DIVISION OF ENVIRONMENTAL MANAGEMENT

Air Quality Section

August 17, 1988

M E M O R A N D U M

To: Ken Schuster / Clyde E. Fuller

From: Michael Y. Aldridge MYA

Subject: Alliance Contracting Corporation
Durham, Durham County, North Carolina
Particulate and Visible Emissions Testing of a
Baghouse installed on an Asphalt Plant Dryer
Conducted May 26, 1988 by
Entropy Environmentalists, Inc.

A report of the subject testing has been reviewed and is found to be acceptable. The results appear reliable and indicate that compliance with the applicable particulate emission standard was being achieved during the test.

The emission standard that applies to the subject facility is 40 CFR 60, Subpart I, which limits particulate emissions to 0.04 grains per dry standard cubic foot and visible emissions to 20 percent opacity.

The particulate emission rate demonstrated by the test results was 0.002 grains per dry standard cubic foot.

Visible emissions were zero for most of the test period with a few isolated instances of 5 percent opacity.

The plant is rated at 200 tons per hour and was operating at 150 tons per hour (75 percent capacity) during the test. While this is a lower operating rate than is usually considered desirable for testing such a facility, the margin of compliance and the degree of control provide additional evidence to support this test as an adequate demonstration of compliance.

Compliance is indicated for particulate and visible emissions.

cc: Central File via Lee Daniel

ENTROPY
ENVIRONMENTALISTS INC.

POST OFFICE BOX 12291
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27709-2291
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STATIONARY SOURCE SAMPLING REPORT

REFERENCE NO. 5911

ALLIANCE CONTRACTING CORPORATION

DURHAM, NORTH CAROLINA

PARTICULATE EMISSIONS AND PLUME OPACITY

COMPLIANCE TESTING

ROTARY DRYER SYSTEM STACK

MAY 26, 1988

REPORT CERTIFICATION

The sampling and analysis performed for this report was carried out under my direction and supervision.

Date June 8, 1988 Signature Willis S. Nesbit

Willis S. Nesbit

I have reviewed all testing details and results in this test report and hereby certify that the test report is authentic and accurate.

Date June 8, 1988 Signature

D. James Grove, P.E.

TABLE OF CONTENTS

INTRODUCTION

1.1 Outline of Test Program. Stationary source sampling was performed for Alliance Contracting Corporation in Durham, North Carolina, on May 26, 1988. Three sets of concurrent EPA Method 5 and Method 9 runs were performed at the rotary dryer system stack to determine the particulate emissions and the plume opacity, respectively. The testing was conducted for compliance purposes.

1.2 Test Participants. Table 1-1 lists the personnel present during the test program.

TABLE 1-1
TEST PARTICIPANTS

Alliance Contracting Corporation	I. E. Harris Test Coordinator
	Mickey Hicks Plant Operator
North Carolina Department of Natural Resources and Community Development	Clyde E. Fuller Test Observer
Entropy Environmentalists, Inc.	Willis S. Nesbit Project Supervisor
	Joseph W. Mullen Engineering Technician
Eastern Technical Associates	Paul A. Minor Plume Opacity Observer

SUMMARY OF RESULTS

2.1 Presentation. Table 2-1 presents the particulate emissions for the testing performed May 26, 1988, at the rotary dryer system stack. Detailed test results are presented in Appendix A; field and analytical data are given in Appendix B.

2.2 Plume Opacity Observations. Plume opacity observations were conducted concurrently with the particulate emissions testing. The majority of the readings were zero, with the highest single reading at 5%. Due to the near absence of a visible plume, the observations were not summarized; refer to the field data sheets in Appendix B for the results.

2.3 Average Emission Rate. The average emission rate for the testing was 0.426 pounds per hour. The average concentration was 0.00232 grains per dry standard cubic foot.

TABLE 2-1

PARTICULATE TESTS SUMMARY OF RESULTS

Rotary Dryer System Stack

	1	2	3
Run Date	5/26/88	5/26/88	5/26/88
Test Train Parameters:			
Volume of Dry Gas Sampled, SCF*	60.866	60.690	58.502
Percent Isokinetic	102.4	102.4	102.5
Flue Gas Parameters:			
Temperature, Degrees F	168	170	174
Volumetric Air Flow Rates SCFM*, Dry	21,710	21,651	20,839
ACFM, Wet	29,433	29,358	28,632
Method 5 Results:			
Catch, Milligrams	9.5	9.0	8.6
Concentration, Grains/DSCF*	0.002409	0.002289	0.002269
Emission Rate, Lbs/Hour	0.4482	0.4247	0.4052

* 68 Degrees F -- 29.92 Inches of Mercury (Hg)

PROCESS DESCRIPTION AND OPERATION

3.1 General. Alliance Contracting Corporation operates a batch mix asphalt plant in Durham, North Carolina. Aggregate is heated, dried, and tumbled in a rotary dryer. From the dryer, the aggregate travels to an elevator which carries it to a screen for sizing into hot storage bins. The graded aggregate is mixed with liquid asphalt in a pug mill, and then is loaded onto trucks in 6,000-pound batches.

3.2 Source Air Flow. Figure 3-1 is an air flow schematic showing the passage of the flue gases exhausted by the rotary dryer.

3.3. Operation During Testing. According to Alliance Contracting Corporation, 150 tons per hour of asphalt were produced during testing.

