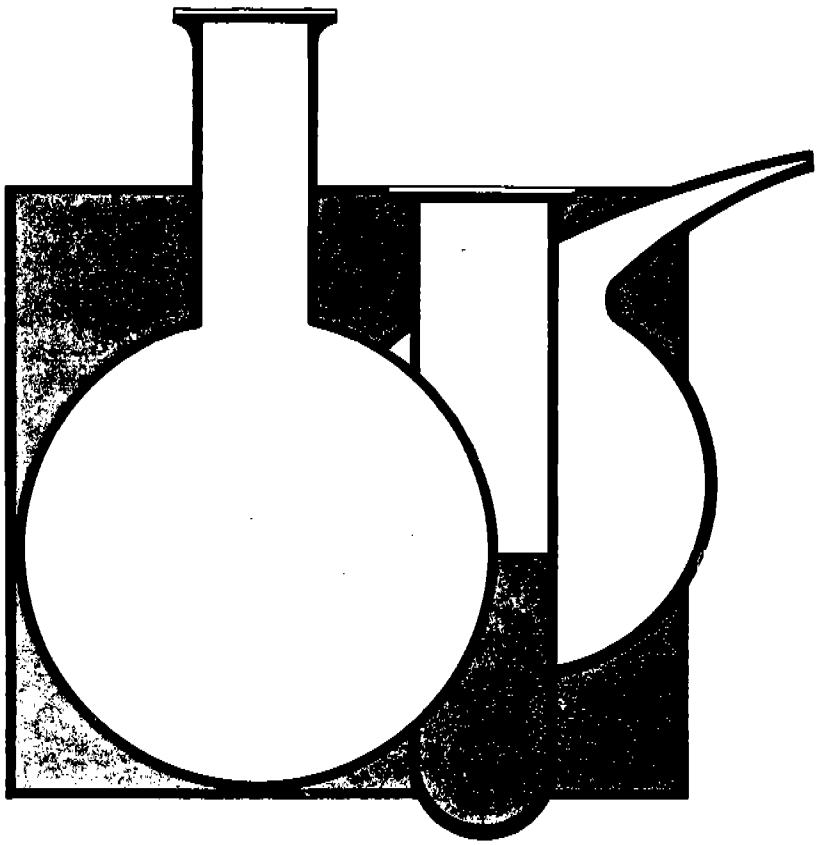
AP-42 Section 12.2
Reference
Report Sect. 4
Reference 161

GUARDIAN SYSTEMS INC.

P.O. Box 300
Leeds, Alabama 35094
205/699-6647

ABC COKE
BATT. #1, POSITIVE PUSH CIRC. SYS.



Test Report

MASS EMISSION TESTS

CONDUCTED ON

COKE BATTERY #1 POSITIVE PUSHING CONTROL SYSTEM

IN

TARRANT, ALABAMA

FOR

ALABAMA BY-PRODUCTS CORPORATION

ON

SEPTEMBER 9-11, 1985

MARCH 25, 1998

Approved by:
Tom Lotz
Director
Field Services Division

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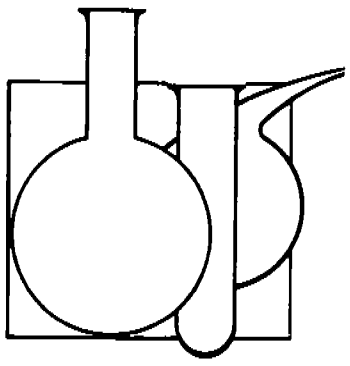
Introduction



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I. INTRODUCTION AND TEST DESCRIPTION

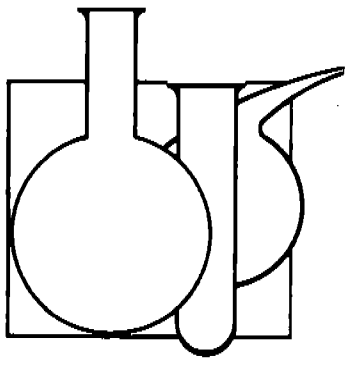
On September 9-11, 1985, Guardian Systems, Inc. performed a series of particulate emissions tests on the Coke Battery #1 Positive Pushing Control System of Alabama By-Products Corpration located in Tarrant, Alabama. These tests were conducted in accordance to the rules and regulating expressed in the 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. Moyer Edwards	Alabama By-Products Corporation
Mr. Buddy Wolfe	Alabama By-Products Corporation
Ms. Veda Hampton	Jefferson County Health Dept.
Mr. George Duckworth	Jefferson County Health Dept.
Mr. Frank Cargo	Jefferson County Health Dept.
Mr. Bob Geddis	Represented EPA
Mr. Greg Karstens	Guardian Systems, Inc.
Mr. Mike Harvey	Guardian Systems, Inc.
Mr. Lane McAlpin	Guardian Systems, Inc.

Test Results



II. SUMMARY OF TEST RESULTS

The following table gives the results of the tests conducted on the Coke Battery #1 Positive Pushing Control System on September 9-11, 1985. The allowable emission rate 0.03 pounds per ton of coal charged (27 tons/push). 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	20.10	20.04	19.57	19.92
Coal charged per test, Tons	648	648	621	639
Particulate Mass Rate lbs/test	10.73	3.83	11.51	8.68
Emissions lbs/ton of coal charged	0.017	0.006	0.019	0.014
*Particulate Mass Rate lbs/hr	31.93	11.47	35.29	26.14
*Coal charged Tons/hour	1928.5	1940.1	1903.9	1924.7
Emissions lbs/ton of coal charged	0.017	0.006	0.019	0.014

* 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	1380	1440	1380	1400
Time greater than 20% opacity, seconds	7	57	28	31
% greater than, 20 % opacity	0.5	4.0	2.0	2.2
Highest opacity, %	25	40	35	33.3

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

Stack Opacity

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

NR= Not Read

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 ALABAMA BY-PRODUCTS CORP
Job Number 55093

RUN NUMBER	1	2	3	4
DATE OF TEST	09/09/85	09/10/85	09/11/85	09/11/85
TIME OF TEST	0800-1645	0800-1630	0745-1800	AVERAGE
LOCATION OF TEST	SYS 1	SYS 1	SYS 1	SYS 1
STACK GAS TEMPERATURE DEGREES F	119	124	125	123
MOISTURE CONTENT, % V/V	5.47	6.15	6.92	6.17
OXYGEN CONTENT, % V/V	18.50	18.50	18.50	18.50
CARBON DIOXIDE CONTENT, % V/V	1.50	1.50	1.50	1.50
STACK GAS VELOCITY FEET PER SECOND	56.32	55.62	57.44	56.29
VOLUMETRIC FLOW ACTUAL CUBIC FEET PER MINUTE	139,504	137,757	142,266	139,431
VOLUMETRIC FLOW DRY STANDARD CUBIC FEET PER MINUTE	120,834	117,445	120,087	119,052
CONCENTRATION GRAINS PER DRY STANCARD CUBIC FOOT	0.031	0.011	0.034	0.026
CONCENTRATION GRAINS PER ACTUAL CUBIC FOOT	0.027	0.010	0.029	0.022
PARTICULATE MASS RATE (#/HR.)	31.93	11.47	35.29	26.14
% ISOKINETIC	105.38	102.00	101.35	103.22

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

Computer Input Parameters for ALABAMA BY-PRODUCTS CORP
Job Number 55098

RUN NUMBER	1	2	3	4
DATE	09/09/85	09/10/85	09/11/85	09/11/85
LOCATION	SYS 1	SYS 1	SYS 1	SYS 1
TIME	0900-1645	0800-1630	0745-1800	AVERAGE
BAROMETRIC PRESSURE (IN. HG)	30.10	30.10	30.10	30.10
STATIC PRESSURE (IN. H2O)	- 0.510	- 0.520	- 0.520	- 0.517
RUN TIME (MINUTES)	20.16	20.04	19.57	59 77
METER VOLUME (CORRECTED)	11.355	10.659	10.536	32.550
STACK TEMPERATURE (°F)	119.00	124.00	125.00	123.00
METER TEMPERATURE (°F)	90.00	92.00	90.00	91.00
METER PRESSURE (IN.H2O)	0.82	0.78	0.83	0.81
SQR VELOCITY PRESSURE	0.941	0.924	0.952	0.936
MASS OF PARTICULATE (MG.)	22.0	7.6	22.7	52.3
ML. OF WATER COLLECTED	13.5	14.3	16.1	43.9
% OXYGEN	18.5	18.5	18.5	18.5
% CARBON DIOXIDE	1.5	1.5	1.5	1.5
% CARBON MONOXIDE	0.0	0.0	0.0	0.0
STACK AREA (SQ. FT.)	41.28	41.28	41.28	41.28
PITOT CORRECTION FACTOR	0.85	0.85	0.85	0.85
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 ALABAMA BY-PRODUCTS CORP
Job Number 55093

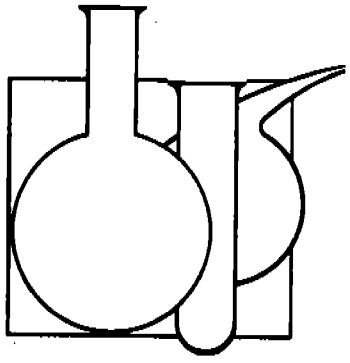
RUN NUMBER	1	2	3	4
DATE OF TEST	09/09/85	09/10/85	09/11/85	09/11/85
LOCATION OF TEST	SYS 1	SYS 1	SYS 1	SYS 1
1. STACK PRESSURE				
INCHES HG	30.06	30.06	30.06	30.06
MILLIMETERS HG	763.59	763.57	763.57	763.57
2. METER PRESSURE				
INCHES HG	30.16	30.16	30.16	30.16
MILLIMETERS HG	766.07	766.00	766.09	766.05
3. METER VOLUME				
DRY STANDARD CUBIC FEET	10.988	10.276	10.196	31.441
DRY STANDARD CUBIC METERS	0.311	0.291	0.289	0.890
4. WATER VOLUME				
STANDARD CUBIC FEET	0.635	0.673	0.758	2.066
STANDARD CUBIC METERS	0.018	0.019	0.021	0.059
5. MOISTURE CONTENT (%)	5.47	6.15	6.92	6.17
6. MOLECULAR WEIGHT DRY	28.98	28.98	28.98	28.98
7. MOLECULAR WEIGHT WET	28.38	28.31	28.22	28.30
8. STACK VELOCITY				
FEET PER SECOND	56.32	55.62	57.44	56.29
METERS PER SECOND	17.17	16.95	17.51	17.16
9. VOLUMETRIC FLOW				
ACTUAL CUBIC FEET PER MINUTE	139,504	137,757	142,266	139,431
ACTUAL CUBIC METERS PER SECOND	65.84	65.01	67.14	65.80
10. VOLUMETRIC FLOW				
DRY STANDARD CUBIC FEET PER MINUTE	120,834	117,445	120,087	119,052
DRY STANDARD CUBIC METER PER SECOND	57.03	55.43	56.68	56.19

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 ALABAMA BY-PRODUCTS CORP
Job Number 55098

RUN NUMBER	1	2	3	4
DATE OF TEST	09/09/85	09/10/85	09/11/85	09/11/85
LOCATION OF TEST	SYS 1	SYS 1	SYS 1	SYS 1
11. CONCENTRATION				
GRAINS PER DRY STANCARD CUBIC FOOT	0.0308	0.0114	0.0343	0.0256
GRAMS PER DRY STANDARD CUBIC METER	0.0705	0.0261	0.0784	0.0586
15. PARTICULATE MASS RATE (#/HR.)	31.93	11.47	35.29	26.14
16. VOLUME AT NOZZLE				
ACTUAL CUBIC FEET	12.687	12.055	12.080	36.825
ACTUAL CUBIC METERS	0.359	0.341	0.342	1.043
17. CONCENTRATION				
GRAINS PER ACTUAL CUBIC FOOT	0.0267	0.0097	0.0289	0.0219
GRAMS PER ACTUAL CUBIC METER	0.0611	0.0222	0.0662	0.0500
18. % ISOKINETIC	105.38	102.00	101.35	103.22

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 (push) at each point. The final point on the third run was omitted at the recommendation of Ms. Veda Hampton due to darkness and threating weather. 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.

