$$\text{Wet Test Meter } Vm_{std} = 17.65 \times 10.011 \left[\frac{29.24 + \frac{-3.0}{13.6}}{69 + 460}\right] \times 1.000\ (C_f) = 9.693 \text{ dcsf} \checkmark$$

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

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

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

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

$$Vm_{std} = 17.65 \times 9.813 \left[\frac{29.24 + \frac{4.0}{13.6}}{71 + 460}\right] = 9.633\ ✓\ dcsf$$

~~9.651~~ ✗

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

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

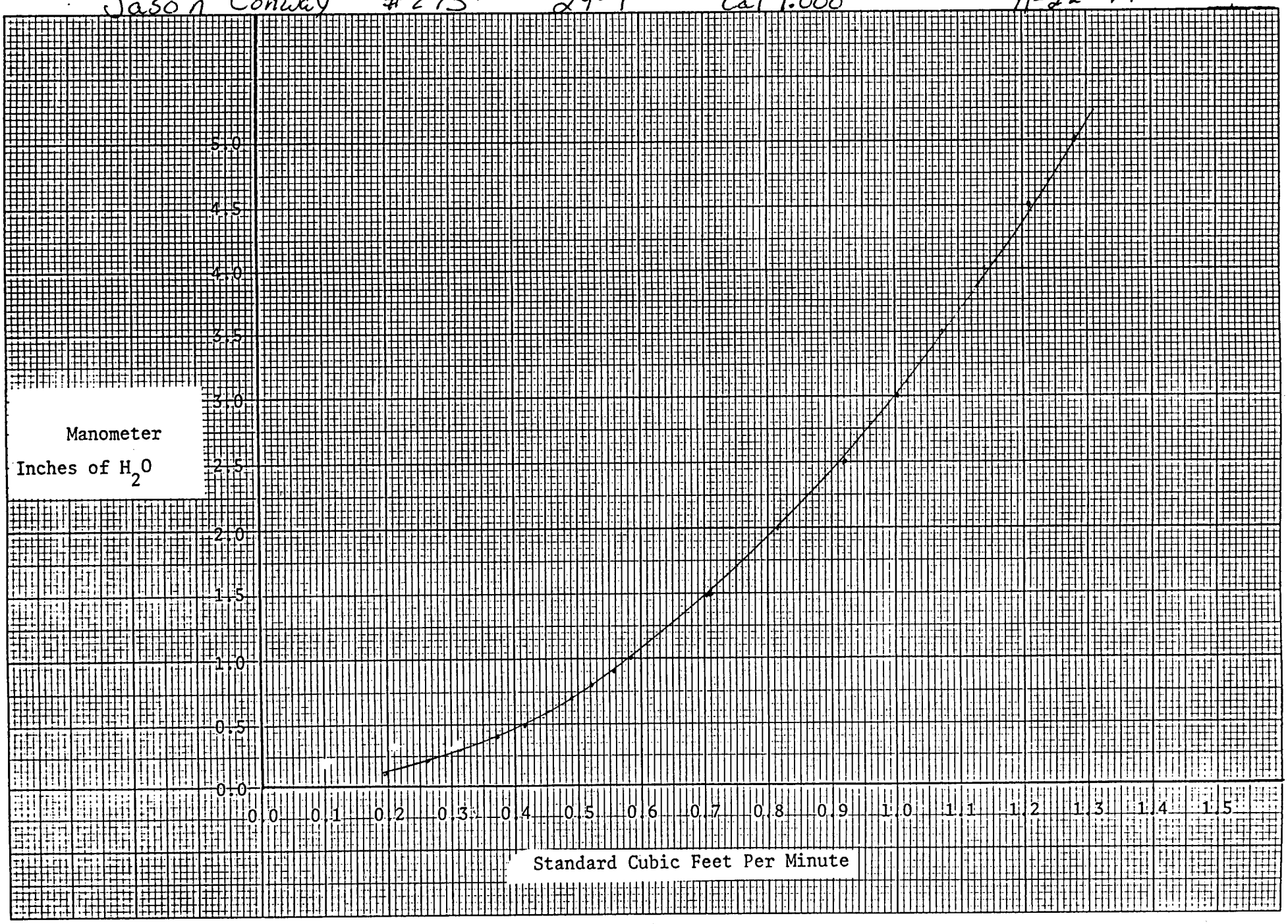
	Wet Test Meter (No. 1)				Dry Gas Meter			
	Time	Meter Reading	Temp.	P_m	Meter Reading	Temp. In	Temp. Out	P_m
End	1637	2.229 cf	70 °F	-0.6 "H_2O	873.468 cf	77 °F	72 °F	0.04 "H_2O
Start	1605	0.000 cf	70 °F	-0.6 "H_2O	871.246 cf	72 °F	72 °F	0.04 "H_2O
Avg.	32 ✓	2.229 ✓ cf	70 ✓ °F	-0.6 ✓ "H_2O	2.222 ✓ cf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



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

*** Check Standard: 2 Ck2 Seq: 767 15:39:03 19 Dec 1999 HB

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		102.	.619	.604	ug/L	.000

*** Sample ID: 1ctb Seq: 768 15:41:23 19 Dec 1999 HB

Hg -.012 ug/L .000 -.013 <0.200 µg/L

*** Sample ID: 1cblk4 Seq: 769 15:43:41 19 Dec 1999 HB

Hg .007 ug/L .000 .007 <0.200 µg/L

*** Sample ID: 1cblk4 dup Seq: 770 15:45:59 19 Dec 1999 HB RPD=<1.0%

Hg .006 ug/L .000 .006 <0.200 µg/L

*** Sample ID: 41c1 Seq: 771 15:48:17 19 Dec 1999 HB

Hg .004 ug/L .000 .004 <0.580 µg

*** Sample ID: 41c1 dup Seq: 772 15:50:35 19 Dec 1999 HB RPD=<1.0%

Hg .003 ug/L .000 .003 <0.580 µg

*** Sample ID: 41c2 Seq: 773 15:52:53 19 Dec 1999 HB

Hg .010 ug/L .000 .010 <0.620 µg

*** Sample ID: 41c2 dup Seq: 774 15:55:11 19 Dec 1999 HB RPD=<1.0%

Hg .004 ug/L .000 .004 <0.620 µg

*** Sample ID: 41c3 Seq: 775 15:57:29 19 Dec 1999 HB

Hg .040 ug/L .000 .040 <0.600 µg

*** Sample ID: 41c3 dup Seq: 776 15:59:47 19 Dec 1999 HB RPD=<1.0%

Hg .041 ug/L .000 .041 <0.600 µg

*** Sample ID: 41c4 Seq: 777 16:02:05 19 Dec 1999 HB

Hg .044 ug/L .000 .044 <0.740 µg

*** Sample ID: 41c4 dup Seq: 778 16:04:23 19 Dec 1999 HB RPD=<1.0%

Hg .046 ug/L .000 .046 <0.740 µg

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: 41c5					Seq:	779	16:06:40 19 Dec 1999	-6	
Hg	.030	ug/L	.000	.030					< 0.720 µg
*** Sample ID: 41c5 dup					Seq:	780	16:08:57 19 Dec 1999	-6	RPD = 41.0%
Hg	.030	ug/L	.000	.030					< 0.720 µg
*** Sample ID: 41c6					Seq:	781	16:11:14 19 Dec 1999	-6	
Hg	.013	ug/L	.000	.013					< 0.640 µg
*** Sample ID: 41c6 dup					Seq:	782	16:13:32 19 Dec 1999	-6	RPD = 41.0%
Hg	.020	ug/L	.000	.020					< 0.640 µg
*** Sample ID: 41c7					Seq:	783	16:15:50 19 Dec 1999	-6	
Hg	.021	ug/L	.000	.021					< 0.680 µg
*** Sample ID: 41c7 dup					Seq:	784	16:18:08 19 Dec 1999	-6	RPD = 41.0%
Hg	.024	ug/L	.000	.024					< 0.680 µg
*** Sample ID: 41c7 trp					Seq:	785	16:20:26 19 Dec 1999	-6	RPD = 41.0%
Hg	.024	ug/L	.000	.024					< 0.680 µg
*** Sample ID: 41c8					Seq:	786	16:22:44 19 Dec 1999	-6	
Hg	.013	ug/L	.000	.013					< 0.560 µg
*** Sample ID: 41c8 dup					Seq:	787	16:25:02 19 Dec 1999	-6	RPD = 41.0%
Hg	.012	ug/L	.000	.012					< 0.560 µg
*** Sample ID: 41c8 spk					Seq:	788	16:27:20 19 Dec 1999	-6	TV = 1.0
Hg	.842	ug/L	.000	.842					84%
*** Sample ID: rblc9					Seq:	789	16:29:40 19 Dec 1999	-6	
Hg	-.012	ug/L	.000	-.012					< 4.0 µg/L
*** Sample ID: rblc9 dup					Seq:	790	16:32:00 19 Dec 1999	-6	RPD = 41.0%
Hg	.002	ug/L	.000	.002					< 4.0 µg/L

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: ccb				Seq: 791	16:34:18 19 Dec 1999 -8			
Hg	-.001	ug/L	.000	-.001				
*** Sample ID: ccv				Seq: 792	16:36:37 19 Dec 1999 -8			
Hg	2.00	ug/L	.000	2.00				

<0.200 ug IC

TV = 2.0 100%

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: icb				Seq: 793		16:44:05 19 Dec 1999 HG			
Hg	-.006	ug/L	.000	-.006					< 0.200 µg IL
*** Sample ID: icblk5				Seq: 794		16:46:23 19 Dec 1999 HG			
Hg	.000	ug/L	.000	.000					< 0.200 µg IL
*** Sample ID: icblk5 dup				Seq: 795		16:48:41 19 Dec 1999 HG			RPD = < 1.0%
Hg	.001	ug/L	.000	.001					< 0.200 µg IL
*** Sample ID: flc1				Seq: 796		16:50:59 19 Dec 1999 HG			
Hg	.012	ug/L	.000	.012					< 0.950 µg
*** Sample ID: flc1 dup				Seq: 797		16:54:45 19 Dec 1999 HG			RPD = < 1.0%
Hg	.008	ug/L	.000	.008					< 0.950 µg
*** Sample ID: flc2				Seq: 798		16:57:03 19 Dec 1999 HG			
Hg	.006	ug/L	.000	.006					< 0.940 µg
*** Sample ID: flc2 dup				Seq: 799		16:59:21 19 Dec 1999 HG			RPD = < 1.0%
Hg	.007	ug/L	.000	.007					< 0.940 µg
*** Sample ID: flc3				Seq: 800		17:01:39 19 Dec 1999 HG			
Hg	.322	ug/L	.000	.322					1.91 µg
*** Sample ID: flc3 dup				Seq: 801		17:03:58 19 Dec 1999 HG			RPD = 1.3%
Hg	.377	ug/L	.000	.377					1.89 µg
*** Sample ID: flc4				Seq: 802		17:06:16 19 Dec 1999 HG			
Hg	3.01	ug/L	.000	3.01					NO DATA
*** Sample ID: flc4 dup				Seq: 803		17:08:49 19 Dec 1999 HG			
Hg	3.03	ug/L	.000	3.03					NO DATA
*** Sample ID: flc4 hno				Seq: 804		17:11:17 19 Dec 1999 HG			
Hg	3.05	ug/L	.000	3.05					NO DATA

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: Slc5					Seq: 805	17:12:47 19 Dec 1999 HG			
Hg	.131	ug/L	.000	.131					< 0.930 µg
*** Sample ID: Slc5 dup					Seq: 806	17:16:04 19 Dec 1999 HG			RPD = < 1.0%
Hg	.145	ug/L	.000	.145					< 0.930 µg
*** Sample ID: Slc5 spk					Seq: 807	17:18:22 19 Dec 1999 HG			TV = 1.0
Hg	1.12	ug/L	.000	1.12					112%
*** Sample ID: Slc4	1:5				Seq: 808	17:20:45 19 Dec 1999 HG			
Hg	.603	ug/L	.000	.603					14.62 µg
*** Sample ID: Slc4 dup	1:5				Seq: 809	17:23:03 19 Dec 1999 HG			RPD = < 1.0%
Hg	.599	ug/L	.000	.599					14.53 µg
*** Sample ID: Slc4 trp	1:5				Seq: 810	17:25:21 19 Dec 1999 HG			RPD = < 1.0%
Hg	.607	ug/L	.000	.607					14.72 µg
*** Sample ID: ccb					Seq: 811	17:30:55 19 Dec 1999 HG			
Hg	-.004	ug/L	.000	-.004					< 0.200 µg IC
*** Sample ID: ccv					Seq: 812	17:33:13 19 Dec 1999 HG			TV = 2.0
Hg	1.99	ug/L	.000	1.99					100%
*** Sample ID: Slc3					Seq: 813	17:35:38 19 Dec 1999 HG			
Hg	2.46	ug/L	.000	2.46					12.18 µg
*** Sample ID: Slc3 dup					Seq: 814	17:38:04 19 Dec 1999 HG			RPD = < 1.0%
Hg	2.47	ug/L	.000	2.47					12.23 µg
*** Sample ID: Slc3 trp					Seq: 815	17:40:34 19 Dec 1999 HG			RPD = 1.6%
Hg	2.50	ug/L	.000	2.50					12.38 µg
*** Sample ID: Slc7					Seq: 816	17:43:08 19 Dec 1999 HG			
Hg	.038	ug/L	.000	.038					< 0.940 µg

