MASS EMISSION TESTS

CONDUCTED ON THE

COKE BATTERY POSITIVE PUSHING CONTROL SYSTEM

IN

BIRMINGHAM, ALABAMA

FOR

JIM WALTERS RESOURCES

ON

NOVEMBER 6-7, 1984

Approved by:

Tom Lotz
Director
Field Services Division

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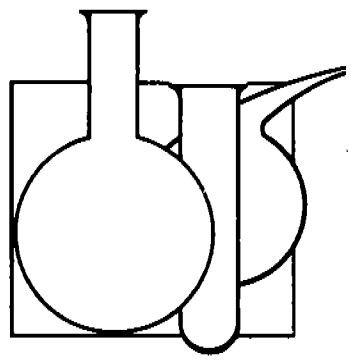
Introduction



I. INTRODUCTION AND TEST DESCRIPTION

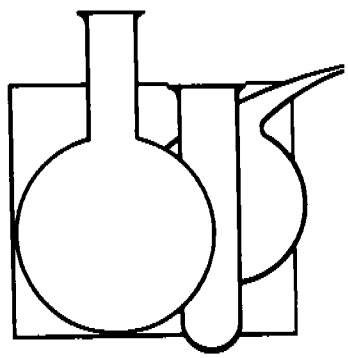
On November 6-7, 1984, Guardian Systems, Inc. performed a series of particulate emissions tests on the Coke Battery Positive Pushing Control System of Jim Walters Resources located in Birmingham, Alabama. These tests were conducted in accordance to the rules and regulating expressed in the Code of Federal Regulations, Title 40, Section 60, Reference Methods 1-5 as amended.

The Push Control System consists of a movable hood assembly which travels with the car and a baghouse for particulate removal. The damper on the baghouse fan is closed when not in use and is open by radio control when the coke is pushed. The sampling time for particulate emissions started when the pusher machine ram began moving forward and stopped when the emissions captured were collected by the baghouse. Only one push was sampled per traverse point and the sampling time varied for each push. Visible Emissions were monitored at the pushing emission control device outlet (stack) and at the pushing operation around the battery by Jefferson County Health Department Personnel.

The following personnel were present during the actual field sampling and represented the companies indicated:

Mr. Dan Schrimscher	Jim Walters Resources
Mr. Ken Walton	Jim Walters Resources
Ms. Veda Hampton	Jefferson County Health Dept.
Mr. Keith Witherspoon	Jefferson County Health Dept.
Mr. George Duckworth	Jefferson County Health Dept.
Mr. Tom Lotz	Guardian Systems, Inc.
Mr. Greg Karstens	Guardian Systems, Inc

Test Results



II. SUMMARY OF TEST RESULTS

The following table gives the results of the tests conducted on the Coke Battery Positive Pushing Control System on November 6-7, 1984. The allowable emission rate 0.03 pounds per ton of coal charged. The figures are presented in two formats; one by calculation of coal and particulate in pounds per test and the second in pounds per hour.

RUN #	1	2	3	Avg.
Sample time per test, Minutes	22.14	25.44	27.06	24.88
Coal charged per test, Tons	336	336	336	336
Particulate Mass Rate lbs/test	3.65	4.23	1.80	3.23
Emissions lbs/ton of coal charged	0.01	0.01	0.01	0.01
*Particulate Mass Rate lbs/hr	9.89	9.97	4.00	7.95
*Coal charged Tons/hour	910.6	792.5	745.0	816.0
Emissions lbs/ton of coal charged	0.01	0.01	0.01	0.01

* The particulate mass rate and the coal charged are both presented in hourly rates even though the individual test times were less than an hour. This was accomplished by using a ratio of the time sampled to 60 minutes or one hour.

Visual Emissions Summaries
Around Push Control

RUN #	1	2	3	Avg.
Sample time per test, Seconds	1328	1526	1624	1493
Time greater than 20% opacity, seconds	57	24	21	34
% greater than, 20 % opacity	4.3	1.6	1.3	2.3
Highest opacity, %	30	30	30	30

Data was taken from the VE Sheets found in the **Field Data** Section.

Stack Opacity

RUN #	1	2	3	Avg.
Opacity, %	0	0	0	0

Table 1

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Summarized Air Test Results for Jim Walters Resources
Job Number 48032

RUN NUMBER	1	2	3	4
DATE OF TEST	11/06/84	11/06/84	11/07/84	11/09/84
TIME OF TEST	0820-1348	1404-1054	1105-1622	Average
LOCATION OF TEST	STACK	STACK	STACK	Averag
STACK GAS TEMPERATURE DEGREES F	81	85	90	85
MOISTURE CONTENT, % V/V	5.34	5.32	4.92	5.18
OXYGEN CONTENT, % V/V	20.50	20.00	19.50	20.00
CARBON DIOXIDE CONTENT, % V/V	0.00	0.50	1.00	0.20
STACK GAS VELOCITY FEET PER SECOND	71.49	70.49	70.66	71.10
VOLUMETRIC FLOW ACTUAL CUBIC FEET PER MINUTE	181,159	178,652	179,075	180,208
VOLUMETRIC FLOW DRY STANDARD CUBIC FEET PER MINUTE	168,915	165,561	165,283	167,234
CONCENTRATION GRAINS PER DRY STANCARD CUBIC FOOT	0.007	0.007	0.003	0.005
CONCENTRATION GRAINS PER ACTUAL CUBIC FOOT	0.006	0.007	0.003	0.005
PARTICULATE MASS RATE (#/HR.)	9.89	9.97	4.00	7.82
% ISOKINETIC	106.60	104.54	105.00	104.84

Table 2

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
P.O. BOX 380
LEEDS, AL 35094
205-699-6647

Computer Input Parameters for Jim Walters Resources
Job Number 48032

RUN NUMBER	1	2	3	4
DATE	11/06/84	11/06/84	11/07/84	11/09/84
LOCATION	STACK	STACK	STACK	Averag
TIME	0820-1348	1404-1054	1105-1622	Average
BAROMETRIC PRESSURE (IN. HG)	30.22	30.25	30.28	30.25
STATIC PRESSURE (IN. H2O)	- 0.300	- 0.280	- 0.340	- 0.310
RUN TIME (MINUTES)	22.14	25.44	27.06	74.64
METER VOLUME (CORRECTED)	16.013	17.874	19.337	53.224
STACK TEMPERATURE (°F)	81.00	85.00	90.00	85.00
METER TEMPERATURE (°F)	54.00	60.00	68.00	61.00
METER PRESSURE (IN.H2O)	1.60	1.58	1.59	1.59
SQR VELOCITY PRESSURE	1.250	1.230	1.230	1.240
MASS OF PARTICULATE (MG.)	7.4	8.4	3.6	19.4
ML. OF WATER COLLECTED	20.0	22.0	21.6	63.6
% OXYGEN	20.5	20.0	19.5	20.0
% CARBON DIOXIDE	0.0	0.5	1.0	0.2
% CARBON MONOXIDE	0.0	0.0	0.0	0.0
STACK AREA (SQ. FT.)	42.24	42.24	42.24	42.24
PITOT CORRECTION FACTOR	0.84	0.84	0.84	0.84
NOZZLE DIAMETER (IN.)	0.180	0.180	0.180	0.180

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Computed Air Test Results for Jim Walters Resources
Job Number 48032

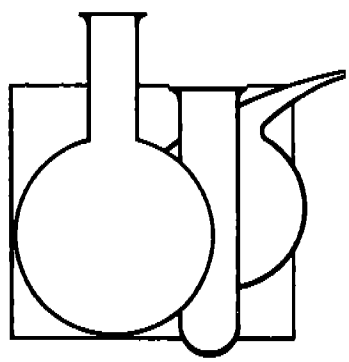
RUN NUMBER	1	2	3	4
DATE OF TEST	11/06/84	11/06/84	11/07/84	11/09/84
LOCATION OF TEST	STACK	STACK	STACK	Averag
1. STACK PRESSURE				
INCHES HG	30.20	30.23	30.25	30.23
MILLIMETERS HG	767.03	767.83	768.48	767.77
2. METER PRESSURE				
INCHES HG	30.34	30.37	30.40	30.37
MILLIMETERS HG	770.58	771.30	772.08	771.32
3. METER VOLUME				
DRY STANDARD CUBIC FEET	16.679	18.420	19.645	54.745
DRY STANDARD CUBIC METERS	0.472	0.522	0.556	1.550
4. WATER VOLUME				
STANDARD CUBIC FEET	0.941	1.036	1.017	2.994
STANDARD CUBIC METERS	0.027	0.029	0.029	0.085
5. MOISTURE CONTENT (%)	5.34	5.32	4.92	5.18
6. MOLECULAR WEIGHT DRY	28.82	28.88	28.94	28.83
7. MOLECULAR WEIGHT WET	28.24	28.30	28.40	28.27
8. STACK VELOCITY				
FEET PER SECOND	71.49	70.49	70.66	71.10
METERS PER SECOND	21.79	21.49	21.54	21.67
9. VOLUMETRIC FLOW				
ACTUAL CUBIC FEET PER MINUTE	181,159	178,652	179,075	180,208
ACTUAL CUBIC METERS PER SECOND	85.50	84.31	84.51	85.05
10. VOLUMETRIC FLOW				
DRY STANDARD CUBIC FEET PER MINUTE	168,915	165,561	165,283	167,234
DRY STANDARD CUBIC METER PER SECOND	79.72	78.14	78.01	78.93

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Computed Air Test Results for Jim Walters Resources
Job Number 48032

RUN NUMBER	1	2	3	4
DATE OF TEST	11/06/84	11/06/84	11/07/84	11/09/84
LOCATION OF TEST	STACK	STACK	STACK	Averag
11. CONCENTRATION				
GRAINS PER DRY STANCARD CUBIC FOOT	0.0068	0.0070	0.0028	0.0055
GRAMS PER DRY STANDARD CUBIC METER	0.0156	0.0161	0.0065	0.0125
15. PARTICULATE MASS RATE (#/HR.)	9.89	9.97	4.00	7.82
16. VOLUME AT NOZZLE				
ACTUAL CUBIC FEET	17.889	19.877	21.286	58.995
ACTUAL CUBIC METERS	0.507	0.563	0.603	1.671
17. CONCENTRATION				
GRAINS PER ACTUAL CUBIC FOOT	0.0064	0.0065	0.0026	0.0051
GRAMS PER ACTUAL CUBIC METER	0.0146	0.0149	0.0060	0.0116
18. % ISOKINETIC	106.60	104.54	105.00	104.84

Sampling & Analytical Procedures



III. METHOD 5 SAMPLING AND ANALYTICAL PROCEDURES

General

All sampling and analytical procedures for determination of the particulate emissions from this source were conducted in strict adherence with the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1-5 as amended. The equipment used in this test was manufactured by Research Appliance Corporation and was properly calibrated before these tests (See **Calibrations**). The particulate mass was determined gravimetrically after removal of uncombined water.

METHOD 1

This method was used to determine the number of sampling points and the required matrix. The dimensions of the stack (see **Figure 1**) indicated that 24 points would be required to sample this source. We sampled 24 points (12 per diameter) for the time of a cycle at each point. Verification of absence of cyclonic flow was not determined because there was no tangential entry and cyclonic flow did not seem to exit from the stack exhaust.

METHOD 2

Velocity meaurements were taken using a properly calibrated S type pitot tube and a 0-10 inch inclined manometer.

METHOD 3

Gas analysis for CO_2, O_2, and N_2 by difference was performed by using the grab sample technique twice during each test and analyzed with a Fyrite Gas Analyzer (0-20% scale with 0.5% divisions).

METHOD 4

Moisture content of the stack gases was determined in conjunction with Method 5 for each test by measuring the amount of water collected in the condenser and the increase in weight of the silica gel. These weights were combined to give the total amount of water collected.

METHOD 5

Sampling Techniques

Previous data was used to determine stack temperature, pressure, range of velocity heads, moisture content and stack gas dry molecular weight prior to sampling. A Monroe 1830 programable calculator or a Radio Shack PC-4 computer and a TI55 were used to calculate the sampling rate for isokinetic sampling. The particulate determinations were made by utilizing the sample train in **Figure 2.** The meter box was leak checked from the pump to the orifice and initial and final leak checks of the sampling system and pitot lines were performed as outlined in Method 5 and were recorded on the data sheets (**See Field Data**). The nozzle (stainless steel 316 with an angle of taper of 30^{o} and of button hook design) was calibrated before and after each test using a micrometer and was also recorded on the data sheets.

The sampling probe was placed at each sampling point and the gases were drawn through a stainless steel nozzle attached to a heated glass lined probe. The probe was maintained at the proper setting to obtain an exit temperature of 248 $\pm$ 25 ^{o}F (See **Calibrations**). The gases then pass through a glass fiber filter (Gelman, Class A) of 0.3 micron retention to remove particulate matter. The filter was maintained at a temperature of 248 $\pm$ 25 ^{o}F. Theses temperatures were recorded at each point on the data sheets.

The gases then pass through a condenser placed in an ice bath to maintain a maximum exit temperature of 68 ^{o}F. This temperature was also recorded on the data sheets. The gases then pass through a pre-weighed drying column filled with indicating silica gel to remove any remaining moisture. The clean and cool gases then entered the meter box where the gas flow and temperature were measured and recorded.