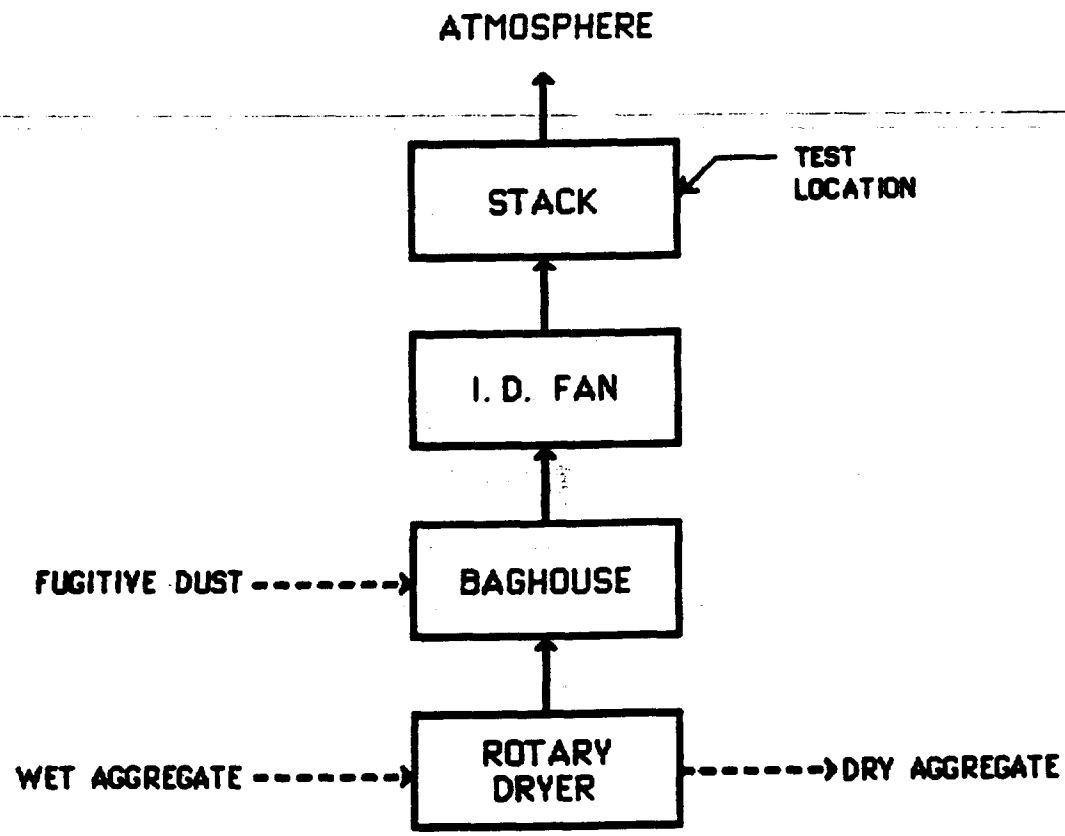


FIGURE 3-1. ROTARY DRYER SYSTEM AIR FLOW SCHEMATIC.

SAMPLING AND ANALYTICAL PROCEDURES

4.1 General. All sampling and analytical procedures were those recommended by the United States Environmental Protection Agency and the North Carolina Department of Natural Resources and Community Development. Descriptions of the sampling equipment and procedures (extracted from 40 CFR 60) are provided in Appendix D.

4.2 Sampling Points. The number and location of the sampling points were determined according to EPA Method 1. The stack cross section was divided into 18 equal areas with six sampling points on each of three traverse axes, as shown in Figure 4-1.

4.3 Volumetric Air Flow Rates

4.3.1 Flue Gas Velocity. EPA Method 2 was used to take the velocity measurements during the traverses of the stack cross section.

4.3.2 Flue Gas Composition. During run 3, a multipoint, integrated flue gas sample was collected and analyzed using EPA Method 3; the analytical results were used to determine the flue gas composition and molecular weight for all runs.

4.3.3 Flue Gas Moisture. Moisture content was determined by analyzing the sampling train impinger reagents according to the procedures outlined in EPA Method 5.

4.4 Emissions Determinations. EPA Method 5 sampling and analytical procedures were used to determine the particulate emissions. Each of the 18 points was sampled for 3.5 minutes, resulting in a net run time of 63 minutes.

4.5 Plume Opacity. The procedures outlined in EPA Method 9 were followed in determining the plume opacity.

4.6 Equipment Calibration. Pertinent calibration data are provided in Appendix C.

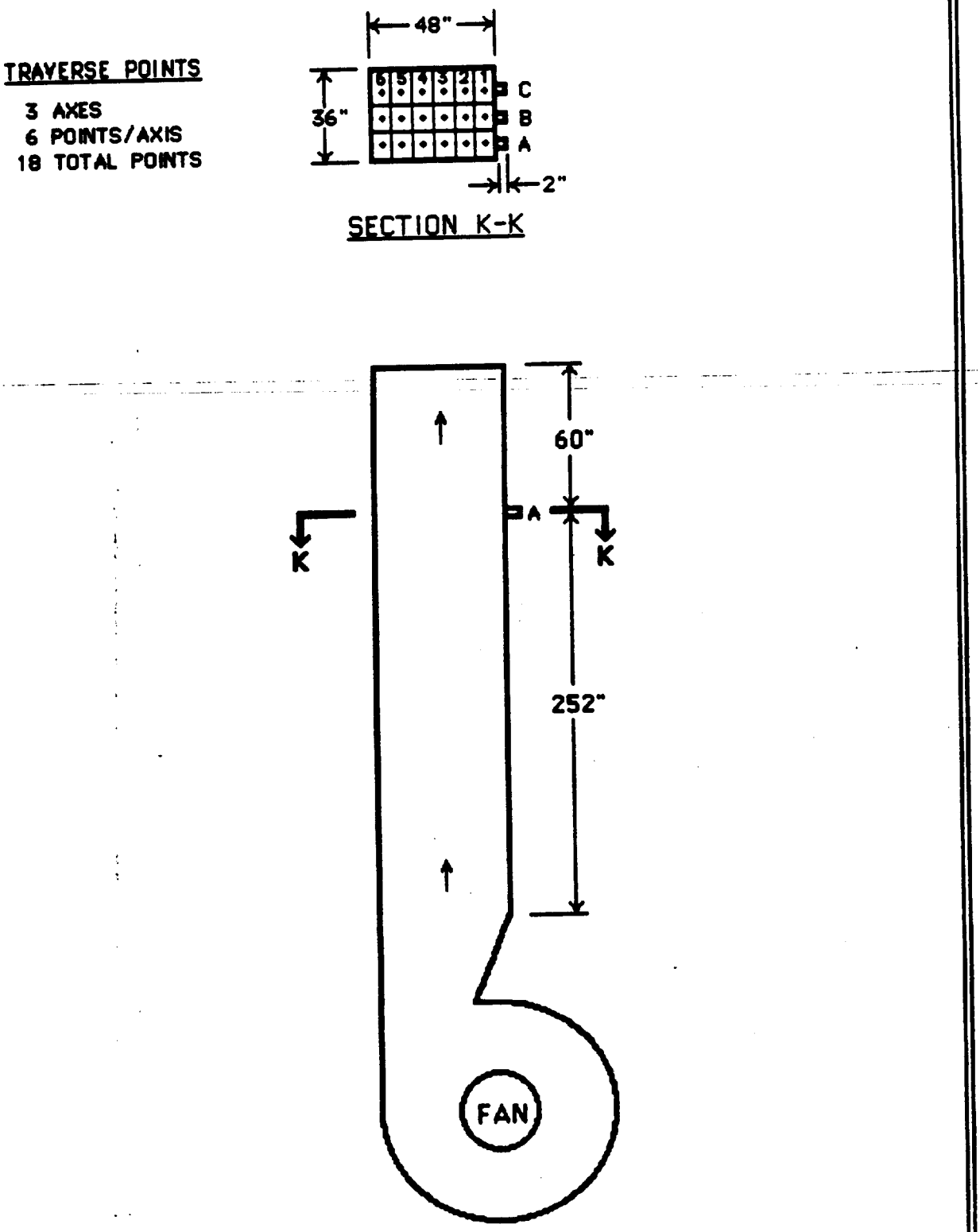


FIGURE 4-1. ROTARY DRYER SYSTEM STACK TEST LOCATION.