Line	Conc.	units	SD/RSD	1	2	3	4	5	
*** Sample ID: slc7 dup					Seq: 817	17:45:23 19 Dec 1999 HG			RPD = <1.00%
Hg	.050	ug/L	.000	.050					<0.940 µg
*** Sample ID: slc7 spk					Seq: 818	17:47:42 19 Dec 1999 HG			
						TV = 1.00			
Hg	1.04	ug/L	.000	1.04					104%
*** Sample ID: slc8					Seq: 819	17:50:04 19 Dec 1999 HG			
Hg	1.93	ug/L	.000	1.93					9.36 µg
*** Sample ID: slc8 dup					Seq: 820	17:52:30 19 Dec 1999 HG			RPD = 1.6%
Hg	1.90	ug/L	.000	1.90					9.23 µg
*** Sample ID: rblc10					Seq: 821	17:55:00 19 Dec 1999 HG			
Hg	-.011	ug/L	.000	-.011					< 2.0 µg/L
*** Sample ID: rblc10 dup					Seq: 822	17:57:19 19 Dec 1999 HG			RPD = <1.0%
Hg	-.005	ug/L	.000	-.005					< 2.0 µg/L
*** Sample ID: rblc7					Seq: 823	17:59:38 19 Dec 1999 HG			
Hg	-.005	ug/L	.000	-.005					<0.200 µg/L
*** Sample ID: rblc7 dup					Seq: 824	18:01:57 19 Dec 1999 HG			RPD = <1.0%
Hg	-.003	ug/L	.000	-.003					<0.200 µg/L
*** Sample ID: rblc11					Seq: 825	18:04:16 19 Dec 1999 HG			
Hg	-.000	ug/L	.000	-.000					<0.200 µg/L
*** Sample ID: rblc11 dup					Seq: 826	18:06:35 19 Dec 1999 HG			RPD = <1.0%
Hg	-.004	ug/L	.000	-.004					<0.200 µg/L
*** Sample ID: ccb					Seq: 827	18:08:54 19 Dec 1999 HG			
Hg	-.005	ug/L	.000	-.005					<0.200 µg/L
*** Sample ID: ccv					Seq: 828	18:11:13 19 Dec 1999 HG			
						TV = 2.00			
Hg	2.03	ug/L	.000	2.03					102%

01/03/00 Analytical Run

```
Protocol: SYSTEST
                    Rev: 3.001   Time: 12:56:26  03 Jan 2000
Folder: JAN00A      Seq: 0                      Print: On
User:               Batch:            Id: StopRep1   Cup: 1 25 Gas:    0.23 LPM
State: Idle                                          Xmit: Off Autosampler: On
```

AUTOSAMPLER: Rack entry Rack 010300B

cup Id	Extended id	Weight	Volume	Macro check	Help
1 icb		1.0000	1.0000		
2 blk		1.0000	1.0000		
3 blk dup		1.0000	1.0000		
4 1633 b		1.0000	1.0000		
5 1633 b dup		1.0000	1.0000		
6 Q78 1/20		1.0000	1.0000		
7 Q78 dup 1/20		1.0000	1.0000		
8 47Q125		1.0000	1.0000		
9 47Q125 dup		1.0000	1.0000		
10 47Q125 trp		1.0000	1.0000		
11 Q79 1/20		1.0000	1.0000		
12 Q79 dup 1/20		1.0000	1.0000		
13 47Q121		1.0000	1.0000		
14 47Q121 dup		1.0000	1.0000		
15 47Q121 spk		1.0000	1.0000		

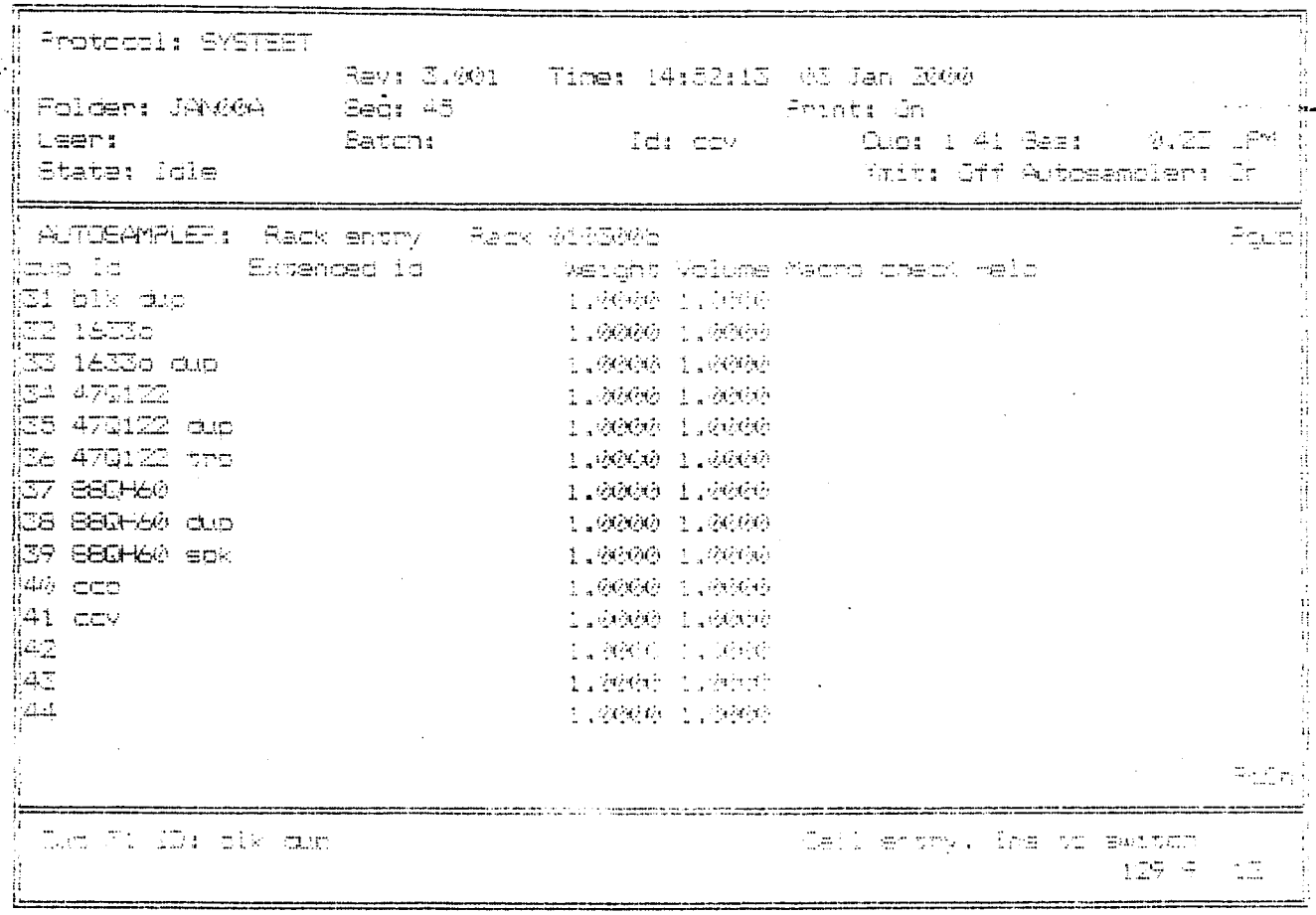
PgDn

```
Cup 1  ID: icb                                  Call entry, Ins to exit
                                                                  Del 9  12
```

```
Protocol: SYSTEST
                    Rev: 3.001    Time: 14:52:07  03 Jan 2000
Folder: JAN00A      Seq: 45                      Print: On
User:               Batch:            Id: ccv        Cup: 1 41 Gas:    0.23 LPM
State: Idle                                          Xmit: Off Autosampler: On

AUTOSAMPLER:  Rack entry   Rack 010300o                                    Pgup
cup Id          Extended id          Weight Volume Macro check Help
16 Q80 1/20                          1.0000 1.0000
17 Q80 cup 1/20                      1.0000 1.0000
18 470126                            1.0000 1.0000
19 470126 cup                        1.0000 1.0000
20 88QH54                            1.0000 1.0000
21 88QH54 cup                        1.0000 1.0000
22 88QH53                            1.0000 1.0000
23 88QH53 cup                        1.0000 1.0000
24 ccp                               1.0000 1.0000
25 ccv                               1.0000 1.0000
26 88QH57                            1.0000 1.0000
27 88QH57 cup                        1.0000 1.0000
28 88QH59                            1.0000 1.0000
29 88QH59 cup                        1.0000 1.0000
30 blk                               1.0000 1.0000
                                                                           PgDn

Cup 16 ID: Q80                                  Cell entry, ins to switch
                                                                  129 9   12
```



```
Protocol: SYSTEST
                    Rev: 3.001   Time: 14:52:13  03 Jan 2000
Folder: JAN00A      Seq: 45                     Print: On
Lser:               Batch:            Id: ccv        Cup: 1 41 Gas:    0.23 LPM
State: Idle                                         Xmit: Off Autosampler: On

AUTOSAMPLER:  Rack entry   Rack 010300b                                    Pgup
cup Id          Extended id          Weight Volume Macro check Help
31 blk dup                           1.0000 1.0000
32 1633o                             1.0000 1.0000
33 1633o dup                         1.0000 1.0000
34 47Q122                            1.0000 1.0000
35 47Q122 dup                        1.0000 1.0000
36 47Q122 trp                        1.0000 1.0000
37 88QH60                            1.0000 1.0000
38 88QH60 dup                        1.0000 1.0000
39 88QH60 spk                        1.0000 1.0000
40 ccp                               1.0000 1.0000
41 ccv                               1.0000 1.0000
42                                   1.0000 1.0000
43                                   1.0000 1.0000
44                                   1.0000 1.0000

                                                                          PgDn

Cup 31 ID: blk dup                                  Cell entry, Ins to switch
                                                                  129 9   13
```

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

*** Standard: 1 Rep: 1 Seq: 4 12:33:04 03 Jan 2000 HG

Hg .000 ug/L -585
Ave. Int. = -588 S. D. = 0

*** Standard: 2 Rep: 1 Seq: 5 12:35:27 03 Jan 2000 HG

Hg .200 ug/L 8204
Ave. Int. = 8204 S. D. = 0

*** Standard: 3 Rep: 1 Seq: 6 12:37:51 03 Jan 2000 HG

Hg .500 ug/L 21177
Ave. Int. = 21177 S. D. = 0

*** Standard: 4 Rep: 1 Seq: 7 12:40:15 03 Jan 2000 HG

Hg 1.00 ug/L 42243
Ave. Int. = 42243 S. D. = 0

*** Standard: 5 Rep: 1 Seq: 8 12:42:41 03 Jan 2000 HG

Hg 2.00 ug/L 85418
Ave. Int. = 85418 S. D. = 0

*** Standard: 6 Rep: 1 Seq: 9 12:45:24 03 Jan 2000 HG

Hg 3.00 ug/L 122695
Ave. Int. = 122695 S. D. = 0

Protocol: SYSTEST

Rev: 3.001 Time: 12:49:00 03 Jan 2000

Folder: DEC99D Seq: 10 Print: On

User: Batch: Id: Std6Rep1 Cup: 1 25 Gas: 0.23 LPM

State: Idle Xmit: Off Autosampler: On

CALIBRATION: Line Calibration

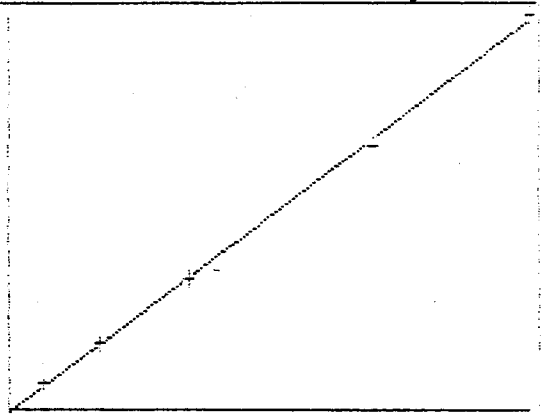
Line: Hg Accepted

	Conc.	Calc.	Dev.	LiNear
S1	.000	-.021	-.021	Quadratic
S2	.200	.191	-.009	WtdLinear
S3	.500	.505	.005	
S4	1.00	1.01	.013	Accept
S5	2.00	2.06	.056	
S6	3.00	2.96	-.044	StdAdd

A .0000000 r .999576

B 2.41582e-5 C -6.91924e-3

Concentration



Relative Absorbance

	Mean	%RSD	
S1	-588	0	-588
S2	8204	0	8204
S3	21177	0	21177
S4	42243	0	42243
S5	85418	0	85418
S6	122695	0	122695

33?