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.

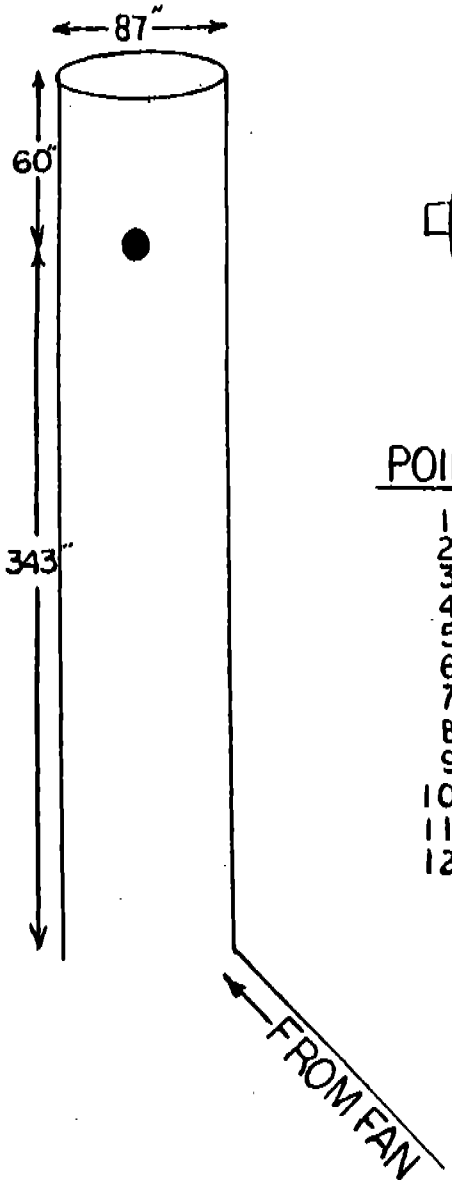
Upon completion of the sampling and the final leak checks the gel column and the probe nozzle-filter holder assembly was transfered to the cleanup area making sure no particulate was lost. The cleanup data was recorded on **Particulate Sample Recovery and Intergrity Sheet** located in the Field Data 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.

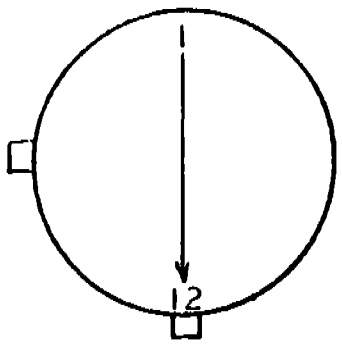
Analysis

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 AND SAMPLING POINTS





POINT	*DISTANCE FROM WALL
1	5.9
2	9.8
3	14.3
4	19.4
5	25.8
6	34.9
7	60.1
8	69.3
9	75.6
10	80.7
11	85.2
12	89.1

*INCLUDES 4" NIPPLE

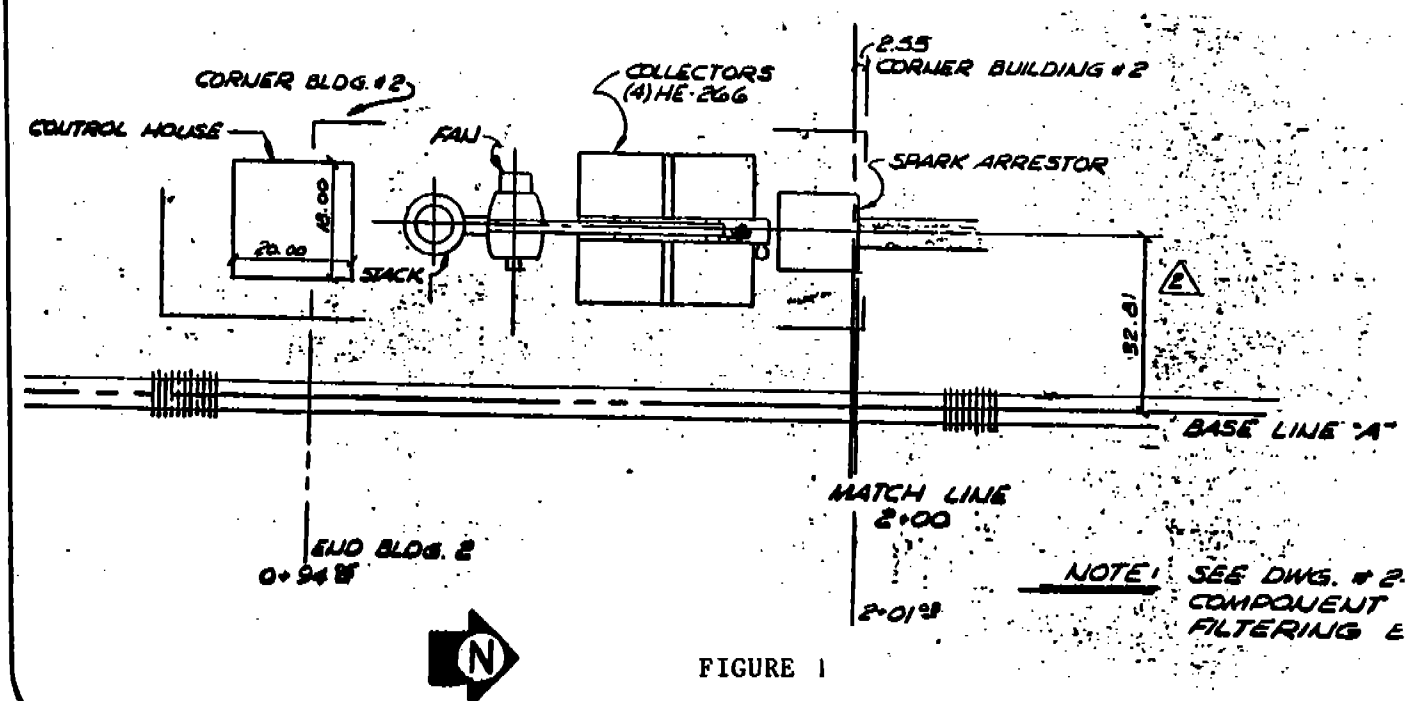


FIGURE 1

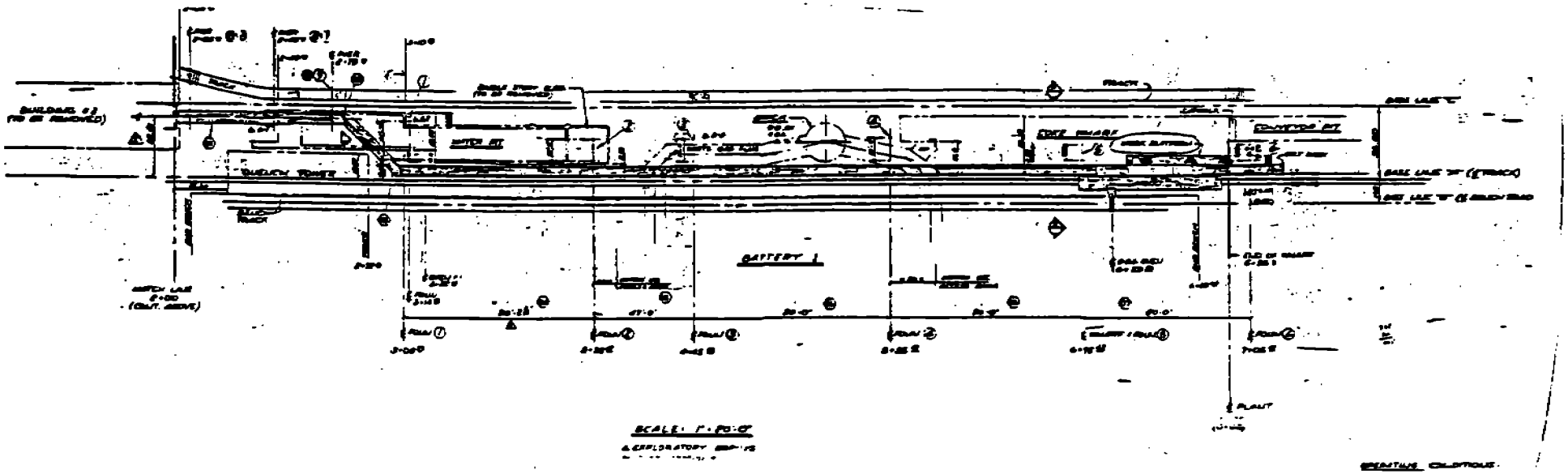
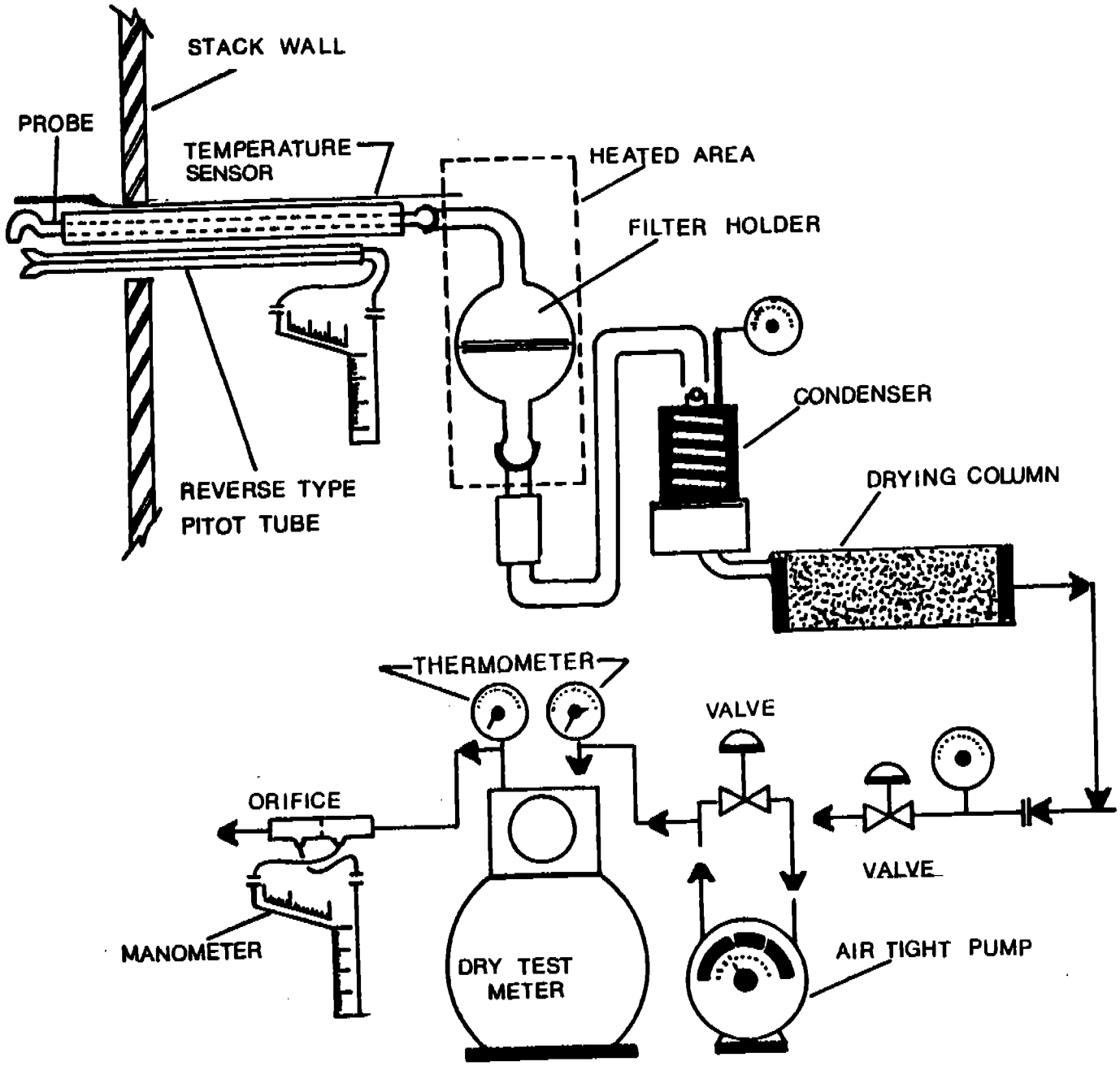


