Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

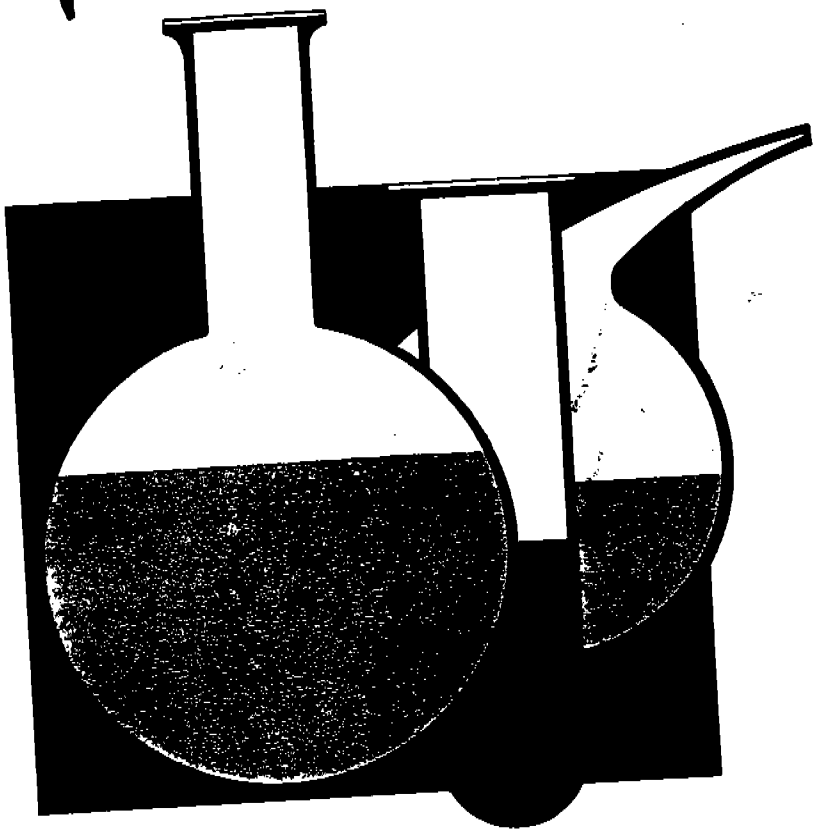
Wilpette 5D

GUARDIAN SYSTEMS INC.

AP-42 Section 12.2
Reference
Report Sect. 4
Reference 165

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

Push #1 July 85



Test Report

MASS EMISSION TESTS

CONDUCTED ON

COKE BATTERY #1 POSITIVE PUSHING CONTROL SYSTEM

IN

TARRANT, ALABAMA

FOR

ALABAMA BY-PRODUCTS CORPORATION

ON

JULY 9-11, 1985

Approved by: Tom Lotz
Tom Lotz
Director
Field Services Division

TABLE OF CONTENTS

Chapter		Page
I	**Introduction and Test Description**	1
II	**Summary of Test Results**	2
	Tables	
	1 VE Summaries	3
	2 Summarized Particulate Results	4
	Computer Input Parameters	5
	Complete Test Results	6
III	**Sampling and Analytical Procedure**	8
	Figures	
	1 Stack Breeching Diagram And Sample Point Location	11
	2 Battery #1 Schematic	12
	3 Particulate Sampling Train	13
IV	**Field Data**	
	Nomenclature	14
	Equations	17
	Data Sheets	19
	Particulate Analysis	22
	VE Sheets for Coke Battery	29
	VE Sheets for Stack	32
V	**Plant Operational Data**	39
VI	**Calibrations**	44

I. INTRODUCTION AND TEST DESCRIPTION

On July 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
Mr. Ben Moore	EPA Region IV
Mr. Dave Musgrove	EPA Region IV
Ms. Veda Hampton	Jefferson County Health Dept.
Mr. Keith Witherspoon	Jefferson County Health Dept.
Mr. George Duckworth	Jefferson County Health Dept.
Mr. Frank Cargo	Jefferson County Health Dept.
Mr. Greg Karstens	Guardian Systems, Inc.
Mr. Mike Harvey	Guardian Systems, Inc.

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 July 9-11, 1985. 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	23.70	22.13	18.61	21.48
Coal charged per test, Tons	648	648	648	648
Particulate Mass Rate lbs/test	5.70	16.09	15.78	12.67
Emissions lbs/ton of coal charged	0.01	0.02	0.02	0.02
*Particulate Mass Rate lbs/hr	14.44	43.63	50.86	35.40
*Coal charged Tons/hour	1640.5	1759.9	2089.2	1810.1
Emissions lbs/ton of coal charged	0.01	0.02	0.02	0.02

* 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	1440	1440	1440	1440
Time greater than 20% opacity, seconds	120	224	18	121
% greater than, 20 % opacity	8.3	15.6	1.3	8.4
Highest opacity, %	55	50	45	50

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 ALABAMA BY-PRODUCTS CORP
Job Number 54157

RUN NUMBER	1	2	3	4
DATE OF TEST	07/09/85	07/10/85	07/10-11	AVERAGE
TIME OF TEST	0800-1826	0700-1710	1754-1415	AVERAGE
LOCATION OF TEST	SYS 1	SYS 1	SYS 1	SYS 1
STACK GAS TEMPERATURE DEGREES F	127	119	116	121
MOISTURE CONTENT, % V/V	4.81	5.14	4.80	4.91
OXYGEN CONTENT, % V/V	19.00	18.50	18.50	18.70
CARBON DIOXIDE CONTENT, % V/V	1.00	1.50	1.50	1.30
STACK GAS VELOCITY FEET PER SECOND	36.33	36.60	44.71	39.24
VOLUMETRIC FLOW ACTUAL CUBIC FEET PER MINUTE	89,986	90,657	110,736	97,190
VOLUMETRIC FLOW DRY STANDARD CUBIC FEET PER MINUTE	77,417	78,821	97,134	84,414
CONCENTRATION GRAINS PER DRY STANCARD CUBIC FOOT	0.022	0.065	0.061	0.049
CONCENTRATION GRAINS PER ACTUAL CUBIC FOOT	0.019	0.056	0.054	0.042
PARTICULATE MASS RATE (#/HR.)	14.44	43.63	50.86	35.40
% ISOKINETIC	95.63	97.28	96.08	95.39

TABLE 2

GUARDIAN SYSTEMS inc

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 54157

RUN NUMBER	1	2	3	4
DATE	07/09/85	07/10/85	07/10-11	AVERAGE
LOCATION	SYS 1	SYS 1	SYS 1	SYS 1
TIME	0800-1826	0700-1710	1754-1415	AVERAGE
BAROMETRIC PRESSURE (IN. HG)	30.10	30.11	30.11	30.11
STATIC PRESSURE (IN. H2O)	- 0.500	- 0.500	- 0.500	- 0.500
RUN TIME (MINUTES)	23.70	22.13	18.61	64.44
METER VOLUME (CORRECTED)	15.197	14.691	14.930	44.818
STACK TEMPERATURE (°F)	127.00	119.00	116.00	121.00
METER TEMPERATURE (°F)	90.00	90.00	87.00	89.00
METER PRESSURE (IN.H2O)	1.24	1.28	1.96	1.49
SQR VELOCITY PRESSURE	0.603	0.612	0.750	0.655
MASS OF PARTICULATE (MG.)	20.8	59.7	57.8	138.3
ML. OF WATER COLLECTED	15.8	16.4	15.6	47.8
% OXYGEN	19.0	18.5	18.5	18.7
% CARBON DIOXIDE	1.0	1.5	1.5	1.3
% 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.)	0.252	0.252	0.252	0.252

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 54157

RUN NUMBER	1	2	3	4
DATE OF TEST	07/09/85	07/10/85	07/10-11	AVERAGE
LOCATION OF TEST	SYS 1	SYS 1	SYS 1	SYS 1
1. STACK PRESSURE				
INCHES HG	30.06	30.07	30.07	30.07
MILLIMETERS HG	763.61	763.86	763.86	763.86
2. METER PRESSURE				
INCHES HG	30.19	30.20	30.25	30.22
MILLIMETERS HG	766.86	767.18	768.45	767.58
3. METER VOLUME				
DRY STANDARD CUBIC FEET	14.721	14.237	14.572	43.535
DRY STANDARD CUBIC METERS	0.417	0.403	0.413	1.233
4. WATER VOLUME				
STANDARD CUBIC FEET	0.744	0.772	0.734	2.250
STANDARD CUBIC METERS	0.021	0.022	0.021	0.064
5. MOISTURE CONTENT (%)	4.81	5.14	4.80	4.91
6. MOLECULAR WEIGHT DRY	28.92	28.98	28.98	28.96
7. MOLECULAR WEIGHT WET	28.39	28.42	28.45	28.42
8. STACK VELOCITY				
FEET PER SECOND	36.33	36.60	44.71	39.24
METERS PER SECOND	11.07	11.16	13.63	11.96
9. VOLUMETRIC FLOW				
ACTUAL CUBIC FEET PER MINUTE	89,986	90,657	110,736	97,190
ACTUAL CUBIC METERS PER SECOND	42.47	42.79	52.26	45.87
10. VOLUMETRIC FLOW				
DRY STANDARD CUBIC FEET PER MINUTE	77,417	78,821	97,134	84,414
DRY STANDARD CUBIC METER PER SECOND	36.54	37.20	45.84	39.84