New calibration coefficients stored 149 2 5

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

*** Check Standard: 2 CK2 Seq: 0 13:00:09 03 Jan 2000 HB

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		101.	.613	.604	ug/L	.000

*** Sample ID: icb Seq: 1 13:02:29 03 Jan 2000 HB

Hg −.014 ug/L .000 −.014 <0.200µg/L

*** Sample ID: blk Seq: 2 13:04:47 03 Jan 2000 HB

Hg .093 ug/L .000 .093 <0.200µg/L

*** Sample ID: blk dup Seq: 3 13:07:05 03 Jan 2000 HB RPD=<1.0%

Hg .088 ug/L .000 .088 <0.200µg/L

*** Sample ID: 1633 b Seq: 4 13:09:23 03 Jan 2000 HB

TV=0.141(±0.019)

Hg 1.90 ug/L .000 1.90 0.177µg/g

*** Sample ID: 1633 b dup Seq: 5 13:11:47 03 Jan 2000 HB RPD=2.1%

TV=0.141(±0.019)

Hg 1.86 ug/L .000 1.86 0.173µg/g

*** Sample ID: 078 Seq: 6 13:14:05 03 Jan 2000 HB

Hg 20.7 ug/L .000 20.7 NO DATA

*** Sample ID: 078 1:20 Seq: 7 13:19:15 03 Jan 2000 HB

Hg 1.21 ug/L .000 1.21 9.00µg

*** Sample ID: 078 dup 1:20 Seq: 8 13:21:37 03 Jan 2000 HB RPD=2.4%

Hg 1.24 ug/L .000 1.24 9.22µg

*** Sample ID: 470125 Seq: 9 13:23:58 03 Jan 2000 HB

Hg .132 ug/L .000 .132 <0.010µg

*** Sample ID: 470125 dup Seq: 10 13:26:14 03 Jan 2000 HB RPD=<1.0%

Hg .135 ug/L .000 .135 <0.010µg

*** Sample ID: 470125 trc Seq: 11 13:28:33 03 Jan 2000 HB RPD=<1.0%

Hg .134 ug/L .000 .134 <0.010µg

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: 079					Seq: 12	13:30:52 03 Jan 2000 HG			
Hg	19.0	ug/L	.000	19.0		NO DATA			
*** Sample ID: 079	1:20				Seq: 13	13:33:47 03 Jan 2000 HG			
Hg	1.05	ug/L	.000	1.05		9.82 µg			
*** Sample ID: 079 dup	1:20				Seq: 14	13:36:06 03 Jan 2000 HG	RPD = 18%		
Hg	1.07	ug/L	.000	1.07		10.01 µg			
*** Sample ID: 470121					Seq: 15	13:38:24 03 Jan 2000 HG			
Hg	.170	ug/L	.000	.170		< 0.010 µg			
*** Sample ID: 470121 dup					Seq: 16	13:40:42 03 Jan 2000 HG	RPD = < 1.00%		
Hg	.171	ug/L	.000	.171		< 0.010 µg			
*** Sample ID: 470121 spk					Seq: 17	13:43:00 03 Jan 2000 HG			
Hg	1.23	ug/L	.000	1.23		TV = 1.00 123%			
*** Sample ID: 080					Seq: 18	13:45:19 03 Jan 2000 HG			
Hg	15.7	ug/L	.000	15.7		NO DATA			
*** Sample ID: 080	1:20				Seq: 19	13:47:37 03 Jan 2000 HG			
Hg	.854	ug/L	.000	.854		7.90 µg			
*** Sample ID: 080 dup	1:20				Seq: 20	13:51:55 03 Jan 2000 HG	RPD = < 1.00%		
Hg	.855	ug/L	.000	.855		7.91 µg			
*** Sample ID: 470125					Seq: 21	13:54:13 03 Jan 2000 HG			
Hg	.087	ug/L	.000	.087		< 0.010 µg			
*** Sample ID: 470125 dup					Seq: 22	13:56:32 03 Jan 2000 HG	RPD = < 1.00%		
Hg	.086	ug/L	.000	.086		< 0.010 µg			
*** Sample ID: BBDH-54					Seq: 23	13:58:51 03 Jan 2000 HG			
Hg	.028	ug/L	.000	.028		< 0.010 µg			

Line	Conc.	Units	SD/FED	1	2	3	4	5	
*** Sample ID: 880H54 dup					Seq: 24	14:01:10 03 Jan 2000 HG			RPD=21.0%
Hg	.027	ug/L	.000	.027					<0.010 µg
*** Sample ID: 880H53					Seq: 25	14:03:29 03 Jan 2000 HG			
Hg	1.35	ug/L	.000	1.35					0.070 µg
*** Sample ID: 880H53 dup					Seq: 26	14:05:49 03 Jan 2000 HG			RPD=21.0%
Hg	1.34	ug/L	.000	1.34					0.067 µg
*** Sample ID: ccb					Seq: 27	14:08:09 03 Jan 2000 HG			
Hg	-.014	ug/L	.000	-.014					<0.200 µg/L
*** Sample ID: ccv					Seq: 28	14:10:29 03 Jan 2000 HG			
Hg	1.83	ug/L	.000	1.83					TV=2.00 92%
*** Sample ID: 880H57					Seq: 29	14:14:20 03 Jan 2000 HG			
Hg	1.75	ug/L	.000	1.75					0.087 µg
*** Sample ID: 880H57 dup					Seq: 30	14:16:41 03 Jan 2000 HG			RPD=21.0%
Hg	1.72	ug/L	.000	1.72					0.086 µg
*** Sample ID: 880H59					Seq: 31	14:19:01 03 Jan 2000 HG			
Hg	1.76	ug/L	.000	1.76					0.088 µg
*** Sample ID: 880H59 dup					Seq: 32	14:21:21 03 Jan 2000 HG			RPD=1.7%
Hg	1.73	ug/L	.000	1.73					0.087 µg
*** Sample ID: blk					Seq: 33	14:23:41 03 Jan 2000 HG			
Hg	.011	ug/L	.000	.011					<0.200 µg/L
*** Sample ID: blk dup					Seq: 34	14:26:00 03 Jan 2000 HG			RPD=21.0%
Hg	.014	ug/L	.000	.014					<0.200 µg/L
*** Sample ID: 1633o					Seq: 35	14:28:20 03 Jan 2000 HG			
Hg	1.71	ug/L	.000	1.71					TV=0.141(±0.019) 0.167 µg/g

Line	Conc.	Units	SD/RSD	1	2	3	4	5	
*** Sample ID: 16Z3b dup					Seq: 36	14:30:41 03 Jan 2000 HG			RPD=11.0%
Hg	1.72	ug/L	.000	1.72					TV=0.141 (±0.019)
*** Sample ID: 470122					Seq: 37	14:33:46 03 Jan 2000 HG			0.168 µg/s
Hg	.068	ug/L	.000	.068					<0.010µg
*** Sample ID: 470122 dup					Seq: 38	14:35:27 03 Jan 2000 HG			RPD=11.0%
Hg	.078	ug/L	.000	.078					<0.010µg
*** Sample ID: 470122 trp					Seq: 39	14:37:48 03 Jan 2000 HG			RPD=11.0%
Hg	.076	ug/L	.000	.076					<0.010µg
*** Sample ID: 880H60					Seq: 41	14:40:09 03 Jan 2000 HG			
Hg	1.43	ug/L	.000	1.43					0.072µg
*** Sample ID: 880H60 dup					Seq: 42	14:42:31 03 Jan 2000 HG			RPD=2.9%
Hg	1.35	ug/L	.000	1.35					0.070µg
*** Sample ID: 880H60 scv					Seq: 43	14:44:52 03 Jan 2000 HG			
Hg	2.26	ug/L	.000	2.26					TV=~~2.0~~ 1.0 77%
*** Sample ID: ccb					Seq: 45	14:47:13 03 Jan 2000 HG			
Hg	-.022	ug/L	.000	-.022					<0.200µg IC
*** Sample ID: ccv					Seq: 46	14:49:37 03 Jan 2000 HG			
Hg	1.82	ug/L	.000	1.82					TV=2.0 92%

METCO Particulate Analysis

12/2/99 JRH

METCO Environmental

Particulate Analysis EPA Method 5

Stack Filters

Job Number 99-95LAC1 Location La Cygene, KS

Job Name EPRI / KCPL Unit Tested Unit 1 Stack

Desiccator Time In	1430 11/22					
Desiccator Time Out	85 11/29	1038 11/30				

Run No. 1	Filter No. 880H53					
Filter & Particulate + Tare Weight (g)						
Tare Weight (g)			/			
Filter & Particulate (g)	0.6339	0.6341	✓			

Filter & Particulate Average (g) 0.6340 /

Initial Filter Weight (g) 0.5076 /

Total Particulate (mg) 126.4 /

Run No. 2	Filter No. 880H57					
Filter & Particulate + Tare Weight (g)						
Tare Weight (g)			/			
Filter & Particulate (g)	0.6504	0.6503	✓			

Filter & Particulate Average (g) 0.6504 /

Initial Filter Weight (g) 0.5084 /

Total Particulate (mg) 142.0 /

Run No. 3 1 of 2	Filter No. 880H59					
Filter & Particulate + Tare Weight (g)						
Tare Weight (g)						
Filter & Particulate (g)	0.5889	0.5886	✓ /			

Filter & Particulate Average (g) 0.5888

Initial Filter Weight (g) 0.5073

~~Total~~ Particulate (mg) 81.5

Run No. 3 2 of 2	Filter No. 880H60					
Filter & Particulate + Tare Weight (g)						
Tare Weight (g)						
Filter & Particulate (g)	0.5766	0.5765	✓			

no visible particulate

Filter & Particulate Average (g) 0.5766

Initial Filter Weight (g) 0.5102

~~Total~~ Particulate (mg) 66.4

Total Particulate 147.9 /

m.k. Analyst

12/1/99

12/2/99 DBB

METCO Environmental

Particulate Analysis EPA Method 17

Thimbles and Backup Filters

Job Number 99-95LAC1 Location La Cygne, KS

Job Name EPRI / KCPL Unit Tested Unit 1 Scrubber A Inlet

Desiccator Time In	1445 11/22					
Desiccator Time Out	850 11/29	930 11/30				

Run No. 1	Thimble No. Q79		Filter No. 470121		
Thimble Final Weight (g)	8.3497	8.3499	✓		
Thimble Initial Weight (g)	3.3567	3.3567			
Particulate (g)	4.9930	4.9932	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1027	0.1027	✓		

torn edge

Filter and Particulate Average (g) 0.1027 ✓

Initial Filter Weight (g) 0.1049 ✓

Filter Particulate Average (mg) 0

Thimble Particulate Average (mg) 4993.1 ✓

Total Particulate (mg) 4993.1 ✓

Run No. 2	Thimble No. Q78		Filter No. 470125		
Thimble Final Weight (g)	7.6921	7.6911	✓		
Thimble Initial Weight (g)	3.6630	3.6630			
Particulate (g)	4.0291	4.0281	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)			✓		
Filter & Particulate (g)	0.1044	0.1045	✓		

frayed edge

Filter and Particulate Average (g) 0.1045 ✓

Initial Filter Weight (g) 0.1074 ✓

Filter Particulate Average (mg) 0

Thimble Particulate Average (mg) 4028.6 ✓

Total Particulate (mg) 4028.6 ✓

Run No. 3	Thimble No. Q80		Filter No. 470126		
Thimble Final Weight (g)	8.4609	8.4596	✓		
Thimble Initial Weight (g)	3.7650	3.7650			
Particulate (g)	4.6959	4.6946	✓		
Filter & Particulate + Tare Weight (g)					
Tare Weight (g)					
Filter & Particulate (g)	0.1142	0.1142	✓ ✓		

Filter and Particulate Average (g) 0.1142 ✓

Initial Filter Weight (g) 0.1166 ✓

Filter Particulate Average (mg) 0 ✓

Thimble Particulate Average (mg) 4695.3

Total Particulate (mg) 4695.3 ✓

DBB 12/1/99

MB

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: 188461
Received: 01-DEC-99
Reported: 14-DEC-99

PURCHASE ORDER: 99-95LACI-29

Project Description: 99-95-LACI: EPRI/KCPL - Lacygne, KS
Unit 1 - 3 Coal Runs (BTU, Ash, Sulfur)

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Coal Run 1 (U1 Feeders)						
Lab Sample: 1384908						
sampled: 17-NOV-99 12:00 by: KCPL						
Moisture, Total	25.5		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	8.52	11.4	%	D 3174	08-DEC-99	VJO
Sulfur	0.91	1.22	%	D 4239	08-DEC-99	VJO
Heating Value	8790	11800	BTU/lb	D 3286	07-DEC-99	VJO
Coal Run 2 (U1 Feeders)						
Lab Sample: 1384909						
sampled: 17-NOV-99 18:15 by: KCPL						
Moisture, Total	24.7		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	8.83	11.7	%	D 3174	08-DEC-99	VJO
Sulfur	0.99	1.31	%	D 4239	08-DEC-99	VJO
Heating Value	8840	11740	BTU/lb	D 3286	07-DEC-99	VJO
Coal Run 3 (LaCygne #1)						
Lab Sample: 1384910						
sampled: 18-NOV-99 by: KCPL						
Moisture, Total	23.4		%	D 3302	01-DEC-99	GLB
SHORT PROX - COAL						
Ash	8.28	10.8	%	D 3174	08-DEC-99	VJO
Sulfur	0.92	1.20	%	D 4239	08-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: 188461

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
Coal Run 3 (LaCygne #1)						
Lab Sample: 1384910 - continued						
Heating Value	9040	11800	BTU/lb	D 3286	07-DEC-99	VJO

< Indicates less than the limit of quantitation.