FIGURE 2

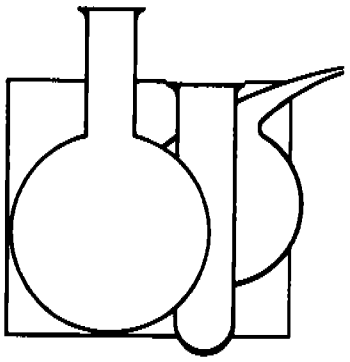
BATTERY Nº 1
SCHEMATIC



PARTICULATE SAMPLING TRAIN.. METHOD 5

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 $\left[\frac{(lb/lb\text{-}mole)(in.\ Hg)}{(^{\circ}R)\ (in.\ H_2O)}\right]^{1/2}$

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 ABC RUN # #1

LOCATION SYSTEM #1 DATE 9-9-85

BARO. PRES. 30.10 TIME 0800-1645

GUARDIAN SYSTEMS INC.

P. O. Box 300
Leeds, Alabama 35094
205/699-6647

	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			412.369	✓			✓			✓	✓	
1	~~48~~	29	412.8	100	72	72	72	33	235	1.06	1.15	2.0
2	53	47	413.3	108	76	76	76	35	246	1.01	1.10	2.0
3	50	55	413.8	110	78	78	78	36	251	.88	.96	1.8
4	47	90	414.2	116	80	80	80	33	242	.81	.88	1.8
5	48	92	414.6	116	81	81	81	30	237	.81	.89	1.8
6	54	16	415.1	118	82	83	83	35	261	.77	.85	1.7
7	49	91	415.5	117	84	84	84	41	256	.74	.82	1.6
8	47	81	416.0	114	85	85	85	39	228	.86	.94	2.1
9	47	96	416.4	115	89	89	89	42	247	.82	.89	2.0
10	50	51	416.9	125	92	91	92	53	236	~~.80~~ 1.14	~~1.09~~ 1.25	2.2
11	46	01	417.3	118	92	92	92	32	240	.97	1.05	2.1
12	62	03	417.9	120	94	94	94	32	227	1.09	1.18	2.3
B												
1	42	14	418.4	127	94	95	95	32	240	.79	.86	2.1
2	41	58	418.9	121	96	96	96	32	243	.94	1.01	2.1
3	52	69	419.6	123	97	97	97	32	249	.93	1.00	2.2
4	45	46	420.0	123	96	96	96	32	254	.72	.78	2.2
5	53	11	420.5	123	96	96	96	32	248	.68	.74	2.0
6	52	06	420.9	123	96	96	96	32	251	.61	.66	2.0
7	55	47	421.4	119	96	96	96	32	260	.60	.64	2.0
8	45	83	421.7	119	94	95	95	32	257	.73	.78	1.8
9	59	18	422.2	124	95	95	95	32	252	.68	.72	1.7
10	51	10	422.6	126	96	96	96	33	247	.63	.68	1.6
11	~~1.01~~ 61	08	423.2	126	95	96	96	33	242	.75	.82	1.4
12	43	15	423.~~58~~	126	96	96	96	32	238	.70	.76	1.3
4	20	16	11.155	119			90			.82	.941	

STATIC PRESSURE "H2O -.51

PROBE TIP SIZE

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

WATER #1

ml. 12

gram 1.5

Total 13.5

OPERATOR KARSTENS/[illegible]

Sample Box No. #1

Meter Box No. 400

Meter ΔH@ 1.71

Pitot, CP .84

Temp. Device SCIT

Probe No. S-1

Probe Liner GLASS

Probe Htr. Set 602

Ambient Temp. 74°

% O_2	18.5	18.5
% CO_2	1.5	1.5

NOTES

Orifice V @ 20"

Pitot ✓

Meter ✓ @ 18" Hg

R 5.2
S 6.4

Final Leak @ 2.5" Hg .009

K = .970

FIELD DATA SHEET

Plants 5CHD 9/10/85

GUARDIAN SYSTEMS INC.
P. O. Box 300
Leeds, Alabama 35094
205/699-6647

PLANT ABC RUN # #2
LOCATION System 1 DATE 9/10/85
BARO. PRES. 30.10 TIME 0800-1630

	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: -.52
				(1)	(2)	(3)		(4)	(5)				PROBE TIP SIZE BEFORE / AFTER
B			423.546										
1	46	01	423.9	119	72	72	72	32	229	.70	.79	1.2	.180 / .180
2	48	51	424.3	119	73	74	74	32	236	.76	.85	1.3	.180 / .180
3	52	14	424.8	120	76	76	76	32	241	.74	.82	1.3	.180 / .180
4	52	66	425.2	120	79	79	79	32	244	.82	.91	1.3	
5	47	18	425.7	122	83	84	84	32	249	.82	.90	1.4	
6	55	37	426.1	122	84	84	84	32	249	.73	.81	1.4	
7	49	56	426.5	125	86	86	86	32	253	.70	.77	1.4	
8	50	50	427.0	125	86	86	86	32	258	.71	.78	1.5	
9	48	56	427.4	127	92	92	92	32	256	.75	.82	1.5	
10	54	11	427.8	124	93	93	93	32	249	.73	.80	1.5	
11	56	94	428.3	124	95	95	95	32	252	.78	.85	1.5	
12	44	80	428.7	125	97	97	97	32	254	.78	.84	1.5	
				[redacted]							[redacted]		
A													
1	43	92	429.1	125	97	97	97	32	258	.78	.84	1.6	
2	50	04	429.5	123	94	94	94	33	251	.73	.79	1.6	
3	46	19	429.9	123	96	96	96	33	246	.81	.88	1.6	
4	47	86	430.3	124	96	96	96	32	240	.77	.83	1.6	
5	53	76	430.8	126	97	97	97	32	236	.85	.92	1.4	
6	45	86	431.2	127	99	99	99	32	241	.79	.86	1.4	
7	52	44	431.7	127	99	99	99	33	247	.74	.80	1.3	
8	53	58	432.2	128	100	100	100	32	252	.76	.82	1.3	
9	1.00	19	432.7	128	100	100	100	33	244	.82	.89	1.4	
10	41	24	433.1	118	100	100	100	33	250	.93	.99	1.5	
11	43	14	433.5	122	100	100	100	32	255	.91	.98	1.5	
12	46	63	434.017	122	100	100	100	33	232	.91	.98	1.5	
14	20	04	10.472	124			92			.78	.124		

#1 WATER
ml. 12.
gram 2.3
Total 14.3

OPERATOR
Harvey / McAlpin

Sample Box No. #1
Meter Box No. 400
Meter ΔH@ 1.71
Pitot, CP .84
Temp. Device Ω II
Probe No. B-1
Probe Liner Glass
Probe Htr. Set 60°
Ambient Temp. 74°
% O_2 18.5 | 18.5
% CO_2 1.5 | 1.5

NOTES
Orifice ✓
Pitot ✓
Meter ✓

Final Leak @ 2.0" Hg .006

FIELD DATA SHEET

GUARDIAN SYSTEMS INC.
P. O. Box 300
Leeds, Alabama 35094
205/699-6647

PLANT ABC
LOCATION System 1
BARO. PRES. 30.10
RUN # #3
DATE 9/11/85
TIME 0745 - 1805

	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			434.077	(1)	(2)	(3)		(4)	(5)			
1	54	54	434.3	121	74	74	74	33	229	.66	.74	1.2
2	50	29	434.7	121	74	74	74	32	236	.71	.80	1.2
3	50	05	435.1	121	76	76	76	32	243	.70	.78	1.2
4	50	98	435.6	122	78	78	78	32	248	.75	.84	1.2
5	59	45	436.1	122	83	83	83	32	251	.74	.82	1.2
6	54	37	436.5	122	84	84	84	32	255	.73	.80	1.3
7	55	80	437.0	125	85	85	85	32	249	.73	.81	1.3
8	50	49	437.5	125	87	87	87	32	244	.84	.93	1.3
9	53	38	438.0	125	95	95	95	32	240	.90	.98	1.3
10	50	01	438.5	125	95	95	95	34	236	.77	.84	1.3
11	50	46	438.9	122	95	95	95	32	240	.79	.85	1.3
12	51	32	439.3	122	91	91	91	32	248	.83	.87	1.2
13												
1	48	76	439.8	124	91	91	91	33	251	.84	.91	1.2
2	46	17	440.2	126	91	91	91	32	257	.88	.95	1.2
3	48	21	440.7	126	91	91	91	32	252	.88	.95	1.2
4	49	78	441.2	128	96	96	96	32	241	.93	1.01	1.2
5	47	34	441.6	128	94	96	96	32	242	.96	1.05	1.2
6	1:03	69	442.2	128	91	91	91	32	245	.94	1.02	1.2
7	45	76	442.6	130	91	91	91	33	242	.92	1.00	1.2
8	50	88	443.1	130	96	96	96	35	240	.90	.98	1.2
9	51	84	443.6	130	93	93	93	38	239	.88	.97	1.2
10	44	71	444.0	129	92	92	92	39	239	.89	.98	1.2
11	46	36	444.438	126	90	90	90	41	237	.90	.99	1.2
12												
13	19.57		10.351	125			90			.829	.952	

STATIC PRESSURE "H2O -.52

PROBE TIP SIZE

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

WATER

#1
ml. 14
gram 2.1
Total 16.1

OPERATOR
Harvey / McAlpin

Sample Box No. 1
Meter Box No. 400
Meter ΔH@ 1.71
Pitot, CP .84
Temp. Device Q-TC
Probe No. S-1
Probe Liner Glass
Probe Htr. Set 60%
Ambient Temp. 76°
% O_2 18.5 / 18.5
% CO_2 1.5 / 1.5

NOTES

Orifice ✓
Pitot ✓
Meter ✓

Final Leak @ 2.0 "Hg .011

BLANK ANALYTICAL DATA

Plant ABC

Sample location System 1

Relative humidity 20%

Type of blank Acetone

Liquid level at mark and container sealed ✓

Density of blank (ρa) 0.7857 g/ml

Blank volume (Va) 200 ml

Date and time of wt. 0800 9/13/85 Gross wt. 317.3 mg

Date and time of wt. 1400 9/13/85 Gross wt. 317.3 mg

Average gross wt. 317.3 mg

Tare wt. 317.2 mg

Weight of blank (ma) 0.1 mg

$$Ca = \frac{ma}{Va\ \rho a} = \frac{(0.1)}{(200)(0.7857)} = .000636 \text{ mg/g}$$

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 B. McKinney

Signature of reviewer LAT

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ABC Sample date: 2/9/85

Sample location: System #1 Run no.: 1

Sample recovery person: Harvey Recovery date: 2/9/85

Filter(s) no.: C6

MOISTURE

Impingers			Silica gel		
Final volume (wt)	12	ml(gm)	Final wt.	956.8 g	____ g
Initial volume (wt)	0	ml(gm)	Initial wt.	955.3 g	____ g
Net volume (wt)	12	ml(gm)	Net wt.	1.5 g	____ g