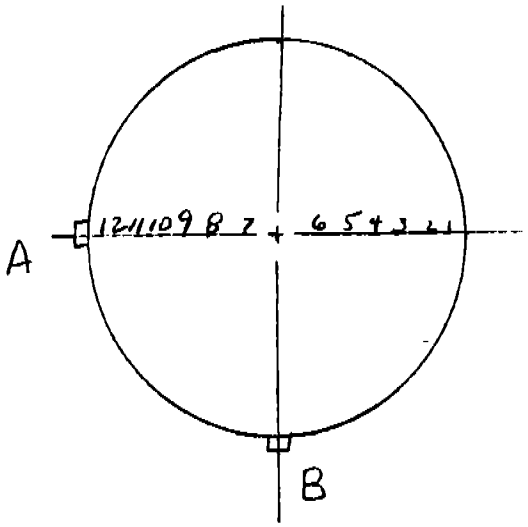
Upon completion of the sampling and the final leak checks the gel column and the probe nozzle-filter holder assembly was transfered to the cleanup area making sure no particulate was lost. The cleanup data was recorded on **Particulate Sample Recovery and Intergrity Sheet** located in the Field Data Section. Particulate catches were placed in sealed petri dishes. Each acetone rinse from the nozzle, probe, and filter holder was combined and placed in a sealed container. For the group of tests an acetone blank of approximately 200 milliliters was placed in a sealed container. These containers were clearly marked and transported to our laboratory for analysis.

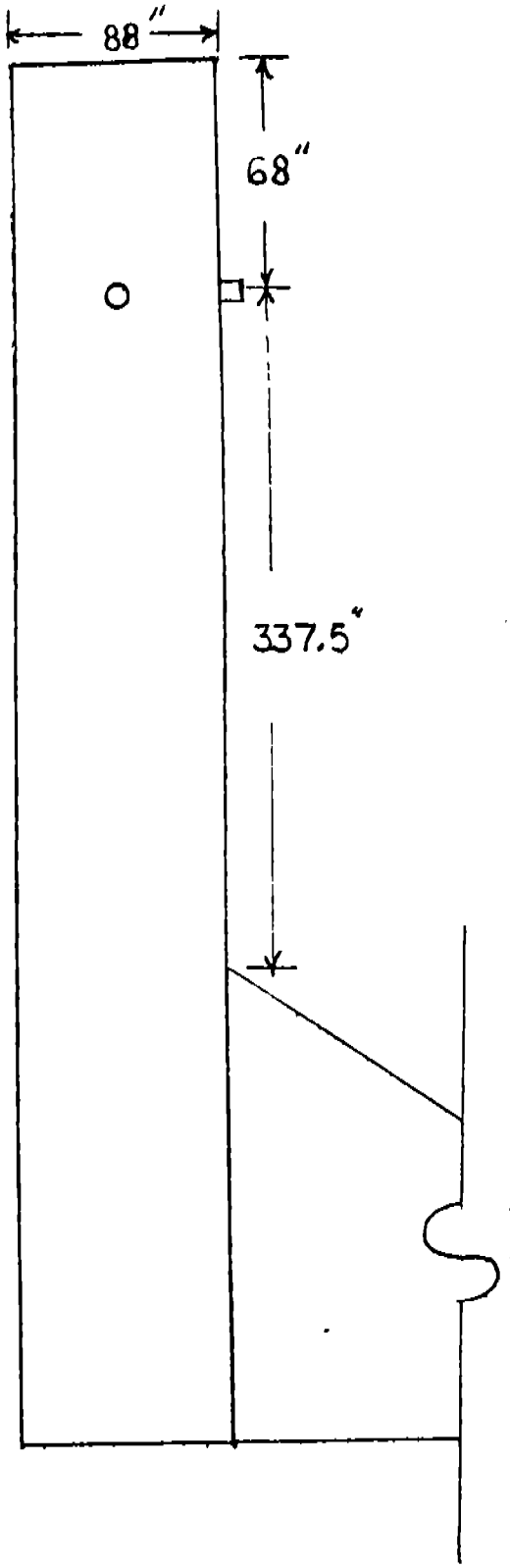
Analysis

The Filter (Gelman, Class A, without organic binder, minimum 99.9% retention for particules of 0.3 microns as determined by DOP tests) were prepared for the field test by first heating for 2 hours 220^{o}F then desiccating at 68 $\pm$ 10 ^{o}F at ambient pressure for 24 hours and weighing at intervals of at least six (6) hours to a constant weight to the nearest 0.1 milligrams (less than 0.5 milligrams change from previous reading). Upon return to the laboratory, the filters were subjected to the same procedures as outlined above. The weights were recorded in a bound laboratory book and transferred to the sheets in this report (**Method 5 Train Analytical Particulate Data**). During each weighing the filter was not exposed to laboratory atmosphere for more than two (2) minutes and a relative humidity of less than fifty percent (50%).

The acetone blank (reagent grade, 0.001 % residue, in glass bottles) (**Blank Analytical Data**) for the group of tests and the acetone rinses for each test were evaporated to dryness in tared glass beakers. They were then desiccated for twenty-four (24) hour and weighed to a constant weight as describe above.

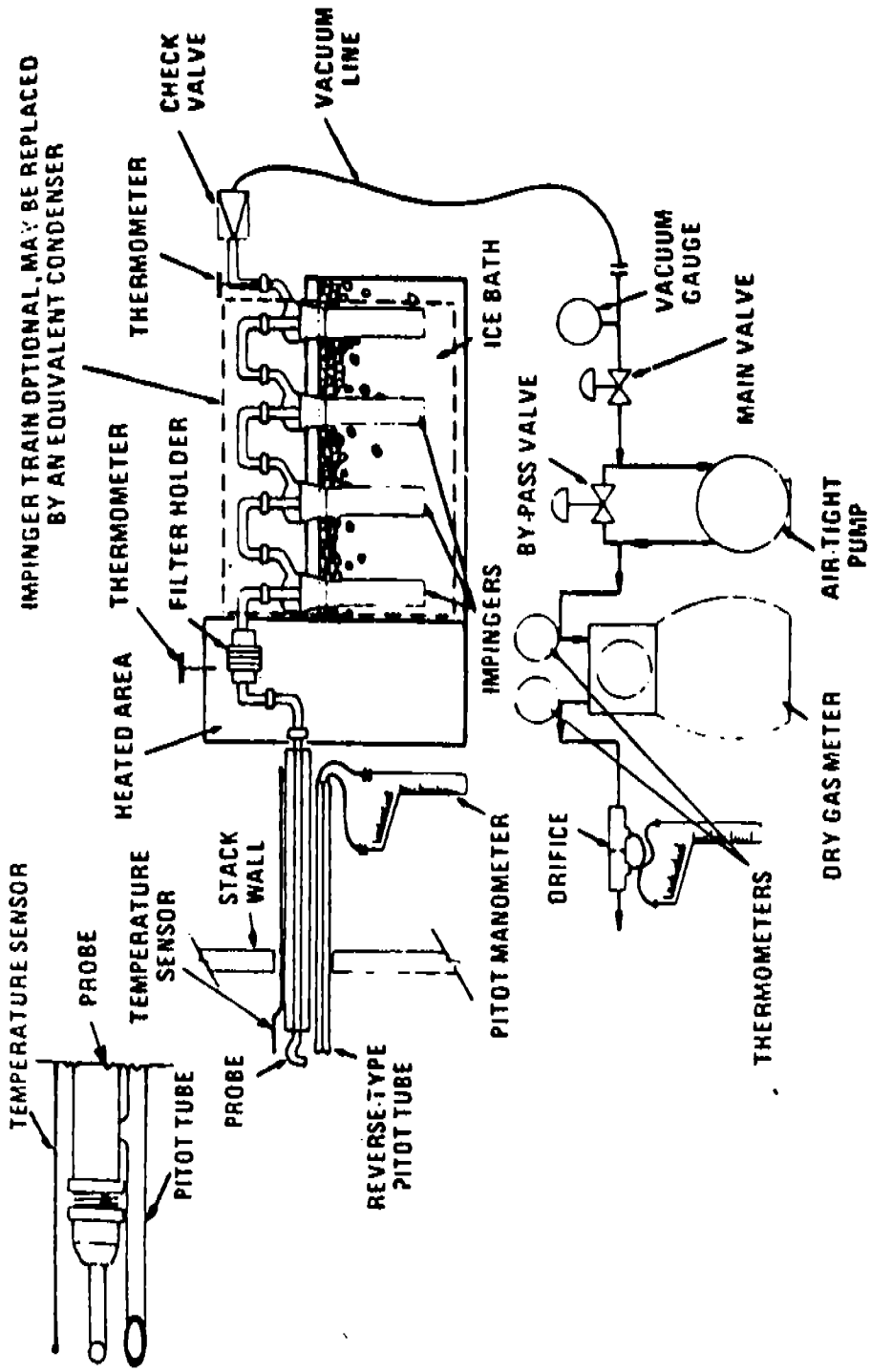
Stack Breeching Diagram and Sample Point Location





Point No.	Distance from wall
12	1.9
11	5.9
10	10.4
9	15.6
8	22.0
7	31.3
6	56.7
5	66.0
4	72.4
3	77.6
2	82.1
1	86.1

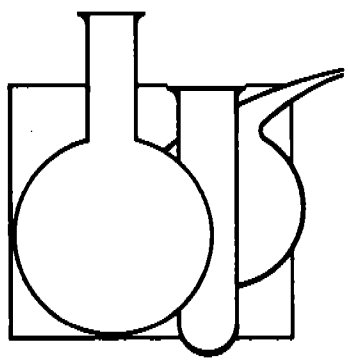
Figure 1



Method 5 Sampling Train

Figure 2

Field Data



NOMENCLATURE

ACF - Actual Cubic Feet

ACFM - Actual Cubic Feet per minute

ACM - Actual Cubic Meters

ACMS - Actual Cubic Meters per second

An - Cross sectional area of nozzle, (ft^2)

As - Area of Stack, (ft^2)

Bws - Water vapor in the gas stream, proportion by volume (dimensionless)

Ca - Acetone blank residue concentration, mg/g

c_a - Particulate Concentration, ACF

CFM - Cubic feet per minute

Cp - Pitot tube coefficient, (dimensionless)

c_s - Particulate Concentration, grains/DSCF

Cso_2 - Concentration of sulfur dioxide (dry basis) corrected to standard conditions, lb/DSCF

C_{12} - Particulate concentration (c_s adjusted to 12% excess air), grains/DSCF

C_{50} - Particulate concentration (c_s adjusted to 50% excess air), grains/DSCF

DSCF - Dry Standard Cubic Feet

DSCFM - Dry Standard Cubic Feet per minute

DSCM - Dry Standard Cubic Meters

DSCMS - Dry Standard Cubic Meters per second

EA - Excess Air, %

I - Isokinetic Sampling, %

Km - Orifice Correction Factor, (dimensionless)

Kp - Pitot tube constant, 85.49 $\left[\frac{(lb/lb\text{-}mole)(in.\ Hg)}{(^{o}R)\ (in.\ H_2O)}\right]^{1/2}$

La - Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.02 CFM or 4 percent of the average sampling rate, whichever is less.

Li - Individual leakage rate observed during the leak check conducted prior to the "i^{th}" component change (i = 1,2,3,...n), CFM.

Lp - Leakage rate observed during the post test leak check, ft^3/min. (cfm).

Ma - Mass of residue of acetone after evaporation, mg.

Md - Molecular weight of stack gas; dry basis, lb/lb-mole.

Mn - Total amount of particulate matter collected, mg.

Ms - Molecular weight of stack gas; wet basis, lb/lb-mole.

Mw - Molecular weight of water, 18.0 g/g-mole (18.01 lb/lb-mole)

ΔP - Velocity head of stack gas, in. H_2O

Pa - Density of acetone, mg/ml

Pbar - Barometric pressure at the sampling site, in. Hg

Pg - Stack static pressure, in. H_2O

Pm - Meter pressure, in. Hg

PMR - Particulate Mass Rate, lbs per hour

Ps - Absolute stack pressure, in. Hg

Pstd - Standard absolute pressure, 29.92 in. Hg

Pw - Density of water, 0.9982 g/ml (0.002201 lb/ml)

Qa - Volumetric flow rate, ACFM

Qs - Volumetric flow rate, DSCFM

R - Ideal gas constant, 0.06236 mm Hg - $m^3/^oK$-g-mole (21.85 in. Hg-$ft^3/^oR$-lb-mole)

SCF - Standard Cubic Foot

ta - Ambient Temperature, ^oF

tm - Average Temperature of meter, ^oF

t_s - Average Temperature of stack, ^oF

tstd - Standard Temperature, $68^{\circ}F$

NOTE: Capital "T" denotes degrees Rankin

Va - Volume of acetone blank, ml

Vaw - Volume of acetone used in wash, ml

Vlc - Total volume of liquid collected in condenser and silica gel, ml

Vm - Volume of gas sample, as measured by the dry gas meter, ACF

Vmc - Volume of gas sample, corrected for leak, ACF

Vm(std) - Volume of gas sample measured by the dry gas meter, corrected to standard conditions, DSCF

Vn - Volume collected at stack conditions through nozzle, ACF

Vs - Average stack gas velocity, ft/sec.

Vw(std) - Volume of water in the gas sample, corrected to standard conditions, SCF

Wa - Weight of residue in acetone wash, mg

Y - Dry gas meter calibration factor, (dimensionless)

ΔH - Average pressure differential across the calibrated orifice, in. H_2O

ΔH_a - Value of ΔH measured for a specific orifice when operated under the following conditions: 0.75 cfm of dry air (M.W. = 29) at $68^{\circ}F$, 29.92 in. Hg.