TEST RESULTS AND EXAMPLE CALCULATIONS

ISOKINETIC SAMPLING TRAIN FIELD DATA & RESULTS TABULATION

PLANT: Alliance Contracting Corporation, Durham, North Carolina

RUN #	DATE	SAMPLING LOCATION	OPERATOR
1	5/26/88	Rotary Dryer System Stack	Willis S. Nesbit
2	5/26/88	Rotary Dryer System Stack	Willis S. Nesbit
3	5/26/88	Rotary Dryer System Stack	Willis S. Nesbit

		1	2	3
	Run Start Time	800	932	1105
	Run Finish Time	905	1037	1220
	Net Sampling Points	18	18	18
Theta	Net Run Time, Minutes	63.00	63.00	63.00
Dia	Nozzle Diameter, Inches	0.309	0.309	0.309
Cp	Pitot Tube Coefficient	0.840	0.840	0.840
Y	Dry Gas Meter Calibration Factor	1.010	1.010	1.010
Pbar	Barometric Pressure, Inches Hg	29.80	29.80	29.80
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	2.877	2.866	2.691
Vm	Volume of Metered Gas Sample, Dry ACF	61.356	61.974	60.094
tm	Dry Gas Meter Temperature, Degrees F	79	86	89
Vm(std)	Volume of Metered Gas Sample, Dry SCF*	60.866	60.690	58.502
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	174.0	169.0	172.5
Vw(std)	Volume of Water Vapor, SCF*	8.190	7.955	8.120
%H2O	Moisture Content, Percent by Volume	11.9	11.6	12.2
Mfd	Dry Mole Fraction	0.881	0.884	0.878
%CO2	Carbon Dioxide, Percent by Volume, Dry	3.1	3.1	3.1
%O2	Oxygen, Percent by Volume, Dry	16.7	16.7	16.7
%CO+N2	CO + N2, Percent by Volume, Dry	80.2	80.2	80.2
Md	Dry Molecular Weight, Lb/Lb-Mole	29.16	29.16	29.16
Ms	Wet Molecular Weight, Lb/Lb-Mole	27.84	27.87	27.80
Pg	Flue Gas Static Pressure, Inches H2O	-0.10	-0.13	-0.14
Ps	Absolute Flue Gas Press., Inches HG	29.79	29.79	29.79
ts	Flue Gas Temperature, Degrees F	168	170	174
Delta p	Average Velocity Head, Inches H2O	0.4280	0.4249	0.4006
vs	Flue Gas Velocity, Feet/Second	40.88	40.78	39.77
A	Stack/Duct Area, Square Inches	1,728	1,728	1,728
Qsd	Volumetric Air Flow Rate, Dry SCFM*	21,710	21,651	20,839
Qaw	Volumetric Air Flow Rate, Wet ACFM	29,433	29,358	28,632
%I	Isokinetic Sampling Rate, Percent	102.4	102.4	102.5

* 68 Degrees F -- 29.92 Inches of Mercury (Hg)

(continued next page)

		1	2	3
	Method 5 Results:			
mg	Catch, Milligrams	9.5	9.0	8.6
gr/DSCF	Concentration, Grains per DSCF*	0.002409	0.002289	0.002269
Lb/Hr	Emission Rate, Lbs/Hour (PMRc)	0.4482	0.4247	0.4052

* 68 Degrees F -- 29.92 Inches of Mercury (Hg)

EXAMPLE TEST CALCULATIONS NO. 1

Rotary Dryer System Stack

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

$$Vm(std) = 17.64 * Y * Vm * \frac{(Pbar + Delta\ H/13.6)}{(460 + tm)}$$

$$Vm(std) = 17.64 * 1.010 * 61.356 * \frac{(29.80 + 2.877/13.6)}{(460 + 79)} = 60.866 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

$$Vw(std) = 0.04707 * Vlc$$

$$Vw(std) = 0.04707 * 174.0 = 8.190 \text{ SCF}$$

PERCENT MOISTURE, BY VOLUME, AS MEASURED IN FLUE GAS

$$\%H2O = 100 * Vw(std) / (Vw(std) + Vm(std))$$

$$\%H2O = \frac{8.190}{8.190 + 60.866} * 100 = 11.9\ \%$$

DRY MOLE FRACTION OF FLUE GAS

$$Mfd = 1 - \%H2O/100$$

$$Mfd = 1 - 11.9/100 = 0.881$$

DRY MOLECULAR WEIGHT OF FLUE GAS

$$Md = \%CO2 * 0.44 + \%O2 * 0.32 + \%CO+N2 * 0.28$$

$$Md = 3.1*0.44 + 16.7*0.32 + 80.2*0.28 = 29.16 \text{ LB/LB-MOLE}$$

WET MOLECULAR WEIGHT OF FLUE GAS

$$Ms = (Md * Mfd) + (0.18 * \%H2O)$$

$$Ms = 29.16 * 0.881 + (0.18 * 11.9) = 27.84 \text{ LB/LB-MOLE}$$

ABSOLUTE FLUE GAS PRESSURE

$$Ps = Pbar + Pg / 13.6$$

$$Ps = 29.80 + (-0.1 / 13.6) = 29.79 \text{ IN. HG.}$$

AVERAGE FLUE GAS VELOCITY [Note: (Delta p)avg is square of avg sq. root]

$$vs = 85.49 * Cp * SQRT\left[\frac{(\text{Delta p})avg * (460 + ts)}{Ps * Ms}\right]$$

$$vs = 85.49 * 0.840 * SQRT\left[\frac{0.4280 * (460 + 168)}{29.79 * 27.84}\right] = 40.9 \text{ FT/SEC}$$

DRY VOLUMETRIC FLUE GAS FLOW RATE @ STANDARD CONDITIONS

$$Qsd = \frac{60}{144} * Mfd * vs * A * \frac{Tstd}{ts + 460} * \frac{Ps}{Pstd}$$

$$Qsd = \frac{60}{144} * 0.881 * 40.9 * 1,728.0 * \frac{528}{168 + 460} * \frac{29.79}{29.92}$$

$$Qsd = 21,710 \text{ SCFM}$$

WET VOLUMETRIC STACK GAS FLOW RATE @ FLUE GAS CONDITIONS

$$Qaw = 60 / 144 * vs * A$$

$$Qaw = 60 / 144 * 40.9 * 1,728.0 = 29,433 \text{ ACFM}$$

PERCENT ISOKINETIC OF SAMPLING RATE

$$\%I = \frac{Pstd}{Tstd} * \frac{100}{60} * \frac{(ts + 460) * Vm(std)}{Ps * vs * Mfd * Theta * \text{Area-nozzle, sq.ft.}}$$

$$\%I = \frac{29.92}{528} * \frac{100}{60} * \frac{(168 + 460) * 60.866}{29.79 * 40.9 * 0.881 * 63.00 * 0.0005208}$$

$$\%I = 102.4 \ \%$$

GRAINS PER DRY STANDARD CUBIC FOOT

$$gr/DSCF = \frac{7000}{453.592} * \frac{mgs}{Vm(std)}$$

$$gr/DSCF = \frac{7000}{453.592} * \frac{9.5}{60.866} = 0.0024 \text{ gr/DSCF}$$

POUNDS PER HOUR

$$Lb/Hr = 60 / 7000 * gr/DSCF * Qsd$$

$$Lb/Hr = 60/7000 * 0.0024 * 21,710 = 0.45 \text{ LB/HR}$$

APPENDIX B.1

B. FIELD AND ANALYTICAL DATA

1. Particulate

Preliminary Field Data

PLANT NAME ALLIANCE CONTRACTING CORP.