PHILIP
ANALYTICAL SERVICES

Chain of Custody Record

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

Sample Container Information

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

Report Results To:
PO # 99-95LAC1-29 Job ID 99-95LAC1
Name: Doug Saathoff
Company: Metco
Mailing Address: — on file —
City: State: ZIP:
Telephone #: Fax #:

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

Analysis Requested

188461

Page 1 of 1

PAS Quote#

Sampled by:

	SAMPLE DESCRIPTION	Air Vol. (L or min)	Matrix Type	Date Sampled	Time Sampled	Comments/Hazards/ Location Details
1	Coal Run 1			11/17/99		Prep. Samples (3)
2	Run 2			11/17/99		analyze for Ash, Btu
3	Run 3			11/18/99		and sulfur (EPRI Project)
4						
5						- Send portion of preped sample
6						to Test America Dayton OH
7						
8						Call questions 800 3941194
9						
10						

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

		Date	Time
Samples relinquished to shipper or courier by:	DR Saathoff	11/29/99	1400
Samples received by:			

		Date	Time
Samples Relinquished by:	Samples Relinquished to:		
Samples Relinquished by:	Samples Relinquished to Laboratory: Nay	12/1/99	0930

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: add'l sampl info: 1: U1 Feeders, 8-12 pM
2: U1 Feeders, 2:15-6:15 PM
3: LaCygne #1, Coal Sample

CHAIN OF CUSTODY RECORD

Page 1 of 1

Job No: 99-95 LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1

Collected By/Company: KCPL

SAMPLE ANALYSIS REQUIRED: 188461

SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI-VOC	VOST	BLU HEXCHROME	Hg	Sulfur	FLY ASH	REMARKS (Specific Compounds/Methods)
Run 1 Coal Sample	11-17-99	0800 - 1200			✓		II	SF			✓					✓	✓	✓	✓	Analyze according to the Ontario Hydro Method. Ship one container to EERC and one container to Phillip Labs
Run 2 Coal Sample	11-17-99	1415 - 1815			✓		II	SF			✓					✓	✓	✓	✓	
Run 3 Coal Sample	11-18-99	? not recorded			✓		II	SF			✓					✓	✓	✓	✓	
		DPS	11/19/99																	

Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign:	Date/Time	Received By/Sign:
Russell [signature]	11/18/99 14:00	Bill Hyfry	Bill Hyfry	11-19-99 1400	Jason Conway
Jason Conway	11-22-99 1100	[signature]			
Received for Laboratory By/Signature:		Date/Time	Send Samples to: ~~Test America~~ Phillip		
			Phone:	Fax:	

PHILIP
ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

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

ANALYTICAL REPORT

Client: METCO Environmental

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

Project: 188907
Received: 01-DEC-99
Reported: 17-DEC-99

PURCHASE ORDER: 99-95LACI-29

Project Description: Cl2 Analysis on 188461: 99-95-LACI
EPRI/KCPL (LaCygne, KS) Unit 1 - 3 Coal Runs

	AS RECEIVED BASIS	DRY BASIS	UNITS	METHOD	DATE	ANALYST
aka 1384908 Coal Run 1 (U1 Feeders)						
Lab Sample: 1386875						
sampled: 17-NOV-99 12:00 by: KCPL						
Chloride, Total	0.03	0.03	%	E776/300.0	16-DEC-99	DRK
aka 1384909 Coal Run 2 (U1 Feeders)						
Lab Sample: 1386876						
sampled: 17-NOV-99 18:15 by: KCPL						
Chloride, Total	0.03	0.03	%	E776/300.0	16-DEC-99	DRK
aka 1384910 Coal Run 3 (LaCygne #1)						
Lab Sample: 1386877						
sampled: 18-NOV-99 by: KCPL						
Chloride, Total	0.03	0.03	%	E776/300.0	16-DEC-99	DRK

< Indicates less than the limit of quantitation.

PHILIP
ANALYTICAL SERVICES

Chain of Custody Record

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

Sample Container Information

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

Report Results To:

PO # 99-95LAC1-29 Job ID 99-95LAC1
Name Doug Saathoff
Company Metco
Mailing Address — on file —
City State ZIP
Telephone # Fax #

Send Invoice To:

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

Analysis Requested

188907 (Cl2)
188461

Page 1 of 1
PAS Quote#

Sampled by:

	SAMPLE DESCRIPTION	Air Vol. (L or min)	Matrix Type	Date Sampled	Time Sampled
1	Coal Run 1			11/17/99	
2	Run 2			11/17/99	
3	Run 3			11/18/99	
4					
5					
6					
7					
8					
9					
10					

Comments/Hazards/ Location Details

Prep. Samples (3) analyze for Ash, Btu and sulfur (EPRI Project)

- Send portion of preped sample to Test America Dayton OH

Call questions 800 3941194

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

Samples relinquished to shipper or courier by: DSaathoff Date 11/29/99 Time 1400
Samples received by: Date Time

Samples Relinquished by: Samples Relinquished to: Date Time
Samples Relinquished by: Samples Relinquished to Laboratory: Date 12/1/99 Time 0930

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: 1: LaCygne #1, all Sample ID's 1: ESP Feeders, 8-12 PM
2: ESP Feeders, 2:15-6:15 PM
3: LaCygne #1, Coal Sample

D-73

Philip Analytical Services
Quality Assurance Protocol

PAS Sample#: 1386877

Client Name: Metco

PAS Project#: 188907

Job ID :

Units: %

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		
1386877-Chlorine					0.03	0.03	0	1.98	1.84	93	0.01	0.01

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

PeakNet AS3500DX - 12169902.AS3

1 Inj. Vol.	Inj/ Vial	Sample	Method (.MET)	Data	Dil.	Int. Std.	Template (.PRP)
50	1	WATER	ACIDSCAN	121699	1	1	
50	1	AUTOCAL1	ACIDSCAN	121699	1	1	
50	1	AUTOCAL2	ACIDSCAN	121699	1	1	
50	1	AUTOCAL3	ACIDSCAN	121699	1	1	
50	1	AUTOCAL4	ACIDSCAN	121699	1	1	
50	1	AUTOCAL5	ACIDSCAN	121699	1	1	
50	1	AUTOCAL6	ACIDSCAN	121699	1	1	
50	1	METH BLK	ACIDSCAN	121699	1	1	
50	1	IPC	ACIDSCAN	121699	1	1	
50	1	QCS	ACIDSCAN	121699	1	1	
50	1	LCS	ACIDSCAN	121699	1	1	
50	1	METH BLK	ACIDSCAN	121699	1	1	
50	1	1385389 1:100	ACIDSCAN	121699	1	1	
50	1	1385389 1:100 DUP	ACIDSCAN	121699	1	1	
50	1	1385389 1:100 MS	ACIDSCAN	121699	1	1	
50	1	1385389 1:100 MSD	ACIDSCAN	121699	1	1	
50	1	CL2 CONT 1:50	ACIDSCAN	121699	1	1	
50	1	1386875	ACIDSCAN	121699	1	1	
50	1	1386876	ACIDSCAN	121699	1	1	
50	1	1386877	ACIDSCAN	121699	1	1	
50	1	1386877 DUP	ACIDSCAN	121699	1	1	
50	1	1386877 MS	ACIDSCAN	121699	1	1	
50	1	1386877 MSD	ACIDSCAN	121699	1	1	
50	1	1386554	ACIDSCAN	121699	1	1	
50	1	1386555	ACIDSCAN	121699	1	1	
50	1	1386556	ACIDSCAN	121699	1	1	
50	1	1386556 DUP	ACIDSCAN	121699	1	1	
50	1	1386556 MS	ACIDSCAN	121699	1	1	
50	1	1386556 MSD	ACIDSCAN	121699	1	1	
50	1	METH BLK	ACIDSCAN	121699	1	1	
50	1	IPC	ACIDSCAN	121699	1	1	
50	1	1385477	ACIDSCAN	121699	1	1	
50	1	1385477 DUP	ACIDSCAN	121699	1	1	
50	1	1385477 MS	ACIDSCAN	121699	1	1	
50	1	1385477 MSD	ACIDSCAN	121699	1	1	
50	1	1385478	ACIDSCAN	121699	1	1	
50	1	1385479	ACIDSCAN	121699	1	1	
50	1	1385480	ACIDSCAN	121699	1	1	
50	1	1385481	ACIDSCAN	121699	1	1	
50	1	1385481 DUP	ACIDSCAN	121699	1	1	
50	1	1385481 MS	ACIDSCAN	121699	1	1	
50	1	1385481 MSD	ACIDSCAN	121699	1	1	
50	1	1385482	ACIDSCAN	121699	1	1	
50	1	1385483	ACIDSCAN	121699	1	1	
50	1	1385484	ACIDSCAN	121699	1	1	
50	1	METH BLK	ACIDSCAN	121699	1	1	
50	1	IPC	ACIDSCAN	121699	1	1	
50	1	1385485	ACIDSCAN	121699	1	1	
50	1	1385485 DUP	ACIDSCAN	121699	1	1	
50	1	1385485 MS	ACIDSCAN	121699	1	1	
50	1	1385485 MSD	ACIDSCAN	121699	1	1	
50	1	1385486	ACIDSCAN	121699	1	1	
50	**1**	**1385489**	**ACIDSCAN**	**121699**	**1**	**1**	
50	**1**	**1385490**	**ACIDSCAN**	**121699**	**1**	**1**	
50	**1**	**1385491**	**ACIDSCAN**	**121699**	**1**	**1**	
50	**1**	**1385492**	**ACIDSCAN**	**121699**	**1**	**1**	
50	**1**	**METH BLK**	**ACIDSCAN**	**121699**	**1**	**1**	
50	**1**	**IPC**	**ACIDSCAN**	**121699**	**1**	**1**	

al s	Inj. Vol.	Inj/ Vial	Sample	Method (.MET)	Data	Dil.	Int. Std.	Template (.PRP)
7	50	1	1385493	ACIDSCAN	121699	1	1	
8	50	1	1385493 DUP	ACIDSCAN	121699	1	1	
9	50	1	1385493 MS	ACIDSCAN	121699	1	1	
0	50	1	1385493 MSD	ACIDSCAN	121699	1	1	
1	50	1	1385494	ACIDSCAN	121699	1	1	
2	50	1	1385495	ACIDSCAN	121699	1	1	
3	50	1	1385496	ACIDSCAN	121699	1	1	
4	50	1	1385497	ACIDSCAN	121699	1	1	
5	50	1	1385498	ACIDSCAN	121699	1	1	
6	50	1	1385499	ACIDSCAN	121699	1	1	
7	50	1	1385500	ACIDSCAN	121699	1	1	
8	50	1	1385501	ACIDSCAN	121699	1	1	
9	50	1	1385502	ACIDSCAN	121699	1	1	
0	50	1	1385503	ACIDSCAN	121699	1	1	
1	50	1	1385504	ACIDSCAN	121699	1	1	
1	50	1	METH BLK	ACIDSCAN	121699	1	1	
2	50	1	IPC	ACIDSCAN	121699	1	1	
0	50	1	WATER	STOP	121699	1	1	

More Run Parameters

ial os	Oven Ctl	Oven Set	Cool Ctl	Cool Set	Cycle Time	Flush Vol	Visc Factor	Prep Visc	Inj Type	Needle Height
40	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
01	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
02	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
03	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
04	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
05	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
06	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
01	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
02	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
03	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
04	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
01	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
05	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
06	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
07	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
08	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
09	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
10	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
11	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
12	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
13	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
14	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
15	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
16	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
17	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
18	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
19	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
20	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
21	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0
22	Off	18	Off	0	0.00	400	Normal	Normal	Push	2.0

[redacted]
188814

PHILIP
ANALYTICAL SERVICES

Client: METCO Env		Test(s): Chloride
Date: 12/16/99	Initials: DRK	Reviewed By:

Standard 1 Concentration: _____ Reading: _____
Standard 2 Concentration: _____ Reading: _____
Standard 3 Concentration: _____ Reading: _____
Standard 4 Concentration: _____ Reading: _____
Spike 1 Spike Amount: _____ Recv'd _____ Recv'y: _____
Spike 2 Spike Amount: _____ Recv'd _____ Recv'y: _____
Cl₂ Cont 1:50 3.349 mg/L

PAGE _____ of _____
☐ Call Results
☐ FAX Results
☐ Results Entered

Sample		Chloride mg/L		WEIGHT (KG)		Chloride mg/kg		% Cl⁻	
1386875		3.241		0.0004944		328		0.03	
1386876		3.504		0.0006283		279		0.03	
1386877		2.975		0.0004267		966		0.03	
1386877	DUP	2.482		0.0004076		304		0.03	
1386554		1.051		0.0005451		96		0.01	
1386555		1.319		0.0006616		100		0.01	
1386556		1.580		0.0004693		113		0.01	
1386556	DUP	1.038		0.0006845		76		<0.01	

Comments For Report:

☐ Analysis performed for PHILIP Analytical by our AIHA accredited reference laboratory ☐ Sample results are blank-corrected

Analytical Method:	LLD
EPA 300.0	1.00 mg/L

A = not applicable ND = none detected L/A = sample lost to lab accident QNS = quantity not sufficient to test N/R = sample not received by chemist