Total moisture 13.5 g

Color of silica gel _____

Description of impinger water _____

RECOVERED SAMPLE

Filter container no. Run #1 sealed ✓

Description of particulate on filter Light Gray

Acetone rinse container no. Run #1 Liquid level marked ✓

Acetone blank container no. BLK Liquid level marked ✓

Samples stored and locked _____

Remarks: _____

Date of laboratory custody _____

Laboratory personnel taking custody _____

Remarks: _____

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ABC Run No. 1

Sample location System #1

Relative humidity 20 %

Density of acetone (ρa) 0.7857 g/ml

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

785.7 mg/ml
× 180 ml
141,426 mg

Acetone rinse container no. #1

Acetone rinse volume (Vaw) 180 ml

Acetone blank residue concentration (Ca) .000636 mg/g

Wa = Ca Vaw ρa = (.000636)(180)(.7857) = .1 mg

Date and time of wt 0800 9/13/85 Gross wt 105695.2 mg

Date and time of wt 1400 9/13/85 Gross wt 105695.2 mg

Average gross wt 105695.2 mg

Tare wt 105674.0 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 21.1 mg

Filter(s) container no. C6

Date and time of wt 0800 9/13/85 Gross wt 167.9 mg

Date and time of wt 1400 9/13/85 Gross wt 167.9 mg

Average gross wt 167.9 mg

Tare wt 167.0 mg

Weight of particulate on filter(s) 0.9 mg

Weight of particulate in acetone rinse 21.1 mg

Total weight of particulate 22.0 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 B. McKinney

Signature of reviewer _____

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ABC Sample date: 9/10/85

Sample location: System 1 Run no.: 2

Sample recovery person: Harvey Recovery date: 9/10/85

Filter(s) no.: C 11

MOISTURE

Impingers			Silica gel		
Final volume (wt)	12	ml(gm)	Final wt.	948.9 g	g
Initial volume (wt)	0	ml(gm)	Initial wt.	946.6 g	g
Net volume (wt)	12	ml(gm)	Net wt.	2.3 g	g

Total moisture 14.3 g

Color of silica gel 1/8 Pink

Description of impinger water Clear

RECOVERED SAMPLE

Filter container no. Run # 2 sealed ✓

Description of particulate on filter Light Gray

Acetone rinse container no. Run # 2 Liquid level marked ✓

Acetone blank container no. BLK Liquid level marked ✓

Samples stored and locked

Remarks:

Date of laboratory custody

Laboratory personnel taking custody

Remarks:

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ABC Run No. 2

Sample location System #1

Relative humidity 20%

Density of acetone (ρa) 0.7857 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) 200 ml

Acetone blank residue concentration (Ca) .000636 mg/g

Wa * Ca Vaw ρa = (.000636)(200)(.7857) = .1 mg

Date and time of wt 0800 9/13/85 Gross wt 102911.9 mg

Date and time of wt 1400 9/13/85 Gross wt 102911.9 mg

Average gross wt 102911.9 mg

Tare wt 102902.7 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 9.1 mg

Filter(s) container no. C11

Date and time of wt 0800 9/13/85 Gross wt 165.6 mg

Date and time of wt 1400 9/13/85 Gross wt 165.6 mg

Average gross wt 165.6 mg

Tare wt 167.1 mg

Weight of particulate on filter(s) −1.5 mg

Weight of particulate in acetone rinse 9.1 mg

Total weight of particulate 7.6 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 B. McNeely

Signature of reviewer _____

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ABC Sample date: 9/11/85

Sample location: System #1 Run no.: 3

Sample recovery person: Harvey Recovery date: 9/11/85

Filter(s) no.: C 1

MOISTURE

Impingers			Silica gel		
Final volume (wt)	14	ml(gm)	Final wt.	951.2 g	____ g
Initial volume (wt)	0	ml(gm)	Initial wt.	949.1 g	____ g
Net volume (wt)	14	ml(gm)	Net wt.	2.1 g	____ g

Total moisture 16.1 g

Color of silica gel 1/8 Pink

Description of impinger water Clear

RECOVERED SAMPLE

Filter container no. Run #3 sealed ✓

Description of particulate on filter Light Gray

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 ____

Laboratory personnel taking custody ____

Remarks: ____

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ABC Run No. 3

Sample location System #1

Relative humidity 20%

Density of acetone (ρa) 0.7857 g/ml

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

Acetone rinse container no. 6

Acetone rinse volume (Vaw) 150 ml

Acetone blank residue concentration (Ca) .000636 mg/g

Wa = Ca Vaw ρa = (.000636)(150)(.7857) = .1 mg

Date and time of wt 0800 9/13/85 Gross wt 98504.8 mg

Date and time of wt 1400 9/13/85 Gross wt 98504.8 mg

Average gross wt 98504.8 mg

Tare wt 98491.5 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 13.2 mg

Filter(s) container no. C 6

Date and time of wt 0800 9/13/85 Gross wt 183.4 mg

Date and time of wt 1400 9/13/85 Gross wt 183.4 mg

Average gross wt 183.4 mg

Tare wt 173.9 mg

Weight of particulate on filter(s) 9.5 mg

Weight of particulate in acetone rinse 13.2 mg

Total weight of particulate 22.7 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 B. McKinney

Signature of reviewer [illegible]

Source Name Alabama By Products - Battery #1 Date 9/9/85

Observer: Gregg Dickson

Test Run No. Run #1

Oven Number	Time	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)
21	8:09	100%	0	0
31	8:30	85%	15	0
41	8:58	90%	10	0
51	9:12	90%	10	0
61	9:29	85%	15	0
71	10:01	75%	25	4
81	10:30	95%	5	0
3	10:56	100%	0	0
13	11:38	90%	10	0
23	11:51	80%	20	0
33	12:33	95%	5	0
43	12:56	85%	15	0
53	1:09	95%	5	0
63	1:24	90%	10	0
73	1:40	95%	5	0
83	1:57	75%	25	2
5	2:18	90%	10	0
15	2:34	75%	25	1
25	2:49	90%	10	0
35	3:12	MISSED		0
45	3:34	90%	10	0
55	3:51	85%	15	0
65	4:11	85%	15	0
75	4:33	90%	10	0

Source	MarFac JCDH	Where From JCDH	(AP-42)	AugFac JCDH	Where From JCDH	ABC Fac	Where From ABC
Charging							
TSP	Wilputte	EPA, 450/4-79-028	0.016#/T	.0022 #/ton coal	AP42 draft	.000024 #/ton coal	87BID
	.0216 #/ton coal				mod. eqn.		
	Beckers	EPA, 450/4-79-028					
	.018 #/ton coal						
VOC	2.5 #/ton coal	AIRS	2.5#/T	.0012#/ton coal	AP42 draft	2.5 #/ton	AIRS, but reduced
					mod. eqn.	.00014 #/ton coal	Reduced AIRS number for batt 1
							Slightly diff. for Beckers.
SO2	.02 #/ton coal	AIRS	0.02#/T	.0012#/ton coal	AP42 draft	0.02 #/ton	AIRS, but reduced
					mod. eqn.	.0000056#/ton coal	Reduced AIRS number for batt 1
							Slightly diff. for Beckers.
NOX	.03 #/ton coal	AIRS	0.03#/T	.0012#/ton coal	AP42 draft	0.03 #/ton	AIRS, but reduced
					mod. eqn.	0.000001 #/ton coal	Reduced AIRS number for batt 1
							Slightly diff. for Beckers.
Doors							
TSP	.36 #/ton coal	EPA, 450/4-79-028	0.54#/T	.009 #/ton coal	AP42 draft	.0004 #/ton coal	87BID
				Wilputte only	mod. eqn.		Wilputte only
VOC	1.5 #/ton coal	AIRS	1.5#/T	.01 #/ton coal	AP42 draft	1.5 #/ton	AIRS, but reduced
				Wilputte only	mod. eqn.	.001 #/ton	Reduced AIRS number for batt 1
SO2	.1 #/ton coal	AIRS	N/A	.007 #/ton coal	AP42 draft	.1 #/ton	AIRS, but reduced
					mod. eqn.	.00006 #/ton	Reduced AIRS number for batt 1
NOX	.01 #/ton coal	AIRS	0.01#/T	.001 #/ton coal	AIRS, but reduced	.000006 #/ton	AIRS, but reduced
					Reduced AIRS number for batt 1		Reduced AIRS number for batt 1

Source	MarFac JCDH	Where From JCDH	(AP42)	AugFac JCDH	Where From JCDH	ABC Fac	Where From ABC
Topside							
Lids/offtakes							
TSP	.09 #/ton coal	AIRS	N/A	.001 #/ton coal	AP42 draft	.0002#/ton	87BID
					mod. lid/offtake eqn.		Wilputte only
VOC			N/A				
	1.5 #/ton coal	AIRS		.001 #/ton coal	AP42 draft	1.5 #/ton	AIRS, but reduced
SO2			N/A		mod. lid/offtake eqn.	.008#/ton	Reduced AIRS number for batt 1
	.1 #/ton coal	AIRS		.00006#/ton coal	AP42 draft	0.1 #/ton	AIRS, but reduced
NOX			N/A		mod. lid/offtake eqn.	.0005#/ton	Reduced AIRS number for batt 1
	.01 #/ton coal	AIRS		.01 #/ton	AIRS, but reduced		
				.0001 #/ton	Reduced AIRS number for batt 1		
Soaking							
TSP	.08 #/ton charged	Allegheny County	N/A	.067 #/ton charged	AP42 draft	0.09 #/ton	AIRS boiler factor x some Ditt.
							derivation. No references.
VOC	.03 #/ton charged	Allegheny County	N/A	.027 #/ton charged	AP42 draft	.0001#/ton	I don't know. No references
SO2	.513 #/ton charged	Allegheny County	N/A	.44 #/ ton charged	AP42 draft	.048 #/ton	I don't know. No references
NOX	.005#/ton charged	Allegheny County	N/A	.004 #/ton charged	AP42 draft	.04 #/ton	I don't know. No references

Source	MarFac JCDH	Where From JCDH	(AP42)	AugFac JCDH	Where From JCDH	ABC Fac	Where From ABC
Pushing							
TSP							
Baghouse	.014 #/ton coal	Guardian	.09 #/T	.014 #/ton coal	Guardian	.02 #/ton	Guardian
Traveling Hot Car	.38 #/ton coal	Percentage of AIRS #		.128 #/ton coal	Allegheny County	.0006#/ton	Keystone done at Allegheny County
Hood fugitives	.233 #/ton coal	AIRS mod from VE`S		.243#/ton coal	AIRS mod from VE`S	not calculated	
Ovens not captured	1.15#/ton coal	AIRS	1.15 #/T	1.2#/ton coal	AP42 draft	not calculated	
VOC	.2#/ton coal	AIRS	0.2 #/T	.2#/ton coal	AP42 draft	.00833#/ton	Easterly
SO2	3.3#/ton coal	AIRS	N/A	.066#/ton coal	AP42 draft	.0663#/ton coal	Easterly
NOX	.03#/ton coal	AIRS	N/A	.016#/ton coal	AP42 draft	.0163#/ton coal	Easterly
Quench							
TSP	.54#/ton coal (AP42)	AP42	0.54 #/T	.475#/ton coal water analysis	AP42 draft	.54#/ton coal	AP42
VOC	.02#/ton coal	AIRS	N/A	.02#/ton coal	AIRS	.02#/ton coal	AIRS
SO2	.4#/ton coal	AIRS	N/A	.4#/ton coal	AIRS	.4#/ton coal	AIRS
NOX	.6#/ton coal	AIRS	N/A	.6#/ton coal	AIRS	.6#/ton coal	AIRS