GUARDIAN SYSTEMS inc

G-5

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 54157

RUN NUMBER	1	2	3	4
DATE OF TEST	07/09/85	07/10/85	07/10-11	AVERAGE
LOCATION OF TEST	SYS 1	SYS 1	SYS 1	SYS 1
11. CONCENTRATION				
GRAINS PER DRY STANDARD CUBIC FOOT	0.0218	0.0646	0.0611	0.0489
GRAMS PER DRY STANDARD CUBIC METER	0.0498	0.1477	0.1398	0.1119
15. PARTICULATE MASS RATE (#/HR.)	14.44	43.63	50.86	35.40
16. VOLUME AT NOZZLE				
ACTUAL CUBIC FEET	17.112	16.376	16.614	50.127
ACTUAL CUBIC METERS	0.485	0.464	0.470	1.419
17. CONCENTRATION				
GRAINS PER ACTUAL CUBIC FOOT	0.0187	0.0561	0.0536	0.0425
GRAMS PER ACTUAL CUBIC METER	0.0428	0.1285	0.1226	0.0972
18. % ISOKINETIC	95.63	97.28	96.08	95.39

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° 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.

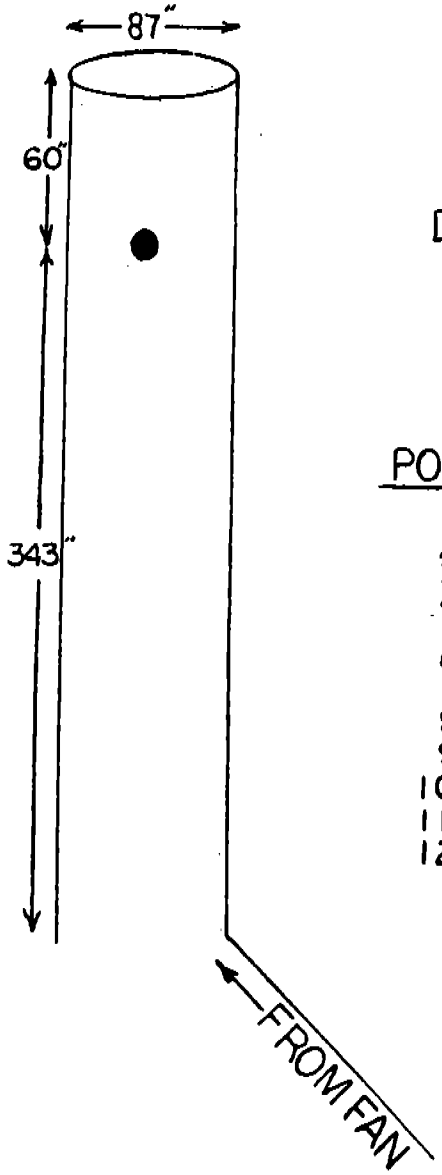
Upon completion of the sampling and the final leak checks the gel column and the probe nozzle-filter holder assembly was transfered to the cleanup area making sure no particulate was lost. The cleanup data was recorded on **Particulate Sample Recovery and Intergrity Sheet** located in the Field Data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