TestAmerica
INCORPORATED

Sample ID: EPRI/KCPL
Lacygne, Kansas

Hg Analysis
ASTM D6414-99

Coal Samples

Collected On: 11/17/99 for Run 1 and Run 2, 11/18/99 for Run 3 Composite
Collected By: METCO

	Digestion Date	Analysis Date	Analyst	Results	Duplicate Result	RPD	Units	Dry Weight (%)	Flags	Notes
Run 1 Composite	12/20/99	12/21/99	jpp	0.110	0.113	2.6	ug/g	84.2		
Run 2 Composite	12/20/99	12/21/99	jpp	0.102	0.106	3.8	ug/g	88.7		
Run 3 Composite	12/20/99	12/21/99	jpp	0.098	0.099	1.7	ug/g	88.7		

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: Jamie L Davis Date: 12/14/09 Time: —

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 LACYGNE

Other ____ Initials ____ Date ____

Issues to Clarify with Client

Corrective Action

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

TestAmerica INCORPORATED

ASRACK # 122199X

COALS

NONAQUEOUS MERCURY BATCH SHEET

Analyst: JRP Date: 12/20/99 12/21/99 Water Bath: start mid end

Standard Reference: 65-41-17 temp: _____

ICV Reference: 65-41-18 date: _____

% DW	Sample # / Client	Weight	MS	MSD
95.1	1384801 TRP [redacted]	1.0724 g		
76.7	1384802 SPL	1.0081 g		
76.8	1384803	1.0423 g		
84.2	1384908 LaCygne	1.0150 g		
88.2	1384909	1.0678 g		
88.7	1384910	1.0018 g		
95.0 ~~96.5~~	1384787 [redacted]	1.0110 g		
96.5	1384788	1.0059 g		
97.0	1384789	1.0816 g		
100	1384796 [redacted]	1.0090 g		
100	1384797 TRP	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 1630 A	1.0044 g		
	Blank			

MB

ICV

MS

MSD

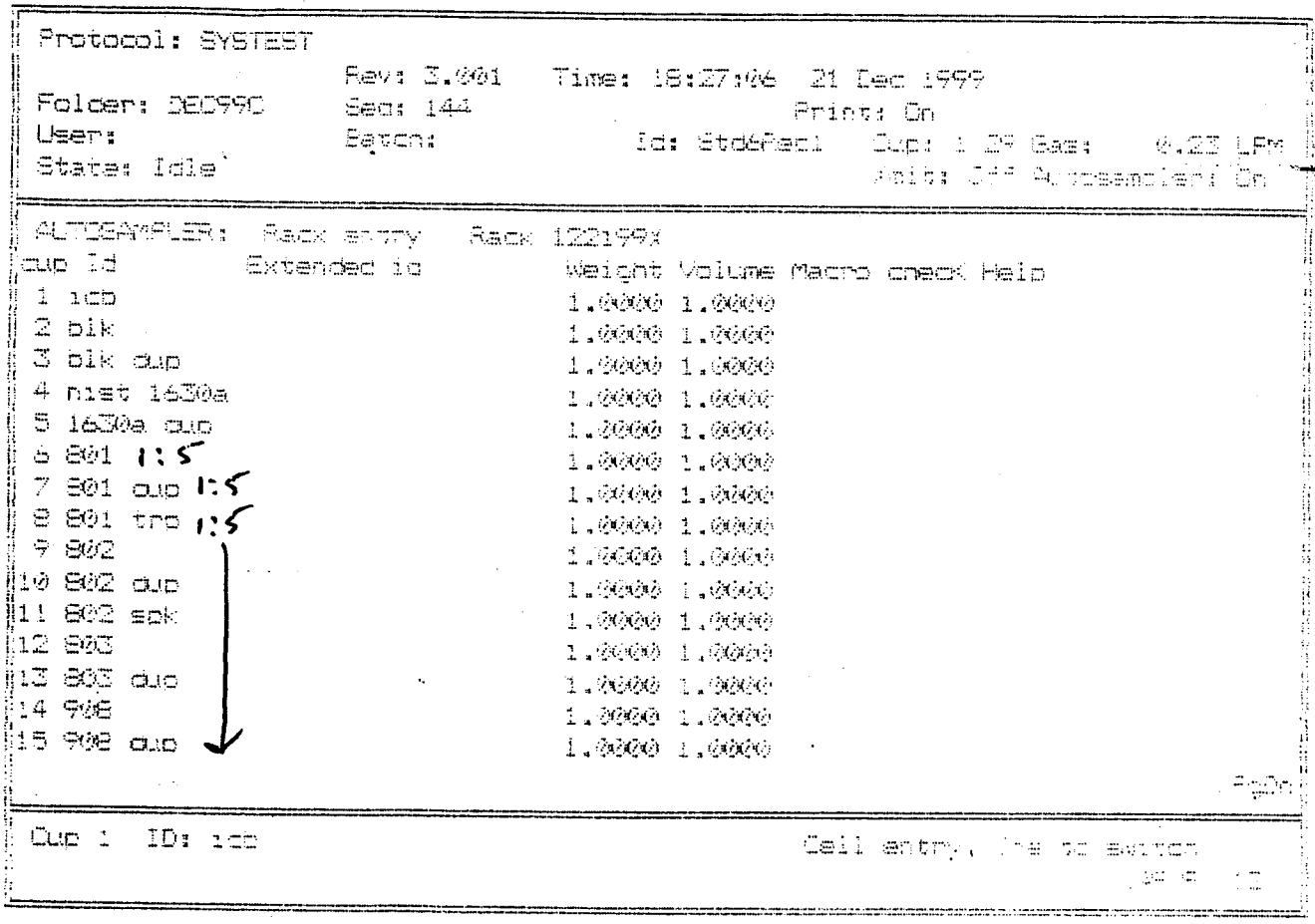
RPD

FLAG

HNO_3 - 65-48-14
HCl - 65-46-1
$KMnO_4$ - 65-33-11
12/21 ~~$SnCl_2$ - 65-50-6~~
NH_2OH - 65-50-6
$SnCl_2$ - 65-50-16

SECONDARY DATA CHECK: analyst:
date:

Comments: _____



Protocol: SYSTEST

Rev: 3.001 Time: 18:27:06 21 Dec 1999

Folder: DEC99C Seq: 144 Print: On

User: Batch: Id: Std6Rec1 Cup: 1 29 Gas: 0.23 LPM

State: Idle Amit: Off Autosampler: On

AUTOSAMPLER: Rack entry Rack 122199X

cup Id	Extended id	Weight	Volume	Macro check	Help
1 icb		1.0000	1.0000		
2 blk		1.0000	1.0000		
3 blk dup		1.0000	1.0000		
4 nist 1630a		1.0000	1.0000		
5 1630a dup		1.0000	1.0000		
6 801 1:5		1.0000	1.0000		
7 801 dup 1:5		1.0000	1.0000		
8 801 trp 1:5		1.0000	1.0000		
9 802		1.0000	1.0000		
10 802 dup		1.0000	1.0000		
11 802 spk		1.0000	1.0000		
12 803		1.0000	1.0000		
13 803 dup		1.0000	1.0000		
14 908		1.0000	1.0000		
15 908 dup		1.0000	1.0000		

PgDn

Cup 1 ID: icb Cell entry, line to switch

```
Protocol: SYSTEST
                    Rev: 3.001    Time: 18:27:10  21 Dec 1999
Folder: DEC99C      Seq: 144                      Print: On
User:               Batch:              Id: StdeRec1   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                                1.0000 1.0000
17 909 cup                            1.0000 1.0000
18 910                                1.0000 1.0000
19 910 cup                            1.0000 1.0000
20 787 NO DIL                         1.0000 1.0000
21 787 cup NO DIL                     1.0000 1.0000
22 788 NO DIL                         1.0000 1.0000
23 788 cup NO DIL                     1.0000 1.0000
24 789 NO DIL                         1.0000 1.0000
25 789 cup NO DIL                     1.0000 1.0000
26 796                                1.0000 1.0000
27 796 cup                            1.0000 1.0000
28 ccp                                1.0000 1.0000
29 ccv                                1.0000 1.0000
30 797                                1.0000 1.0000
                                                                              PgDn

Cup 16 ID: 909                                  Cell entry, Ins to switch
                                                                    149 9  12
```

1:5

1:5

Protocol: SYSTEST

Rev: 3.001 Time: 18:27:12 21 Dec 1999

Folder: DEC99D Seq: 144 Print: On

User: Batch: Id: Std6Rep1 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
31	797 dup	1:5	1.0000	1.0000		
32	797 trp		1.0000	1.0000		
33	798	NODIL	1.0000	1.0000		
34	798 dup	NODIL	1.0000	1.0000		
35	798 spk	1:5 (=1.44 mg/L)	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		

PgDn

Cup 31 ID: 797 dup Cell entry, Ins to switch

149 9 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: 0.23 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 [illegible]

*** 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 18:13:26 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 123926
Ave. Int. = 123926 S. D. = 0

Protocol: SYSTEST

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

Folder: DEC99C Seq: i44 Print: On

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

State: Idle Xmit: Off Autosampler: On

CALIBRATION: Line Calibration

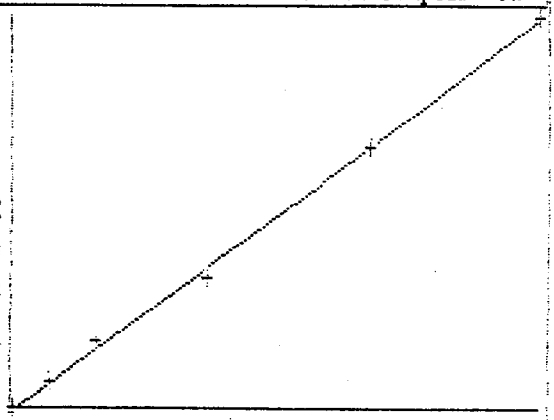
Line: Hg Accepted

	Conc.	Calc.	Dev.	LiNear
S1	.000	-.005	-.005	Quadratic
S2	.200	.192	-.008	WtdLinear
S3	.500	.456	-.044	
S4	1.00	1.08	.077	Accept
S5	2.00	2.00	.001	
S6	3.00	2.98	-.021	StdAdd

Concentration

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 CK2 Sec: 144 18:28:37 21 Dec 1999 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		104.	.626	.604	ug/L	.000

*** Sample ID: icb Sec: 145 18:32:36 21 Dec 1999 HG

Hg -.010 ug/L .000 -.010 <0.0002 mg/L

*** Sample ID: blk Sec: 146 18:34:50 21 Dec 1999 HG

Hg .087 ug/L .000 .087 <0.0002 mg/L

*** Sample ID: blk dup Sec: 147 18:37:11 21 Dec 1999 HG

Hg .090 ug/L .000 .090 <0.0002 mg/L

*** Sample ID: nist 1630a Sec: 148 18:45:49 21 Dec 1999 HG

Hg 1.62 ug/L .000 1.62 0.091 mg/kg

TV = 0.106 ± 0.032

*** Sample ID: 1630a dup Sec: 149 18:48:11 21 Dec 1999 HG

Hg 1.80 ug/L .000 1.80 0.090 mg/g

*** Sample ID: [redacted] Sec: [redacted]

Hg 4.64 ug/L .000 4.64 NO DATA

*** Sample ID: 801 1:5 Sec: 151 19:35:47 21 Dec 1999 HG

Hg .906 ug/L .000 .906 0.222 ug/g

*** Sample ID: 801 dup 1:5 Sec: 152 19:41:05 21 Dec 1999 HG RPD = 3.3%

Hg .938 ug/L .000 .938 0.208 ug/g

*** Sample ID: 901 trp 1:5 Sec: 153 19:43:23 21 Dec 1999 HG RPD = <1.0%

Hg .917 ug/L .000 .917 0.225 ug/g

*** Sample ID: 802 1:5 Sec: 154 19:45:42 21 Dec 1999 HG

Hg .552 ug/L .000 .552 0.180 ug/kg

*** Sample ID: 802 dup 1:5 Sec: 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: [redacted] 1:5 Seq: [redacted] 19:50:19 21 Dec 1999 HG									
Hg	1.33	ug/L	.000		1.33				
*** Sample ID: 880 [redacted] 1:5 Seq: [redacted] 19:52:38 21 Dec 1999 HG									
Hg	1.16	ug/L	.000		1.16				
*** Sample ID: [redacted] dup 1:5 Seq: 152 19:54:57 21 Dec 1999 HG									
[redacted]									
*** Sample ID: 908 LACLEDE 1:5 Seq: 159 19:57:16 21 Dec 1999 HG									
Hg	.377	ug/L	.000		.377				
*** Sample ID: 908 dup 1:5 Seq: 160 19:59:34 21 Dec 1999 HG									
Hg	.387	ug/L	.000		.387				
*** Sample ID: 909 LC 1:5 Seq: 161 20:01:52 21 Dec 1999 HG									
Hg	.326	ug/L	.000		.326				
*** Sample ID: 909 dup 1:5 Seq: 162 20:04:10 21 Dec 1999 HG									
Hg	.400	ug/L	.000		.400				
*** Sample ID: 910 LC 1:5 Seq: 163 20:06:29 21 Dec 1999 HG									
Hg	.347	ug/L	.000		.347				
*** Sample ID: 910 dup 1:5 Seq: 164 20:08:46 21 Dec 1999 HG									
Hg	.353	ug/L	.000		.353				
*** [redacted] 1:5 [redacted]									
Hg	.056	ug/L	.000		.056				
*** Sample ID: 757 Seq: [redacted] 20:14:37 21 Dec 1999 HG									
Hg	.419	ug/L	.000		.419				
*** Sample ID: 757 dup Seq: 167 20:16:55 21 Dec 1999 HG									
Hg	.417	ug/L	.000		.417				