LOCATION DURHAM, NC

SAMPLING LOCATION BAGHOUSE OUTLET STACK

DUCT DEPTH
FROM INSIDE FAR WALL TO OUTSIDE OF PORT 50"

NIPPLE LENGTH 2"

DEPTH OF DUCT 48

WIDTH (RECTANGULAR DUCT) 36

EQUIVALENT DIAMETER:

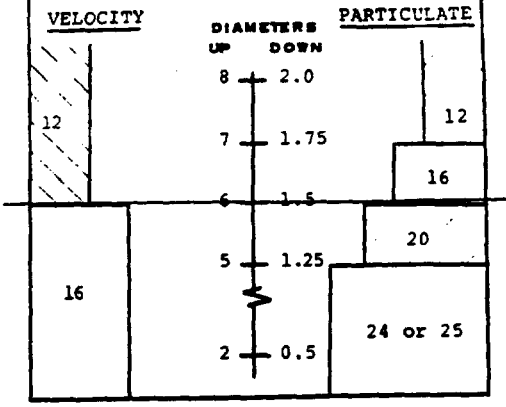
$$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(48)(36)}{(48 + 36)} = 41.14$$

DISTANCE FROM PORTS TO NEAREST FLOW DISTURBANCE	UPSTREAM	DOWNSTREAM
	21'	5'
DIAMETERS	6.15	1.46

STACK AREA= 48" X 36" = 1728 IN^2

DRAW HORIZONTAL LINE THROUGH DIAMETERS

If more than 8 and 2 diameters and if duct dia. is less than 24", use 8 or 9 points.



Point	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	8.3	4"	6"
2	25.0	12	14
3	41.7	20	22
4	58.3	28	30
5	75.0	36	38
6	91.7	44	46
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

LOCATION OF TRAVERSE POINTS IN RECTANGULAR STACKS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

Plant Name Alliance Construction Contracting

Sampling Location Baghouse stack Fuel Type

Run and/or Sample No. 3 Leak Test? ✓ Date 5/26/88 Operator WSN

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
11:05	15:50	3.1	19.8	—	16.7	—	
—	—	3.1	19.8	—	16.7	—	
12:20	16:05	3.0	19.8	—	16.8	—	
	Avg.	3.1		Avg.	16.7	—	80.2

Run and/or Sample No. Leak Test? Date Operator

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
	Avg.			Avg.			

Run and/or Sample No. Leak Test? Date Operator

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
	Avg.			Avg.			

PARTICULATE FIELD DATA

COMPANY NAME Alliance Contracting Corp. Construction
ADDRESS Durham NC
SAMPLING LOCATION Baghouse Stack
DATE 5/26/88 TEAM LEADER WSN TECHNICIANS JWM
BAROMETRIC PRESSURE, IN. HG 29.8 STATIC PRESSURE, IN. H_2O -0.10
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 6
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.006 0.002

RUN NUMBER 1
TIME START 08:00
TIME FINISH 09:05

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- NA ORSAT SAMPLING SYSTEM
- NA TEDLAR BAG
- ✓ THERMOCOUPLE @ 146 °F

IDENTIFICATION NUMBERS

REAGENT BOX 241 NOZZLE 407 DIAMETER .309
METER BOX N.8 T/C READOUT F.6
UMBILICAL U.50 T/C PROBE 6.1
SAMPLE BOX 33 ORSAT PUMP NA
PROBE 5.11 TEDLAR BAG NA

FILTER #	TARE
E 6958	.4899

NOMOGRAPH SET-UP NOMOGRAPH # WSN

$\Delta H_@$ 1.69 C FACTOR 0.80
METER TEMP 75 STACK TEMP 150
% MOISTURE 14 REF. ΔP 0.28

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ORIFICE SETTING (ΔH), IN. H_2O ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 1	0/0	856.305	0.34	2.28	2.28	62	2	265	60	146	
2	3½	859.57	0.32	2.15	2.15	64	2	264	58	161	
3	7	862.58	0.29	1.92	1.92	67	2	264	58	164	
4	10½	865.22	0.26	1.72	1.72	69	2	264	58	165	
5	14	867.88	0.23	1.52	1.52	71	2	265	58	166	
6	17½	870.39	0.29	1.92	1.92	73	2	264	58	163	
B 1	21/0	873.08	0.52	3.39	3.39	74	3	263	58	169	
2	3½	876.74	0.52	3.39	3.39	79	3	263	58	171	
3	7	880.62	0.48	3.16	3.16	80	3	262	59	169	
4	10½	884.09	0.44	2.90	2.90	83	3	262	59	173	
5	14	887.57	0.44	2.90	2.90	84	3	262	60	173	
6	17½	890.99	0.48	3.16	3.16	85	3	262	60	170	
C 1	42/0	894.64	0.48	3.16	3.16	86	3	262	60	160	
2	3½	898.38	0.54	3.56	3.56	87	3	262	60	168	
3	7	902.63	0.58	3.85	3.85	89	3	262	60	172	
4	10½	906.11	0.58	3.85	3.85	90	4	262	60	174	
5	14	910.11	0.54	3.56	3.56	90	3	262	60	178	
6	17½	913.92	0.52	3.39	3.39	91	3	262	60	178	
	63/OFF	917.661									

61.356	.428	2.877	79		168
V_M	$(\sqrt{\Delta P})^2$	ΔH	T_M		T_S

F-1010
8/86

EMITDDV

PARTICULATE FIELD DATA

COMPANY NAME Allegiance Constr. Corp. — RUN NUMBER 2
ADDRESS Durham, NC — TIME START 09:32
SAMPLING LOCATION Roxboro Steam — TIME FINISH 10:37
DATE 5/26/88 — TEAM LEADER WSN — TECHNICIANS JWM
BAROMETRIC PRESSURE, IN. HG 29.8 — STATIC PRESSURE, IN. H_2O -0.13
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 6
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.002 0.005

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- NA ORSAT SAMPLING SYSTEM
- NA TEDLAR BAG
- ✓ THERMOCOUPLE @ 170 °F

IDENTIFICATION NUMBERS

REAGENT BOX 241 — NOZZLE ~~4684~~ 40 — DIAMETER .309
METER BOX N-8 — T/C READOUT F-6
UMBILICAL V-50 — T/C PROBE 6-3
SAMPLE BOX 22 — ORSAT PUMP NA
PROBE 5-2 — TEDLAR BAG NA

FILTER #	TARE
E6904	.4918
E6994	

NOMOGRAPH SET-UP — NOMOGRAPH # WSN

$\Delta H_@$ 1.69 — C FACTOR 0.83
METER TEMP 90 — STACK TEMP 165
% MOISTURE 13 — REF. ΔP 0.28

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ORIFICE SETTING (ΔH), IN. H_2O ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
C 1	0/0	917.962	0.52	3.42	3.42	75	3	250	62	158	
2	3½	921.74	0.55	3.65	3.65	76	3	256	60	165	
3	7	925.58	0.58	3.85	3.85	79	4	260	60	170	
4	10½	929.63	0.58	3.85	3.85	81	4	262	60	171	
5	14	933.56	0.55	3.65	3.65	83	4	263	59	171	
6	17½	937.46	0.50	3.35	3.35	85	4	263	60	171	
B 1	21/0	941.05	0.48	3.18	3.18	84	4	265	60	169	
2	3½	944.68	0.48	3.18	3.18	86	4	265	60	170	
3	7	948.58	0.42	2.79	2.79	87	4	266	60	171	
4	10½	952.00	0.40	2.65	2.65	88	4	266	60	171	
5	14	955.29	0.42	2.79	2.79	89	4	266	60	171	
6	17½	958.56	0.48	3.18	3.18	90	4	266	60	171	
A 1	42/0	962.45	0.34	2.28	2.28	88	3	264	60	169	
2	3½	965.72	0.31	2.09	2.09	90	3	264	61	171	
3	7	968.74	0.28	1.84	1.84	90	3	264	62	173	
4	10½	971.37	0.28	1.84	1.84	90	3	264	62	173	
5	14	974.30	0.26	1.72	1.72	90	3	264	62	170	
6	17½	976.89	0.34	2.28	2.28	90	3	264	62	167	
	63/OFF	979.936									