Source	MarFac JCDH	Where From JCDH	(AP42)	AugFac JCDH	Where From JCDH	ABC Fac	Where From ABC
Underfire							
TSP	stack test	Guardian	0.47#/T	stack test	Guardian	stack test	Guardian
VOC	2.0#/ton coal	AIRS	N/A	.48#/ton coal	AP42 draft	1.2#/mmcf	AIRS process gas
						.007#/ton coal	Conversion mmcf/ton coal
SO2	388.3#/mmcf	H2S in gas	4.0 #/T	388.3#/mmcf	H2S in gas	388.3#/mmcf	H2S in gas
NOX	.04#/ton coal	AIRS	N/A	1.22#/ton coal	AIRS AP 42 DRAFT	80#/mmcf	AIRS, process gas
						.47#/ton coal	
Storage Tanks							
VOC	calc in byproducts		N/A	calc in byproducts		1.46 tons /yr	Tanks 2
Byproducts	39.67 tons/yr	EPA 450/3-83-016, draft		6.32 tons/yr	AP42 draft	29.6 tons/yr	SOCMI
		EPA 600/2-90-024 Iron & Steel					
Liquid Loading	not calc.		N/A	not calc		1.81ton/yr	AP42
Flare							
TSP	6.2#/mmcf	AIRS, process gas	N/A	6.2#/mmcf	AIRS, process gas	6.2#/mmcf	AIRS, process gas
VOC	1.2#/mmcf	AIRS, process gas	N/A	1.2#/mmcf	AIRS, process gas	29.8#/mmcf	AP42, proylene, methane, acetyl
SO2	388.3#/mmcf	H2S in gas	N/A	388.3#/mmcf	H2S in gas	388.3#/mmcf	H2S in gas
NOX	80#/mmcf	AIRS, process gas	N/A	80#/mmcf	AIRS, process gas	35.4#/mmcf	AP42, proylene, methane, acetyl

Source	MarFac JCDH	Where From JCDH	(AP42)	AugFac JCDH	Where From JCDH	ABC Fac	Where From ABC
Boilers							
TSP	6.9#/hr	Guardian	N/A	8.87#/hr	Guardian but mod. to reflect higher operations.	.06#/mbtu	Guardian converted to btu's, but 1.09 ton less than ours
VOC	1.2#/mmcf	AIRS, process gas	N/A	1.2#/mmcf	AIRS, process gas	1.2#/mmcf	AIRS, process gas
SO2	93.19#/hr	Guardian	N/A	119.448#/hr	Guardian but mod. to reflect higher operations.	119.448#/hr	Guardian converted to btu's.
NOX	12.43#/hr	Guardian	N/A	15.92#/hr	Guardian but mod. to reflect higher operations.	15.92#/hr	Guardian converted to btu's.
Material Handling							
TSP	334.235t/yr	PEDCO 1981	N/A	57.23t/yr	1991 inventory Allegheny County	21.63t/yr	Texas Natural Resource Conservation Commission & AP42 batch drop eqns.
Vehicular Traffic							
TSP	9.97	PEDCO 1981 very limited calc.		599.44t/yr	ABC emission inventory	481.46t/yr	ABC summary sheet 1994 emission inventory
Decarb.	.021#/ton coke	PEDCO 1981	N/A	not calc.		not calc.	
BTF	.142tons/yr	influent prod. request. tanks program	N/A	.142tons/yr	influent prod. request. tanks program	not calc.	
Ammonia			—				
	8.866 t/yr	EPA 600/2-90-024 Iron & Steel				0.622t/yr	
Ammonia, Mercury, HCN			—	186.564t/yr	AP42 Draft speciated	mercury, HCN not calc.	
From Ammonia, Mercury, HCN: 60.77 ton are mercury and HCN.							

Source Name Alabama By Products - Battery #1 Date 7/10/85

Observer: Vicki Hampton

Test Run No. Run #2

Oven Number	Time	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)
56	7:47	90%	10%	1 sec
66	8:01	75%	25%	10 sec
76	8:14	95%	5%	-
86	8:40	90%	10%	1 sec
8	9:51	85%	15%	2 sec.
18	10:08	95%	5%	1 sec.
28	10:28	100%	0%	1 sec.
38	10:42	95%	5%	1 sec.
48	10:57	90%	10%	-
58	11:15	85%	15%	2 sec.
68	11:29	60%	40%	20 sec.
78	11:42	90%	10%	-
1	12:38	90%	10%	1 sec.
11	12:51	95%	5%	-
21	1:06	85%	15%	15 sec.
31	1:27	90%	10%	2 sec.
51	1:56	95%	5%	-
61	2:09	95%	5%	-
71	2:21	100%	0%	-
81	2:33	100%	0%	-
3	2:47	95%	5%	-
13	3:22	100%	0%	-
23	3:42	100%	0%	-
33	4:02	95%	5%	-

Total Observed: 24
Total Pushes Recieved 85% or Greater - 22
Total Pushes Less Than 85% - 2

Source Name Alabama By Products - Batt #1 Date 9/11/0

Observer: Vecchi

Test Run No. Run #3

Oven Number	Time	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)
54	7:44	85%	15%	1 sec.
64	8:04	85%	15%	1 sec
74	8:20	95%	5%	-
84	8:41	95%	5%	-
6	9:03	90%	10%	-
16	9:21	90%	10%	-
26	9:58	90%	10%	-
36	11:00	95%	5%	-
46	11:36	90%	10%	-
56	12:34	95%	5%	-
66 Damper Bodet open	12:57	Not Tested 60%	40%	~~10~~ sec.
76	1:09	95%	5%	-
86	1:33	90%	10%	-
8	1:48	85%	15%	1 sec.
18 Damper Bodet open	2:08	Not Tested 55%	45%	~~30~~ sec.
28	2:21	90%	10%	-
38	2:36	95%	5%	-
48	2:49	90%	10%	-
58	3:27	95%	5%	-
68	3:58	100%	0%	-
78	4:09	100%	0%	-
1	4:33	75%	25%	5 sec.
11	4:52	90%	10%	-
21 *	5:19	65%	35%	20 sec
31	5:40	90%	10%	
41				

* Emissions from Charging Doors & smoke 20-25% to Quench Tower

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

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name Alabama By-Product V.E.E. No. [ ]

Source push control battery #1 Permit No. 00000185 02

Start/Stop Time _____ Sky Condition clear Date 09 10 85

Observation Point Soq source Distance from Source 100'

Stack Height 40' Background sky Plume Color _____

Method of Evaluation [ ] Wind Direction E

Total Minutes Observed [ ]

Highest 6 Minute Average [ ]

Violation Observed [ ]

Notice Number [ ]

Minutes Exceeding:

10% Opacity = [ ]

20% Opacity = [ ]

60% Opacity = [ ]

[ ] % Opacity = [ ]

Min	Seconds 0	15	30	45
0	7:46	0	0	0
1	0	0	0	0
2	8:03	0	0	0
3	0	0	0	0
4	8:16	0	0	0
5	0	0	0	0
6	8:42	0	0	0
7	0	0	0	0
8	9:52	0	0	0
9	0	0	0	0
10	10:09	0	0	0
11	0	0	0	0
12	10:29	0	0	0
13	0	0	0	0
14	10:4	0	0	0

Min	Seconds 0	15	30	45
15	0	0	0	0
16	10:59	0	0	0
17	0	0	0	0
18	11:17	0	0	0
19	0	0	0	0
20	11:31	0	0	0
21	0	0	0	0
22	11:44	0	0	0
23	0	0	0	0
24	12:40	0	0	0
25	0	0	0	0
26	12:53	0	0	0
27	0	0	0	0
28	1:08	0	0	0
29	0	0	0	0

Min	Seconds 0	15	30	45
30	1:29	0	0	0
31	0	0	0	0
32	1:43	0	0	0
33	0	0	0	0
34	1:58	0	0	0
35	0	0	0	0
36	2:10	0	0	0
37	0	0	0	0
38	2:23	0	0	0
39	0	0	0	0
40	2:35	0	0	0
41	0	0	0	0
42	2:49	0	0	0
43	0	0	0	0
44	3:23	0	0	0

Min	Seconds 0	15	30	45
45	0	0	0	0
46	3:43	0	0	0
47	0	0	0	0
48	4:04	0	0	0
49	0	0	0	0
50				
51	only run 7			
52				
53				
54				
55				
56				
57				
58				
59				

Results and Recommendations:

stack test
run #2

Observer Cargo [43]

Time Analysis [ ]

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

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name ABC V.E.E. No. _____

Source Rush Central Boiler #1 Permit No. 0 0 0 0 0 1 8 5 0 2

Start/Stop Time 7:36 - 12:52 Sky Condition scattered Date _____

Observation Point SW of Source Distance from Source 80 feet

Stack Height 40 feet Background brick stack Plume Color _____

Method of Evaluation 1 Wind Direction _____ Minutes Exceeding:

Total Minutes Observed _____ 10% Opacity = _____

Highest 6 Minute Average _____ 20% Opacity = _____

Violation Observed _____ 60% Opacity = _____

Notice Number _____ _____ % Opacity = _____

Min.	Seconds 0	15	30	45
0	7:36			0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	—	
6				
7	7:46			
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11				
12	8:06			
13	0	0	0	0
14	0	0	0	0

Min.	Seconds 0	15	30	45
15	0	0	0	0
16	0	—		
17				
18	8:22			
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22				
23	8:37	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	—		
27				
28	9:05			
29	0	0	0	0

Min.	Seconds 0	15	30	45
30	0	0	0	0
31	0	0	—	
32				
33	9:23	0	0	0
34	0	0	0	0
35	0	0	0	0
36				
37	9:39			0
38	0	0	0	0
39	0	0	0	0
40	0	0	—	
41				
42	10:39	0	0	0
43	0	0	0	0
44	0	0	—	

Min	Seconds 0	15	30	45
45	11:36	0	0	0
46	0	0	0	0
47	0	0	—	
48				
49	11:56			0
50	0	0	0	0
51	0	0	0	0
52	0	0	—	
53				
54	12:49			
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	—		
59				

Results and Recommendations:

Run #3

Observer _____ K-2

Time Analysis _____

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

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name ABC V.E.E. No. [ ]

Source Push Cedar Battery #1 Permit No. 00008802

Start/Stop Time 1:11 - Sky Condition scattered Date 07/11/85

Observation Point SW of source Distance from Source 80 feet

Stack Height 40 feet Background Brick stack Plume Color -

Method of Evaluation 1 Wind Direction _____

Minutes Exceeding:

Total Minutes Observed [ ]

10% Opacity = [ ]

Highest 6 Minute Average [ ]

20% Opacity = [ ]

Violation Observed [ ]

60% Opacity = [ ]

Notice Number [ ]

[ ] % Opacity = [ ]

Min.	Seconds 0	15	30	45
	1:11			0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0-
	1:35	0	0	0
	0	0	0	0
	0	0	0	0
	0	—		
12	1:50			
	0	0	0	0
	0	0	0	0

Min.	Seconds 0	15	30	45
15	0	-		
16				
17	2:10	0	0	0
18	0	0	0	0
19	0	0	0	0-
20				
21	2:33			0
22	0	0	0	0
23	0	0	0	0-
24				
25	2:38	0	0	0
26	0	0	0	0
27	0	—		
28				
29	2:51	0	0	0

Min	Seconds 0	15	30	45
30	0	0	0	0
31	0	0	0	—
32				
33	3:29			0
34	0	0	0	0
35	0	0	0	0-
36				
37	3:52			0
38	0	0	0	0
39	0	0	0	0-
40				
41	4:11		0	0
42	0	0	0	0
43	0	0	0	0-
44				

Min	Seconds 0	15	30	45
45	4:35			
46	0	0	0	0
47	0	0	0	—
48				
49	4:57	0	0	0
50	0	0	0	0
51	0	—		
52				
53	5:21			0
54	0	0	0	0
55	0	0	0	—
56				
57	5:41		0	0
58	0	0	0	0
59	0	0	0	-

Results and Recommendations:

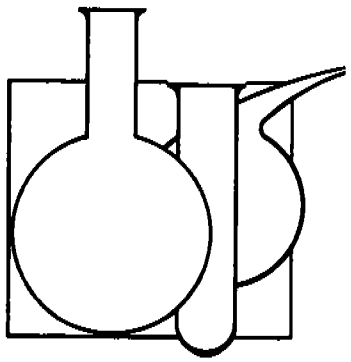
Run #3

Observer Duckworth [ ]

Time Analysis [ ]

NV-AP-008-12/84 Revised

Plant Operation Data



T-626-3/81 SUN BELT PRESS, INC.