$\sqrt{\Delta P}$ - Average of the square roots of the velocity pressure, in. H_2O

Θ - Total sampling time, min.

Θ_1 - Sampling time interval from the beginning of a run until the first component change, min.

Θ_i - Sampling time interval between two successive component changes, beginning with the interval between the first and second changes, min.

Θp - Sampling time interval from the final (n^{th}) component change until the end of the sampling run, min.

$\%CO_2$, $\%O_2$, $\%N_2$, %CO - Number percent (%) by volume (dry basis) of each compound in the stack gas.

EQUATIONS

1. $$P_s = P_{bar} + \frac{P_g}{13.6}$$

2. $$P_m = P_{bar} + \frac{\overline{\Delta H}}{13.6}$$

3. $$V_{m(std)} = V_m Y \left(\frac{Tstd}{Tm}\right) \left[\frac{Pbar + \frac{\overline{\Delta H}}{13.6}}{Pstd}\right]$$

4. $$V_w(std) = 0.04707\ V_{lc}$$

5. $$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}}$$

6. $$M_d = 0.44\ (\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

7. $$M_s = M_d\ (1 - B_{ws}) + 18(B_{ws})$$

8. $$v_s = K_p C_p\ (\sqrt{\Delta p})\ \text{avg.} \sqrt{\frac{T_s}{M_s P_s}}$$

9. $$Q_a = (v_s)\ (A_s)\ (60)$$

10. $$Q_s = Q_a\ (1 - B_{ws}) \left(\frac{528}{T_s}\right) \left(\frac{P_s}{29.92}\right)$$

11. $$c_s = \left[0.0154\ (Mn/Vmstd)\right]$$

12. $$EA = \left[\frac{\%O_2 - 0.5\ \%CO}{0.264\ \%N_2\ (\%O_2 - 0.5\ \%CO)}\right] 100$$

13. $$c_{50} = \frac{c_s}{1 - \left[\frac{(1.5)(\%O_2) - 0.133(\%N_2) - 0.75\ (\%CO)}{21}\right]}$$

14. $$c_{12} = c_s \frac{12}{\%\ CO_2}$$

15. $$PMR = (c_s)(Q_s)\left(\frac{60}{7000}\right)$$

16. $$V_n = \frac{T_s}{P_s}\left[(0.002669)(V_{1c}) + \frac{V_m}{T_m}\left(P_{bar} + \frac{\overline{\Delta H}}{13.6}\right)\right]$$

17. $$C_a = (0.0154)(M_n)\ /V_n$$

18. $$I = \frac{100\ V_n}{60\ \Theta\ v_s\ An}$$

19. $$V_{mc} = V_m - (L_p - L_a)\ \Theta$$

20. $$W_a = Ca\ Vaw\ p_a$$

FIELD DATA SHEET

PLANT JIM WALTERS RUN # #1

LOCATION BAGHOUSE STACK DATE 11-6-84

BARO. PRES. 30.32 TIME 0820 - 1348

GUARDIAN SYSTEMS INC.
2610 18th Street South
Birmingham, Alabama 35209
205/879-1850

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP °F IN	METER TEMP °F OUT	METER TEMP °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
A			184.079	(1)	(2)	(3)		(4)	(5)			
1	36	17	184.5	78	47	47	47	35	223	1.88	1.85	31
2	69	66	185.4	81	50	50	50	41	260	1.49	1.45	2.9
3	62	52	186.1	81	51	50	51	38	234	1.41	1.38	2.7
4	60	85	186.8	79	50	50	50	42	238	1.46	1.43	2.8
5	44	41	187.3	78	51	51	51	41	253	1.45	1.42	2.8
6	38	60	187.7	79	51	51	51	38	234	1.62	1.58	
7	44	21	188.2	79	51	51	51	34	366	1.41	1.38	2.6
8	51	98	188.8	79	54	54	54	35	249	1.67	1.62	3.1
9	49	35	189.4	82	55	55	55	36	242	1.52	1.48	3.0
10	46	98	189.9	83	56	56	56	36	251	1.60	1.55	3.1
11	48	27	190.5	83	57	57	57	34	253	1.73	1.68	3.5
12	47	28	191.1	86	53	55	54	32	252	1.56	1.53	3.1
B												
1	60	87	191.8	81	55	54	55	32	248	1.76	1.71	3.4
2	59	14	192.6	82	55	54	55	33	238	2.11	2.05	3.9
3	68	12	193.6	82	54	54	54	33	228	2.11	2.05	3.8
4	58	59	194.2	83	54	54	54	32	233	1.39	1.35	2.5
5	44	49	194.7	79	55	55	55	32	237	1.35	1.32	2.2
6	43	05	195.2	05	57	56	56	32	242	1.62	1.58	3.1
7	114	56	196.6	82	56	55	56	33	239	1.60	1.55	3.0
8	44	10	197.1	81	55	55	55	34	265	1.46	1.42	3.1
9	49	95	197.7	79	56	57	56	32	259	1.69	1.64	3.5
10	46	30	198.2	83	58	57	57	33	261	1.54	1.49	3.2
11	84	50	199.3	81	57	57	57	33	248	1.57	1.52	3.3
12	54	16	199.863	78	57	57	57	32	268	1.42	1.36	2.8
			15.784 X 1.0145									
24		22.14	16.013	81			54			1.60	1.25	3.9

STATIC PRESSURE "H2O +1.30

PROBE TIP SIZE

BEFORE	AFTER
.180	.180
.180	.080
.190	.180

WATER

RED #1

ml. 17.0

gram 3

Total 20.0

OPERATOR LOTZ/KARSTONS

Sample Box No. 4

Meter Box No. 400

Meter ΔH@ 1.70

Pitot, CP .84

Temp. Device III

Probe No. S-1

Probe Liner GLASS

Probe Htr. Set 500

Ambient Temp. 43

% O_2 20.5 20.5

% CO_2 0 0

NOTES

Orifice ✓ @6.8

Pitot ✓

Meter ✓

184.078
184.060
.018

@7.2 46.1

FINAL AT 4.0" Hg
.012
4.8
7.1

FIELD DATA SHEET

PLANT JIM WALTER RUN # #2

LOCATION BAGHOUSE INLET DATE 11-6-84

BARO. PRES. 30.22 TIME 1404-1555/0817-1054

GUARDIAN SYSTEMS INC.
2810 18th Street South
Birmingham, Alabama 35209
205/879-1850

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	METER TEMP. °F OUT	METER TEMP. °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg	STATIC PRESSURE "H2O: .28
			200.920	(1)	(2)	(3)	[redacted]	(4)	(5)				PROBE TIP SIZE BEFORE / AFTER
B1	41	28	201.5	80	60	59	60	33	224	2.19	2.10	2.8	.180 / .180
2	49	56	202.2	82	61	60	61	36	242	1.97	1.89	2.7	.180 / .180
3	73	23	203.0	82	60	61	61	35	251	1.33	1.28	1.7	.180 / .180
4	58	38	203.6	81	61	61	61	36	228	1.52	1.46	2.1	
5	47	55	204.1	86	62	62	62	38	243	1.40	1.35	1.9	
6	50	73	204.7	85	61	61	61	38	231	1.56	1.51	1.7	
7	39	39	205.2	85	61	61	61	37	254	1.59	1.53	1.8	
8	59	73	205.9	83	61	62	62	39	272	1.70	1.63	2.0	
9	59	67	206.5	83	61	62	62	39	269	1.31	1.26	1.5	
10	53	68	207.2	86	61	62	62	40	263	1.94	1.87	2.1	
11	47	43	207.8	89	62	62	62	41	264	1.67	1.62	1.9	
12	74	12	208.600	86	62	62	62	41	259	1.37	1.33	1.6	
A			209.065	11-7-84		B.P. 30.28							
1	58	87	209.9	83	64	63	64	32	269	1.65	1.57	2.2	
2	70	30	210.7	85	59	58	59	41	265	1.88	1.82	2.4	
3	63	28	211.4	86	58	57	58	38	232	1.46	1.43	1.7	
4	76	86	212.3	82	57	56	57	35	227	1.41	1.36	1.7	
5	90	03	213.2	84	56	56	56	33	232	1.35	1.31	1.6	
6	122	40	214.4	86	57	56	57	33	231	1.32	1.29	1.5	
7	70	93	215.3	91	58	57	58	34	242	1.32	1.30	1.5	
8	59	58	215.9	88	59	58	59	33	231	1.36	1.32	1.5	
9	61	79	216.7	86	60	60	60	33	270	1.69	1.64	2.0	
10	88	28	217.7	87	61	60	61	33	233	1.73	1.68	2.1	
11	59	73	218.4	87	61	61	61	33	247	1.59	1.54	2.1	
12	49	89	219.004	91	62	62	62	33	270	1.55	1.51	2.0	
			17.619 × 1.0145							1.58	1.23		
24		25.44	17,874	85			60		FINAL LEAK CHECK			2.8	

#5 WATER
ml. 18.2
gram 3.8
Total 22.0

OPERATOR
LOTZ/KARSTENS (11)

Sample Box No. 4
Meter Box No. 400
Meter ΔH@ 1.70
Pitot, CP .84
Temp. Device RTD
Probe No. B-2
Probe Liner GLASS
Probe Htr. Set 5%
Ambient Temp. 58°
% O_2 20.5 19.5
% CO_2 0 1

NOTES
Orifice
Pitot ✓
Meter ✓

SG.8
R 4.2
.014 @ 25" Hg
LEAK CHECK @ 3" Hg .012
57.3
R6.6
57.1
RCV

FINAL LEAK CHECK at 7" Hg .008

11-7-84

G-1

B4

A

FIELD DATA SHEET

PLANT JIM WALTER RUN # #3

LOCATION BAGHOUSE STACK DATE 11-7-84

BARO. PRES. 30.28 TIME 1105-1622

GUARDIAN SYSTEMS INC.
2510 18th Street South
Birmingham, Alabama 35209
205/879-1880

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP °F IN	METER TEMP °F OUT	METER TEMP °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
A			219.120	(1)	(2)	(3)		(4)	(5)			
1	58	04	219.8	88	62	62	62	36	224	1.53	1.48	2.4
2	71	01	220.7	89	63	63	63	33	228	1.77	1.71	3.1
3	54	42	221.3	89	64	63	64	32	230	1.79	1.73	3.1
4	51	11	221.9	83	65	65	65	32	271	1.43	1.36	2.7
5	86	27	222.8	88	67	66	67	34	269	1.32	1.27	2.7
6	58	79	223.5	87	67	67	67	32	243	1.30	1.34	2.6
7	98	06	224.7	88	68	67	68	32	270	1.62	1.55	3.1
8	52	56	225.3	84	70	68	69	32	253	1.39	1.32	2.9
9	48	71	225.9	94	70	69	70	33	268	1.64	1.58	3.2
10	55	33	226.5	85	69	69	69	34	272	1.67	1.59	2.9
11	60	72	227.2	88	67	67	67	43	262	1.33	1.28	2.6
12	48	84	227.7	87	67	67	67	44	273	1.40	1.34	2.7
B												
1	135	52	229.5	89	66	66	66	44	243	1.99	1.92	3.6
2	60	23	230.2	95	66	66	66	44	250	2.13	2.07	3.8
3	47	41	230.9	93	67	66	67	44	265	1.93	1.87	3.4
4	83	81	231.8	92	67	66	67	45	268	1.22	1.18	2.1
5	90	69	232.8	91	67	66	67	45	269	1.50	1.45	2.7
6	52	20	233.4	95	67	67	67	46	258	1.55	1.51	2.8
7	104	08	234.6	94	69	68	69	48	241	1.46	1.41	2.7
8	56	39	235.3	93	70	69	70	45	252	1.57	1.51	2.6
9	42	60	235.8	93	71	70	71	46	262	1.75	1.68	3.2
10	70	02	236.6	93	71	70	71	46	271	1.72	1.65	2.6
11	55	09	237.3	91	71	71	71	46	269	1.64	1.57	3.0
12	81	68	238.181	93	71	70	71	46	254	1.31	1.26	2.4
			19.061									
24		27.06	19.357	90			68			1.59	1.23	3.8

STATIC PRESSURE "H2O +.34

PROBE TIP SIZE

BEFORE	AFTER
.180	.180
.180	.180
.180	.180

WATER

NO #

ml. 18.0

gram 3.6

Total 21.6

OPERATOR

LOTZ / KARNTOWS

Sample Box No. 4

Meter Box No. 400

Meter ΔH@ 1.70

Pitot, CP .84

Temp. Device ISTT

Probe No. K-1

Probe Liner GLASS

Probe Htr. Set 550

Ambient Temp. 65°

% O_2 19.5 19.5

% CO_2 1.0 1.0

NOTES

Orifice

Pitot ✓

Meter ✓

55.0
88.3

.010 at 15" Hg

S 5.6
R 6.4

FINAL LEAK CHECK at 9.0" Hg .009

BLANK ANALYTICAL DATA

Plant JIM WALTER COKE

Sample location BAGHOUSE STACK

Relative humidity 20%

Type of blank ACETONE

Liquid level at mark and container sealed ✓

Density of blank (ρa) .7852 g/ml

Blank volume (Va) 200 ml

Date and time of wt. 11-8-84 0700 Gross wt. 918.6 mg

Date and time of wt. 11-8-84 1300 Gross wt. 918.7 mg

Average gross wt. 918.65 mg

Tare wt. 918.6 mg

Weight of blank (ma) .05 mg

$$Ca = \frac{ma}{Va\ \rho a} = \frac{(.05)}{(200)(.7852)} = .000318 \text{ mg/g}$$