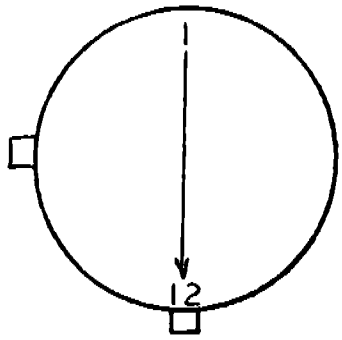
Analysis

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

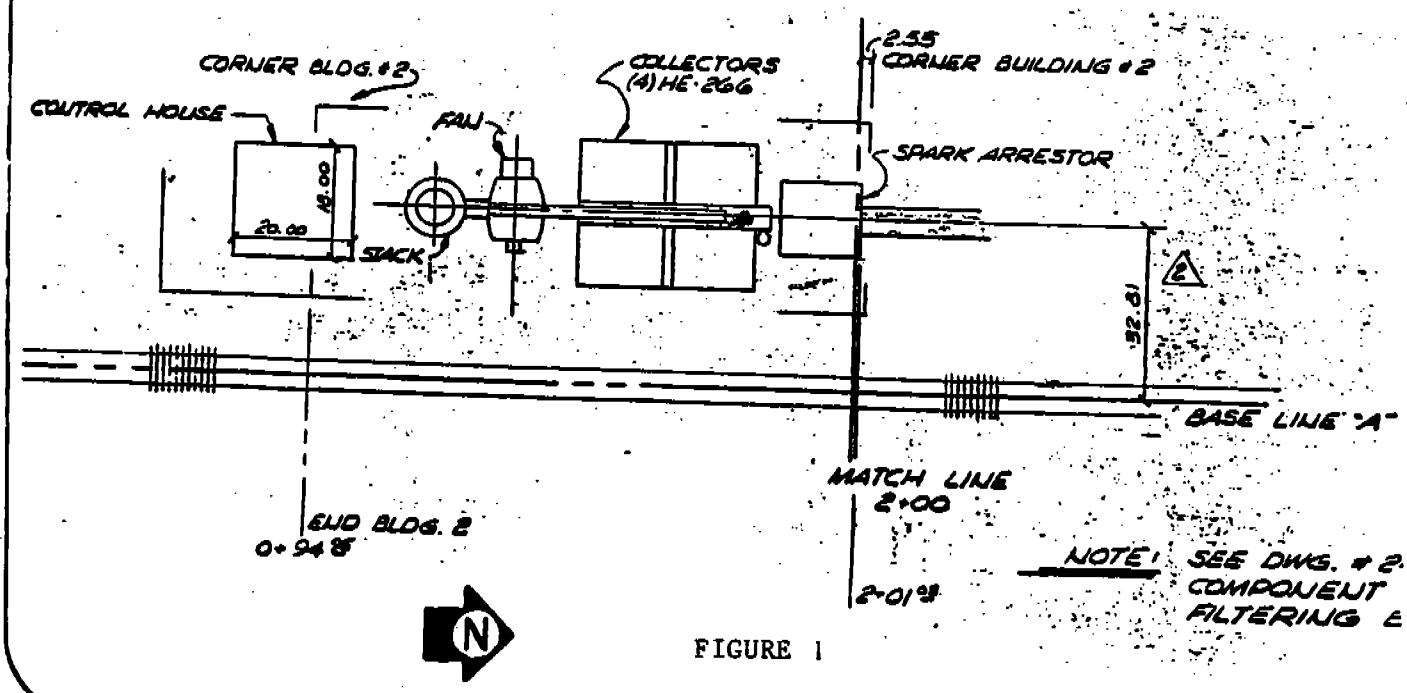


FIGURE 1

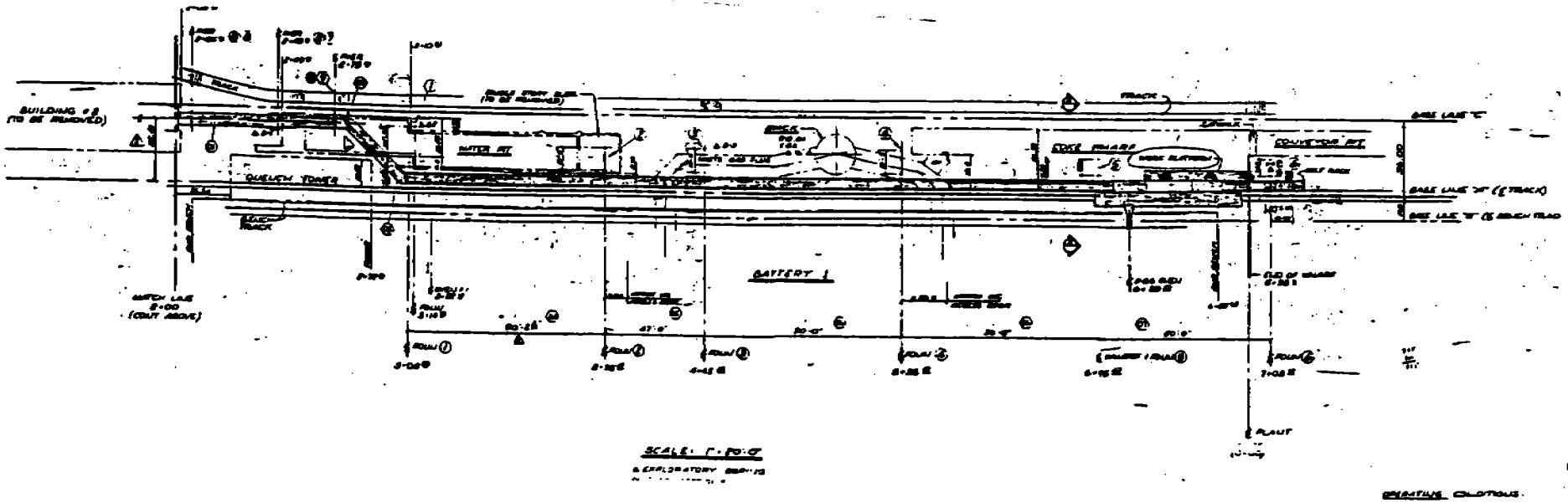
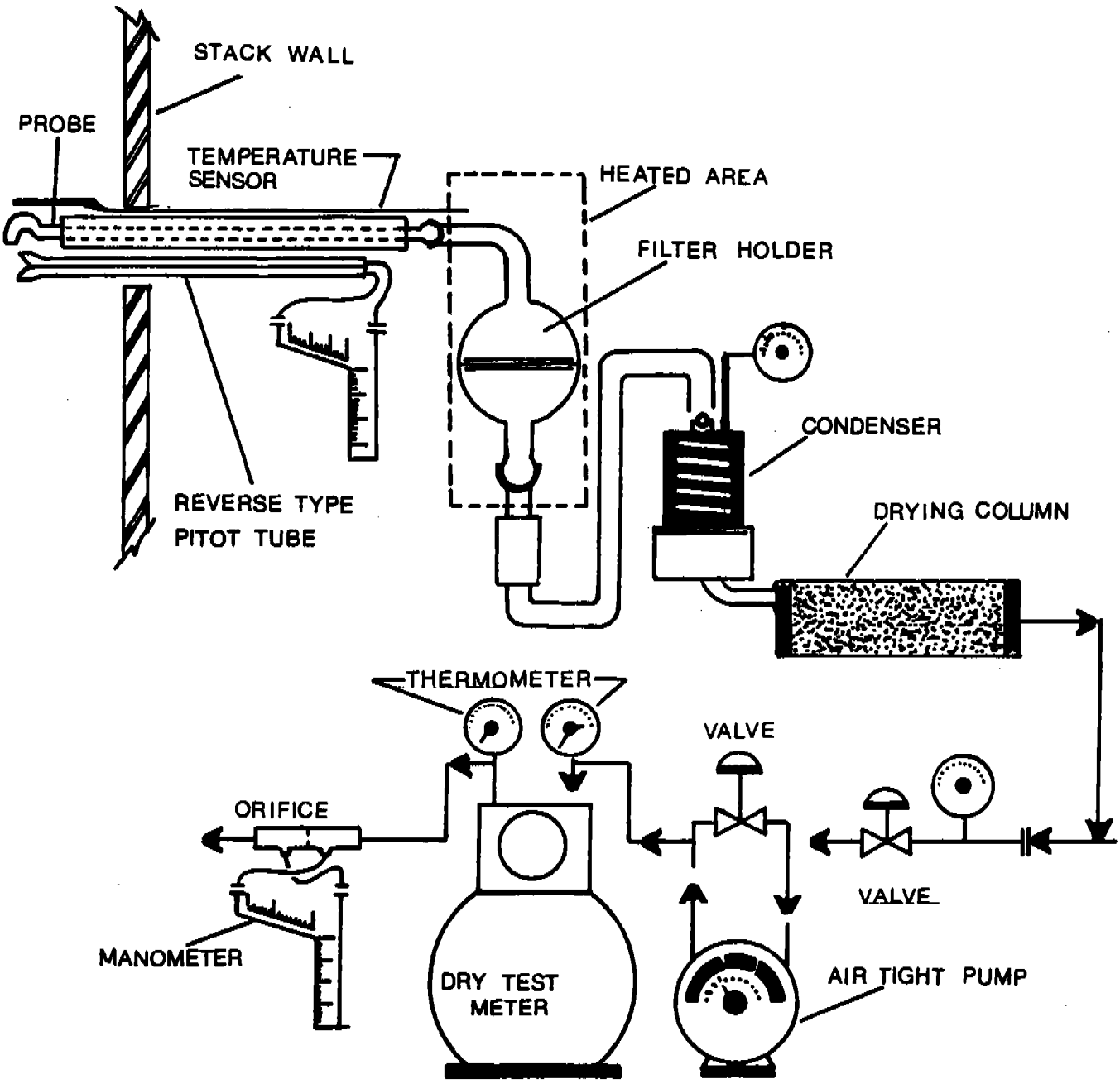


FIGURE 2

BATTERY Nº 1
SCHEMATIC



PARTICULATE SAMPLING TRAIN.. METHOD 5

FIGURE 3

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, $68^{o}F$

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 $68^{o}F$, 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. $V_w(std) = 0.04707\ V_{1c}$

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

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. $W_a = Ca\ Vaw\ p_a$

BATCH 1

JCHO 7/9/85

FIELD DATA SHEET

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

PLANT: ABC
LOCATION: STACK 1
BARO. PRES.: 30.10
RUN #: #1
DATE: 7-9-85
TIME: 0800-1826

	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			215.835	(1)	(2)	(3)		(4)	(5)			
1	121	87	217.1	125	77	76	77	32	259	1.27	.37	1.5
2	48	44	217.6	128	80	80	80	32	268	1.25	.38	1.5
3	49	17	218.1	128	83	81	82	32	258	1.12	.34	1.5
4	47	85	218.6	118	82	82	82	32	254	1.09	.33	1.5
5	46	43	219.2	130	93	93	93	32	246	1.71	.52	2.0
6	48	69	219.7	122	85	85	85	33	256	1.04	.31	1.3
7	43	71	220.2	126	86	86	86	32	263	1.23	.37	1.5
8	49	44	220.7	~~130~~ 122	87	86	86	32	271	~~1.48~~ 1.21	~~.45~~ .36	2.0
9	47	09	221.2	124	87	87	87	32	256	1.37	.41	1.8
10	47	31	221.7	125	85	85	85	32	241	1.30	.39	1.6
11	50	39	222.3	126	93	92	92	32	237	1.58	.47	1.8
12	48	49	222.9	123	92	91	92	32	254	1.22	.36	1.5
B												
1	82	52	223.6	125	95	94	94	32	261	.84	.25	1.2
2	53	11	224.2	129	94	93	94	32	272	1.07	.32	1.5
3	70	55	225.0	130	96	95	95	32	257	1.65	.49	2.0
4	44	94	225.5	112	95	95	95	36	268	1.39	.40	1.8
#43 5	139	99	226.8	121	94	94	94	40	263	.82	.24	1.1
#. 6	96	24	227.6	129	95	94	94	42	257	.81	.24	1.1
#3 7	48	61	228.2	133	96	95	95	44	260	.87	.26	1.3
#73 8	49	15	228.7	134	96	95	95	47	267	1.10	.33	1.5
#3 9	44	79	229.2	133	95	95	95	49	262	1.60	.48	2.0
#5 10	52	24	229.8	131	95	94	95	51	242	1.70	.51	2.0
11	44	43	230.4	137	94	93	94	51	237	1.72	.52	2.0
#5 12	46	43	230.834	130	94	93	94	53	228	.74	.22	1.8
24	1121		4.999	127			90			1.24	.60	2.0
	23.70		10.197									

STATIC PRESSURE "H2O: -.50

PROBE TIP SIZE

BEFORE	AFTER
.252	.252
.252	.252
.252	.252

WATER

#8

ml. 140

gram 1.8

Total 15.8

OPERATOR: HARVEY - KARSTE

Sample Box No. 2
Meter Box No. 400
Meter ΔH@ 1.71
Pitot, CP .84
Temp. Device STT
Probe No. 8-1
Probe Liner GLASS
Probe Htr. Set 600°
Ambient Temp. 75°