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

4/ PUSHER

BATTERY NO. 1A & 2A SHIFT 7-3 DATE 9-9-85

OVEN NO.	TIME SCHD	TIME PUSHED	PUSH AMP	ROOF CARBON	POS. OF DOOR AFTER REPLACING	DID DOOR LEAK AFTER CHARGING	CHUCK DOOR & FRAME CLEANED	DID CHUCK DOOR LEAK AFTER CHARGING	DID STEAM HOLD FIRE DURING CHARGING	CLEANERS DOOR	CLEANERS JAMB
1 21		808	250	OK	OK	[illegible]	[illegible]	[illegible]	[illegible]		
2 31		830	✓	✓	✓	✓	✓	✓	✓		
3 41		857	✓	✓	✓	✓	✓	✓	✓		
4 51		912	✓	✓	✓	✓	✓	✓	✓		
5 61		930	✓	✓	✓	✓	✓	✓	✓		
6 71		1001	✓	✓	✓	✓	✓	✓	✓		
7 81		1030	✓	✓	✓	✓	✓	✓	✓		
8		1056	✓	✓	✓	✓	✓	✓	—		
9 13		1139	✓	✓	✓	✓	✓	✓	✓		
10 23		1151	✓	✓	✓	✓	✓	✓	✓		
11 33		1233	✓	✓	✓	✓	✓	✓	✓		
12 43		1256	✓	✓	✓	✓	✓	✓	✓		
13 53		110	✓	✓	✓	✓	✓	✓	✓		
14 63		125	✓	✓	✓	✓	✓	✓	✓		
15 73		140	✓	✓	✓	✓	✓	✓	✓		
16 83		157	✓	✓	✓	✓	✓	✓	✓		
17 93		219	✓	✓	✓	✓	✓	✓	✓		
18 5		234	✓	✓	✓	✓	✓	✓	✓		
19 15		250	✓	✓	✓						
20		1/2 19									
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											

OPERATOR [illegible]

T-526-7/81 SUN BELT PRESS, INC.

#2220 Pusher

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

BATTERY NO. Wilputte SHIFT 3-11 DATE 9-5-85

OVEN NO.	TIME SCHD	TIME PUSHED	PUSH AMP	ROOF CARBON	POS. OF DOOR AFTER REPLACING	DID DOOR LEAK AFTER CHARGING	CHUCK DOOR & FRAME CLEANED	DID CHUCK DOOR LEAK AFTER CHARGING	DID STEAM HOLD FIRE DURING CHARGING	CLEANERS DOOR	CLEANERS JAMB
1 35		311	250	OK	OK	yes	✓	yes	yes		
2 45		332	"	"	"	"	✓	"	"		
3 55		350	"	"	"	"	✓	"	"		
4 65		409	"	Heavy	"	"	✓	"	"		
5 75		432	"	OK	"	"	✓	"	"		
6 85		450	"	Heavy	"	"	✓	"	"		
7 97		507	"	OK	"	"	✓	"	"		
8 07		524	"	"	"	"	✓	"	"		
9 17		538	"	"	"	"	✓	"	"		
10 27		550	"	Heavy	"	"	✓	"	"		
11 37		607	"	OK	"	"	✓	"	"		
12 47		711	"	"	"	"	✓	"	"		
13 57		744	"	Heavy	"	"	✓	"	"		
14 67		809	"	OK	"	"	✓	"	"		
15 77		835	"	"	"	"	✓	"	"		
16 87		850	"	"	"	"	✓	"	"		
17 97		901	"	"	"	"	✓	"	"		
18 07		914	"	"	"	"	✓	"	"		
19 17		926	"	"	"	"	✓	"	"		
20 27		939	"	"	"	"	✓	"	"		
21 37		955	"	Heavy	"	"	✓	"	"		
22 47		1002	"	OK	"	"	✓	"	"		
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											

OPERATOR [illegible]

T-826-3/81 SUN BELT PRESS, INC

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

4 - PUSHER BATTERY NO. 1-A 2A SHIFT 7-3 DATE 9-10-85

OVEN NO.	TIME SCHD	TIME PUSHED	PUSH AMP	ROOF CARBON	POS. OF DOOR AFTER REPLACING	DID DOOR LEAK AFTER CHARGING	CHUCK DOOR & FRAME CLEANED	DID CHUCK DOOR LEAK AFTER CHARGING	DID STEAM HOLD FIRE DURING CHARGING	CLEANERS	
										DOOR	JAMB
46		738	250	OK	OK	Yes	Yes	Yes	Yes		
56		749	✓	✓	✓	✓	✓	✓	✓		
66		804	✓	✓	✓	✓	✓	✓			
76		817	✓	✓	✓	✓	✓	✓			
86		843	✓	✓	✓	✓	✓	✓			
8		953	✓	✓	✓	✓	✓	✓			
18		1010	✓	✓	✓	✓	✓	✓			
28		1030	✓	✓	✓	✓	✓	✓			
38		1045	✓	✓	✓	✓	✓	✓			
48		1100	✓	✓	✓	✓	✓	✓			
58		1118	✓	✓	✓	✓	✓	✓			
68		1132	✓	✓	✓	✓	✓	✓			
78		1145	✓	✓	✓	✓	✓	✓			
1		1242	✓	✓	✓	✓	✓	✓			
11		1254	✓	✓	✓	✓	✓	✓			
21		109	✓	✓	✓	✓	✓	✓			
31		131	✓	✓	✓	✓	✓	✓			
41		144	✓	✓	✓	✓	✓	✓			
51		159	✓	✓	✓	✓	✓	✓			
61		211	✓	✓	✓	✓	✓	✓			
71		224	✓	✓	✓	✓	✓	✓			
81		236	✓	✓	✓	✓	✓	✓			
3		250	✓	✓	✓						

OPERATOR 0139

T-526 3/81 SUN BELT PRESS, INC.

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

BATTERY NO. 1A&2A SHIFT 3-11 DATE 09-10-85

OVEN NO.	TIME SCHD	TIME PUSHED	PUSH AMP	ROOF CARBON	POS. OF DOOR AFTER REPLACING	DID DOOR LEAK AFTER CHARGING	CHUCK DOOR & FRAME CLEANED	DID CHUCK DOOR LEAK AFTER CHARGING	DID STEAM HOLD FIRE DURING CHARGING	CLEANERS DOOR	CLEANERS JAMB
1	N/A	323	300	ok	ok	no	no	no	no	—	—
2	3	343	300								
3	3	403	300								
4	3	603	300								
5	3	614	300								
6	3	627	300	Ring							
7	3	642	300								
8	3	654	300	ok							
9	5	715	300								
10	5	938	300								
11	5	739	300								
12	5	750	300								
13	5	802	300								
14	55	804	300								
15	5	836	300	Ring							
16	5	848	300	ok							
17	55	910	300								
18	7	924	300								
19	7	953	300								
20	7	1005	300								
21	7	1017	300								
22	7	1028	300								
23	7	1048	300								
24											
25											
26	3	—	—	—	—	—	no	no	no	—	—
27	58	—	—	—	—	—	no	no	no	—	—
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											

RT - SKIPPED BECAUSE HOOD WOULD NOT + RAISE

OPERATOR [illegible]

T-526-3/81 SUN BELT PRESS, INC.

ALABAMA BY-PRODUCTS CORPORATION

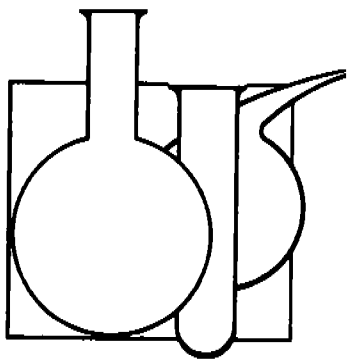
OVENS PUSHED

BATTERY NO. 1A&2A SHIFT 3-11 DATE 09-11-85

OVEN NO.	TIME SCHD	TIME PUSHED	PUSH AMP	ROOF CARBON	POS. OF DOOR AFTER REPLACING	DID DOOR LEAK AFTER CHARGING	CHUCK DOOR & FRAME CLEANED	DID CHUCK DOOR LEAK AFTER CHARGING	DID STEAM HOLD FIRE DURING CHARGING	CLEANERS DOOR	CLEANERS JAMB
58	N/A	3:31	300	ok	ok	yes	yes	yes	yes	—	—
68		3 52	300	heavy		"	"	"	"		
78		412	300	S							
1		438	300	OK							
11		458	300								
21		521	300								
31		541	300								
41			300								
51			300								
61			300								
71			300								
81			300								
3			300								
13			300								
23			300								
33			300								
43			300								
53			300								
63			300								
73			300								
83			300								
5			300								
15			300								
	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X
38	—	—	—	—	—	yes	yes	yes	yes	—	—
48	—	—	—	—	—	"	"	"	"	—	—

OPERATOR J.S. Andrews

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 0.81 a 1.00 "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 capacity 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

Meter Box: #400

Stack Temperature: OMEGA II

Sample Box: #2

Condenser: #1

The average temperature of the stack was 123 ^{o}F. The OMEGA II was recalibrated at 125 ^{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.

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 to 25,000
Lead	.20		

OTHER PHYSICALS:

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

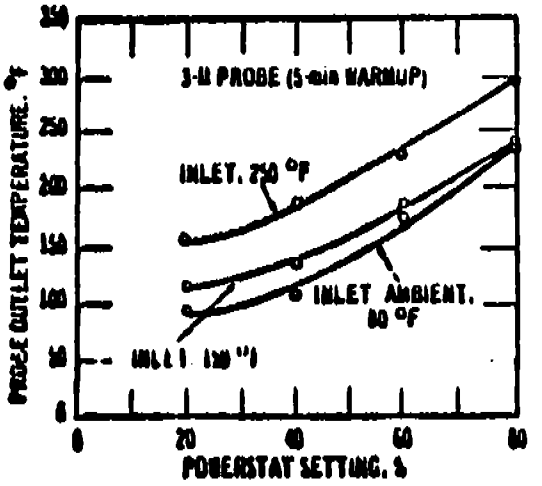
OTHER PHYSICALS:

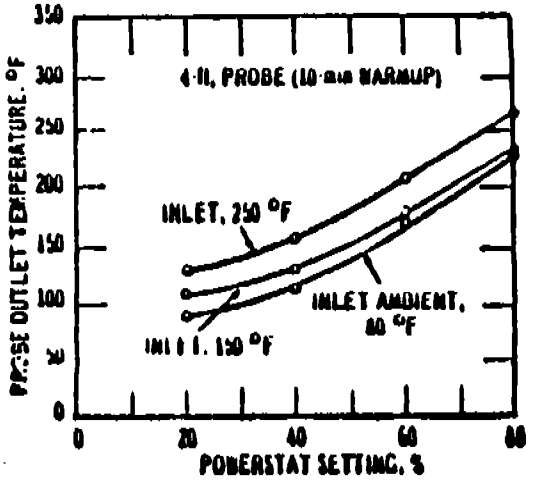
BSO	.522	Flow Resistance (Max.) @ 320 cm/min.	.80 mm
*pH	.9.0	Flow Rate (air) lpm/cm² @ 70 cm Hg	.60
DOP @320/cm/min ASTM Methods 2986)	.99.9%	Max. Use Temp.	.400°C
Tensile Strength (Fed. Spec. UUP31B)	.600 gr.	Static Properties	Medium
Weight 8"x10"sheet	.4.0±.3 gr.	Ability to Fold	Good