TV=1.0

99.8%

0.362 µg/g

RPD = 1.0%

0.305 µg/g

0.110 µg/g

RPD = 2.6%

0.113 µg/g

0.102 µg/g

RPD = 3.8%

0.106 µg/g

0.098 µg/g

RPD = 1.7%

0.099 µg/g

NO DATA

0.022 µg/g

RPD = 1.0%

0.022 µg/g

20:19:14 21 Dec 1999 Folder: DEC99C Protocol: SYSTEST Page 246

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 [redacted]				Seq: 169	20:22:25 21 Dec 1999 HG			
Hg	.759	ug/L	.000	.759		0.039 µg/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 µg/g		
*** Sample ID: 789 [redacted]				Seq: 171	20:27:02 21 Dec 1999 HG			
Hg	.514	ug/L	.000	.514		0.024 µg/g		
*** Sample ID: 789 dup				Seq: 172	20:29:21 21 Dec 1999 HG	RPD = 2.1%		
Hg	.525	ug/L	.000	.525		0.025 µg/g		
*** Sample ID: 7[redacted]				Seq: 173	20:31:39 21 Dec 1999 HG			
Hg	.388	ug/L	.000	.388		0.096 µg/g		
*** Sample ID: 796 dup			1:5	Seq: 174	20:33:59 21 Dec 1999 HG	RPD = <1.0%		
[redacted]						0.0[illegible] µg/g		
*** Sample ID: ccb				Seq: 175	20:36:18 21 Dec 1999 HG			
Hg	-.037	ug/L	.000	-.037		<0.2 µg/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%		
*** Sample ID: 797 [redacted]				Seq: 177	20:41:01 21 Dec 1999 HG			
Hg	.322	ug/L	.000	.322		0.079 µg/g		
*** Sample ID: 797 dup			1:5	Seq: [illegible]	20:43:20 21 Dec 1999 HG	RPD = <1.0%		
Hg	.323	ug/L	.000	.323		0.079 µg/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 µg/g		

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: 77[redacted]			1:5	Seq: 180	20:47:58 21 Dec 1999 HG			
Hg	-.032	ug/L	.000	-.032		NO DATA		
*** Sample ID: 798				Seq: 181	20:56:07 21 Dec 1999 HG			
Hg	2.20	ug/L	.000	2.20	0.103 µg/g	~~0.516 µg/g~~ gpo 1/6/00		
*** Sample ID: 798 dup				Seq: 182	20:58:33 21 Dec 1999 HG	RPD = <1.0%		
Hg	2.22	ug/L	.000	2.22	0.104 µg/g	~~0.520 µg/g~~ gpo 1/6/00		
*** Sample ID: 798 spk			1:5	Seq: 183	21:00:57 21 Dec 1999 HG			
Hg	1.44	ug/L	.000	1.44		TV=1.0		
						100%		
*** Sample ID: 774[redacted]			1:5	Seq: 184	21:03:19 21 Dec 1999 HG			
Hg	.535	ug/L	.000	.535		0.134 µg/g		
*** Sample ID: 774 dup			1:5	Seq: 185	21:05:39 21 Dec 1999 HG	RPD = <1.0%		
Hg	.531	ug/L	.000	.531		0.133 µg/g		
*** Sample ID: 775[redacted]			1:5	Seq: 186	21:08:00 21 Dec 1999 HG			
Hg	.570	ug/L	.000	.570		0.142 µg/g		
*** Sample ID: 775 dup			1:5	Seq: 187	21:10:21 21 Dec 1999 HG	RPD = 1.0%		
Hg	.576	ug/L	.000	.576		0.143 µg/g		
*** Sample ID: 776[redacted]			1:5	Seq: 188	21:12:42 21 Dec 1999 HG			
Hg	.548	ug/L	.000	.548		0.141 µg/g		
*** Sample ID: 776 dup			1:5	Seq: 189	21:15:03 21 Dec 1999 HG	RPD = <1.0%		
Hg	.544	ug/L	.000	.544		0.139 µg/g		
*** Sample ID: 554[redacted]			1:5	Seq: 190	21:17:24 21 Dec 1999 HG			
Hg	1.07	ug/L	.000	1.07		0.287 µg/g		
*** Sample ID: 554 dup			1:5	Seq: 191	21:19:45 21 Dec 1999 HG	RPD = <1.0%		
Hg	1.07	ug/L	.000	1.07		~~0.287 µg/g~~		

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: [redacted]				Seq: 192		21:22:32 21 Dec 1999 HG		
Hg	.995	ug/L	.000	.995				
*** Sample ID: 555 dup				Seq: 193		21:24:21 21 Dec 1999 HG		
Hg	1.00	ug/L	.000	1.00				
*** Sample ID: [redacted]				Seq: 194		21:27:09 21 Dec 1999 HG		
Hg	.968	ug/L	.000	.968				
*** Sample ID: 556 dup				Seq: 195		21:29:27 21 Dec 1999 HG		
Hg	.942	ug/L	.000	.942				
*** Sample ID: ccc				Seq: 196		21:31:49 21 Dec 1999 HG		
Hg	-.038	ug/L	.000	-.038				
*** Sample ID: ccv				Seq: 197		21:34:08 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]	[illegible]	1384744	1384745	[illegible]	[illegible]
Client/Pan #	LAWRENCE 17 R1	18 R2	19 R3	MICHIGAN 20 R1	21 R1	22 R2
Wt of Pan + Sample	8.9951	9.2612	8.5994	9.186	10.0610	8.7108
Wt after Drying	8.5997	8.7743	8.2963	8.7995	8.5074	7.3689
Wt of Pan or Wt After Ignition	0.9808	0.9770	0.9805	0.9772	0.9776	0.9794
Difference	7.6189	7.7973	7.3158	7.8223	7.5298	6.3895
Sample amount g	8.0143	8.2842	7.6189	8.2088	9.0834	7.7314
Result	[illegible]	94.1 %	96.0 %	95.1 %	[illegible]	[illegible]

Sample Number/ Test (DW/TVS)	[illegible]	1384908	1384909	1384910	[illegible]	[illegible]
Client/Pan #	MICHIGAN 23 R3	LACYGNE 24 R1	25 R2	26 R3	BMP HG 27 R1	28 R2
Wt of Pan + Sample	11.1414	8.6880	8.6140	8.6025	6.3006	9.2582
Wt after Drying	9.4834	7.4730	7.7521	7.7375	6.3018	9.2572
Wt of Pan or Wt After Ignition	0.9827	0.9800	0.9778	0.9789	0.9820	0.9842
Difference	8.5005	6.4930	6.7743	6.7586	5.3198	8.2730
Sample amount g	10.1587	7.7080	7.6362	7.6236	5.5186	8.2740
Result	[illegible]	84.2 %	88.7 %	88.7 %	[illegible]	[illegible]

Sample Number/ Test (DW/TVS)	[illegible]	[illegible]	[illegible]	[illegible]
Client/Pan #	BMP HG 29 R3	CINERGY 30 R1	31 [illegible] R1	32 R2
Wt of Pan + Sample	8.2005	9.0194	8.7995	7.3404
Wt after Drying	8.1950	8.3329	7.9414	6.6936
Wt of Pan or Wt After Ignition	0.9863	0.9840	0.9868	0.9865
Difference	7.2087	7.3489	6.9546	5.7071
Sample amount g	7.2142	8.0354	7.8057	6.3539
Result	[illegible]	[illegible]	[illegible]	[illegible]

Batch Number —
TVS -
DW - 3395

Note:
METCO COALS
- CONT'D -

Analyst: LP Date: 12/21/99

TestAmerica INCORPORATED

APPENDIX E

Unit Operational Data

Run 1 Bill

START 08:50

STOP 13:00

Unit Operating Periods Only

Point	1_Stk_T-mp_A_35	1_SO2_#-mmBtu_35	1_Stk_T-mp_B_35	1_MWatt-s_35	1_CO2_35
Units	Deg F	#/mmBtu	Deg F	MW_Gross	%
Full Scale	500.00	9.990	500.00	800.00	25.00
11/17/99 08:45	161.80	0.370>	172.80	712.40	9.55>!
11/17/99 09:00	162.00	0.360	173.50	712.80	9.64!
11/17/99 09:15	162.30	0.350	173.50	713.20	9.74!
11/17/99 09:30	163.50	0.340	173.80	713.20	9.78!
11/17/99 09:45	164.30	0.340	174.80	713.60	9.80!
11/17/99 10:00	165.80	0.335	174.80	712.40	9.83!
11/17/99 10:15	165.80	0.345	174.50	713.60	9.84!
11/17/99 10:30	166.30	0.340	174.80	710.00	9.89!
11/17/99 10:45	167.50	0.340	175.30	711.60	9.89!
11/17/99 11:00	167.50	0.340	175.80	712.40	9.86!
11/17/99 11:15	167.80	0.350	175.50	712.00	9.75!
11/17/99 11:30	167.80	0.360	176.30	712.40	9.66!
11/17/99 11:45	168.00	0.365	175.80	713.20	9.64!
11/17/99 12:00	168.00	0.370	175.50	712.00	9.70!
11/17/99 12:15	167.80	0.380	176.50	709.60	9.79!
11/17/99 12:30	168.50	0.380	176.80	711.60	9.73!
11/17/99 12:45	168.30	0.380	176.30	712.40	9.66!
11/17/99 13:00	168.00	0.375	176.30	711.60	9.63!
Average	166.17	0.357	175.14	712.22	9.74
Minimum	161.80	0.335	172.80	709.60	9.55
Maximum	168.50	0.380	176.80	713.60	9.89
Off-line (%)	0.00	0.00	0.00	0.00	0.00
Missing (%)	0.00	0.00	0.00	0.00	0.00
Invalid (%)	0.00	0.00	0.00	0.00	0.00
O O Cal (%)	0.00	0.00	0.00	0.00	0.00
In Cal (%)	0.00	0.00	0.00	0.00	0.00
Valid (%)	100.00	100.00	100.00	100.00	100.00
Available(%)	100.00	100.00	100.00	100.00	100.00

M MissingData	F PowerFailure	P InPurge	f DiscreteMissing
D Downed	C InCalibration	O Part60-OOC	O Part75-OOC
B NoSamples	< TooFewSamples	r Reserved_1	u Reserved_2
A HighAlarm	a LowAlarm	m EPA_MinCO2MaxO2	G EPA_AppG_CO2
> EnoughSamples	E Edited	S StackOffline	! PrimaryMonitor
@ BackupMonitor	# Alternate	$ ReferenceMethod	% Parametric
^ Average_HB_HA	& Init_QA_Hrs_Avg	* 90thPercentile	(95thPercentile
) BinMaximum	- BinAverage	+ MaxPotential	| Other

Unit Operating Periods Only

Point	1_Flow_-Avg_39	1_CO2_39	1_NOx_#-mmB_39
Units	KSCFM	%	#/mmBtu
Full Scale	3000.00	25.00	2.00000
11/17/99 08:45	2179.50!	9.55>!	1.32103>!
11/17/99 09:00	2164.00!	9.64!	1.31092!
11/17/99 09:15	2169.00!	9.74!	1.29967!
11/17/99 09:30	2168.50!	9.78!	1.29655!
11/17/99 09:45	2187.50!	9.80!	1.29610!
11/17/99 10:00	2181.00!	9.83!	1.28558!
11/17/99 10:15	2183.00!	9.84!	1.29083!
11/17/99 10:30	2156.50!	9.89!	1.27779!
11/17/99 10:45	2166.50!	9.89!	1.27344!
11/17/99 11:00	2167.50!	9.86!	1.29257!
11/17/99 11:15	2133.50!	9.75!	1.31597!
11/17/99 11:30	2133.50!	9.66!	1.33268!
11/17/99 11:45	2134.00!	9.64!	1.35105!
11/17/99 12:00	2120.00!	9.70!	1.33826!
11/17/99 12:15	2120.50!	9.79!	1.31938!
11/17/99 12:30	2141.00!	9.73!	1.32751!
11/17/99 12:45	2147.00!	9.66!	1.34603!
11/17/99 13:00	2137.50!	9.63!	1.34353!
Average	2155.00	9.74	1.31216
Minimum	2120.00	9.55	1.27344
Maximum	2187.50	9.89	1.35105
Off-line (%)	0.00	0.00	0.00
Missing (%)	0.00	0.00	0.00
Invalid (%)	0.00	0.00	0.00
O O Cal (%)	0.00	0.00	0.00
In Cal (%)	0.00	0.00	0.00
Valid (%)	100.00	100.00	100.00
Available(%)	100.00	100.00	100.00

M MissingData	F PowerFailure	P InPurge	f DiscreteMissing
D Downed	C InCalibration	O Part60-OOC	O Part75-OOC
B NoSamples	< TooFewSamples	r Reserved_1	u Reserved_2
A HighAlarm	a LowAlarm	m EPA_MinCO2MaxO2	G EPA_AppG_CO2
> EnoughSamples	E Edited	S StackOffline	! PrimaryMonitor
@ BackupMonitor	# Alternate	$ ReferenceMethod	% Parametric
^ Average_HB_HA	& Init_QA_Hrs_Avg	* 90thPercentile	(95thPercentile
) BinMaximum	- BinAverage	+ MaxPotential	| Other