% O_2	19.5	18.5
% CO_2	.5	1.5

NOTES

Orifice ✓ @ 22" Hg
Pitot ✓
Meter ✓ @ 20" Hg

FINAL LEAK CHECK AT 2" Hg
.003

RS.0
S 6.4

FIELD DATA SHEET

7/10/85 JC110

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

PLANT: ABC
LOCATION: BATTERY #1
BARO. PRES.: 30.11
RUN #: #2
DATE: 7-10-85
TIME: 0700-1710

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	OUT	AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
B			230.942	(1)	(2)	(3)		(4)	61			
1	87	65	231.7	112	77	76	77	33	242	.87	.26	1.6
2	40	12	232.2	113	77	76	77	32	253	1.64	.49	2.3
3	37	98	232.6	110	78	78	78	33	253	.94	.28	1.6
4	35	57	232.9	118	81	80	80	32	244	.97	.29	1.6
5	41	62	233.3	116	82	82	82	32	243	1.14	.34	2.0
6	48	37	233.8	113	84	83	84	33	237	.95	.28	1.2
7	123	80	234.9	110	85	85	85	33	235	.88	.26	1.1
8	46	96	235.4	109	87	87	87	33	241	.99	.26	1.2
9	44	66	235.9	113	88	87	88	33	265	1.09	.32	1.5
10	45	80	236.4	122	88	88	88	35	262	1.48	.44	2.1
11	86	34	237.3	128	89	89	89	36	238	1.10	.33	1.6
12	44	29	237.8	122	94	94	94	32	228	.91	.27	1.5
A												
1	72	54	238.7	124	94	94	94	32	238	1.83	.54	2.1
2	47	29	239.3	123	94	93	94	32	254	1.86	.55	2.3
3	49	25	239.9	117	94	94	94	32	253	1.61	.47	2.1
4	97	65	241.1	125	96	95	96	33	234	1.42	.42	2.0
5	48	87	241.6	121	96	95	96	32	258	1.30	.38	1.6
6	50	51	242.1	121	97	96	97	35	244	1.27	.37	1.6
#7 7	47	19	242.7	116	96	96	96	40	235	1.31	.38	1.6
#76 8	47	67	243.3	123	96	96	96	40	238	1.26	.37	1.5
#5 9	47	02	243.7	127	96	95	96	40	252	1.22	.36	1.5
#8 10	41	62	244.2	127	96	95	96	40	236	1.52	.45	2.0
# 11	47	56	244.8	125	94	94	94	44	258	1.72	.51	2.4
#28 12	47	29	245.442	129	94	93	94	45	271	1.64	.49	2.4
	1327	62	14.500	119			90			1.28	.612	2.4
	220	13	1.012									
			14.69									

STATIC PRESSURE "H2O: .50

PROBE TIP SIZE

BEFORE	AFTER
.252	.252
.252	.252
.252	.252

WATER

A5

ml. 15
gram 1.4
Total 16.4

OPERATOR: HARVEY-KARSTGAL

Sample Box No. 2
Meter Box No. 400
Meter ΔH@ 1.71
Pitot, CP .84
Temp. Device ATT
Probe No. 8-1
Probe Liner GLASS
Probe Htr. Set 600
Ambient Temp. 77°
% O_2 18.5 | 20.5
% CO_2 1.5 | 2.5

NOTES

Orifice
Pitot ✓
Meter ✓ @ 18" Hg
R6.2
574
FINAL LEAK CHECK
AT 3" Hg
.004

FIELD DATA SHEET

7/10 & 11/85 JCM

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

PLANT: ABC
LOCATION: BATTERY #1
BARO. PRES.: 30.11
RUN #: #3
DATE: 7-10/11/85
TIME: ~~1900~~ (10) 1754 - 1910 (11) 0720 - 1415

	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"			245.515	(1)	(2)	(3)		(4)	(5)			
#2 1	45	05	246.0	117	94	94	94	50	234	1.20	.35	1.5
#4 2	47	39	246.5	125	94	94	94	52	241	1.12	.33	1.5
#5 3	47	31	247.0	128	94	94	94	53	228	1.01	.30	1.4
#68 4	44	10	247.4	130	94	94	94	54	268	.84	.25	1.2
#7 5	45	51	248.0	133	94	93	94	56	271	1.67	.50	2.2
6	43	73	248.5	132	94	93	94	56	243	2.10	.63	2.7
7	30	06	248.9	108	73	72	73	33	243	1.71	.51	2.0
8	46	74	249.6	98	75	74	75	33	227	2.50	.73	2.7
9	42	64	250.2	108	77	77	77	32	229	2.19	.65	2.5
10	47	27	250.8	113	78	77	78	32	243	2.18	.65	2.5
11	49	88	251.5	115	78	78	78	33	227	2.37	.71	2.6
12	48	62	252.4	115	79	78	79	33	232	3.01	.90	3.0
"B"				~~107~~	~~79~~	~~79~~	~~79~~	~~33~~	~~237~~			
1	42	07	253.0	107	79	79	79	33	237	2.82	.83	2.8
2	49	02	253.8	105	81	81	81	36	228	2.73	.80	2.8
3	48	63	254.60	111	82	82	82	37	239	3.02	.89	3.0
4	44	53	255.3	112	84	84	84	38	232	2.68	.79	2.7
5	52	11	256.1	110	87	87	87	40	230	2.50	.73	2.5
#2 6	49	56	256.8	114	87	87	87	43	230	1.84	.54	2.1
#- 7	52	87	257.4	115	87	87	87	45	233	1.77	.52	2.0
8	51	22	258.2	105	94	94	94	41	236	~~2.28~~ 1.82	~~.68~~ .52	2.0
9	46	12	258.7	113	96	95	96	32	239	1.20	.49	2.0
10	49	43	259.2	113	97	96	97	34	228	1.53	.44	2.0
11	46	01	259.7	120	97	96	97	36	232	1.16	.34	2.0
12	46	98	260.250	133	97	97	97	39	230	1.64	.49	2.0
	1116	85	14.735	116			87			1.96	.750	3.0
	18	61	1.0172									

STATIC PRESSURE "H2O: -.5

PROBE TIP SIZE

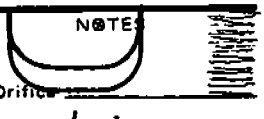
BEFORE	AFTER
.252	.252
.252	.252
.252	.252

WATER #2
ml. 12
gram 3.4
Total 15.6

OPERATOR: HARVEY-KARSTENS

Sample Box No. 2
Meter Box No. 400
Meter ΔH@ 1.71
Pitot, CP .84
Temp. Device SXT
Probe No. 8-1
Probe Liner GLASS
Probe Htr. Set 68°F
Ambient Temp. 89°
% O_2 18.5 | 18.5
% CO_2 1.5 | 1.5

NOTES



Orifice
Pitot ✓
Meter ✓ @ 18" Hg
R 6.8
S.S.Y
FINAL LEAK CHECK AT 3.0" Hg

BLANK ANALYTICAL DATA

Plant ABC

Sample location #1

Relative humidity 20%

Type of blank ACETONE

Liquid level at mark and container sealed ✓

Density of blank (ρa) .7957 g/ml

Blank volume (Va) 200 ml

Date and time of wt. 0800 7-15-85 Gross wt. 981.7 mg

Date and time of wt. 1400 7-15-85 Gross wt. 981.9 mg

Average gross wt. 981.8 mg

Tare wt. 981.6 mg

Weight of blank (ma) .2 mg

$$Ca = \frac{ma}{Va\ \rho a} = \frac{(.2)}{(200)(.7957)} = .001272 \text{ mg/g}$$

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 Geo A Karstin

Signature of reviewer [illegible]

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ABC Sample date: 7-9-85

Sample location: #1 Run no.: #1

Sample recovery person: KARSTENS Recovery date: 7-9-85

Filter(s) no.: Y-12

MOISTURE

Impingers			Silica gel		
Final volume (wt)	14	ml(gm)	Final wt.	961.3 g	g
Initial volume (wt)	0	ml(gm)	Initial wt.	959.5 g	g
Net volume (wt)	14	ml(gm)	Net wt.	1.8 g	g

Total moisture 15.8 g

Color of silica gel BLUE

Description of impinger water CLEAR

RECOVERED SAMPLE

Filter container no. RUN#1 sealed ✓

Description of particulate on filter BLACK - CARBON

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 #1

Relative humidity 20%

Density of acetone (ρa) .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) 135 ml

Acetone blank residue concentration (Ca) .001272 mg/g

Wa = Ca Vaw ρa = (.001272)(135)(.7857) = .1 mg

Date and time of wt 0800 7-15-85 Gross wt 1101439 mg

Date and time of wt 1400 7-15-85 Gross wt 1101439 mg

Average gross wt 1101439 mg

Tare wt 1101234 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 23.8 mg

Filter(s) container no. Y12

Date and time of wt 0800 7-15-85 Gross wt 163.7 mg

Date and time of wt 1400 7-15-85 Gross wt 163.7 mg

Average gross wt 163.7 mg

Tare wt 166.7 mg

Weight of particulate on filter(s) −3.0 mg

Weight of particulate in acetone rinse 23.8 mg

Total weight of particulate 20.8 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 Gartman

Signature of reviewer

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ABC Sample date: 7-10-85

Sample location: #1 Run no.: #2

Sample recovery person: KARSTENS Recovery date: 7.10-85

Filter(s) no.: Y-11

MOISTURE

Impingers			Silica gel		
Final volume (wt)	15.0	ml(gm)	Final wt.	922.3 g	g
Initial volume (wt)	0	ml(gm)	Initial wt.	920.9 g	g
Net volume (wt)	15	ml(gm)	Net wt.	1.4 g	g