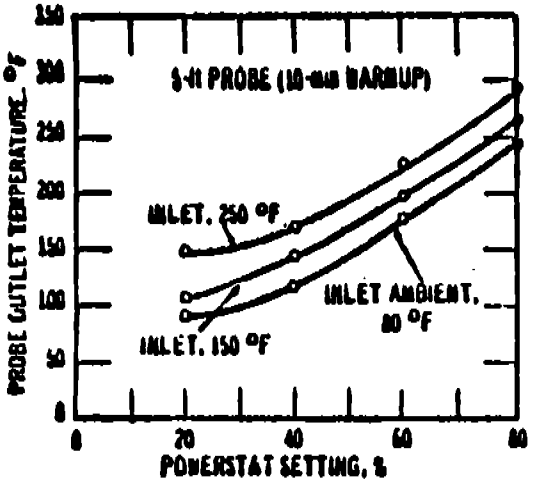
WATER EXTRACTABLE IONS:

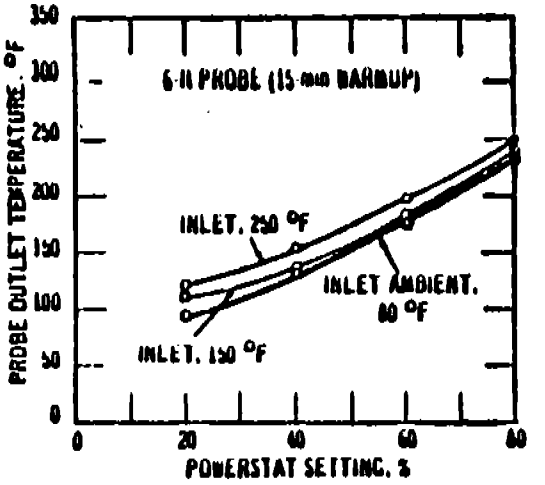
Sulfate	.600	Chloride	.1500
Nitrate	.115	Fluoride	.87
Ammonia	.13		

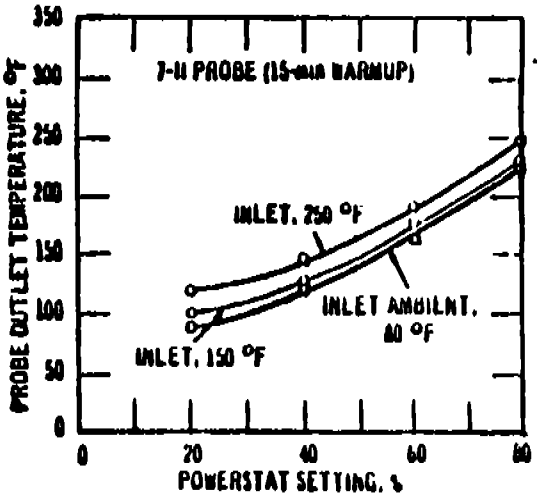
*pH—Gelman Procedure:
A. 500 ml distilled water.
B. Add 15 drops saturated KCl solution.
C. Shread one 8"x10" sheet and soak in prepared water for one hour.
D. Run pH at ambient temperature











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

METER CALIBRATION FORM

Date 3/18/85 Box No. 400

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

Orifice Manometer Setting ΔH (in. H_2O)	Δ wtm (in. H_2O)	Gas Volume Wet Test Meter Initial	Gas Volume Wet Test Meter Final	Gas Volume Dry Gas Meter Initial	Gas Volume Dry Gas Meter Final	Temperature Wet Test Meter Initial	Temperature Wet Test Meter Final	Avg. Temp. Dry Gas Meter Inlet	Avg. Temp. Dry Gas Meter Outlet
2.0	-1.03	0.006	13.515	736.625	750.348	12.2	12.5	75/94	64/72
2.5	-1.25	13.515	26.765	750.348	763.584	12.5	13.0	90/101	72/75
1.5	-0.78	26.765	37.010	763.584	774.522	13.0	13.2	97/98	75/51
1.0	-0.58	37.010	45.505	774.522	783.237	13.2	13.5	96/97	51/52
0.5	-0.36	45.505	51.557	783.237	789.497	13.5	13.5	95/94	52/52

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

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

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

1.0082
1.0046
1.0132
1.0179
1.0210
1.0130

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

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

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

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 ABC STACK SYSTEM #1

Date 9-20-85 Box No. 400

P_{bar} = 30.20 in. Hg Calibrated by G KARSTENS
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
1.0 @ "Hg	-.62	0	8.729	622.090	631.013	20	20	97	74.5
1.0 @ "Hg	-.62	0	8.671	631.018	639.920	20	20	100.5	83
1.0 @ "Hg	-.62	0	8.654	639.920	648.931	20	20.2	104	88

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)

$\bar{Y} = \frac{\Sigma Y}{3}$ = .9861

Pre test Y 1.01

% Difference -2.4

ORIFICE CALIBRATION FORM

Date 3/18/85 Meter Box No. 4D

P_{bar} 30.41 Calibrated By LDT2

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			
2.0	736.675	750.348	1020	84.5	68	13.673	.7554	.7265	1.75
2.5	750.348	763.984	900	95.5	75	13.636	.8861	.7249	1.75
1.5	763.984	774.522	900	97.5	79.5	10.538	.7001	.7273	1.74
1.0	774.522	783.237	900	96.5	81.5	8.715	.5833	.7403	1.68
0.5	783.237	789.459	900	94.5	82	6.222	.4187	.7506	1.63
							Average K_m	.7339	

1.71

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) $\dfrac{V_2 - V_1}{\theta} \left[\dfrac{t_2 + 460}{\frac{t_1 + t_2}{2} + 460} \right] (60)(Y)$

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 9-20-85 Meter Box No. 400

P_{bar} 30.20 Calibrated By Greg Karstens
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		
1.0	627.090	631.018	900	97	74.5	8.928	.5733	.7348
1.0	631.018	639.920	900	100.5	83	8.902	.5786	.7357
1.0	639.920	648.931	900	104	88	9.011	.5827	.7375

Average K_m .7360

Average H@ 1.70

Pre test H@ 1.71

% Difference -.6%

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) $\dfrac{V_2 - V_1}{\theta}\left[\dfrac{t_2 + 460}{\frac{t_1 + t_2}{2} + 460}\right](60)(Y)$

1.71
1.70
1.69

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:

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

4. Calculate ΔH_a as follows:

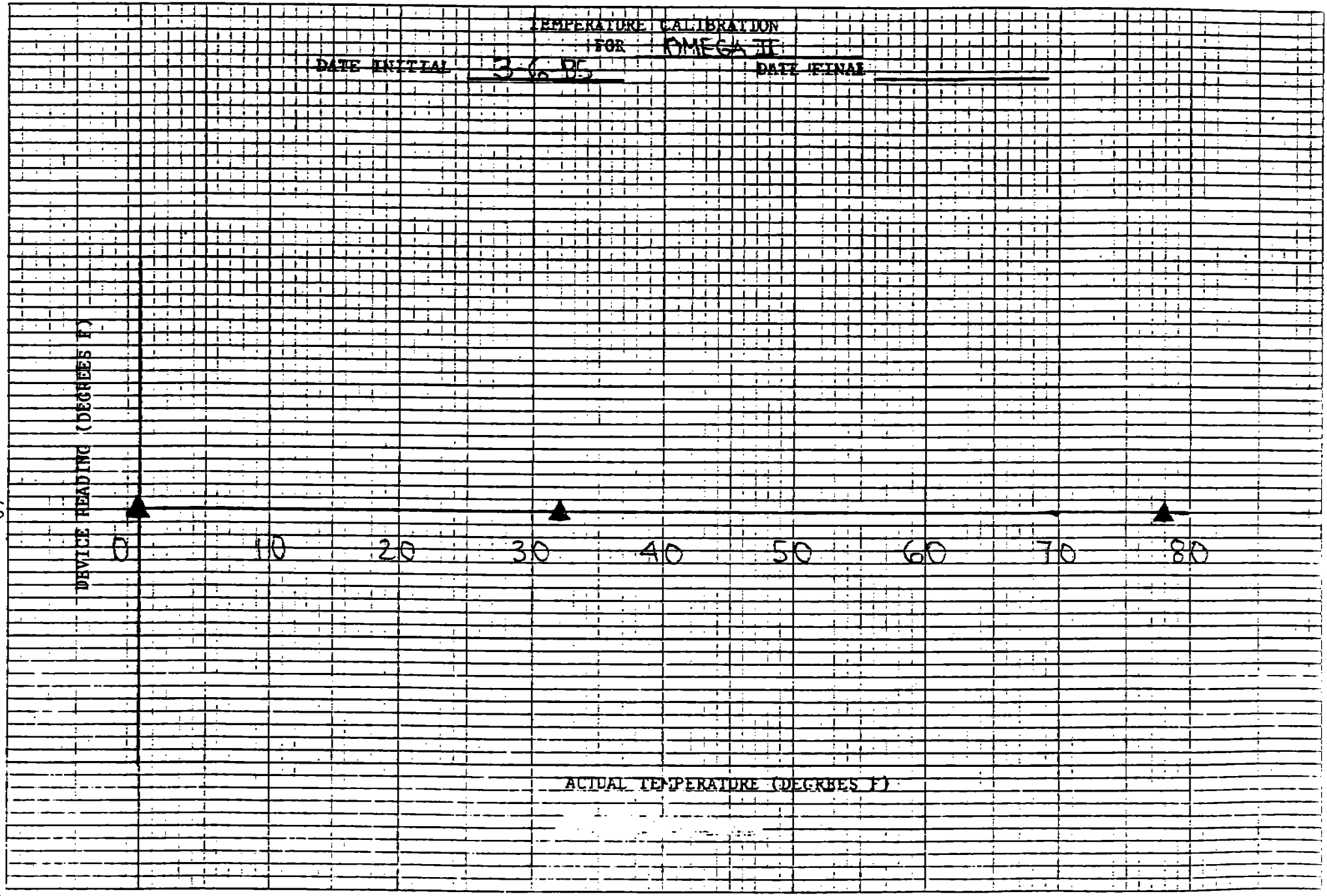
$$\Delta H_a = \frac{Q@^2\ P@\ M@}{T@}\left[\frac{1}{\bar{K}_m{}^2}\right] = \frac{0.921}{\bar{K}_m{}^2}$$