MERCURY EMISSIONS TEST

RUN 1

Date 11-17-99

"A" side

Time	Net Load (MW)	F.W. F. [redacted] Flow	Cyclones In Service	Fuel Flow (TPH)	Gas Temperature Leaving Air Heaters	pH's on "A" Module	Scrubber Outlet Pressure
800	615	5179	18	431.5	638	Not making	41.7
815	617	5238	18	438.6	638	—	41.9
830	620	5216	18	438.9	641	—	42.6
845	621	5203	18	440.0	640	5.81	43.0
900	621	5210	18	440.2	642	5.70	42.7
915	621	5179	18	441.9	642	5.69	42.9
930	621	5169	18	439.1	641	5.70	42.8
945	622	5145	18	435.9	642	5.70	43.4
1000	620	5134	18	434.0	641	5.70	43.3
1015	623	5104	18	430.7	642	5.70	43.6
1030	616	5135	18	428.6	641	5.70	42.6
1045	620	5142	18	432.2	641	5.70	43.2
1100	620	5150	18	431.4	641	5.70	42.9
1115	621	5159	18	428.4	641	5.70	42.0
1130	621	5144	18	429.7	641	5.70	42.1
1145	622	5130	18	428.0	640	5.70	42.1

MERCURY EMISSIONS TEST

Date 11-17-99

A Side

Time	Net Load (MW)	F.W. F ~~Steam Flow~~	Cyclones In Service	Fuel Flow (TPH)	Gas Temperature Leaving Air Heaters	pH's on "A" Module	Scrubber Outlet Pressure
1200	623	5105	18	420.9	641	5.7	42
1215	623	5116	18	414.2	641	5.7	41.8
1230	620	5162	18	417.2	641	5.7	42.4
1245	621	5176	18	415.4	642	5.7	42.9
1300	622	5174	18	410.0	643	5.7	42.3
				Avg = 429.8	Avg = 641	Avg = 5.7	Avg = 42.6

Bill
Run 2
start 14:15
stop 17:00

Unit Operating Periods Only

Point	1_Stk_T-mp_A_35	1_SO2_#-mmBtu_35	1_Stk_T-mp_B_35	1_MWatt-s_35	1_CO2_35
Units	Deg F	#/mmBtu	Deg F	MW_Gross	%
Full Scale	500.00	9.990	500.00	800.00	25.00
11/17/99 14:15	168.00	0.360	176.80	712.40	9.81!
11/17/99 14:30	168.30	0.355	176.50	707.20	9.84!
11/17/99 14:45	168.30	0.355	176.50	708.80	9.88!
11/17/99 15:00	168.00	0.355	176.30	708.40	9.94!
11/17/99 15:15	167.30	0.360	176.30	706.40	10.19!
11/17/99 15:30	166.50	0.360	175.30	706.00	10.23!
11/17/99 15:45	167.00	0.365	175.80	706.00	10.18!
11/17/99 16:00	166.80	0.370	175.80	706.80	10.11!
11/17/99 16:15	166.50	0.380	176.30	707.20	10.08!
11/17/99 16:30	166.50	0.380	176.00	706.80	10.08!
11/17/99 16:45	166.50	0.380	176.00	706.80	10.10!
11/17/99 17:00	167.00	0.370	176.00	707.20	10.13!
Average	167.22	0.366	176.13	707.50	10.05
Minimum	166.50	0.355	175.30	706.00	9.81
Maximum	168.30	0.380	176.80	712.40	10.23
Off-line (%)	0.00	0.00	0.00	0.00	0.00
Missing (%)	0.00	0.00	0.00	0.00	0.00
Invalid (%)	0.00	0.00	0.00	0.00	0.00
O O Cal (%)	0.00	0.00	0.00	0.00	0.00
In Cal (%)	0.00	0.00	0.00	0.00	0.00
Valid (%)	100.00	100.00	100.00	100.00	100.00
Available(%)	100.00	100.00	100.00	100.00	100.00

M MissingData	F PowerFailure	P InPurge	f DiscreteMissing
D Downed	C InCalibration	O Part60-OOC	O Part75-OOC
B NoSamples	< TooFewSamples	r Reserved_1	u Reserved_2
A HighAlarm	a LowAlarm	m EPA_MinCO2MaxO2	G EPA_AppG_CO2
> EnoughSamples	E Edited	S StackOffline	! PrimaryMonitor
@ BackupMonitor	# Alternate	$ ReferenceMethod	% Parametric
^ Average_HB_HA	& Init_QA_Hrs_Avg	* 90thPercentile	(95thPercentile
) BinMaximum	- BinAverage	+ MaxPotential	| Other

Unit Operating Periods Only

Point	1_Flow_-Avg_39	1_CO2_39	1_NOx_#-mmB_39
Units	KSCFM	%	#/mmBtu
Full Scale	3000.00	25.00	2.00000
11/17/99 14:15	2142.50!	9.81!	1.31450!
11/17/99 14:30	2119.00!	9.84!	1.31049!
11/17/99 14:45	2110.50!	9.88!	1.28343!
11/17/99 15:00	2123.50!	9.94!	1.29947!
11/17/99 15:15	2058.50!	10.19!	1.31188!
11/17/99 15:30	2032.00!	10.23!	1.30675!
11/17/99 15:45	2027.50!	10.18!	1.31739!
11/17/99 16:00	2006.50!	10.11!	1.32226!
11/17/99 16:15	1990.00!	10.08!	1.31127!
11/17/99 16:30	1976.50!	10.08!	1.30274!
11/17/99 16:45	1971.00!	10.10!	1.29165!
11/17/99 17:00	1981.00!	10.13!	1.28358!
Average	2044.88	10.05	1.30462
Minimum	1971.00	9.81	1.28343
Maximum	2142.50	10.23	1.32226
Off-line (%)	0.00	0.00	0.00
Missing (%)	0.00	0.00	0.00
Invalid (%)	0.00	0.00	0.00
O O Cal (%)	0.00	0.00	0.00
In Cal (%)	0.00	0.00	0.00
Valid (%)	100.00	100.00	100.00
Available(%)	100.00	100.00	100.00

M MissingData	F PowerFailure	P InPurge	f DiscreteMissing
D Downed	C InCalibration	O Part60-OOC	O Part75-OOC
B NoSamples	< TooFewSamples	r Reserved_1	u Reserved_2
A HighAlarm	a LowAlarm	m EPA_MinCO2MaxO2	G EPA_AppG_CO2
> EnoughSamples	E Edited	S StackOffline	! PrimaryMonitor
@ BackupMonitor	# Alternate	$ ReferenceMethod	% Parametric
^ Average_HB_HA	& Init_QA_Hrs_Avg	* 90thPercentile	(95thPercentile
) BinMaximum	- BinAverage	+ MaxPotential	| Other

MERCURY EMISSIONS TEST

Run 2

Date 11-17-99

A Side

Time	Net Load (MW)	F.W.F. ~~Steam Flow~~	Cyclones In Service	Fuel Flow (TPH)	Gas Temperature Leaving Air Heaters	pH's on "A" Module	Scrubber Outlet Pressure
2:15	700	5174.2	18	411.9	643	5.70	42.3
2:30	693	5105	18	405.4	642	5.7	41.6
2:45	698	5109.4	18	410.7	640	5.70	42.5
3:00	697	5068.7	18	409.9	641	5.70	42.4
3:15	693	5042.3	18	405.9	638	5.70	39.8
3:30	692	5086.1	18	408.0	637	5.70	39.8
3:45	693	5093.8	18	408.1	638	5.70	39.7
400	692	5118.8	18	406.5	638	5.70	39.1
415	693	5130.1	18	405	638	5.70	38.4
430	694	5122.2	18	403.4	639	5.70	38.4
445	694	5108	18	400.00	637	5.70	38.2
5:00	695	5122.4	18	400.6	637	5.70	38.2
				Avg = 406.3	Avg = 639	Avg = 5.7	Avg = 40.0

Run 3
09:15 - 12:15

Unit Operating Periods Only

Point	1_Stk_T-mp_A_35	1_SO2_#-mmBtu_35	1_Stk_T-mp_B_35	1_MWatt-s_35	1_CO2_35
Units	Deg F	#/mmBtu	Deg F	MW_Gross	%
Full Scale	500.00	9.990	500.00	800.00	25.00
11/18/99 09:15	167.00	0.465	174.80	720.00	10.50!
11/18/99 09:30	167.30	0.470	175.30	724.00	10.45!
11/18/99 09:45	167.00	0.465	175.00	722.40	10.49!
11/18/99 10:00	167.00	0.415	175.00	722.40	10.50!
11/18/99 10:15	166.50	0.400	175.00	723.60	10.51!
11/18/99 10:30	166.50	0.395	175.00	722.40	10.36!
11/18/99 10:45	166.50	0.405	174.80	722.00	10.20!
11/18/99 11:00	166.80	0.415	175.50	718.80	10.08!
11/18/99 11:15	167.30	0.415	175.50	723.20	10.00!
11/18/99 11:30	167.00	0.415	176.00	722.80	10.08!
11/18/99 11:45	167.30	0.420	176.00	721.20	10.14!
11/18/99 12:00	167.30	0.425	176.30	722.80	10.11!
11/18/99 12:15	167.30	0.440	176.30	719.20	9.95!
Average	166.98	0.427	175.42	721.91	10.26
Minimum	166.50	0.395	174.80	718.80	9.95
Maximum	167.30	0.470	176.30	724.00	10.51
Off-line (%)	0.00	0.00	0.00	0.00	0.00
Missing (%)	0.00	0.00	0.00	0.00	0.00
Invalid (%)	0.00	0.00	0.00	0.00	0.00
O O Cal (%)	0.00	0.00	0.00	0.00	0.00
In Cal (%)	0.00	0.00	0.00	0.00	0.00
Valid (%)	100.00	100.00	100.00	100.00	100.00
Available(%)	100.00	100.00	100.00	100.00	100.00

M MissingData	F PowerFailure	P InPurge	f DiscreteMissing
D Downed	C InCalibration	O Part60-OOC	O Part75-OOC
B NoSamples	< TooFewSamples	r Reserved_1	u Reserved_2
A HighAlarm	a LowAlarm	m EPA_MinCO2MaxO2	G EPA_AppG_CO2
> EnoughSamples	E Edited	S StackOffline	! PrimaryMonitor
@ BackupMonitor	# Alternate	$ ReferenceMethod	% Parametric
^ Average_HB_HA	& Init_QA_Hrs_Avg	* 90thPercentile	(95thPercentile
) BinMaximum	- BinAverage	+ MaxPotential	| Other

Unit Operating Periods Only

Point	1_Flow_-Avg_39	1_CO2_39	1_NOx_#-mmB_39
Units	KSCFM	%	#/mmBtu
Full Scale	3000.00	25.00	2.00000
11/18/99 09:15	1999.50!	10.50!	1.24449!
11/18/99 09:30	2035.00!	10.45!	1.25456!
11/18/99 09:45	2028.50!	10.49!	1.23748!
11/18/99 10:00	2016.00!	10.50!	1.22197!
11/18/99 10:15	2023.00!	10.51!	1.23104!
11/18/99 10:30	2016.00!	10.36!	1.24678!
11/18/99 10:45	2023.00!	10.20!	1.26845!
11/18/99 11:00	2017.00!	10.08!	1.29208!
11/18/99 11:15	2026.50!	10.00!	1.30886!
11/18/99 11:30	2038.00!	10.08!	1.30061!
11/18/99 11:45	2030.00!	10.14!	1.29079!
11/18/99 12:00	2026.50!	10.11!	1.29250!
11/18/99 12:15	2031.50!	9.95!	1.29816!
Average	2023.88	10.26	1.26829
Minimum	1999.50	9.95	1.22197
Maximum	2038.00	10.51	1.30886
Off-line (%)	0.00	0.00	0.00
Missing (%)	0.00	0.00	0.00
Invalid (%)	0.00	0.00	0.00
O O Cal (%)	0.00	0.00	0.00
In Cal (%)	0.00	0.00	0.00
Valid (%)	100.00	100.00	100.00
Available(%)	100.00	100.00	100.00

M MissingData	F PowerFailure	P InPurge	f DiscreteMissing
D Downed	C InCalibration	O Part60-OOC	O Part75-OOC
B NoSamples	< TooFewSamples	r Reserved_1	u Reserved_2
A HighAlarm	a LowAlarm	m EPA_MinCO2MaxO2	G EPA_AppG_CO2
> EnoughSamples	E Edited	S StackOffline	! PrimaryMonitor
@ BackupMonitor	# Alternate	$ ReferenceMethod	% Parametric
^ Average_HB_HA	& Init_QA_Hrs_Avg	* 90thPercentile	(95thPercentile
) BinMaximum	- BinAverage	+ MaxPotential	| Other