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of blank used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Thos C. Kristensen

Signature of reviewer _____

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: JIM WALTER Sample date: 11-6-84
Sample location: BAGHOUSE STACK Run no.: #1
Sample recovery person: KARSTENS Recovery date: 11-6-84
Filter(s) no.: K-14

MOISTURE

Impingers			Silica gel		
Final volume (wt)	17	ml(gm)	Final wt.	930.5 g	930.5 g
Initial volume (wt)	0	ml(gm)	Initial wt.	927.5 g	928.5 g
Net volume (wt)	17	ml(gm)	Net wt.	3.0 g	2.0 g

Total moisture 20.0g
Color of silica gel MIXED
Description of impinger water CLEAR

RECOVERED SAMPLE

Filter container no. RUN #1 sealed ✓
Description of particulate on filter LIGHT GREY

Acetone rinse container no. RUN #1 Liquid level marked ✓
Acetone blank container no. BLANK Liquid level marked ✓
Samples stored and locked ✓
Remarks:

Date of laboratory custody NA
Laboratory personnel taking custody —
Remarks:

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant JIM WALTER COKE Run No. #1

Sample location BAGHOUSE STACK

Relative humidity 20%

Density of acetone (ρa) .7852 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. #2

Acetone rinse volume (Vaw) 230 ml

Acetone blank residue concentration (Ca) .000318 mg/g

Wa = Ca Vaw ρa = (.000318)(230)(.7852) = .06 mg

Date and time of wt 11-8-84 0700 Gross wt 110216.2 mg

Date and time of wt 11-8-84 1300 Gross wt 110286.3 mg

Average gross wt 110286.25 mg

Tare wt 110278.4 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 7.75 mg

Filter(s) container no. K-18

Date and time of wt 11-8-84 0700 Gross wt 237.8 mg

Date and time of wt 11-8-84 1300 Gross wt 238.3 mg

Average gross wt 238.05 mg

Tare wt 238.4 mg

Weight of particulate on filter(s) -.35 mg

Weight of particulate in acetone rinse 7.75 mg

Total weight of particulate 7.4 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Greg A. Kastens

Signature of reviewer _____

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: JIM WALTER Sample date: 11-6/7/84
Sample location: BAGHOUSE SMACK Run no.: #2
Sample recovery person: KARSTENS Recovery date: 11-7-84
Filter(s) no.: K-17

MOISTURE

Impingers			Silica gel		
Final volume (wt)	18.2	ml(gm)	Final wt.	957.4g	957.4g
Initial volume (wt)	0	ml(gm)	Initial wt.	953.6g	953.6g
Net volume (wt)	18.2	ml(gm)	Net wt.	3.8g	3.8g

Total moisture 22.0g
Color of silica gel MIXED
Description of impinger water CLEAR

RECOVERED SAMPLE

Filter container no. Run#2 sealed ✓
Description of particulate on filter LIGHT GREY

Acetone rinse container no. Run#2 Liquid level marked ✓
Acetone blank container no. _____ Liquid level marked _____
Samples stored and locked ✓
Remarks: _____

Date of laboratory custody NA
Laboratory personnel taking custody _____
Remarks: _____

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant JIM WALTER COKE Run No. #2

Sample location BAGHOUSE STACK

Relative humidity 20%

Density of acetone (ρa) .7852 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. #3

Acetone rinse volume (Vaw) 235 ml

Acetone blank residue concentration (Ca) .000318 mg/g

Wa = Ca Vaw ρa = (.000318)(235)(.7852) = .06 mg

Date and time of wt 11-8-84 0700 Gross wt 1054661 mg

Date and time of wt 11-8-84 1300 Gross wt 1054662 mg

Average gross wt 1054661.5 mg

Tare wt 1054434 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 22.65 mg

Filter(s) container no. K-17

Date and time of wt 11-8-84 0700 Gross wt 223.0 mg

Date and time of wt 11-8-84 1200 Gross wt 222.6 mg

Average gross wt 222.8 mg

Tare wt 219.5 mg

Weight of particulate on filter(s) -14.2 mg

Weight of particulate in acetone rinse 22.65 mg

Total weight of particulate 8.45 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Greg Kaster

Signature of reviewer _____

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: JIM WALTER Sample date: 11-7-84
Sample location: BAGHOUSE STACK Run no.: #3
Sample recovery person: KARSTENS Recovery date: 11-7-84
Filter(s) no.: A-1

MOISTURE

Impingers			Silica gel	
Final volume (wt)	18.0 ml(gm)	Final wt.	941.4 g	941.4 g
Initial volume (wt)	0 ml(gm)	Initial wt.	937.8 g	937.8 g
Net volume (wt)	18.0 ml(gm)	Net wt.	3.6 g	3.6 g

Total moisture 21.6 g
Color of silica gel 1/10 PINK
Description of impinger water CLEAR

RECOVERED SAMPLE

Filter container no. RUN #3 sealed ✓
Description of particulate on filter LT GREY

Acetone rinse container no. RUN #3 Liquid level marked ✓
Acetone blank container no. BLK Liquid level marked ✓
Samples stored and locked ✓
Remarks:

Date of laboratory custody NA
Laboratory personnel taking custody —
Remarks:

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant JIM WALTER COKE Run No. #3

Sample location BAGHOUSE STACK

Relative humidity 20%

Density of acetone (ρa) .7852 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. #4

Acetone rinse volume (Vaw) 220 ml

Acetone blank residue concentration (Ca) .000318 mg/g

Wa = Ca Vaw ρa = (.000318)(220)(.7852) = .06 mg

Date and time of wt 11-8-84 0700 Gross wt 104791.7 mg

Date and time of wt 11-8-84 1300 Gross wt 104792.2 mg

Average gross wt 104791.95 mg

Tare wt 104791.4 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse .45 mg

Filter(s) container no. A1

Date and time of wt 11-8-84 0700 Gross wt 221.7 mg

Date and time of wt 11-8-84 1300 Gross wt 221.5 mg

Average gross wt 221.6 mg

Tare wt 218.5 mg

Weight of particulate on filter(s) 3.1 mg

Weight of particulate in acetone rinse .45 mg

Total weight of particulate 3.55 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Guy L Kastens

Signature of reviewer _____

PUSH CONTROL SYSTEM - OBSERVATIONS

Source Name Jim Walter Resources' Coke Plant Date 11/6/84

Test Run No. #1

Oven Number	Time	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)
223 - Batt # 5	8:40	100%	0%	0
145 - Batt # 3	9:00	70%	30%	5
22 - Batt # 3	9:06	75%	25%	15
168 - Batt # 4	9:17	70%	30%	0
178 - Batt # 4	9:27	80%	20%	7
193 - Batt # 5	9:44	95%	5%	10
213 - Batt # 5	9:54	85%	15%	10
132 - Batt # 3	10:33	70%	30%	5
142 - Batt # 3	10:44	90%	10%	0
155 - Batt # 4	10:54	95%	5%	0
165 - Batt # 4	11:04	95%	5%	5
233 - Batt # 5	11:17	100%	0%	0
190 - Batt # 5	11:28	100%	0%	0
210 - Batt # 5	11:38	100%	0%	0
230 - Batt # 5	11:47	100%	0%	0
29 - Batt # 3	12:00	95%	5%	0
139 - Batt # 3	12:10	90%	10%	0
175 - Batt # 4	12:20	90%	10%	0
152 - Batt # 4	12:30	90%	10%	0
200 - Batt # 5	13:07	100%	0%	0
220 - Batt # 5	13:18	100%	0%	0
41 - Batt # 3	13:32	90%	10%	0
26 - Batt # 3	13:38	90%	10%	0
162 - Batt # 4	13:47	95%	5%	0

(a) Total Pushes Observed: 24
Total Pushes Receiving 85% Capture or Greater: 19

(b) Total Pushes Receiving Less Than 85% Capture: 5

Observers: Keith Witherspoon & Veda Hampton

PUSH CONTROL SYSTEM - OBSERVATIONS

Source Name Jim Walter Coke Plant Date 11/6/84 & 11/7/84

Test Run No. #2

Observers: Keith Wetherspoon
Veda Hampton

Oven Number	Time	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)	
11/84 240 - Batt #5	14:08	90%	10%	0	
187 - Batt #5	14:18	90%	10%	0	
136 - Batt #3	14:28	85%	15%	0	
146 - Batt #3	14:35	85%	15%	0	
159 - Batt #4	14:46	80%	20%	3	
69 - Batt #4	14:56	95%	5%	0	
207 - Batt #5	15:09	100%	0%	0	
227 - Batt #5	15:18	100%	0%	0	
7 - Batt #5	15:27	85%	15%	6	
217 - Batt #5	15:36	95%	5%	0	
3 - Batt #3	15:54	95%	5%	0	
133 - Batt #3	16:03	85%	15%	0	
11/7/84 05 - Batt #5	8:19	75%	25%	3	
29 - Batt #5	8:29	90%	10%	0	
39 - Batt #3	8:44	95%	5%	0	
49 - Batt #3	8:57	90%	10%	1	
152 - Batt #4	9:06	75%	25%	3	
62 - Batt #4	9:17	70%	30%	6	
199 - Batt #5	9:28	95%	5%	0	
219 - Batt #5	9:39	90%	10%	0	
126 - Batt #3	10:14	90%	10%	2	
136 - Batt #3	10:23	95%	5%	0	
172 - Batt #4	10:34	95%	5%	0	
159 - Batt #4	10:42	50%	50%	9	Did Not Tr. Damper Not Op
39 - Batt #5	10:56	90%	10%	0	

Total Pushes Observed: 25

Total Pushes Receiving 85% or Greater Capture: 20

Total Pushes Receiving Less Than 85% Capture: 5

PUSH CONTROL SYSTEM - OBSERVATIONS

Source Name Jim Walter Coke Plant Date 11/7/84

Test Run No. #3

Observers: Keith Witherspoon
Vesh Hampton

Oven Number	Time	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)
186 - Batt #5	11:06	90%	10%	0
206 - Batt #5	11:15	80%	20%	6
226 - Batt #5	11:25	90%	10%	0
16 - Batt #3	12:16	100%	0%	0
33 - Batt #3	12:25	90%	10%	0
69 - Batt #4	12:36	95%	5%	0
179 - Batt #4	13:45	70%	30%	5
196 - Batt #5	13:56	100%	0%	0
216 - Batt #5	14:05	95%	5%	0
133 - Batt #3	14:13	85%	15%	3
153 - Batt #3	14:22	90%	10%	4
156 - Batt #4	14:33	95%	5%	0
176 - Batt #4	14:40	85%	15%	2
236 - Batt #5	14:50	90%	10%	1
253 - Batt #5	15:01	95%	5%	0
130 - Batt #3	15:12	95%	5%	0
150 - Batt #3	15:22	95%	5%	0
176 - Batt #4	15:32	95%	5%	0
193 - Batt #4	15:42	95%	5%	0
203 - Batt #5	15:51	100%	0%	0
223 - Batt #5	15:59	100%	0%	0
193 - Batt #5	16:07	100%	0%	0
213 - Batt #5	16:15	95%	5%	0
150 - Batt #3	16:26	90%	10%	0

Total Pushes Observed: 24

Total Pushes Receiving 85% or Greater Capture: 22

Total Pushes Receiving Less Than 85% Capture: 2

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Jim Walter (Coke) — Location (1): 03

Source: baghouse stack — Permit No. (3):

Start/Stop Time: 9:00 - 11:04 — Sky Condition: clear — Date (13): 11 06 84

Observation Point: E - SE of source — Distance from Source: 100 ft

Stack Height: 50 ft — Background: sky — Plume Color: -

Method of Evaluation: (19) 1 Hour Cumulative; (20) 6 Minute Average; (21) Other

Violation Observed (22): — If Notice Given, Notice Number (23):

Total Minutes Observed (28): 30 — Highest 6 Minute Average (30):

Minutes Exceeding (32): 20 — % Opacity = (34): 00, (36): 60 — % Opacity = (38): 00

Observer: Duckworth — (40): 42 — Time Analysis (42): 06 — ID (79): VE

Broke in 9:10

Min.	Seconds 0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	/
6				
7				0
8	0	0	0	0
9	0	0	0	/
10				
11				
12	0	0	0	0
13	0	0	0	/
14				

Min.	Seconds 0	15	30	45
15	0	0	0	0
16 45/30	0	0	/	
17				
18 55/15		0	0	0
19	0	0	0	0
20	0	0	0	0
21 59/00	/			
22				
23 05/15				0
24	0	0	0	0
25	0	0	0	0
26 08/15	0	/		
27				
28 17/15		0	0	0
29	0	0	0	0

Min.	Seconds 0	15	30	45
30 19/15	0	0	/	
31				
32 24/15				0
33	0	0	0	0
34 28/15	0	0	0	/
35				
36 43/15		0	0	0
37 44/15	0	0	0	/
38				
39 47/30	0	0	0	0
40 63/30	0	0	/	
41				
42 37/15		0	0	0
43	0	0	0	0
44 33/30	0	0	/	

Min.	Seconds 0	15	30	45
45 52/15				0
46	0	0	0	0
47	0	0	0	0
48 55/00	/			
49				
50 52/15		0	0	0
51	0	0	0	0
52 54/15	0	/		
53				
54 02/30			0	0
55	0	0	0	0
56 04/15	0	/		
57				
58				
59				

Results and Recommendations:

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Jim Walter (Coke) — Location (1): 03

Source: baghouse stack — Permit No. (3):

Start/Stop Time: 11:15 - 2:19 — Sky Condition: clear — Date (13): 11 06 84

Observation Point: S - SE of source — Distance from Source: 120 ft

Stack Height: 50 ft — Background: sky — Plume Color: —

Method of Evaluation: (19) [ ] 1 Hour Cumulative (20) [ ] 6 Minute Average (21) [ ] Other

Violation Observed (22): [ ] — If Notice Given, Notice Number (23):

Total Minutes Observed (28): 28 — Highest 6 Minute Average (30):

Minutes Exceeding (32): 20 — % Opacity = (34): 00 , (36): 60 — % Opacity = (38): 00

Observer: Duckworth (40): 42 — Time Analysis (42): 04 — ID (79): VE

probe in 11:20 — probe out 1:43 — probe in 2:02

Min.	Seconds 0	15	30	45
11 0		0	0	0
11 1	0	0	0	
2				
11 3	0	0	0	0
11 4	0	0	0	
5				
11 6				0
7	0	0	0	0
11 8	0			
9				
11 10		0	0	0
11	0	0	0	0
11 12				
13				
14				

Min.	Seconds 0	15	30	45
15		0	0	0
16	0	0	0	0
12 17	0	0		
18				
12 19			0	0
20	0	0	0	
12 21	0	0		
22				
12 23				0
24	0	0	0	0
12 25	0	0		
26				
12 27	0	0	0	0
28	0	0	0	0
12 29	0	0	0	

Min.	Seconds 0	15	30	45
30				0
31	0	0	0	0
32	0			
33				
34		0	0	0
35	0	0	0	
36				
37		0	0	0
38	0	0	0	0
39	0	0	0	0
40	0			
41				
42			0	0
43	0	0	0	0
44	0	0	0	0

Min.	Seconds 0	15	30	45
45				
46				
47	0	0	0	0
48	0	0	0	
49				
50			0	0
51	0	0	0	0
52				
53				
54	0	0	0	0
55	0			
56				
57		0	0	0
58	0	0	0	0
59				

Results and Recommendations:

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Jim Walter (Coke) — Location (1): 03

Source: baghouse stack — Permit No. (3):

Start/Stop Time: 0825 - 1406 — Sky Condition: clear — Date (13): 11 06 84

Observation Point: S-SE of source — Distance from Source: 120 ft

Stack Height: 120 ft — Background: sky — Plume Color: -

Method of Evaluation: (19) [ ] 1 Hour Cumulative (20) [ ] 6 Minute Average (21) [ ] Other

Violation Observed (22): [ ] — If Notice Given, Notice Number (23):

Total Minutes Observed (28): 18 — Highest 6 Minute Average (30):

Minutes Exceeding (32): 20 — % Opacity = (34): 00, (36): 60 — % Opacity = (38): 00

Observer: Duckworth (40): K2 — Time Analysis (42): 04 — ID (79): VE

probe out 1405

Min.	Seconds 0	15	30	45
0			0	0
1	0	0	0	0
2	0	0	0	/
3				
4		0	0	0
5	0	0	0	0
6	0	/		
7				
8				0
9	0	0	0	0
10	0	0	0	/
11				
12		0	0	0
13	0	0	0	/
14				

Min.	Seconds 0	15	30	45
15			0	0
16	0	0	0	/
17				
18				0
19	0	0	0	0
20	0	/		
21				
22			0	0
23	0	0	0	0
24	/			
25				
26				0
27	0	0	0	0
28	0	/		
29				

Min	Seconds 0	15	30	45
30		0	0	0
31	0	0	0	0
32	0	/		
33				
34		0	0	0
35	0	0	0	0
36	0	0	0	0
37	/			
38				
39				
40				
41				
42				
43				
44				

Min.	Seconds 0	15	30	45
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				

Results and Recommendations:

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Jim Walter (Coke) — Location (1): 03

Source: baghouse stack — Permit No. (3):

Start/Stop Time: 7:54 - 10:44 — Sky Condition: overcast — Date (13): 11 07 84

Observation Point: E-SE of source — Distance from Source: 120 ft

Stack Height: 50 ft — Background: sky — Plume Color: —

Method of Evaluation: (19) ☐ 1 Hour Cumulative (20) ☐ 6 Minute Average (21) ☐ Other

Violation Observed (22): ☐ — If Notice Given, Notice Number (23):

Total Minutes Observed (28): 28 — Highest 6 Minute Average (30):

Minutes Exceeding (32): 20 — % Opacity = (34): 00, (36): 60 — % Opacity = (38): 00

Observer: Duckworth — (40): 42 — Time Analysis (42): 04 — ID (79): VE

pate in 7:47

Min.	Seconds 0	15	30	45
0		0	0	0
1	0	0	0	0
2	0	/		
3				
4				0
5	0	0	0	0
6	0	0	/	
7				
8		0	0	0
9	0	0	0	0
10	/			
11				
12				0
13	0	0	0	0
14	/			

Min.	Seconds 0	15	30	45
15			0	0
16	0	0	0	0
17	0	0	0	0
18	/			
19				
20			0	0
21	0	0	0	0
22	0	0	0	/
23				
24			0	0
25	0	0	0	0
26	0	0	0	0
27	/			
28				
29				

Min.	Seconds 0	15	30	45
30			0	0
31	0	0	0	0
32	0	0	0	0
33	0	/		
34				
35				0
36	0	0	0	0
37	0	0	/	
38				
39				0
40	0	0	0	0
41	0	0	/	
42				
43				
44				

Min.	Seconds 0	15	30	45
45				0
46	0	0	0	0
47	0	0	0	/
48				
49	0	0	0	0
50	0	0	0	0
51	0	0	/	
52				
53			0	0
54	0	0	0	0
55	0	0	/	
56				
57		0	0	0
58	0	0	0	0
59	0	0	/	

Results and Recommendations:

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name [illegible] Walter (Coke)   Location (1) 0 3

Source [illegible]   Permit No. (3) [ ]

Start/Stop Time [illegible]-3:13   Sky Condition overcast   Date (13) 1 1 0 7 8 4

Observation Point [illegible]   Distance from Source 120 ft

Stack Height 50 ft   Background [illegible]   Plume Color –

Method of Evaluation: (19) [ ] 1 Hour Cumulative (20) [ ] 6 Minute Average (21) [ ] Other ______

Violation Observed (22) [ ]   If Notice Given, Notice Number (23) [ ]

Total Minutes Observed (28) 2 8   Highest 6 Minute Average (30) [ ]

Minutes Exceeding: (32) 2 0 % Opacity = (34) 0 0, (36) 6 0 % Opacity = (38) 0 0

Observer [illegible] (40) 4 2   Time Analysis (42) 0 4   ID (79) V E

[illegible] 10:58 [illegible] 11:05 [illegible] position [illegible]

Min.	0	15	30	45	Min.	0	15	30	45	Min	0	15	30	45	Min	0	15	30	45
0		0	0	0	15		0	0	0	30				0	45				0
1	0	0	/		16	0	0	0	0	31	0	0	0	0	46	0	0	0	0
2					17	0	0	/		32	0	0	/		47	0	0	0	/
3		0	0	0	18					33					48				
4	0	0	0	/	19			0	0	34		0	0	0	49		0	0	0
5					20	0	0	0	0	35	0	0	0	/	50	0	0	0	/
6		0	0	0	21	0	/			36					51				
7	0	0	0	/	22					37				0	52			0	0
8					23		0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	0	0	0	0	39	0	0	/		54	0	/		
10	0	0	/		25	0	/			40					55				
11					26					41			0	0	56				0
12	0	0	0	0	27			0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	/	28	0	0	0	0	43	0	/			58	0	0	0	0
14					29	0	/			44					59	0	/		

Results and Recommendations:

ENV-AP-008-1/84 REVISED

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Jim Walter (Coke) — Location (1): 03

Source: baghouse stack — Permit No. (3):

Start/Stop Time: 3:20 - 4:36 — Sky Condition: broken — Date (13): 11 07 84

Observation Point: E-NE of source — Distance from Source: 120 ft

Stack Height: 50 — Background: sky — Plume Color: —

Method of Evaluation: (19) ☐ 1 Hour Cumulative (20) ☐ 6 Minute Average (21) ☐ Other

Violation Observed (22): ☐ — If Notice Given, Notice Number (23):

Total Minutes Observed (28): 13 — Highest 6 Minute Average (30):

Minutes Exceeding: (32) 20 — % Opacity = (34) 00, (36) 60 — % Opacity = (38) 00

Observer: Duckworth — (40) KR — Time Analysis (42) 02 — ID (79) VE

probe out at 1:25

Min.	Seconds 0	15	30	45
0		0	0	0
1	0	0	0	0
2	0	0	/	
3				
4		0	0	0
5	0	0	0	/
6				
7	0	0	0	0
8	0	0	0	0
9	0	/		
10				
11	0	0	0	0
12	0	0	/	
13				
14				
15	0	0	0	0
16	0	/		
17				
18		0	0	0
19	0	0	0	0
20	/			
21				
22				0
23	0	0	0	0
24	0	/		
25				
26	0	0	0	0
27	0	0	0	0
28	0	/		
29				
30				
31				
32				
33				
34				
35				
36				
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38				
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41				
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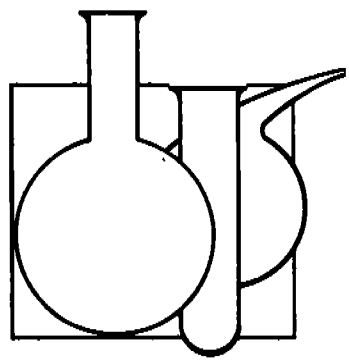
59				

Results and Recommendations:

Plant Operation Data



OVEN REPORT

DATE 11-6-84
SHIFT 7:AM

CHARGING

TOP HOUSE BUNKER	TYPE COAL	NO OVENS CHARGED	REMARKS

PUSHING

TYPE COKE	NO OVENS PUSHED	COKE TEMP HOT, COLD, GOOD	SIZE SMALL, LARGE AVE	OTHER

OVEN TEMPERATURES

NO 3 BATTERY PS	CS	AVE	NO 4 BATTERY PS	CS	AVE	NO 5 BATTERY PS	CS	AVE
2157	2204	2181	2162	2201	2182	1852	1862	1857

REMARKS

Temperatures will vary with Different Coal Blend

FMN

OVEN REPORT

DATE 11-7-84
SHIFT 7 AM

CHARGING

TOP HOUSE BIN NO	TYPE COAL	NO OVENS CHARGED	REMARKS

PUSHING

TYPE COKE	NO OVENS PUSHED	COKE TEMP HOT, COLD, GOOD	SIZE SMALL, LARGE AVE	OTHER

OVEN TEMPERATURES

NO 3 BATTERY PS	CS	AVE	NO 4 BATTERY PS	CS	AVE	NO 5 BATTERY PS	CS	AVE
2118	2162	2145	2136	2167	2152	1826	1849	1833

REMARKS

Temperatures will vary with the different Coal Blends

FMN

Br-o

OVEN FILLING REPORT

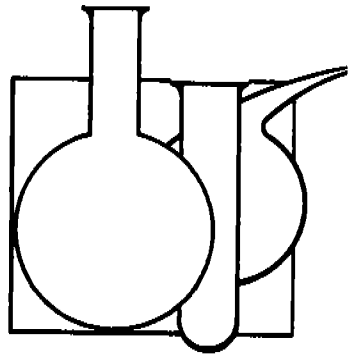
BLOCK NO. 11 SCHD

DATE 11-6-84

1ST SHIFT								2ND SHIFT								3RD SHIFT							
Trip	Oven No.	Light No. of Ft	Green No. of Ft	Broke Up	Blk. Head Cut	Double Pushed	Disposition	Trip	Oven No.	Light No. of Ft.	Green No. of Ft.	Broke Up	Blk. Head Cut	Double Pushed	Disposition	Trip	Oven No.	Light No. of Ft.	Green No. of Ft.	Broke Up	Blk. Head Cut	Double Pushed	Disposition
1	236	7:AM						1	197	300	15:27	Batt #5		Test #2		1	208	1100					
2	183	11						2	217	11	15:36	Batt #5		Test #2		2	228	11					
3	125	22						3	129	22	15:57	Batt #3		Test #2		3	121	22					
4	135	33						4	133	33	16:03	Batt #3		Test #2		4	131	33					
5	171	44						5	179	44						5	177	44					
6	158	55						6	156	55						6	154	55					
7	203	806						7	237	406						7	198	1206					
Start Test #1 8	223	17	8:40	Batt #5		Test #1		8	184	17						8	218	17					
9	145	28	9:00	Batt #3		Test #1		9	143	29						9	141	28					
10	122	39	9:06	Batt #3		Test #1		10	130	39						10	128	39					
11	168	50	9:17	Batt #4		Test #1		11	166	50						11	164	50					
12	178	901	9:27	Batt #4		Test #1		12	176	501						12	174	101					
13	193	12	9:48	Batt #5		Test #1		13	204	12						13	238	12					
14	213	23	9:54	Batt #5		Test #1		14	224	23						14	185	23					
15	X	34						15	X	34						15	X	34					
16	132	45	10:33	Batt #3		Test #1		16	146	45						16	138	45					
17	142	56	10:44	Batt #3		Test #1		17	150	56						17	148	56					
18	155	1007	10:54	Batt #4		Test #1		18	153	607						18	151	207					
19	165	18	11:07	Batt #4		Test #1		19	169	18						19	161	18					
20	233	29	11:19	Batt #5		Test #1		20	194	29						20	205	29					
21	190	40	11:28	Batt #5		Test #1		21	214	40						21	225	40					
22	X	51						22	X	51						22	X	51					
23	X	1102						23	X	702						23	X	302					
24	210	13	11:38	Batt #5		Test #1		24	234	13						24	195	13					
25	230	24	11:49	Batt #5		Test #1		25	191	24						25	215	24					
26	129	35	12:00	Batt #3		Test #1		26	127	35						26	125	35					
27	139	46	12:10	Batt #3		Test #1		27	137	46						27	135	46					
28	175	57	12:20	Batt #4		Test #1		28	173	57						28	171	57					
29	152	1208	12:30	Batt #4		Test #1		29	160	808						29	158	408					
30	200	17	13:07	Batt #5		Test #1		30	201	19						30	235	19					
31	220	30	13:18	Batt #5		Test #1		31	221	30						31	182	30					
32	X	41						32	X	41						32	X	41					
33	149	52	13:32	Batt #3		Test #1		33	147	52						33	145	52					
34	126	103	13:38	Batt #3		Test #1		34	124	903						34	122	503					
Stop 35	162	14	13:47	Batt #4		Test #1		35	170	14						35	168	14					
36	172	25						36	180	28						36	178	28					
Start Test #2 37	240	36	14:08	Batt #5		Test #2		37	191	36						37	202	36					
38	187	47	14:18	Batt #5		Test #2		38	211	47						38	222	47					
39	136	58	14:28	Batt #3		Test #2		39	134	58						39	132	58					
40	146	209	14:35	Batt #3		Test #2		40	144	1009						40	142	7009					
41	159	20	14:46	Batt #4		Test #2		41	157	20						41	155	20					
42	169	31	14:56	Batt #4		Test #2		42	167	31						42	165	31					
43	207	42	15:09	Batt #5		Test #2		43	231	42						43	192	42					
44	227	53	15:16	Batt #5		Test #2		44	188	53						44	212	53					
45								45								45							
46								46								46							
47								47								47							
48								48								48							
49								49								49							
50								50								50							

MOTORMAN MOTORMAN MOTORMAN

Calibrations



VI. METHOD 5 CALIBRATIONS

Meter Box

The meter box shall be initially calibrated every 6 months at the fixed settings of 0.5, 1.0, 1.5, 2.0, and 2.5 inches of water. Upon return to the laboratory from this test the meter box was recalibrated using the average meter pressure for the test series. The recalibration point shall be the closest point to the initial calibration (for an average meter pressure of 1.59 a 1.50 "H_20 was used as the recalibration point). These recalibrations produced a single point MCF and a H@ which shall be compared to the original calibration to see if they are within the 5% allowed at the highest vacuum seen. These recalibration sheets are located behind the original calibration sheets.

Pitot Tubes

The S type pitot tubes shall be calibrated against a standard pitot tube (C_p = 0.99) every six months in a wind tunnel with a capaciaty to generate a test section velocity of approximately 3000 feet/ minute. Additionally the pitot tube shall be measured as to its specifications and alignment. Upon return, the intercomponent spacings and the face opening alignment of the pitot tube assembly shall be rechecked and if no changes are noticed; it shall be assumed that the cofficient of the assembly had not changed.

Temperature measurments

All temperature devices (impinger, meter box, hot box and stack) shall be calibrated every 6 months against an ASTM mercury-in-glass reference therometer or a reference thermocouple and potentiometer calibrated by fixed points, e.g., ice bath and boiling water (corrected to barometric pressure). Upon return the stack temperature device shall be recalibrated within 10% of the average absolute stack temperarure. If the device being tested agrees within 1.5% of the reference device, the temperature data taken in the field shall be considered valid.

VI. METHOD 5 CALIBRATIONS CONTINUED

Barometric Pressure

An aneroid barometer capable of measuring atmospheric pressure to within 0.1 inches Hg shall be used. If this device is defective the following alternate method shall be used. The barometric reading may be obtained from a nearby national weather service station, in which case the station value (which is the absolute barometric pressure) shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 0.1 inches Hg per 100 feet elevation increase or vice versa for elevation decrease.

Specific Test equipment and measurements

The equipment used during these tests was as follows:

Probe: 8-1 & 8-2
Meter Box: #400
Stack Temperature: OMEGA II
Sample Box: #4
Condenser: #1

The average temperature of the stack was 85^{o}F. The OMEGA II was recalibrated at 85^{o}F and agreed exactly with an ASTM mercury-in-glass reference thermometer. The intercomponent spacings and the face opening alignment of the Pitot Tube assembly was rechecked and no changes were noticed; therefore, it was assumed that the cofficient of the assembly had not changed.

Gauge	Average Test Condition Temperature	Gauge Reading	Reference Reading	Difference
Impinger (Pre) #1		66	Room Temp 66	—
Meter In (Pre) 400		66	Room Temp 66	—
Meter Out (Pre) 400		66	Room Temp 66	—
Filter Heated Area (Pre) #4		255	248 ± 25°F 255	—
Stack (Post)	85	85	Stack Temp °F 85	

Post Test	Run 1	Run 2	Run 3
Train Leak Rate	.012 CFM	.008 CFM	.004 CFM
Pitot Leak Check	✓	✓	✓
Pre Test (Answer Yes or No)			
Orsat Leak Check	NA		
Metering System Leak Check	✓		
Barometer Calibrated	✓		
Sample Bag Leak Check (If used)	NA		

Signature [signature] Title ASST DIRECTOR Date 11-8-84

Calibration data for dry gas meter, orifice, nozzle, pitot and differential pressure gauge (if other than manometer) must be available for inspection at the time of the test and must be included in the test report.

Type A Glass Fiber Filters

FEATURES

■ High tensile strength. ■ Excellent handling characteristics. ■ Good wetting properties. ■ Minimum of 99.9% retention for particles of .3 μm as determined by DOP tests. ■ Binder free.

This is the original glass fiber filter pioneered by Gelman Instrument Company over 15 years ago. It continues to be widely used for high volume sampling. Since zinc is one of the raw materials incorporated in the glass fibers, Type A Filters have a variable zinc content. Another component of the filter, sulfuric acid, is used as a dispersion medium, making the sheets unsuitable for measurement of sulfates.

Type A Glass Fiber Filters are less likely to develop static charge or tear than other glass fiber media types. They are used extensively in applications where zinc and iron content is not important, or where sulfate content is not being determined.

Size	37 mm	47 mm	102 mm	8"x10"
Product No.	61715	61694	61696	61701
Filters/Pkg.	500	100	100	100

TYPE A GLASS FIBER FILTER SPECIFICATION REPORT

The following physical/chemical properties represent typical, average values obtained in accordance with accepted test methods. They are subject to normal manufacturing variations and are supplied as a technical service. *The analysis has been made in accordance with EPA procedures (micrograms/8" x 10" sheet).*

ELEMENTS:

Antimony	.30	Manganese	.200
Arsenic	.30	Mercury	.100
Beryllium	.1	Molybdenum	.10
Bismuth	.10	Nickel	.10
Cadmium	.5	Selenium	.5000
Chromium	.10	Tin	.10
Cobalt	.10	Titanium	.170
Copper	.2	Vanadium	.10
Iron	.2300	Zinc	.5000
Lead	.20		to 25,000

OTHER PHYSICALS:

BSO	.522	Flow Resistance (Max.)	
*pH	.8.5	@ 320 cm/min.	.80 mm
DOP @320/cm/min		Flow Rate (air)	
(ASTM Method 2986	.99.9%	lpm/cm² @ 70 cm Hg	.50
Tensile Strength		Max. Use Temp.	.400°C
(Fed. Spec. UUP31B)	.750 gr	Static Properties	.Low
Weight,		Ability to	
8"x10" sheet	.4.0±.3 gr.	Fold	.Excellent

WATER EXTRACTABLE IONS:

Sulfate	.100	Chloride	.1500
Nitrate	.50	Fluoride	.15
Ammonia	.20		

*pH—Gelman Procedure:

A 500 ml distilled water.
B. Add 15 drops saturated KCl solution
C. Shred one 8"x10" sheet and soak in prepared water for one hour.
D. Run pH at ambient temperature.

Type A/E Glass Fiber Filters

FEATURES

■ Low trace metals. ■ Medium Handling characteristics. ■ Available in all sizes. ■ Minimum of 99.9% retention for particles of .3 μm as determined by DOP tests. ■ Binder free.

Type A/E Glass Fiber Filters are composed of low acid soluble glass fiber. They contain low levels of both zinc and iron. The filters do react with atmospheric sulfur dioxide; and therefore, when high levels of sulfur are expected, corrections for this reaction should be accounted for.

Type A/E Glass Fiber Filters are binder free and ideal for gravimetric analysis of air pollutants. This pure, organic free filter is the basis for procedures widely used in determining municipal and industrial air polluting substances.

Size	25 mm	37 mm	47 mm	102 mm	8"x10"
Product No.	61630	61652	61631	61633	61638
Filters/Pkg.	500	500	100	100	100

TYPE A/E GLASS FIBER FILTER SPECIFICATION REPORT

The following physical/chemical properties represent typical, average values obtained in accordance with accepted test methods. They are subject to normal manufacturing variations and are supplied as a technical service. *The analysis has been made in accordance with EPA procedures (micrograms/8" x 10" sheet).*

ELEMENTS:

Antimony	.20	Manganese	.2
Arsenic	.20	Mercury	.80
Beryllium	.1	Molybdenum	.10
Bismuth	.10	Nickel	.10
Cadmium	.2	Selenium	.200
Chromium	.10	Tin	.10
Cobalt	.10	Titanium	.10
Copper	.2	Vanadium	.10
Iron	.100-1800	Zinc	.90
Lead	.10		

OTHER PHYSICALS:

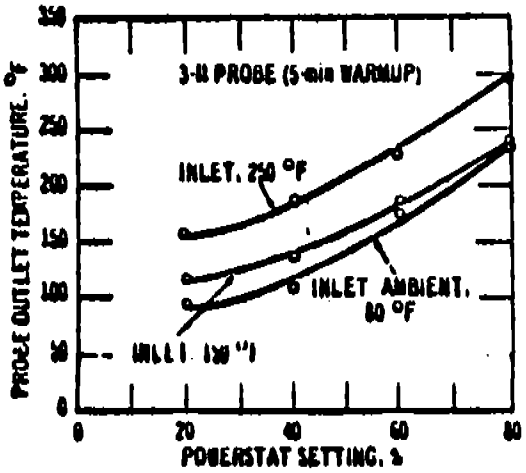
BSO	.522	Flow Resistance (Max.)	
*pH	.9.0	@ 320 cm/min.	.80 mm
DOP @320/cm/min		Flow Rate (air)	
ASTM Methods 2986)	.99.9%	lpm/cm² @ 70 cm Hg	.60
Tensile Strength		Max. Use Temp.	.400°C
(Fed. Spec. UUP31B)	.600 gr.	Static Properties	.Medium
Weight		Ability to	
8"x10"sheet	.4.0±.3 gr.	Fold	.Good

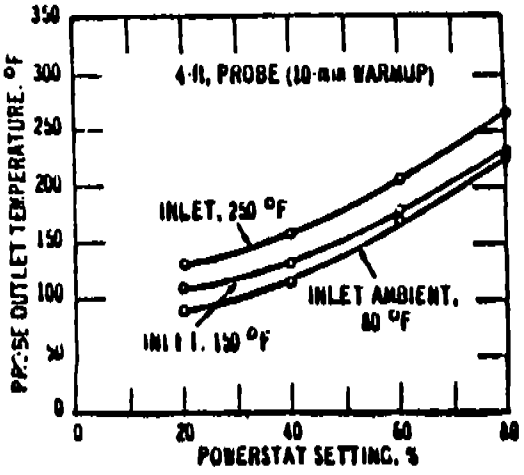
WATER EXTRACTABLE IONS:

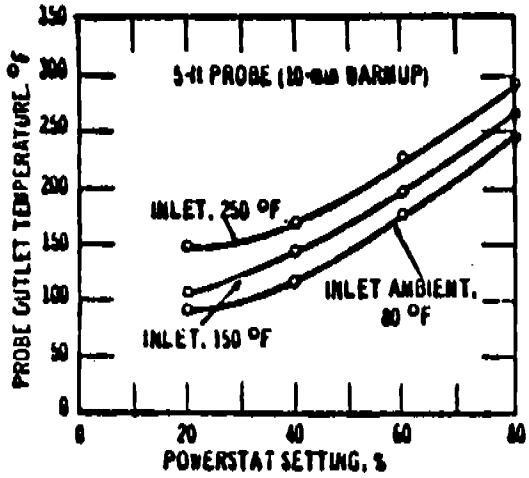
Sulfate	.600	Chloride	.1500
Nitrate	.115	Fluoride	.67
Ammonia	.13		

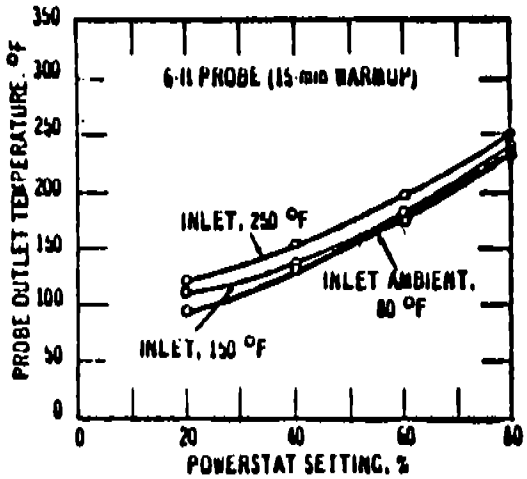
*pH—Gelman Procedure:

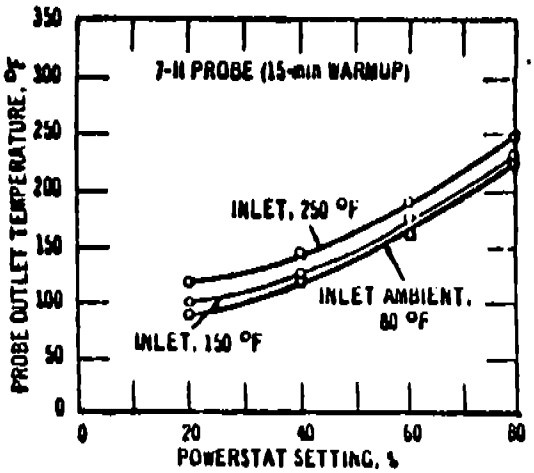
A 500 ml distilled water.
B Add 15 drops saturated KCl solution.
C. Shread one 8"x10" sheet and soak in prepared water for one hour.
D. Run pH at ambient temperature.