Q@ = 0.75 cfm
T@ = 528^oR
P@ = 29.92 in.Hg
M@ = 29

TEMPERATURE CALIBRATION

FOR OMEGA III

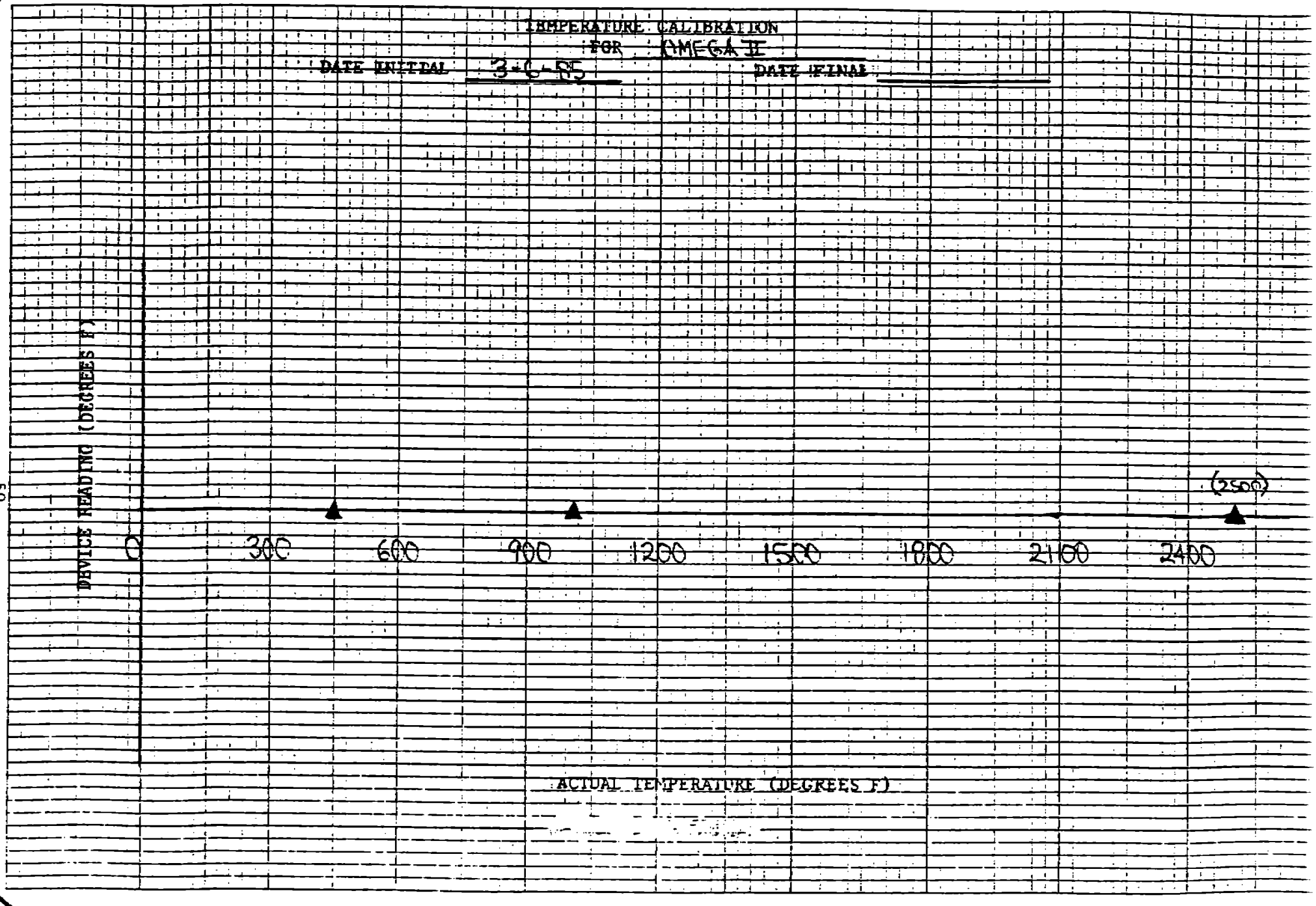
DATE INITIAL 3-6-92 DATE FINAL



TEMPERATURE CALIBRATION

FOR OMEGA II

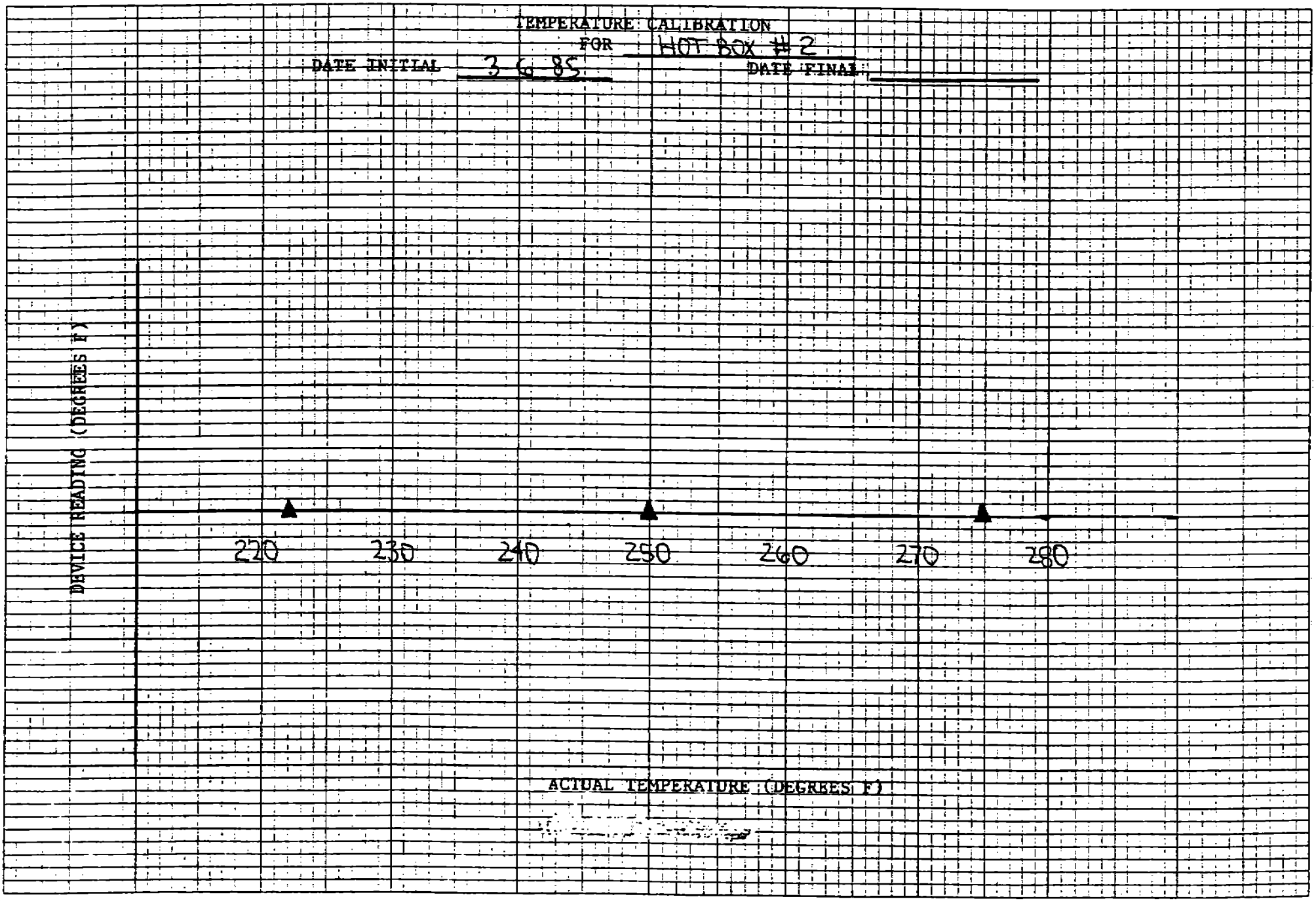
DATE INITIAL 3-6-85 DATE FINAL



TEMPERATURE CALIBRATION

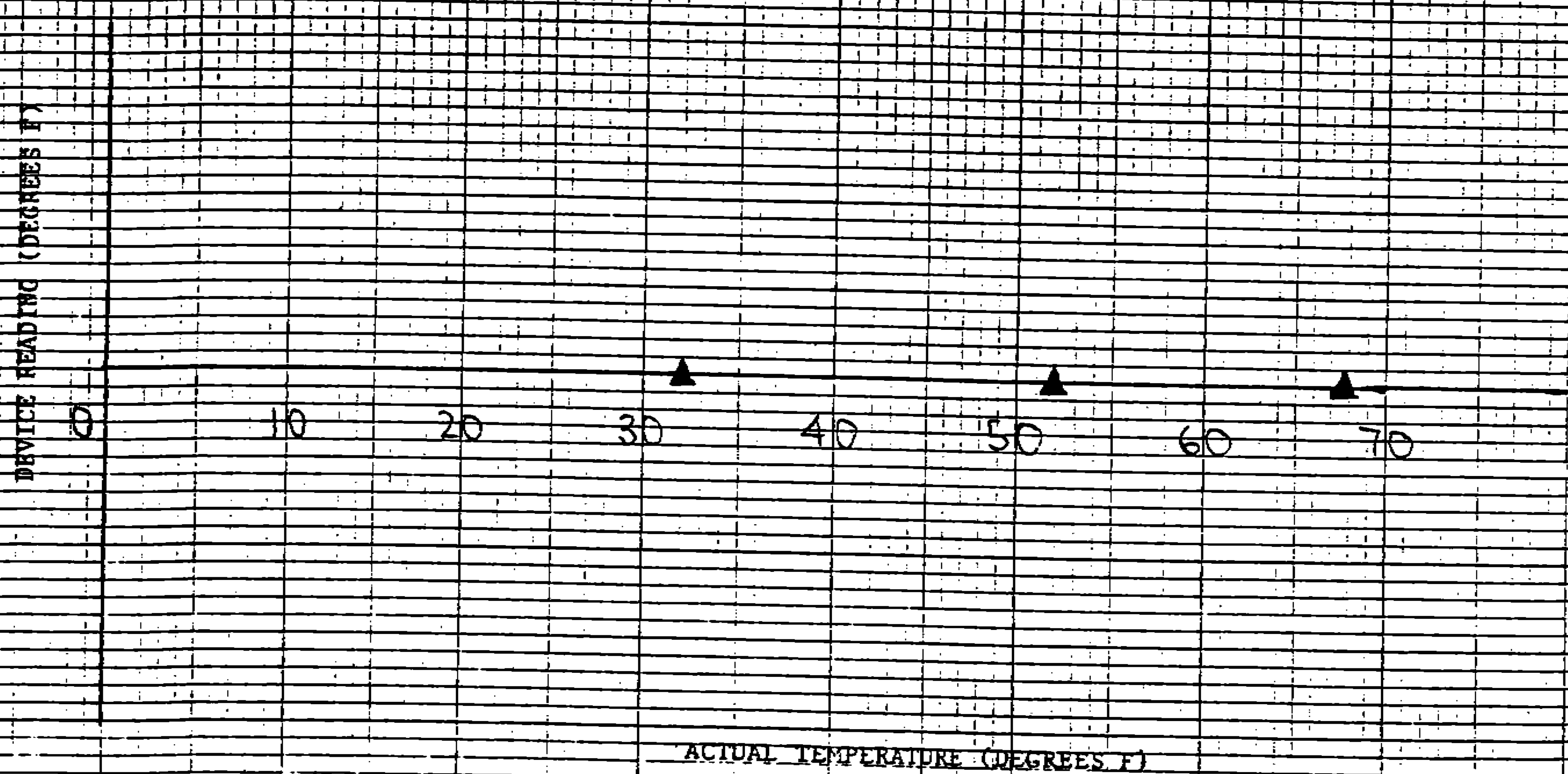
FOR HOT BOX #2

DATE INITIAL 3 6 85 DATE FINAL



TEMPERATURE CALIBRATION
FOR IMPINGER # 1

DATE INITIAL 3-6-85 DATE FINAL ________



PITOT CALIBRATION FORM

Date 3-6-85 Probe # 8-1

Calibrated By G KARSTENS

Nozzle Size N/A

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	.483	.663	.845	-.002
2	.480	.653	.849	+.002
3	.480	.653	.849	+.002
		$\bar{C}_{p(A)}$	.847	

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	.493	.673	.847	—
2	.480	.656	.847	—
3	.486	.666	.846	-.001
		$\bar{C}_{p(B)}$	.847	

CALCULATIONS

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

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

← Must be ≤ 0.01

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