V_M	$(\sqrt{\Delta P})^2$	ΔH	T_M		T_S
61.974	.4249	2.866	86		170

F-1010
8/86

ENTRODY

PARTICULATE FIELD DATA

COMPANY NAME Alliance Contr. Corp. RUN NUMBER 3
ADDRESS Durham, NC TIME START 11:05
SAMPLING LOCATION Raghouse 5th. TIME FINISH 12:20
DATE 5/26/88 TEAM LEADER WSN TECHNICIANS JWM
BAROMETRIC PRESSURE, IN. HG 29.8 STATIC PRESSURE, IN. H_2O -0.14
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 6
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.005 0.000

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE @ 172 °F

IDENTIFICATION NUMBERS

REAGENT BOX 241 NOZZLE 407 DIAMETER .309
METER BOX N-8 T/C READOUT F-6
UMBILICAL U-50 T/C PROBE 6-1
SAMPLE BOX 33 ORSAT PUMP 4
PROBE 5-11 TEDLAR BAG 21

FILTER #	TARE
E 7167	.4872

NOMOGRAPH SET-UP NOMOGRAPH # WSN

$\Delta H_@$ 1.69 C FACTOR 0.83
METER TEMP 90 STACK TEMP 165
% MOISTURE 13 REF. ΔP 0.28

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ORIFICE SETTING (ΔH), IN. H_2O ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 1	0/6	980.932	0.28	1.84	1.84	82	2	248	62	172	
2	3½	983.72	0.28	1.84	1.84	81	2	252	62	173	
3	7	986.55	0.25	1.68	1.68	82	2	256	60	176	
4	10½	988.99	0.26	1.72	1.72	84	2	256	60	177	
5	14	991.64	0.28	1.84	1.84	85	3	256	60	177	
6	17½	994.40	0.34	2.26	2.26	87	3	260	60	175	
B 1	21/6	997.50	0.43	2.86	2.86	87	3	260	60	170	
2	3½	1001.03	0.44	2.90	2.90	89	3	260	62	174	
3	7	4.50	0.42	2.79	2.79	91	4	262	62	173	
4	10½	8.35	0.44	2.90	2.90	93	4	263	62	171	
5	14	11.40	0.42	2.79	2.79	93	4	265	62	170	
6	17½	14.88	0.48	3.18	3.18	94	4	265	62	170	
C 1	42/6	18.57	0.44	2.90	2.90	93	4	265	63	170	
2	3½	22.09	0.50	3.35	3.35	94	4	266	64	174	DOWN 11:54
3	7	25.80	0.52	3.42	3.42	90	4	266	64	173	RE. START 12:03
4	10½	29.70	0.52	3.42	3.42	91	4	266	64	182	
5	14	33.68	0.54	3.56	3.56	93	4	264	64	181	
6	17½	37.43	0.48	3.18	3.18	94	4	264	64	177	
	63/OFF	1041.026									

60.094 .4006 2.691 89 174
V_M $(\sqrt{\Delta P})^2$ ΔH T_M T_S

F-1010
8/86

PARTICULATE SAMPLING LABORATORY RESULTS

Plant Name: ALLIANCE EEI Ref# 5911

Sampling Location: Baghouse Stack

Date Received: 5/27 Date Analyzed: 5/31 Reagent Box(es): 0241

Run Number	1	2	3
Run Date	5/26	5/26	5/26
Sample ID/Container #	F&R 2083	F&R 2103	F&R 2137
	97.6424	97.7653	98.7799
	97.6428	97.7655	98.7799
Tare Weight., g.	97.1426	97.2641	98.2837
SAMPLE WT., g.	0.4998	0.5012	0.4962
Sample ID/Container #			
Tare Wt., g.	0.0000	0.0000	0.0000
SAMPLE WT., g.	0.0000	0.0000	0.0000
Sum of Particulate, mg.	499.8	501.2	496.2
Total Filter Tare, mg.	489.9	491.8	487.2
Blank Residue, mg.	0.4 (200 ml)	0.4 (175 ml)	0.4 (200 ml)
TOTAL PARTICULATE CATCH, mg.	9.5	9.0	8.6

Blank Beaker # 2003
Final wt., mg. 99546.3
Tare wt., mg. 99545.9
Residue, mg. 0.4
Volume, ml. 200

Concentration, mg/ml 0.002

---Legend---
= Final Weight
L = Loose Particulate
F = Filter D = Dish
R = Rinse P = Pan

Notes and Comments

ENTROPY

MOISTURE SAMPLING LABORATORY RESULTS

Plant Name: ALLIANCE EEI Ref# 5911

Sampling Location: Baghouse Stack

Date Received: 5/27 Date Analyzed: 5/27 Reagent Box(es): 0241

Run Number	1	2	3
Run Date	5/26	5/26	5/26
ANALYSIS OF MOISTURE CATCH			
Reagent 1 (H2O)			
Final Weight, g.	350.0	337.0	340.0
Tared Weight, g.	200.0	200.0	200.0
Water Catch,g.	150.0	137.0	140.0
Reagent 2 ( )			
Final Weight, g.			
Tared Weight, g.			
Water Catch,g.	0.0	0.0	0.0
Reagent 3 ( )			
Final Weight, g.			
Tared Weight, g.			
Water Catch,g.	0.0	0.0	0.0
CONDENSED WATER, g.	150.0	137.0	140.0
Silica Gel:			
Final Weight, g.	224.0	232.0	232.5
Tared Weight, g.	200.0	200.0	200.0
ADSORBED WATER, g.	24.0	32.0	32.5
TOTAL WATER COLLECTED, g.	174.0	169.0	172.5

CUSTODY SHEET FOR REAGENT BOX # 0241

Date of Makeup 5/12 Initials MSN Locked? ✓

Individual Tare of Reagent: 200 mls. of H_2O

Individual Tare of Reagent: _____ mls. of _____

Individual Silica Gel Tare Weight 200 gms.

PLANT NAME Alliance Construction

SAMPLING LOCATION Baghouse Stack

Run Number	Date Used	Initials	Locked?	Date Cleanup	% S. Gel Spent	Initials	Locked?
1	5/26/88	WSN	✓	5/26/88	.70	WSN	✓
2	5/26/88	WSN	✓	5/26/88	.70	WSN	✓
3	5/26/88	WSN	✓	5/26/88	.70	WSN	✓

Received in Lab Date 5/27 Initials SAW Locked? ✓

Zero & Span Balance Initials ✓

Sampling Method: M-5

Filter #	Tare Weight (grams)	Used on Test
E6958	.4899	1
E6994	.4918	2
E7176	.4872	3

Remarks:

ENTROPY ENVIRONMENTALISTS, INC.