MERCURY EMISSIONS TEST

Date 11/18/99

Time	Net Load (MW)	Feedwater Flow	Cyclones In Service	Fuel Flow (TPH)	Gas Temperature Leaving Air Heaters	pH's on "A" Module	Scrubber Outlet Pressure
915	710	5265	18	409.1	638	5.70	39.2
930	710	5267	18	415	638	5.69	39.8
9:45	710	5233	18	412	639	5.70	39.2
10:00	710	5238	18	410.4	637	5.65	39.2
10:15	712	5195	18	412	636	5.61	40.0
10:30	709	5204	18	410	635	5.65	39.7
10:45	711	5193	18	411.4	632	5.70	39.7
11:00	705	5236	18	408.4	633	5.69	39.2
11:15	709	5254	18	414	633	6.79	40.7
11:30	711	5224	18	409	635	5.70	40.2
11:45	707	5243	18	407	634	5.70	39.6
12:00	707	5259	18	406	634	5.70	39.2
1215	709	5258	18	401	638	5.70	40.1
1230				Avg=409.6	636	Avg=5.77	Avg=39.7

APPENDIX F

Chain of Custody Records

METCO ENVIRONMENTAL

CHAIN OF CUSTODY RECORD

Job No: 99-95LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Scubber A Inlet Duct

Collected By/Company: METCO Environmental

Run 1 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	SAMPLE ANALYSIS REQUIRED: RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
Container 1 Filter	11-17-99	1322	✓				II	BH									✓			Ship to METCO for Weight. Thimble #: Q79 Filter #: 47Q121
Container 2 0.1 N HNO_3 F.W.	11-17-99	1328	✓				I	BH									✓			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-17-99	1343	✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	11-17-99	1346	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	11-17-99	1407	✓				I	BH									✓			Used $NH_2OH \cdot H_2SO_4$

Relinquished By/Sign: Bill Hefley	Date/Time 1400 11-19-99	Received By/Sign: Jason Conway	Relinquished By/Sign: Jason Conway	Date/Time 1100 11-22-99	Received By/Sign:
Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign: Partic. analyzed M. Painter	Date/Time 11/30/99 1100	Received By/Sign:
Received for Laboratory By/Signature:	12-3-99	Date/Time 12/2/99	Send Samples to: TestAmerica Phone:	Fax:	

METCO ENVIRONMENTAL

CHAIN OF CUSTODY RECORD

Job No: 99-95 LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Scrubber A Inlet Duct

Collected By/Company: METCO Environmental

Run 2 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
								SAMPLE ANALYSIS REQUIRED												Analyze according to the Ontario Hydro method.
Container 1 Filter	11-17-99	1731	✓				II	BH									✓			Ship to METCO for weight. Thimble #: Q78 Filter #: 47Q125
Container 2 0.1 N HNO_3 F.W.	11-17-99	1733	✓				I	BH									✓			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-17-99	1740	✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	11-17-99	1743	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	11-17-99	1754	✓				I	BH									✓			Used $NH_2OH \cdot H_2SO_4$

Relinquished By/Sign: Bill Ryley	Date/Time 1400 11-18-99	Received By/Sign: Jason Conway	Relinquished By/Sign: Jason Conway Particulate and Dryer	Date/Time 1100 11-22-99	Received By/Sign:
Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign: M. Ganter	Date/Time 11/30/99 1100	Received By/Sign:
Received for Laboratory By/Signature:	12-3-99	Date/Time 12/2/99	Send Samples to: Test America Phone:	Fax:	

METCO ENVIRONMENTAL

CHAIN OF CUSTODY RECORD

Job No: 99-95 LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Scrubber A Inlet Duct

Collected By/Company: METCO Environmental

SAMPLE ANALYSIS REQUIRED

Run 3 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI-VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
Container 1 Filter	11-18-99	1235	✓				II	BH									✓			Ship to METCO for weight. Thimble #: Q80 Filter #: 470126
Container 2 0.1 N HNO_3 F.W.	11-18-99	1236	✓				I	BH									✓			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-18-99	1242	✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	11-18-99	1244	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	11-18-99	1252	✓				I	BH									✓			Used $NH_2OH \cdot H_2SO_4$

Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign:	Date/Time	Received By/Sign:
Bill Hyley	1400 11-18-99	Jason Conway	Jason Conway	1100 11-22-99	[signature]
Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign: Particulate Analyzed M. Santer	Date/Time 11/30/99 1100	Received By/Sign:
Received for Laboratory By/Signature: [signature]	12-5-99	Date/Time 12/2/99	Send Samples to: TestAmerica Phone:	Fax:	

CHAIN OF CUSTODY RECORD

Job No: 99-95LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Scrubber A Inlet Duct.

Collected By/Company: METCO Environmental

Blank Train SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-18-99	1044	✓				I	BH									✓			Containers 1, 2, 2A not recovered.
Container 4 0.1 N HNO_3 Rinse Imp 4	11-18-99	1050	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	11-18-99	1101	✓				I	BH									✓			Used $NH_2OH \cdot H_2SO_4$

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Relinquished By/Sign: Brad Tuley	Date/Time 1400 11-18-99	Received By/Sign: Jason Conway	Relinquished By/Sign: Jason Conway	Date/Time 1100 11-22-99	Received By/Sign:
Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign:	Date/Time	Received By/Sign:
Received for Laboratory By/Signature: 12-3-99		Date/Time 12/2/99	Send Samples to: TestAmerica Phone:		Fax:

METCO ENVIRONMENTAL

CHAIN OF CUSTODY RECORD

Job No: 99-95LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Stack

Collected By/Company: METCO Environmental

Run 1 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	SAMPLE ANALYSIS REQUIRED: RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
Container 1 Filter	11-17-99	1421	✓				I	BH									✓			Ship to METCO for weight. Filter #: 880H53
Container 2 0.1 N HNO_3 F.W.	11-17-99	1422	✓				I	BH									✓			Container 2A not recovered
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-17-99	1440	✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	11-17-99	1442	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	11-17-99	1454	✓				I	BH									✓			Used $NH_2OH \cdot H_2SO_4$

Relinquished By/Sign: Bill Hyfy	Date/Time 11-18-99	Received By/Sign: Jason Conway	Relinquished By/Sign: Jason Conway (Particulate Analyzed)	Date/Time 1100 11-22-99	Received By/Sign:
Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign: M. Banter	Date/Time 11/30/99 1100	Received By/Sign:
Received for Laboratory By/Signature:	12-3-99	Date/Time 12/2/99	Send Samples to: TestAmerica Phone:	Fax:	

METCO ENVIRONMENTAL

CHAIN OF CUSTODY RECORD

Page 1 of 1

Job No: 99-95LACl
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Stack

Collected By/Company: METCO Environmental

Run 2 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	SAMPLE ANALYSIS REQUIRED: RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
								Analyze according to the Ontario Hydro Method.												
Container 1 Filter	11-17-99	1757	✓				I	BH									✓			Ship to METCO for weight. Filter #: 88Q H57
Container 2 0.1 N HNO_3 F.W.	11-17-99	1801	✓				I	BH									✓			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-17-99	1812	✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	11-17-99	1814	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	11-17-99	1828	✓				I	BH									✓			Used $NH_2OH \cdot H_2SO_4$

Relinquished By/Sign: Bill Hyley	Date/Time 1400 11-18-99	Received By/Sign: Jason Cannon	Relinquished By/Sign: Jason Cannon (Particulate Analyzed)	Date/Time 1100 11-22-99	Received By/Sign:
Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign: M. Gentile	Date/Time 11/30/99 1100	Received By/Sign:
Received for Laboratory By/Signature:	12-3-99	Date/Time 12/2/99	Send Samples to: TestAmerica Phone:	Fax:	

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CHAIN OF CUSTODY RECORD

Job No: 99-95LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Stack

Collected By/Company: METCO Environmental

Run 3 SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
								SAMPLE ANALYSIS REQUIRED												Analyze according to the Ontario Hydro method.
Container 1 Filter	11-18-99	1309	✓				II	BH									✓			Ship to METCO Fa weight. Filter #: 88Q ; 88Q
Container 2 0.1 N HNO_3 F.W.	11-18-99	1310	✓				I	BH									✓			Container 2A not recovered.
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-18-99	1318	✓				II	BH									✓			
Container 4 0.1 N HNO_3 Rinse Imp 4	11-18-99	1317	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imp 5,6,7	11-18-99	1328	✓				I	BH									✓			Used $NH_2OH \cdot H_2SO_4$

Relinquished By/Sign: Bill Lighty	Date/Time 11-18-99	Received By/Sign: Joseph Conway	
Relinquished By/Sign:	Date/Time	Received By/Sign: TRM	
Received for Laboratory By/Signature:	12-3-99	Date/Time 12/2/99	

Relinquished By/Sign: Joseph Conway	Date/Time 1100 11-22-99	Received By/Sign:
Relinquished By/Sign: Particulate Analyzed M. Gantner	Date/Time 11/30/99 1100	Received By/Sign:
Send Samples to: TestAmerica		
Phone:	Fax:	

CHAIN OF CUSTODY RECORD

Job No: 99-95LAC1
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1 Stack

Collected By/Company: METCO Environmental

Blank Train SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
								SAMPLE ANALYSIS REQUIRED												Analyze according to the Ontario Hydro Method.
Container 3 10% HNO_3 Rinse Imp 1,2,3	11-18-99	0957	✓				I	BH									✓			Containers 1,2,2A not recovered.
Container 4 0.1 N HNO_3 Rinse Imp 4	11-18-99	0959	✓				I	BH									✓			
Container 5 0.1 N HNO_3 Rinse Imps 5,6,7	11-18-99	1010	✓				I	BH									✓			Used NH_2OH-H_2SO_4

Relinquished By/Sign: Bill Nulty	Date/Time 1400 11-18-99	Received By/Sign: Jason Conway	Relinquished By/Sign: Jason Conway	Date/Time 1100 11-22-99	Received By/Sign:
Relinquished By/Sign:	Date/Time	Received By/Sign:	Relinquished By/Sign:	Date/Time	Received By/Sign:
Received for Laboratory By/Signature:	Date/Time 12-3-99	12/2/99	Send Samples to: TestAmerica Phone:	Fax:	

METCO ENVIRONMENTAL

CHAIN OF CUSTODY RECORD

Job No: 99-95LACI
Job Name: EPRI / KCPL
Location: LaCygne, KS
Unit: Unit 1

Collected By/Company: METCO Environmental

Reagent Blanks SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# of CONTAINERS	SAMPLE ANALYSIS REQUIRED: RECOVERED BY	PART	HCL	CL2	METALS	PCDD/PCDF	SEMI--VOC	VOST	HEXCHROME	Hg			REMARKS (Specific Compounds/Methods)
Container 7 0.1 N HNO_3 Blank	11-17-99	1605	✓				I	BH									✓			Vol. = 50 ml
Container 8 1 M KCL Blank	11-17-99	1607	✓				I	BH									✓			Vol. = 51 ml
Container 9 5% HNO_3 - 10% H_2O_2 Blank	11-17-99	1606	✓				I	BH									✓			Vol. = 52 ml
Container 10 $KMnO_4$ - H_2SO_4 Blank	11-17-99	1610	✓				I	BH									✓			Vol. = 50 ml
Container 11 NH_2OH - H_2SO_4 Blank	11-17-99	1611	✓				I	BH									✓			Vol. = 100 ml
Container 12 Filter Blank	11-17-99	1615	✓				I ~~IV~~ (3H)	BH									✓			Thimbles: Q81, Q82, Q83 88mm Filters: 88QH54, 88QH55, 88QH56 47mm Filters: 47Q122, 47Q123, 47Q124

Relinquished By/Sign: Bill Hayley	Date/Time 1400 11-18-99	Received By/Sign: Jason Lewis	Relinquished By/Sign: Jason Lewis / Date/Time 1100 11-22-99 / Received By/Sign:
Relinquished By/Sign:	Date/Time	Received By/Sign: Julie A Pre	Relinquished By/Sign: / Date/Time / Received By/Sign:
Received for Laboratory By/Signature: 12-3-99	Date/Time 1620 12/2/99	Send Samples to: TestAmerica Phone:	Fax:

APPENDIX G

Resumes

METCO ENVIRONMENTAL

BILLY J. MULLINS, JR.; President

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

MULLINS

Publications

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

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

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

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

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

Teaching Experience

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

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

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

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

MULLINS

Teaching Experience (Cont'd)

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

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

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

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

Technical Experience

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

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

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

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

MULLINS

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

Research Projects

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

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

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

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

Related Projects

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

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

BILLY L. HEFLEY; Project Supervisor II

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

HEFLEY

Thoroughly trained in all EPA testing procedures, 1991 - Present

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

Experienced with calibration techniques for all field testing equipment.

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

Thermo Environmental Model 10AR Oxides of Nitrogen Analyzer

Thermo Environmental Model 48 Carbon Monoxide Analyzer

Teledyne Model 326 Oxygen Analyzer

Western Research Model 721A Sulfur Dioxide Analyzer

Anarad Model AR880 Oxides of Nitrogen Analyzer

Anarad Model AR23 Oxygen Analyzer

Anarad Model AR30C2 Sulfur Dioxide Analyzer

Anarad Model AR50-C Carbon Dioxide Analyzer

SHANE LEE; Environmental Technician II

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

MICHAEL BASS; Environmental Technician II

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

SCOTT HART; Environmental Technician I

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

JASON CONWAY; Environmental Technician I

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

JASON BROWN; Environmental Technician I

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