NOTE: Flow rate held constant at 0.75; 50% change in flow rate has little effect on probe temperature.

METER CALIBRATION FORM

Date 9/19/84 Box No. 400

P_{bar} = 30.00 in. Hg Calibrated by LOTZ

Orifice Manometer Setting ΔH (in. H_2O)	Δ wtm (in. H_2O)	Gas Volume Wet Test Meter		Gas Volume Dry Gas Meter		Temperature Wet Test Meter		Avg. Temp. Dry Gas Meter	
		Initial	Final	Initial	Final	Initial	Final	Inlet	Outlet
0.5 @ 19	-0.40	0	6.225	683.762	685.546	21.5	21.5	97.5	87
1.0 @ 17.5	-0.60	14.707	23.463	698.624	707.351	21.5	22.0	103	92.5
1.5 @ 16.5	-0.83	23.463	34.035	707.351	716.045	22.0	22.0	108	94.5
2.0 @ 15.5	-1.05	34.035	47.071	716.045	731.341	22.0	22.2	112	96.5
2.5 @ 15.0	-1.32	47.071	60.512	731.341	745.353	22.2	22.5	113	97.5

Pump must be operated for at least 15 minutes at each ΔH setting (.5, 1, 1.5, 2 and 3)

T_{dgm} = average temperature of dry gas meter (inlet and outlet) + 460°F

T_{wtm} = average temperature of wet test meter + 460°F

$P_{wtm} = P_{bar} - \frac{\Delta wtm}{13.6}$

$P_{dgm} = P_{bar} + \frac{\Delta H}{13.6}$

Δwtm = pressure on wet test meter in inches of H_2O

Y = meter calibration factor

1.0197
1.0185
1.0145
1.0055
1.0116
1.0140 = 1.01 Avg

28.316 = conversion factor when using a wet test meter calibrated in liters

Calculations

$$Y = \frac{(\text{wet final} - \text{wet initial})(T_{dgm})(P_{wtm})}{(\text{dry final} - \text{dry initial})(28.316)(T_{wtm})(P_{dgm})} \quad \text{or (1)}$$

$$\bar{Y} = \frac{\Sigma Y}{5}$$

Meter Tolerance = 1.00 ± 0.01

If the meter calibration factor is not within the allowable tolerance, the calibration factory Y may be used to mathematically correct the gas meter dial readings to the proper values instead of physically adjusting the dry gas meter dials to correspond to the wet test meter readings.

POST TEST METER CALIBRATION

PROJECT JIM WALTERS COKE STACK BAGHOUSE

Date 11-8-84 Box No. 400

P_{bar} = 30.26 in. Hg Calibrated by J. Kaiser
Signature

Orifice Manometer Setting ΔH (in. H_2O)	Δ wtm (in. H_2O)	Gas Volume Wet Test Meter		Gas Volume Dry Gas Meter		Temperature Wet Test Meter		Avg. Temp. Dry Gas Meter	
		Initial	Final	Initial	Final	Initial	Final	Inlet	Outlet
15 @1.5 "Hg	-.74	0	10.409	252.424	263.080	16	16	94	75
15 @1.5 "Hg	-.74	0	10.506	263.080	273.037	16	16	104.5	83
15 @1.5 "Hg	-.74	0	10.545	273.037	284.714	16	16	109	89

Pump must be operated for at least 15 minutes at each ΔH setting

T_{dgm} = average temperature of dry gas meter (inlet and outlet) + 460°F

T_{wtm} = average temperature of wet test meter + 460°F

$P_{wtm} = P_{bar} - \frac{\Delta wtm}{13.6}$ (includes vapor pressure of water at saturation at the temperature of the wet test meter)

$P_{dgm} = P_{bar} + \frac{\Delta H}{13.6}$

Δwtm = pressure on wet test meter in inches of H_2O

Y = meter calibration factor

28.316 = conversion factor when using a wet test meter calibrated in liters

Calculations

$$Y = \frac{(\text{wet final} - \text{wet initial})(T_{dgm})(P_{wtm})}{(\text{dry final} - \text{dry initial})(28.316)(T_{wtm})(P_{dgm})}$$

or (1)

$\bar{Y} = \frac{\Sigma Y}{3}$ = 1.01

Pre test Y 1.01

% Difference —

ORIFICE CALIBRATION FORM

Date 9/19/84 Meter Box No. 400

P_{bar} 30.00 Calibrated By LOTZ

ΔH	V_1	V_2	θ	t_1	t_2	$V_2 - V_1$	Q_m	K_m	
in. H_2O	CF	CF	Sec.	°F	°F	CF			
0.5	683.762 ~~675.578~~	689.946 ~~689.946~~	900	97.5	88	6.184	.4168	.7431	1.67
1.0	689.946	707.391	900	103	92.5	8.763	.5894	.7405	1.68
1.5	707.391	718.045	900	108	94.5	10.654	.7119	.7294	1.73
2.0	718.045	731.341	960	112	96.5	13.296	.8241	.7303	1.73
2.5	731.341	745.353	900	113	97.5	14.012	.9320	.7386	1.69
							Average K_m	.7364	

V_1 = Dry gas meter reading at the start of each test

V_2 = Dry gas meter reading at the end of each test

t_1 = Dry gas meter inlet temperature

t_2 = Dry gas meter outlet temperature

1.70 Avg

Calculations

1. Q_m = (for each ΔH) $\dfrac{V_2 - V_1}{\theta}\left[\dfrac{t_2 + 460}{\frac{t_1 + t_2}{2} + 460}\right](60)(Y)$

2. K_m = (for each ΔH) $Q_m\sqrt{\dfrac{P_m M_m}{T_m \Delta H}}$

$M_m = 29$
$T_m = t_2 + 460$
$P_m = P_{bar} + \dfrac{\Delta H}{13.6}$

Y = meter calibration factor

3. Calculate the average K_m as follows:

$$\bar{K}_m = \frac{\Sigma K_m}{5}$$

4. Calculate ΔH_a as follows:

$$\Delta H_a = \frac{Q@^2\ P@\ M@}{T@}\left[\frac{1}{\bar{K}_m{}^2}\right] = \frac{0.921}{\bar{K}_m{}^2}$$

Q@ = 0.75 cfm
T@ = 528°R
P@ = 29.92 in.Hg
M@ = 29

5. Orifice Tolerance = 1.84 ± .25

POST TEST ORIFICE CALIBRATION

Date 11-8-84 Meter Box No. 400

P_{bar} 30.26 Calibrated By [signature] (Signature)

ΔH	V_1	V_2	θ	t_1	t_2	$V_2 - V_1$	Q_m	K_m
in. H_2O	CF	CF	Sec.	^oF	^oF	CF		
1.5	242.974	253.580	900	94	75	10.606	.6964	.7295
1.5	263.080	273.837	900	104.5	83	10.757	.7134	.7418
1.5	273.837	284.714	900	109	89	10.877	.7239	.7482

Average K_m .7400

Average H@ 1.68

Pre test H@ 1.70

% Difference -1.2%

V_1 = Dry gas meter reading at the start of each test

V_2 = Dry gas meter reading at the end of each test

t_1 = Dry gas meter inlet temperature

t_2 = Dry gas meter outlet temperature

Calculations

1. Q_m = (for each ΔH) $\quad \frac{V_2 - V_1}{\theta} \left[\frac{t_2 + 460}{\frac{t_1 + t_2}{2} + 460} \right] (60)(Y)$

2. K_m = (for each ΔH) $\quad Q_m \sqrt{\frac{P_m M_m}{T_m \Delta H}}$

$M_m = 29$

$T_m = t_2 + 460$

$P_m = P_{bar} + \frac{\Delta H}{13.6}$

Y = meter calibration factor

3. Calculate the average K_m as follows:

$$\bar{K}_m = \frac{\Sigma K_m}{3}$$

4. Calculate ΔH_a as follows:

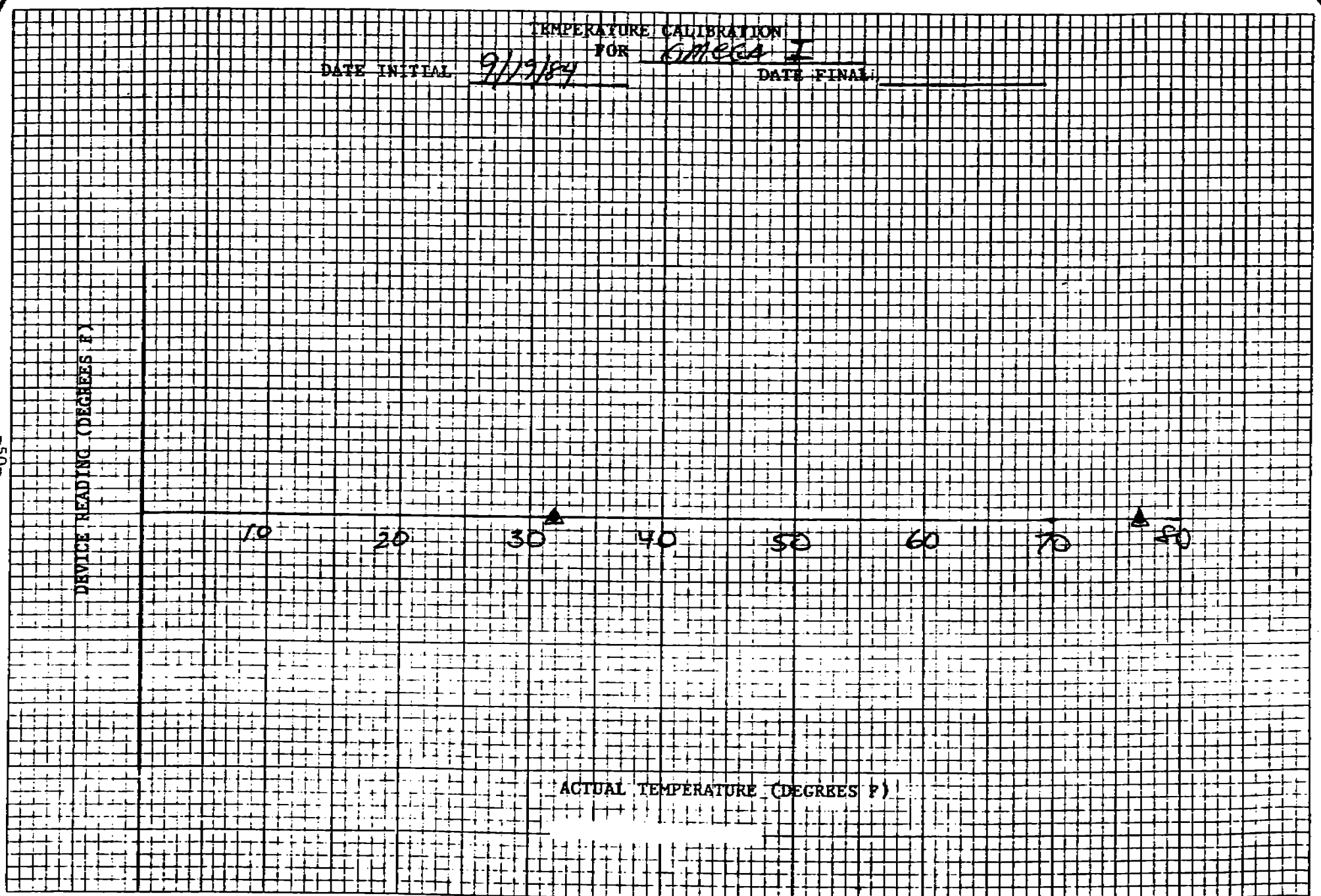
$$\Delta H_a = \frac{Q@^2 \; P@ \; M@}{T@} \left[\frac{1}{\bar{K}_m^2} \right] = \frac{0.921}{\bar{K}_m^2}$$