APPENDIX B.2

B. FIELD AND ANALYTICAL DATA

2. Plume Opacity

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Paul Mixon

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

Thomas H Rose
President

Willie S Lee
Vice President

David Savage
Program Manager

219467
Certificate Number

Orlando
Location

March 9, 1988
Date of Issue

VISIBLE EMISSION OBSERVATION FORM

No. 002

COMPANY NAME: Alliance Construction Corp		
STREET ADDRESS: Plum Ave		
CITY: Durham	STATE: N.C.	ZIP:
PHONE (KEY CONTACT):	SOURCE ID NUMBER:	

PROCESS EQUIPMENT: Asphalt Rotary Kiln	OPERATING MODE: Running
CONTROL EQUIPMENT: Bag house	OPERATING MODE: Running

DESCRIBE EMISSION POINT: 3'x4' Baghouse stack

HEIGHT ABOVE GROUND LEVEL: 28'	HEIGHT RELATIVE TO OBSERVER: Start 23' End 23'
DISTANCE FROM OBSERVER: Start 180' End 180'	DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start No visible Emissions End

EMISSION COLOR: Start No visible emissions End No visible emissions	IF WATER DROPLET PLUME: Attached ( ) Detached (✓)

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 1' Above stack opening End 1' Above stack opening

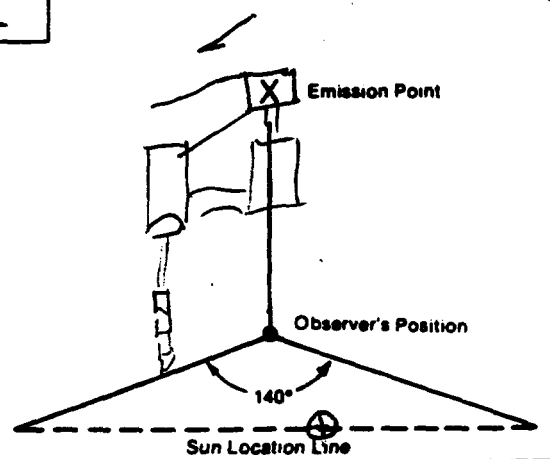
DESCRIBE PLUME BACKGROUND: Start Clear Sky End clear sky

BACKGROUND COLOR: Start Blue Sky End Blue Sky	SKY CONDITIONS: Start Clear End Clear
WIND SPEED: Start 3-5 End 3-5 mph	WIND DIRECTION: Start N End N
AMBIENT TEMP: Start 52°F End 53°F	WET BULB TEMP: 44°F; RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION: Visible emissions Light brown when Seen Slant Angle 7°

OBSERVATION DATE	START TIME	END TIME
5-26-88	0829	0859

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	5	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	5	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	5	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): Paul A. Minor	
OBSERVER'S SIGNATURE: Paul Minor	DATE: 5-26-88
ORGANIZATION: Eastern Technical Assoc.	
CERTIFIED BY: Eastern Technical Associates	DATE: 3-9-88

CONTINUED ON VEO FORM NUMBER: 003

VISIBLE EMISSION OBSERVATION FORM

No. 001

COMPANY NAME: Alliance Construction Corp

STREET ADDRESS: Plum Ave

CITY: Durham | STATE: N.C. | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Kiln | OPERATING MODE: Running

CONTROL EQUIPMENT: Bag house | OPERATING MODE: Running

DESCRIBE EMISSION POINT: Bag house stack 4' x 3'

HEIGHT ABOVE GROUND LEVEL: 28' | HEIGHT RELATIVE TO OBSERVER: Start 23' End 23'

DISTANCE FROM OBSERVER: Start 180' End 180' | DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start No visible Emissions End No visible Emissions

EMISSION COLOR: Start — End — | IF WATER DROPLET PLUME: Attached [ ] Detached [✓]

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 1' Above Stack End 1' Above Stack

DESCRIBE PLUME BACKGROUND: Start Blue sky End Blue sky

BACKGROUND COLOR: Start Blue End Blue | SKY CONDITIONS: Start Clear End Clear

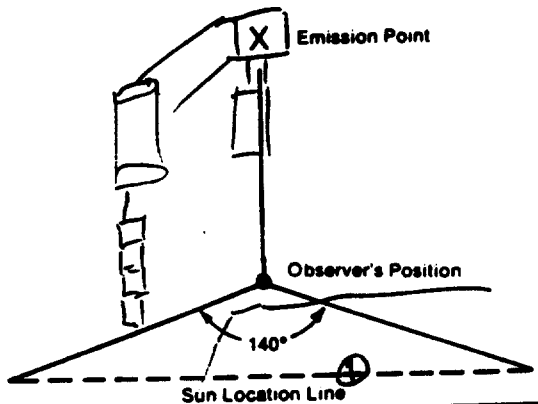
WIND SPEED: Start 4-7 mph End 4-7 mph | WIND DIRECTION: Start N End N

AMBIENT TEMP: Start 50°F End 51°F | WET BULB TEMP: 43°F | RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION

Stack Angle 70°

OBSERVATION DATE: 5-26-88 | START TIME: 0759 | END TIME: 0929

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	5	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): Paul Anthony Minor

OBSERVER'S SIGNATURE: Paul Minor | DATE: 5-26-88

ORGANIZATION: Eastern Technical Associates

CERTIFIED BY: Eastern Technical Assoc | DATE: 3/9/88

CONTINUED ON VEO FORM NUMBER: 002

EVALUATOR Penelope Weiden EVALUATION DATE 5-6-93

B

METHOD 5: SECONDARY EMISSIONS TEST REPORT EVALUATION

AGENCY: NC FACILITY: Alliance Contracting Corp. TEST DATE: 5-26-88

PROCESS TESTED (SCC): control Device → No Spec's Avail.

Rotary Dryer Stack, Baghouse → stack → Atmosphere

TEST RESULTS/PROCESS RATES/EMISSION FACTOR RATINGS:

	Emission Rate (lb/hr)	Emission Factor (lb/Ton)
1	0.4482	0.00256
2	0.4247	0.00243
3	0.4052	0.00232
Avg	0.4260	0.00243

PROCESS RATE 3
is process rate during testing representative of normal operations

175 tph

FLOW/STREAM ANALYSIS 3
Methods 1-4 or equivalent (including traverse and port illustrations, cyclonic flow determination, MW and moisture calculations) performed to allow calculation of emission rates at standard conditions

1 ✓ 3 ports 6 pts/port
2 VH✓, SP✓, AP✓, T✓ MW✓, A✓
3 CO_2, O_2 ✓
4 ✓

FIELD DATA 3
is field data on standard forms, and does raw data correspond with printout

SAMPLING DURATION 3
must have at least 3 runs, each ≥ 1 hour ✓ duration, with sampling ≥ 2 minutes at each ✓ traverse point, and total sampling volume ≥ 30 dscf ✓

3.5 min/pt

SAMPLING TEMPERATURE 3
both probe and filter must be maintained at 248 ± 25°F or other temperature specified in NSPS

ISOKINETICS 3
within 100±10% for all runs

BACK-HALF N/A
if any, what method was used to catch and recover condensible matter