Total moisture 16.4 g

Color of silica gel BLUE

Description of impinger water CLEAR

RECOVERED SAMPLE

Filter container no. RUN#2 sealed ✓

Description of particulate on filter BLACK - CARBON

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 #1

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

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

Acetone rinse container no. #9

Acetone rinse volume (Vaw) 125 ml

Acetone blank residue concentration (Ca) .001272 mg/g

Wa = Ca Vaw ρa = (.001272)(125)(.7857) = .1 mg

Date and time of wt 0800 7.15-85 Gross wt 105466 mg

Date and time of wt 1400 7.15-85 Gross wt 105466 mg

Average gross wt 105466 mg

Tare wt 105486.0 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 62.9 mg

Filter(s) container no. Y-11

Date and time of wt 0800 7.15-85 Gross wt 167.7 mg

Date and time of wt 1400 7-15-85 Gross wt 167.7 mg

Average gross wt 167.7 mg

Tare wt 170.9 mg

Weight of particulate on filter(s) -3.2 mg

Weight of particulate in acetone rinse 62.9 mg

Total weight of particulate 59.7 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 Greg A Karstens

Signature of reviewer

METHOD 5

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ABC Sample date: 7-10-11-85

Sample location: #1 Run no.: #3

Sample recovery person: KARTENS Recovery date: 7-11-85

Filter(s) no.: Y-8

MOISTURE

Impingers			Silica gel		
Final volume (wt)	12	ml(gm)	Final wt.	982.7 g	g
Initial volume (wt)	0	ml(gm)	Initial wt.	979.1 g	g
Net volume (wt)	12	ml(gm)	Net wt.	3.6 g	g

Total moisture 15.6 g

Color of silica gel BLUE

Description of impinger water CLEAR

RECOVERED SAMPLE

Filter container no. RUN #3 sealed ✓

Description of particulate on filter BLACK - CARBON

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 #1

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

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

Acetone rinse container no. #10

Acetone rinse volume (Vaw) 185 ml

Acetone blank residue concentration (Ca) .001272 mg/g

Wa = Ca Vaw ρa = (.001272)(185)(.7857) = .2 mg

Date and time of wt 0800 7-15-85 Gross wt 1154835 mg

Date and time of wt 1400 7-15-85 Gross wt 1154835 mg

Average gross wt 1154835 mg

Tare wt 1154360 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 55.6 mg

Filter(s) container no. Y-8

Date and time of wt 0800 7-15-85 Gross wt 173.4 mg

Date and time of wt 1400 7-15-85 Gross wt 173.4 mg

Average gross wt 173.4 mg

Tare wt 171.2 mg

Weight of particulate on filter(s) 2.2 mg

Weight of particulate in acetone rinse 55.6 mg

Total weight of particulate 57.8 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 Karstens

Signature of reviewer

PUSH CONTROL SYSTEM - OBSERVATIONS - Push System - Battery #1

Source Name Alabama By Products

Date 7/10/85

Observers: Vern Hampton, George Duckworth, Frank Cargo

Test Run No. 2

Oven Number	Time Start	Time Stop	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)
52	7:15	7:16	95%	5%	
62	7:42	7:43	95%	5%	
72	8:02	8:03	90%	10%	
82	8:22	8:23	90%	10%	
4	8:49	8:50	75%	25%	
14	9:20	9:21	90%	10%	
24	9:52	9:53	65%	35%	40sec.
34	10:23	10:24	75%	25%	15sec.
44	10:45	10:46	90%	10%	
54	11:01	11:02	90%	10%	
64	11:24	11:25	50%	50%	54sec.
84	12:40	12:41	85%	15%	
6	12:53	12:54	95%	5%	
16	1:08	1:09	65%	35%	5sec.
26	1:30	1:31	60%	40%	14sec.
36	1:55	1:56	85%	15%	
46	2:10	2:11	90%	10%	
56	2:27	2:28	75%	25%	20sec.
66	3:19	3:20	95%	5%	
76	3:32	3:33	80%	20%	5sec.
86	3:48	3:49	65%	35%	56sec.
8	4:31	4:32	95%	5%	
18	4:48	4:49	90%	10%	
28	5:04	5:05	75%	25%	15sec.

Total Pushes Observed: 24

Total Pushes Receiving 85% Capture or Greater: 14

Total Pushes Receiving Less Than 85% Capture: 10

1-Marginal

PUSH CONTROL SYSTEM - OBSERVATIONS Battery #1

Source Name Alabama By Products Date 7/10/85 & 7/11/85

Test Run No. 3

OBSERVER: Vicki Hampton, Frank Cargo, George Duckworth

Oven Number	Time Start	Time Stop	Capture Efficiency	Opacity Of Leakage	Seconds Greater Than (20%)
38	5:54	5:55	75%	25%	15sec
48	6:06	6:07	80%	20%	
58	6:23	6:24	95%	5%	
68	6:37	6:38	95%	5%	
78	6:52	6:53	95%	5%	
1	7:09	7:10	55%	45%	3 sec
7/ 85 85	7:31	7:32	95%	5%	
7	7:56	7:57	95%	5%	
17	8:11	8:12	85%	15%	
27	8:28	8:29	95%	5%	
37	8:49	8:50	90%	10%	
47	9:08	9:09	95%	5%	
57	9:29	9:30	90%	10%	
67	9:48	9:49	95%	5%	
77	10:06	10:07	90%	10%	
9	10:22	10:23	85%	15%	
19	10:28	10:29	70%	30%	
29	11:04	11:05	55%	45%	
39	11:20	11:21	75%	25%	
49	12:33	12:34	95%	5%	
59	12:48	12:49	95%	5%	
69	1:14	1:15	85%	15%	
79	1:35	1:36	75%	25%	
2	1:57	1:58	70%	30%	

Total Pushes Observed: 24

Total Pushes Receiving 85% Capture or Greater: 16

Total Pushes Receiving Less Than 85% Capture: 8

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: baghouse on pushcontrol system Permit No.: 0 0 0 0 0 1 8 5 0 1

Start/Stop Time: 8:07 Sky Condition: clear Date: 0 7 0 9 8 5

Observation Point: E of source Distance from Source: 90 feet

Stack Height: 40' Background: blue sky Plume Color: black

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

Results and Recommendations:
Missed 1st push due to lack of communication

Run #1

Observer: Cargo 43 Time Analysis:

ENV-AP-008-12/84 Revised

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: Baghouse on push control system Permit No.: 0 0 0 0 0 1 8 5 0 1

Start/Stop Time: 3:54- Sky Condition: Clear Date: 0 7 0 9 8 5

Observation Point: W of stack Distance from Source: 100'

Stack Height: 50' Background: Sky Plume Color: –

Method of Evaluation: Wind Direction: N 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	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15 6:03	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17 6:09	0	0			32					47				
3	0	0	0	0	18 6:21	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20 6:23	0				35					50				
6	0	0	0	0	21					36					51				
7	0	0	0	0	22					37					52				
8	0	0			23					38					53				
9	0	0	0	0	24					39					54				
10	0	0	0	0	25					40					55				
11	0	0	0	0	26					41					56				
12	0	0	0	0	27					42					57				
13	0	0	0	0	28					43					58				
14	0	0	0	0	29					44					59				

Results and Recommendations:

Run # 1

Observer: K Witherspoon 33

Time Analysis:

ENV-AP-008-12/84 Revised

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: [illegible] Permit No.: 0 0 0 0 0 1 7 5 0 1

Start/Stop Time: Sky Condition: [illegible] Date: 0 7 / 0 1 / 5

Observation Point: [illegible] Distance from Source: [illegible]

Stack Height: 30 feet Background: [illegible] Plume Color: [illegible]

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

Results and Recommendations:

Run #2

Observer: Buckworth + Cargo Time Analysis:

ENV-AP-008-12/84 Revised

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

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name Alabama By Products V.E.E. No.

Source Baghouse Permit No.