Q@ = 0.75 cfm
T@ = 528°R
P@ = 29.92 in.Hg
M@ = 29

TEMPERATURE CALIBRATION

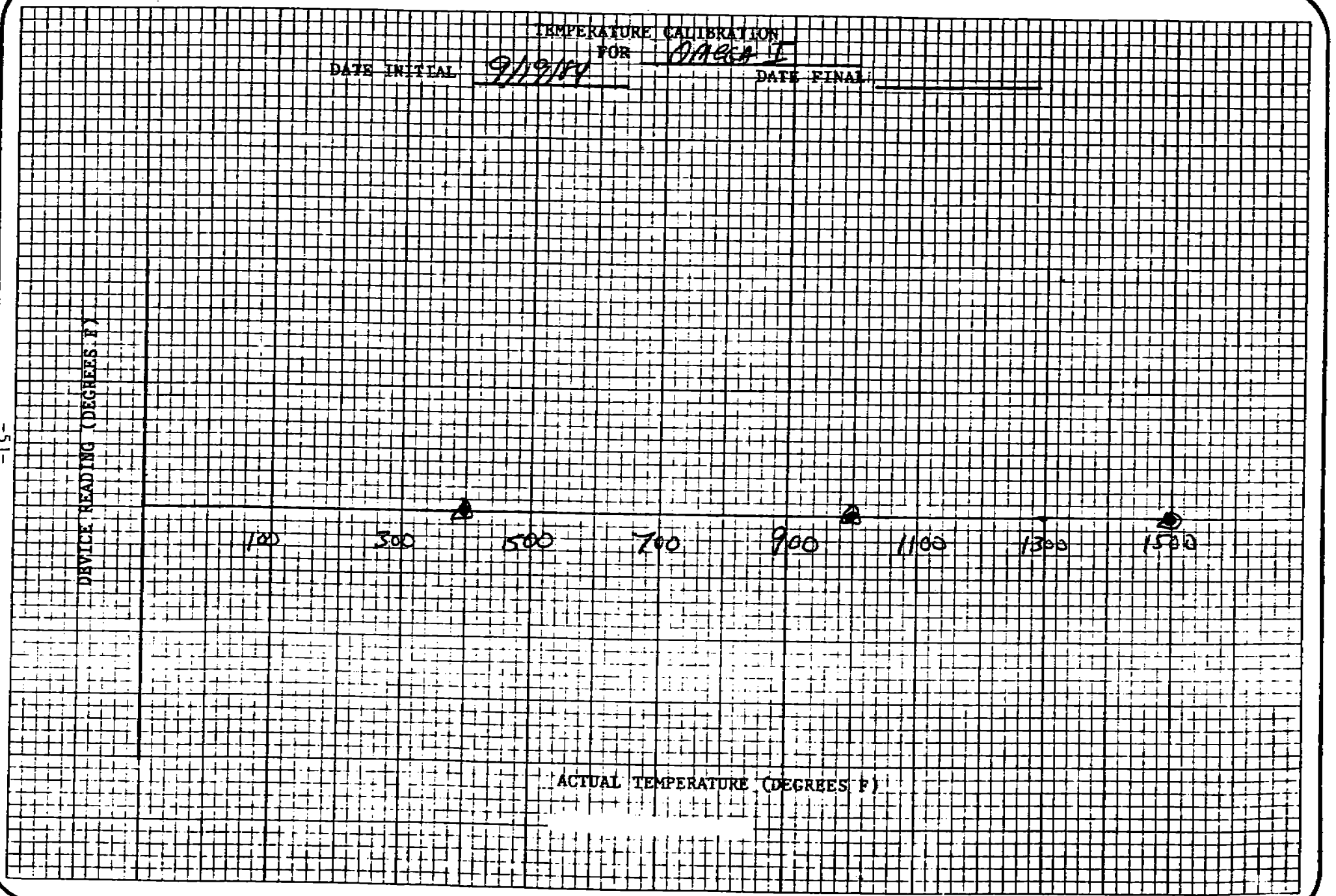
FOR Omega I

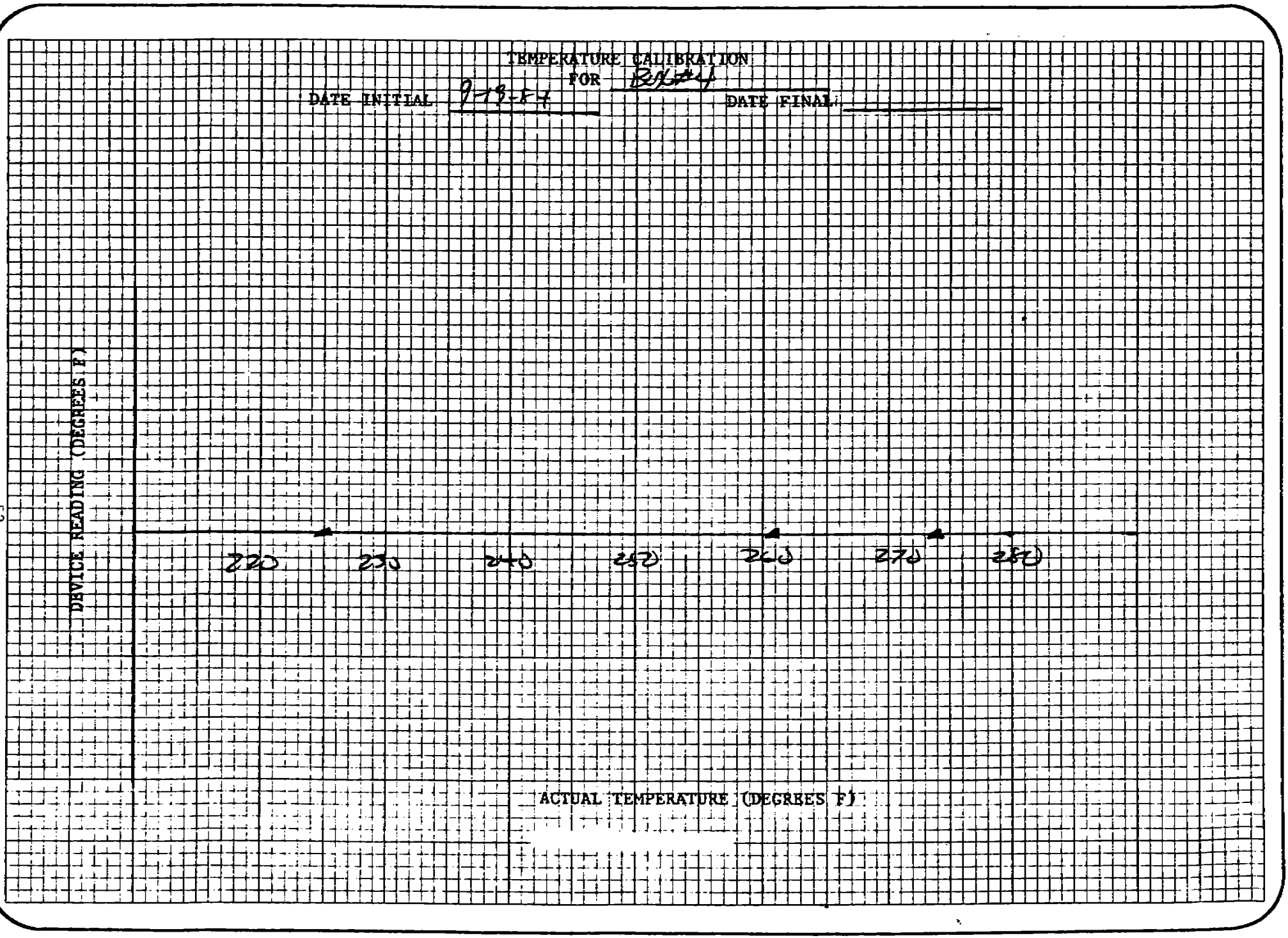
DATE INITIAL 9/19/84 DATE FINAL



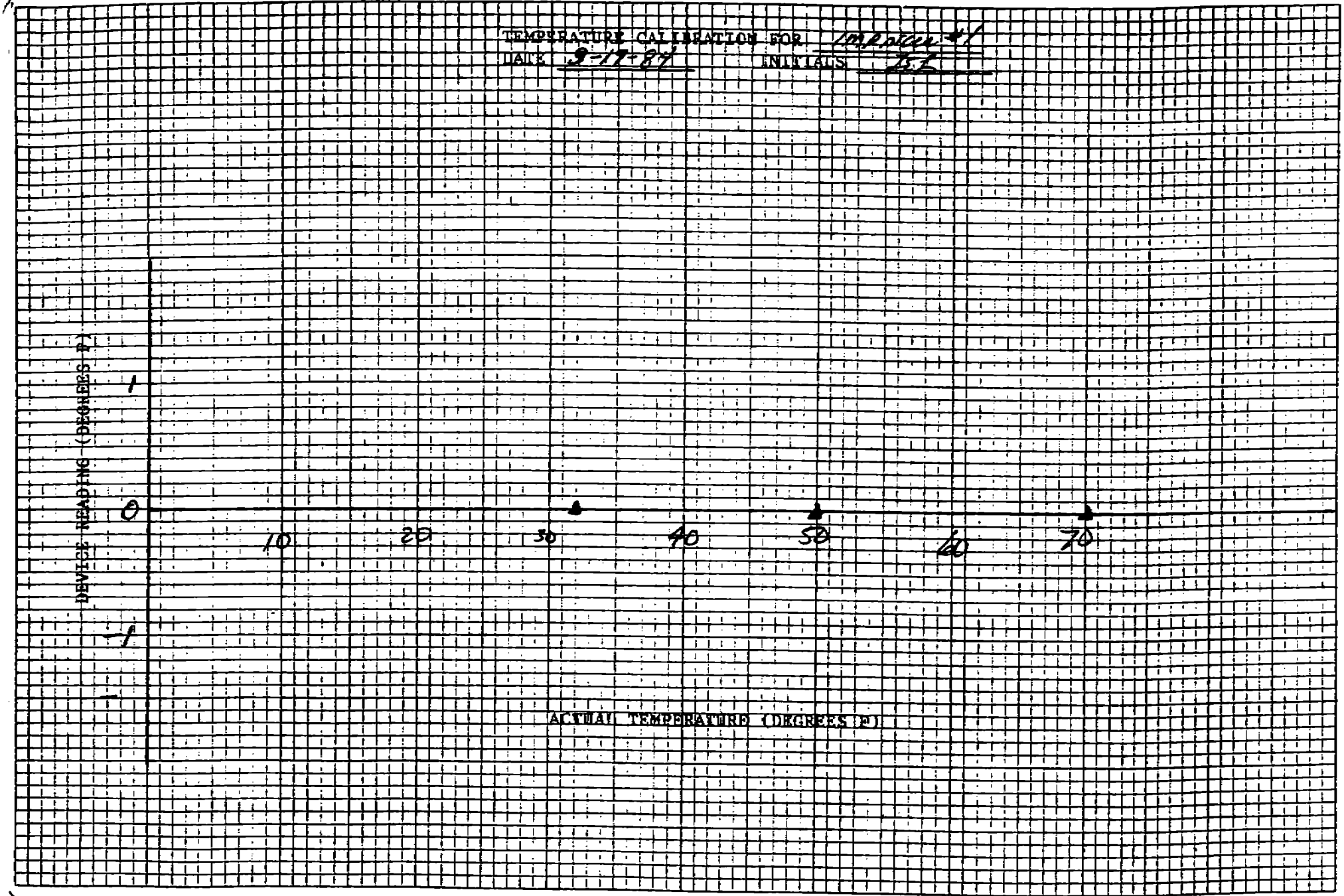
TEMPERATURE CALIBRATION

DATE INITIAL 9/19/89 FOR Oven 5 DATE FINAL _____





TEMPERATURE CALIBRATION FOR: Meteorological
DATE: 9-17-87 INITIALS: JL



PITOT CALIBRATION FORM

Date 9-17-84 Probe # 8'-1

Calibrated By G KARSTENS

Nozzle Size NONE

SIDE A

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(A)$
1	.655	.915	.837	-.001
2	.655	.915	.837	-.001
3	.665	.925	.839	+.001
		$\bar{C}_{p(A)}$	.838	

SIDE B

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(B)$
1	.695	.965	.841	0
2	.700	.970	.842	+.001
3	.690	.960	.839	-.002
		$\bar{C}_{p(B)}$	.841	

CALCULATIONS

$$C_p(s) = C_{p(std)} \text{ (or 0.99)} \sqrt{\frac{\Delta P_{std}}{\Delta P(s)}}$$

$$\text{Average Deviation} = \frac{\Sigma \left| C_p(s) - \bar{C}_p(A \text{ or } B) \right|}{3}$$

← Must be ≤ 0.01

$$\left| \bar{C}_p(A) - \bar{C}_p(B) \right|$$ ← Must be ≤ 0.01

PITOT CALIBRATION FORM

Date 9-17-84 Probe # S'-2

Calibrated By G KARSTENS

Nozzle Size NONE

SIDE A

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(A)$
1	.695	.970	.838	+.002
2	.685	.960	.836	0
3	.670	.945	.833	-.003
		$\bar{C}_{p(A)}$	.836	

SIDE B

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(B)$
1	.650	.900	.842	+.001
2	.650	.905	.839	-.002
3	.640	.890	.841	0
		$\bar{C}_{p(B)}$	.841	

CALCULATIONS

$$C_p(s) = C_{p(std)} \text{ (or 0.99)} \sqrt{\frac{\Delta P_{std}}{\Delta P(s)}}$$

$$\text{Average Deviation} = \frac{\Sigma \left| C_p(s) - \bar{C}_p(A \text{ or } B) \right|}{3}$$ ← Must be ≤ 0.01

$$\left| \bar{C}_p(A) - \bar{C}_p(B) \right|$$ ← Must be ≤ 0.01