Filterable only

EQUIPMENT 2
borosilicate glass probe liner, quartz fiber filter

CALIBRATION were both pre- and post-test calibrations performed for 3

meter box ✓ ✓

pitot tube 3

temperature sensor 3

nozzle (3 #) 3

LEAK CHECKS 3
pretest optional; post-test, conducted at vacuum ≥ highest sampling vacuum, leakage rate < 0.02 cfm or 4% of average sampling rate

BLANKS 3
acetone blank analyzed, < 0.001% residue

$0.002\ \frac{mg}{ml} \cdot \frac{cm^3}{.791\ g} \cdot \frac{10^6\ ml}{10^6\ cm^3} \cdot \frac{g}{1000\ mg} = 2.53 \times 10^{-6}$

SAMPLE PREP 3
filter desiccation and tare weights documented ✓ ✓

VISIBLE EMISSION OBSERVATION FORM

No. 003

COMPANY NAME: Alliance Construction Corp

STREET ADDRESS:

CITY: Durham | STATE: N.C. | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Rotary Kiln | OPERATING MODE: Running

CONTROL EQUIPMENT: Bag house | OPERATING MODE: Running

DESCRIBE EMISSION POINT: Bag house stack 4'x3'

HEIGHT ABOVE GROUND LEVEL: 28' | HEIGHT RELATIVE TO OBSERVER: Start 23' End 23'

DISTANCE FROM OBSERVER: Start 180' End 180' | DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start No visible Emissions End No visible emissions

EMISSION COLOR: Start NONE End NONE | IF WATER DROPLET PLUME: Attached [ ] Detached [✓]

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 1' Above stack End 1' Above stack

DESCRIBE PLUME BACKGROUND: Start Clear Sky End Clear Sky

BACKGROUND COLOR: Start Blue End Blue | SKY CONDITIONS: Start Clear End Clear

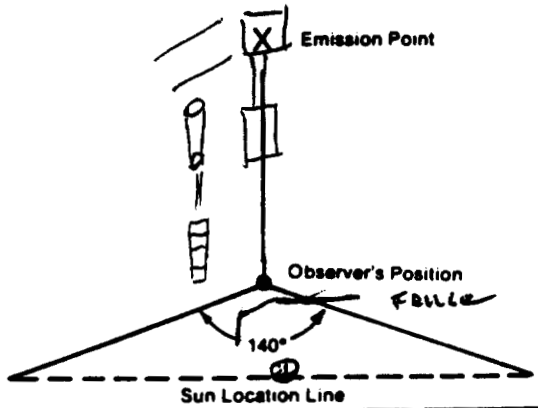
WIND SPEED: Start 3-5 mph End 3-5 mph | WIND DIRECTION: Start N End N

AMBIENT TEMP: Start 54°F End 54°F | WET BULB TEMP: 49°F | RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION

Slant Angle 7°

OBSERVATION DATE: 5-26-88 | START TIME: 0859 | END TIME: 0905

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0			End of Test
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT): Paul A. Minor

OBSERVER'S SIGNATURE: Paul Minor | DATE: 5-26-88

ORGANIZATION: Eastern Technical Associates

CERTIFIED BY: Eastern Technical Associates | DATE: 5-26-88

CONTINUED ON VEO FORM NUMBER:

Test 2 - 21

VISIBLE EMISSION OBSERVATION FORM

No. 004

COMPANY NAME: Alliance Construction Corp		
STREET ADDRESS: 311 Plum st.		
CITY: Durham	STATE: N.C.	ZIP:
PHONE (KEY CONTACT):	SOURCE ID NUMBER:	

PROCESS EQUIPMENT: Rotary Kiln	OPERATING MODE: Running
CONTROL EQUIPMENT: Bag house	OPERATING MODE: Running

DESCRIBE EMISSION POINT: 3' x 4' Bag house stack

HEIGHT ABOVE GROUND LEVEL: 28'	HEIGHT RELATIVE TO OBSERVER: Start 23' End 23'
DISTANCE FROM OBSERVER: Start 180' End 180'	DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start NO Visible Emissions End No visible Emissions

EMISSION COLOR: Start None End	IF WATER DROPLET PLUME: Attached ☐ Detached ☑

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 3' Above Stack opening End 3' Above Stack opening

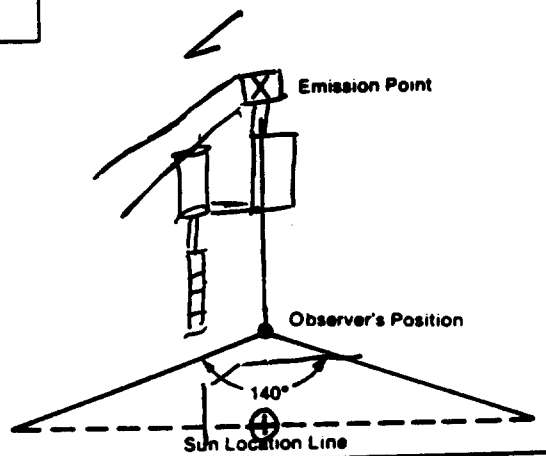
DESCRIBE PLUME BACKGROUND: Start Clear Sky End Clear Sky

BACKGROUND COLOR: Start Blue End Blue	SKY CONDITIONS: Start Clear End clear
WIND SPEED: Start 3-5 mph End 3-5 mph	WIND DIRECTION: Start N End N
AMBIENT TEMP: Start 56°F End 57°F	WET BULB TEMP: 49°F; RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE	START TIME	END TIME
5-26-88	0930	1000

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	5	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): Paul A. Minor	
OBSERVER'S SIGNATURE: Paul Minor	DATE: 5-26-88
ORGANIZATION: Eastern Technical Associates	
CERTIFIED BY: Eastern Technical Assoc.	DATE: 3-9-88

CONTINUED ON VEO FORM NUMBER: 005

Test #2 - 23

VISIBLE EMISSION OBSERVATION FORM

No. 006

COMPANY NAME: Alliance Construction Corp

STREET ADDRESS: 311 Plum St

CITY: Durham | STATE: N.C. | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Rotary Kiln | OPERATING MODE: Runny

CONTROL EQUIPMENT: Bag house | OPERATING MODE: Running

DESCRIBE EMISSION POINT: 3' x 4' Bag house stack

HEIGHT ABOVE GROUND LEVEL: 28' | HEIGHT RELATIVE TO OBSERVER: Start 20' End 20'

DISTANCE FROM OBSERVER: Start 180' End 180° | DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start No visible emissions End No visible emissions

EMISSION COLOR: Start None End None | IF WATER DROPLET PLUME: NO Attached ☐ Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 3' Above stack opening End 3' Above stack opening

DESCRIBE PLUME BACKGROUND: Start Blue sky End Blue sky

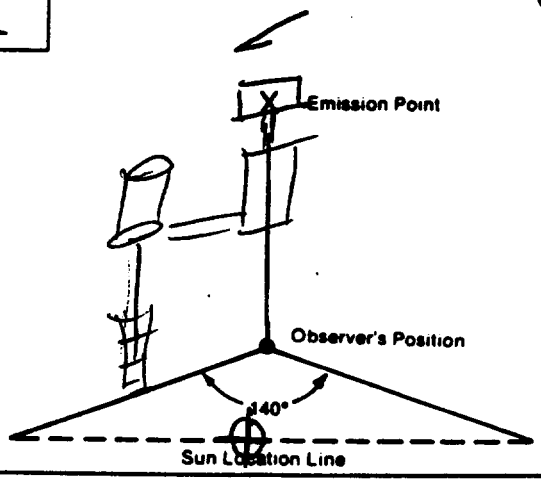
BACKGROUND COLOR: Start Blue End Blue | SKY CONDITIONS: Start Clear End Clear