Start/Stop Time 1173- Sky Condition overcast Date 07/15/85

Observation Point E-SE of source Distance from Source 55 feet

Stack Height 45 feet Background sky Plume Color

Method of Evaluation 1 Wind Direction West 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	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	1123	0	0	0	15	0	0	0		30	1130			0	45	0	0	0	0
1	0	0	0	0	16					31	0	0	0	0	46				
2	0	0	0	0	17	1201	0	0	0	32	0	0	0	0	47	1232		0	0
3	0				18	0	0	0	0	33	0	0			48	0	0	0	0
4					19	0	0	0		34					49	0	0		
1153	0	0	0	0	20					35	1233	0	0	0	50				
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51				
7	0	0	0	0	22	0	0	0	0	37	0	0	0		52				
8					23	0	0			38					53				
9	1153	0	0	0	24					39	1237			0	54				
10	0	0	0	0	25	1206			0	40	0	0	0	0	55				
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56				
12					27	0	0	0	0	42					57				
1312	0	0	0	0	28	0	0			43	1210		0	0	58				
14	0	0	0	0	29					44	0	0	0	0	59				

Results and Recommendations:

Run #2

Should be 2 #5 & 6

Observer Dunlavey 4 2 Time Analysis

ENV-AP-008-12/84 Revised

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

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Ala By-Products V.E.E. No.:

Source: pneumatic baghouse Permit No.: 0 0 0 0 0 1 8 5 0 1

Start/Stop Time: Sky Condition: 40% cloud Date: 0 7 1 0 8 5

Observation Point: SW of sand Distance from Source: 150 ft

Stack Height: 30' Background: sky Plume Color: black

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

Results and Recommendations:

Run # 2 & #3

Observer: Carver Time Analysis:

Supervisor:

ENV-AP-008-12/84 Revised

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

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Alabama By-Products Co. V.E.E. No.:

Source: Kiln Permit No.: 0 0 0 0 1 8 5 0 1

Start/Stop Time: Sky Condition: Clear Date: 0 7 / 1 / 8 5

Observation Point: So of source Distance from Source: 1/2 foot

Stack Height: 40' Background: Sky Plume Color:

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

Results and Recommendations:

0 0 0 0

Run # 3

Observer: Duckworth + Cargo

Time Analysis:

ENV-AP-008-12/84 Revised

Facility Name: ALABAMA By Products Corp. Date: 7/11/85

Emission Point No./Name: Wilputte Battery #1

Size of Baghouse: Total No. of Bags 266 per Compartment

No. of Independent Sections 4

Size of a Bag 6" Inches Diam. by 12'0" Ft. Long

Type of Bags: ( ) Woven (X) Felted

Material Polyester

Dirty Air is on ( ) Inside (X) Outside of Bags

Bag Cleaning Method: ( ) Shaking ( ) Other _____
( ) Reverse Air
(X) Pulse Jet

Operating Conditions: 8" In W.G. ΔP

130000 ACFM @ 275°F

Emissions: (X) Not Visible ( ) Visible, ___% Opacity

( ) Visible, Vapor Plume

Maintenance: Leaks in baghouse, ducts ( ) Yes (X) No

Date and Description of Last Repair: NONE

Date and Description of Next Anticipated Repair: NONE

How is collected dust stored, handled, disposed of? _____

Comments: _____

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

14

Run #1

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

BATTERY NO. 1A-2A SHIFT 1st DATE 7/3/85

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 28		716	250	OK	OK	Yes	Yes	No	Yes	No	No
2 38		729	✓	✓	✓	✓	✓	✓	✓	✓	✓
3 48		745	✓	✓	✓	✓	✓	✓	✓	✓	✓
4 58	Run #1	800	✓	✓	✓	✓	✓	✓	✓	✓	✓
5 68	↓	829	✓	✓	✓	✓	✓	✓	✓	✓	
6 78		847	✓	✓	✓	✓	✓	✓	✓		
7 1		912	✓	✓	✓	✓	✓	✓	✓		
8 11		935	✓	✓	✓	✓	✓	✓	✓		
9 21		957	✓	✓	✓	✓	✓	✓	✓	✓	✓
10 31		1014	✓	✓	✓	✓	✓	✓	✓	✓	
11 41		1037	✓	✓	✓	✓	✓	✓	✓	✓	✓
12 51		1054	✓	✓	✓	✓	✓	✓	✓	✓	✓
13 61		1114	✓	✓	✓	✓	✓	✓	✓	✓	✓
14 71		1226	✓	✓	✓	✓	✓	✓	✓	✓	
15 81		1241	✓	✓	✓	✓	✓	✓	✓	✓	✓
16 3		126	✓	✓	✓	✓	✓	✓	✓	✓	
17 13		154	✓	✓	✓	✓	✓	✓	✓	✓	
18 23		223	✓	✓	✓	✓	✓	✓	✓	✓	✓
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											

OPERATOR 0139

(-A26-3/81 SUN BELT PRESS, INC.

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

BATTERY NO. 1A & 2A SHIFT 3-11 DATE 07-09-85

	OVEN	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	3		316	300	ok	ok	yes	yes	yes	yes	—	—
2	73		331	300								
3	3		353	300								
4	3		412	300	heavy							
5	73		435	300	ok							
6	3		453	300								
7	5		550	300								
8	15		603	300								
9	5	Restart	621	300								
10	35	Step	730	300								
11	5		801	300								
12	5		814	300								
13	65		829	300	heavy							
14	5		850	300	ok							
15	85		908	300								
16	7		927	300								
17	7		944	300								
18	27		1005	300								
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
32												
33												
34												
35												
36												
37												
38												

OPERATOR 15 John D. Clemmons

1-828-3/81 SUN BELT PRESS, INC.

Run #2

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

BATTERY NO. 1A-2A SHIFT 1st DATE 7/10/85

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 2	Run #2	715	250	OK	OK	Yes	Yes	Yes	Yes		
2 62	↓	742	✓	✓	✓	✓	✓	✓	✓		
3 72		801	✓	✓	✓	✓	✓	✓	✓		
4 82		822	✓	✓	✓	✓	✓	✓	✓		
5 4		848	✓	✓	✓	✓	✓	✓	✓		
6 14		919	✓	✓	✓	✓		✓	✓		
7 24		951	✓	✓	✓	✓	✓	✓	✓		
8 94		1023	✓	✓	✓	✓	✓	✓	✓		
9 44		1044	✓	✓	✓	✓	✓	✓	✓		
10 54		1102	✓	✓	✓	✓	✓	✓	✓		
11 64		1126	✓	✓	✓	✓	✓	✓	✓		
12 74		1217	✓	✓	✓	✓	✓	✓	✓		
13 84		1242	✓	✓	✓	✓	✓	✓	✓		
14		1255	✓	✓	✓	✓	✓	✓	✓		
15 16		110	✓	✓	✓	✓	✓	✓	✓		
16 26		131	✓	✓	✓	✓	✓	✓	✓		
17 36		156	✓	✓	✓	✓	✓	✓	✓		
18 46		212	✓	✓	✓	✓	✓	✓	✓		
19 56		229	✓	✓	✓	✓	✓	✓	✓		
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
10											
11											
12											
13											
14											
15											
16											
17											
18											

OPERATOR 0139

T-516-3/81 SUN BELT PRESS, INC.

Run 283

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

74

BATTERY NO. 1A & 2A SHIFT 3-11 DATE 07-10-85

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 6		317	300	heavy	ok	yes	yes	yes	yes	—	—
2 16		330	300	ok							
3 26		346	300								
4 8		429	300								
5 18		446	300								
6 28	Run Stop	502	300								
7 38	Run 3	551	300	heavy							
8 48	Start	603	300	ok							
9 58		620	300	ok							
10 68		635	300	heavy ++							
11 78		650	300	ok							
12 1		706	300								
13 11	Stop for 7/10/85	823	300								
14 21		835	300								
15 31		848	300								
16 41		904	300								
17 51		920	300								
18 61		953	300	heavy							
19 71		1011	300	ok							
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											

OPERATOR 15 John O. Clemmer

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

74 PUSHER

Run A3

ALABAMA BY-PRODUCTS CORPORATION

OVENS PUSHED

BATTERY NO. 1-A+2-A SHIFT 1ST DATE 07-11-85

	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
1	85	Run A3	0730	250	0.5	OK	Yes	Yes	No	Yes		
	7		0256	✓	✓	✓	✓	✓	✓	✓		
	17		0810	✓	✓	✓	✓	✓	✓	✓		
4	27		0827	✓	✓	✓	✓	✓	✓	✓		
	37		0848	✓	✓	✓	✓	✓	✓	✓		
6	47		0908	✓	✓	✓	✓	✓	✓	✓		
	57		0928	✓	✓	✓	✓	✓	✓	✓		
	67		0947	✓	✓	✓	✓	✓	✓	✓		
9	77		1005	✓	✓	✓	✓	✓	✓	✓		
1	9		1024	✓	✓	✓	✓	✓	✓	✓		
11	19		1047	✓	✓	✓	✓	✓	✓	✓		
12	29		1103	✓	✓	✓	✓	✓	✓	✓		
1	39		1119	✓	✓	✓	✓	✓	✓	✓		
14	49		1233	✓	✓	✓	✓	✓	✓	✓		
1	59		1247	✓	✓	✓	✓	✓	✓	✓		
1	69		1314		✓	✓	✓	✓	✓	✓		
17	79		1334	✓	✓	✓	✓	✓	✓	✓		
1	2		1355	✓	✓	✓	✓	✓	✓	✓		
19	12		1418	✓	✓	✓	✓	✓	✓	✓		
2												
2												
22												
2												
24												
2												
2												
27												
2												
27												
3												
3												
32												
3												
3												
35												
3												
37												
3												

OPERATOR 0139

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 1.49 a 1.50 "H_2O 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 121 ^{o}F. The OMEGA II was recalibrated at 120 ^{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:

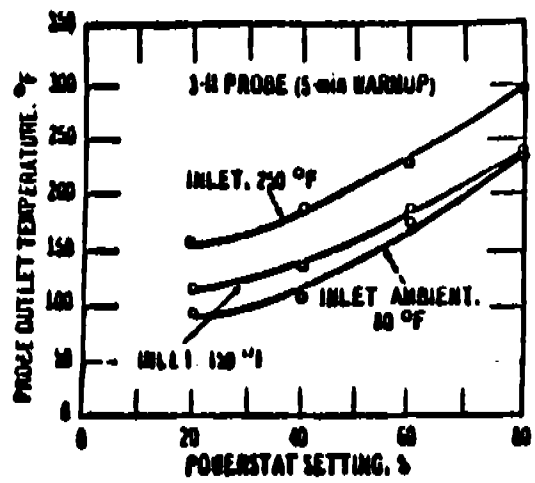
BSO	522	Flow Resistance (Max.) @ 320 cm/min.	80 mm
*pH	9.0	Flow Rate (air) lpm/cm² @ 70 cm Hg	60
DOP @320/cm/min ASTM Methods 2986)	99.9%	Max. Use Temp.	400°C
Tensile Strength (Fed. Spec. UUP31B)	600 gr.	Static Properties	Medium
Weight 8"x10"sheet	4.0±.3 gr.	Ability to Fold	Good

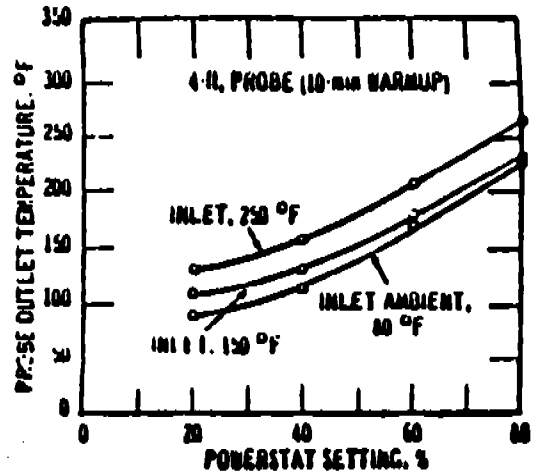
WATER EXTRACTABLE IONS:

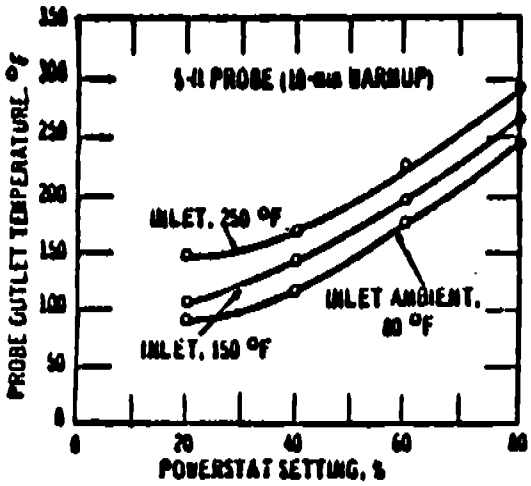
Sulfate	600	Chloride	1500
Nitrate	115	Fluoride	87
Ammonia	13		

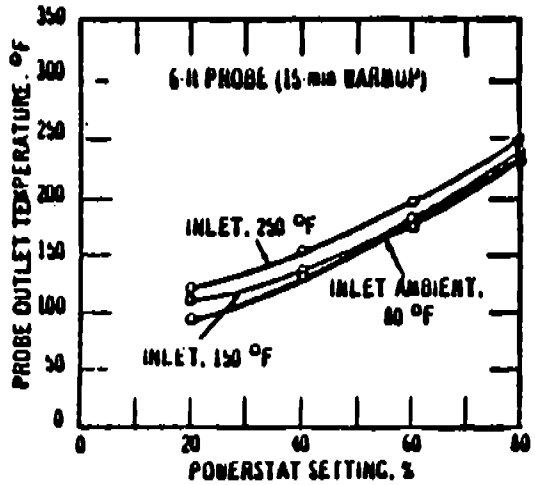
*pH—Gelman Procedure:

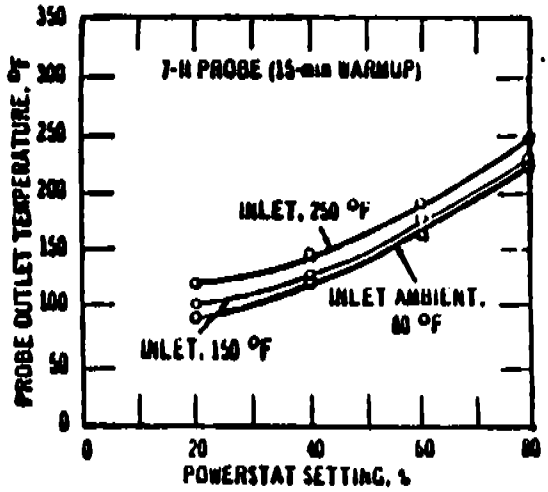
A. 500 ml distilled water.
B. Add 15 drops saturated KCl solution.
C. Shred one 8"x10" sheet and soak in prepared water for one hour.
D. Run pH at ambient temperature.











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 LOZ

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
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	72/78
1.5	-0.78	26.765	37.0.0	763.584	774.522	13.0	13.2	97/98	74/51
1.0	-0.58	37.0.0	45.505	774.522	783.237	13.2	13.5	96/97	51/52
0.5	-0.36	45.505	51.557	783.237	789.457	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

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

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

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

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

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 7-25-85 Box No. 400

P_{bar} = 29.90 in. Hg Calibrated by D 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
1.5 @ 18"Hg	-.88	0	10.473	542.635	553.280	20.5	20.5	110	91
1.5 @ 18"Hg	-.88	0	10.513	553.280	564.041	20.5	20.5	113	94.5
1.5 @ 18"Hg	-.88	0	10.515	564.041	574.853	20.5	20.5	115.5	97.5

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

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

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

Pre test Y 1.01

% Difference —

ORIFICE CALIBRATION FORM

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

P_{bar} 30.00 Calibrated By LDTL

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	1010	84.5	68	13.673	.7584	.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)
$$\frac{V_2 - V_1}{\theta}\left[\frac{t_2 + 460}{\frac{t_1 + t_2}{2} + 460}\right](60)(Y)$$

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

$M_m = 29$
$T_m = t_2 + 460$
$P_m = P_{bar} + \frac{\Delta H}{13.6}$
Y = meter calibration factor

3. Calculate the average K_m as follows:

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

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 7-25-85 Meter Box No. 400

P_{bar} 29.90 Calibrated By G 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.	°F	°F	CF		
1.5	542.635	553.280	900	110	91	10.645	.7059	.7244
1.5	553.280	564.041	900	113	94.5	10.761	.7131	.7295
1.5	564.041	574.853	900	115.5	92.5	10.812	.7171	.7316

Average K_m .7285

Average H@ 1.73

Pre test H@ 1.71

% Difference +1.4%

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)

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

2. K_m = (for each ΔH)

$$Q_m\sqrt{\frac{P_m M_m}{T_m \Delta H}}$$

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

Y = meter calibration factor

3. Calculate the average K_m as follows:

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

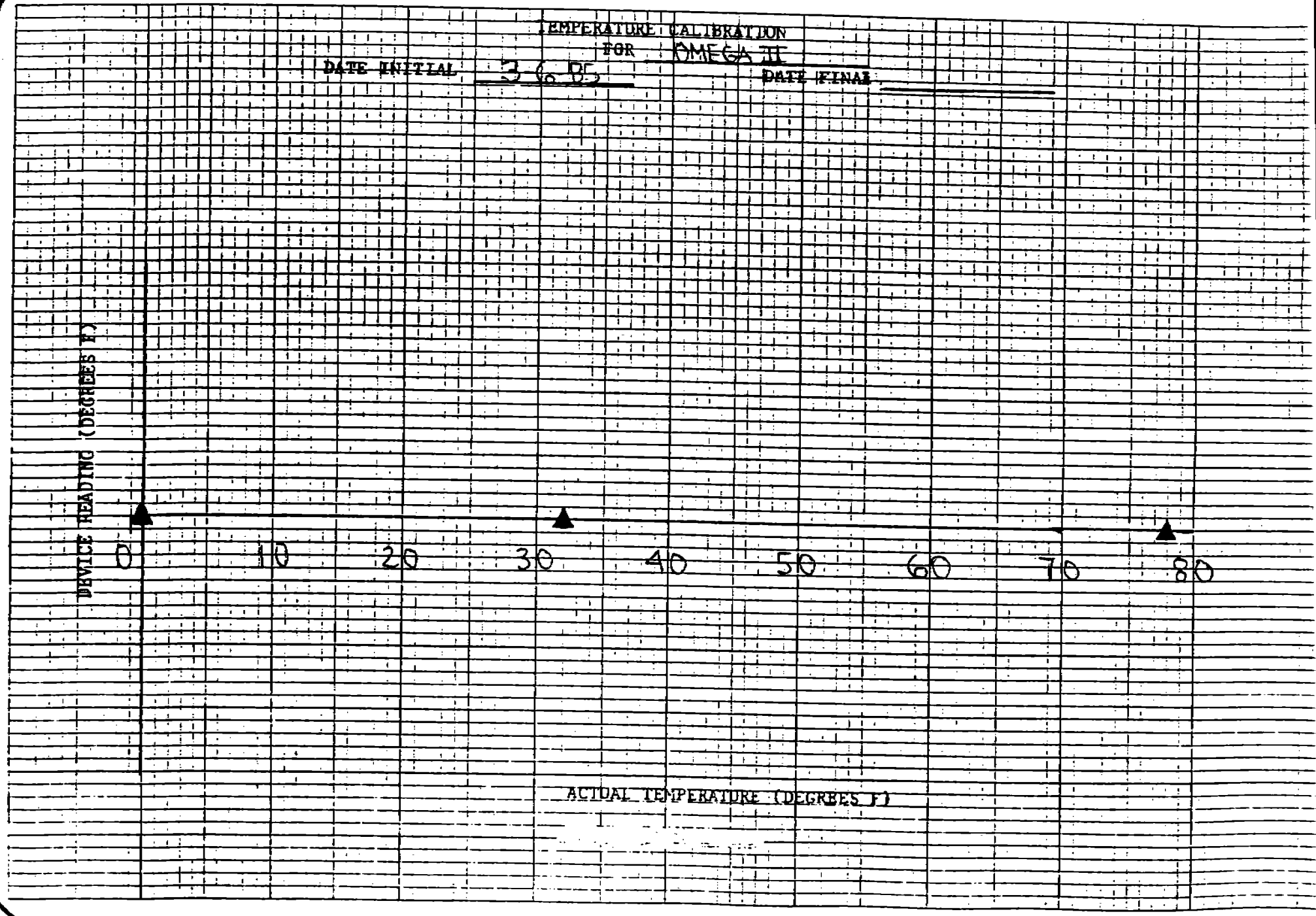
4. Calculate ΔH_a as follows:

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

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

TEMPERATURE CALIBRATION
FOR OMEGA III

DATE INITIAL 3-6-85 DATE FINAL

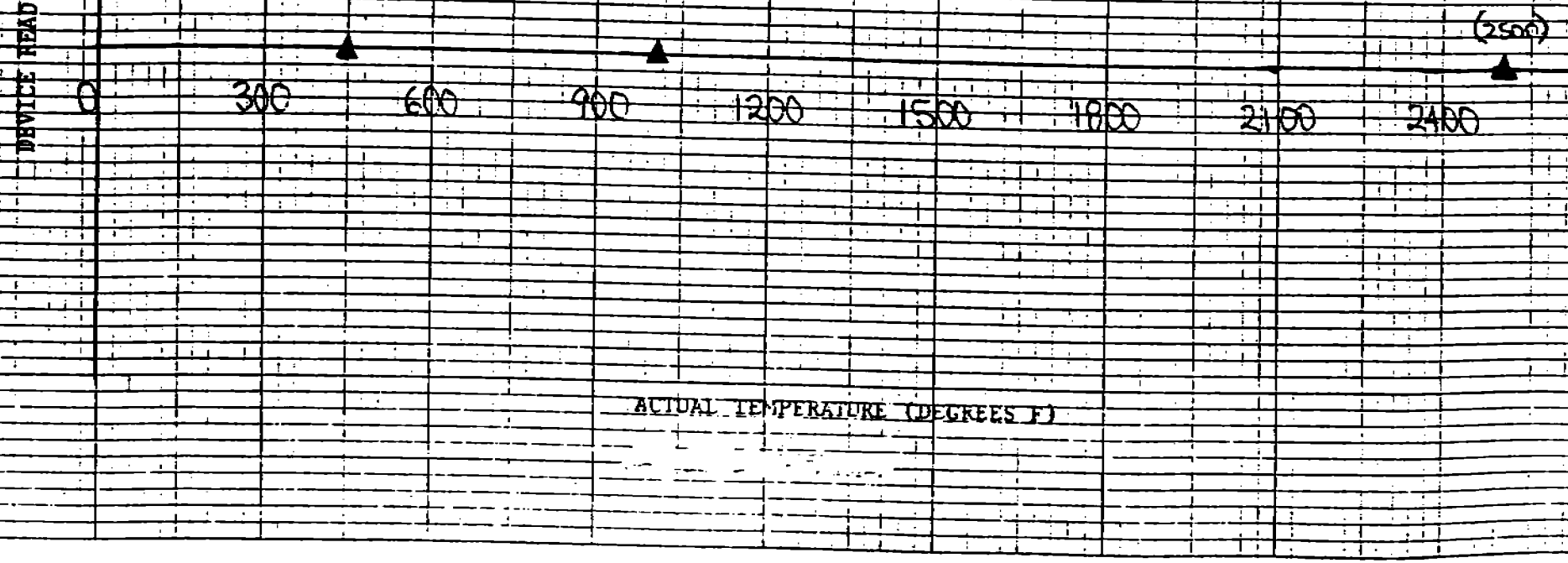


GUARDIAN SYSTEMS INC

TEMPERATURE CALIBRATION

FOR OMEGA II

DATE INITIAL 3-6-85 DATE FINAL

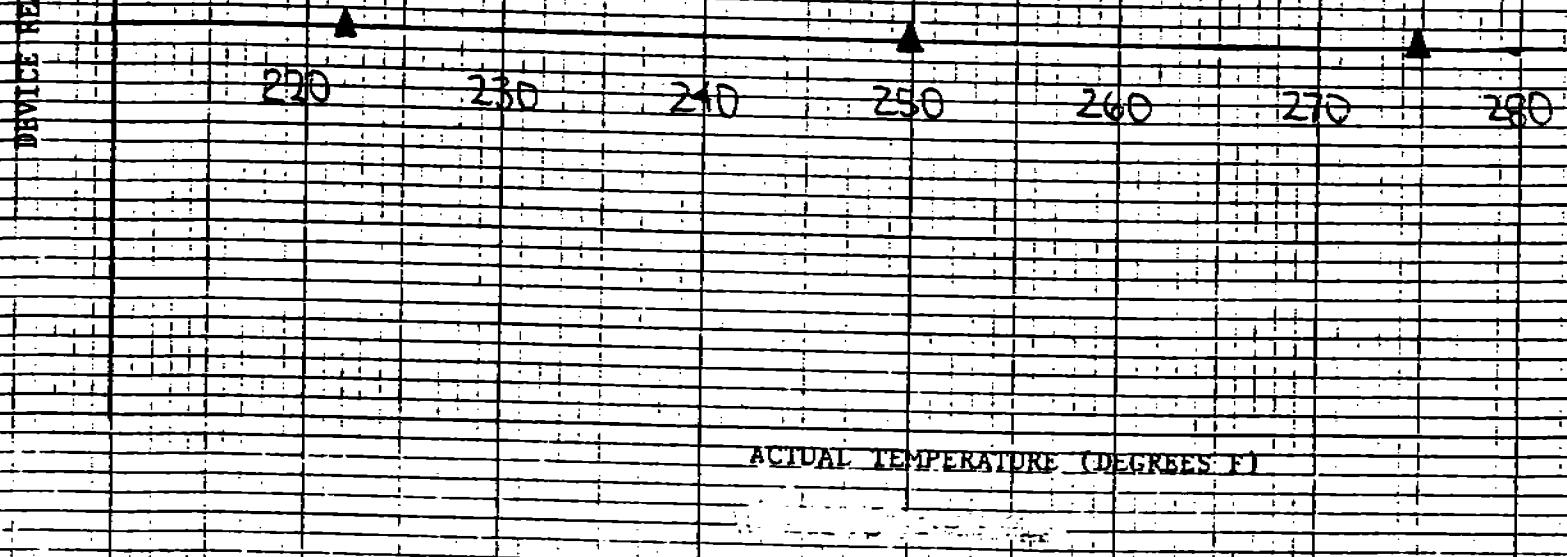


GUARDIAN SYSTEMS inc

TEMPERATURE CALIBRATION

FOR HOT BOX #2

DATE INITIAL 3 6 85 DATE FINAL



GUARDIAN SYSTEMS INC

TEMPERATURE CALIBRATION

FOR IMPINGER # 1

DATE INITIAL 3-6-85

DATE FINAL

DEVICE READING (DEGREES F)

0 10 20 30 40 50 60 70

ACTUAL TEMPERATURE (DEGREES F)

GUARDIAN SYSTEMS inc

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 $C_p(s) - \bar{C}_p(A)$
1	.493	.673	.847	—
2	.480	.656	.847	—
3	.486	.666	.846	-.001
		$\bar{C}_p(B)$	.847	

CALCULATIONS

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

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

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