WIND SPEED: Start 3-5 mph End 3-5 mph | WIND DIRECTION: Start NE End NE

AMBIENT TEMP: Start 59°F End 59°F | WET BULB TEMP: 46°F | RH, percent:

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION: 4° Slant Angle

OBSERVATION DATE	START TIME	END TIME
5-26-88	10:30	1038

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0				End of Test
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT): Paul A. Minor

OBSERVER'S SIGNATURE: Paul Minor | DATE: 5-26-88

ORGANIZATION: Eastern Technical Associates

CERTIFIED BY: Eastern Technical Associates | DATE: 3-9-88

CONTINUED ON VEO FORM NUMBER:

VISIBLE EMISSION OBSERVATION FORM

Test # 3 - 24
No. 007

COMPANY NAME: Alliance Construction Corp		
STREET ADDRESS: 311 Plum St.		
CITY: Durham	STATE: N.C.	ZIP:
PHONE (KEY CONTACT):	SOURCE ID NUMBER:	

PROCESS EQUIPMENT: Rotary Kiln	OPERATING MODE: Running
CONTROL EQUIPMENT: Bag house	OPERATING MODE: Running

DESCRIBE EMISSION POINT: 3'x4' Bag house stack

HEIGHT ABOVE GROUND LEVEL: 28'	HEIGHT RELATIVE TO OBSERVER: Start 20' End 20'
DISTANCE FROM OBSERVER: Start 180' End 180'	DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start NONE End NONE

EMISSION COLOR: Start NONE End NONE	IF WATER DROPLET PLUME NO: Attached [ ] Detached [ ]

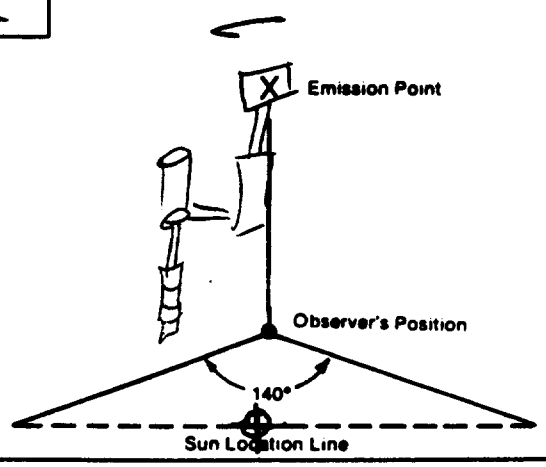
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 3' Above stack opening End 3' Above stack opening

DESCRIBE PLUME BACKGROUND: Start Clear Sky End Clear Sky

BACKGROUND COLOR: Start Blue End Blue	SKY CONDITIONS: Start clear End Clear
WIND SPEED: Start 4-7 End 3-5	WIND DIRECTION: Start NE End NE
AMBIENT TEMP: Start 62°F End	WET BULB TEMP: 54°F / RH, percent:

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION: 4° start Angle

OBSERVATION DATE	START TIME	END TIME
5-26-88	1103	1133

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): Paul A. Minor	
OBSERVER'S SIGNATURE: Paul Minor	DATE: 5-26-88
ORGANIZATION: Eastern technical Associates	
CERTIFIED BY: Eastern Technical Associates	DATE: 3-9-88

CONTINUED ON VEO FORM NUMBER: 008

Test 3 - 25

VISIBLE EMISSION OBSERVATION FORM

No. 008

COMPANY NAME: Alliance Construction Corp.

STREET ADDRESS: 311 Plum St.

CITY: Durham | STATE: N.C. | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Rotary Kiln Asphalt | OPERATING MODE: Running

CONTROL EQUIPMENT: Bag house | OPERATING MODE: Running

DESCRIBE EMISSION POINT: 3'x 4' Bag house stack

HEIGHT ABOVE GROUND LEVEL: 28' | HEIGHT RELATIVE TO OBSERVER: Start 20' End 20'

DISTANCE FROM OBSERVER: Start 180' End 180' | DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start NONE End NONE

EMISSION COLOR: Start NONE End | IF WATER DROPLET PLUME: NO — Attached [ ] Detached [ ]

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 3' Above Stack Opening End 3' Above Stack opening

DESCRIBE PLUME BACKGROUND: Start Clear sky End Clear sky

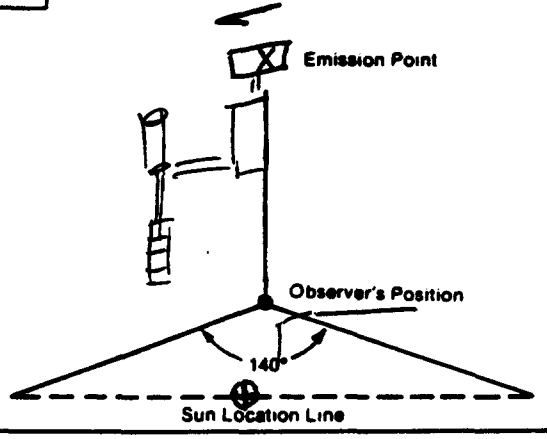
BACKGROUND COLOR: Start Blue End Blue | SKY CONDITIONS: Start Clear End Clear

WIND SPEED: Start 4-7 mph End 4-7 | WIND DIRECTION: Start NE End NE

AMBIENT TEMP: Start 64°F End 65°F | WET BULB TEMP: 58°F | RH, percent:

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION: 4° slant Angle

OBSERVATION DATE	START TIME	END TIME
5-26-88	1133	1213

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0*	0	0	1154 Stop
21	0	0	0	0	*1202 START
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): Paul A. Minor

OBSERVER'S SIGNATURE: Paul Minor | DATE: 5-26-88

ORGANIZATION: Eastern Technical Associates

CERTIFIED BY: Eastern Technical Associates | DATE: 3-9-88

CONTINUED ON VEO FORM NUMBER: 0 0 9

Test #5 & 6

VISIBLE EMISSION OBSERVATION FORM

No. 509

COMPANY NAME: Alliance Construction Corp.

STREET ADDRESS: 311 Plum St

CITY: Durham | STATE: N.C. | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Rotary kiln | OPERATING MODE: Running

CONTROL EQUIPMENT: Bag house | OPERATING MODE: Running

DESCRIBE EMISSION POINT: 3'x4 Bag house stack

HEIGHT ABOVE GROUND LEVEL: 28' | HEIGHT RELATIVE TO OBSERVER: Start 20' End 20'

DISTANCE FROM OBSERVER: Start 180' End 180' | DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start No visible Emissions End No visible emissions

EMISSION COLOR: Start None End None | IF WATER DROPLET PLUME: NO | Attached [ ] Detached [ ]

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 3' Above stack opening End 3' Above stack opening

DESCRIBE PLUME BACKGROUND: Start Clear sky End Clear sky

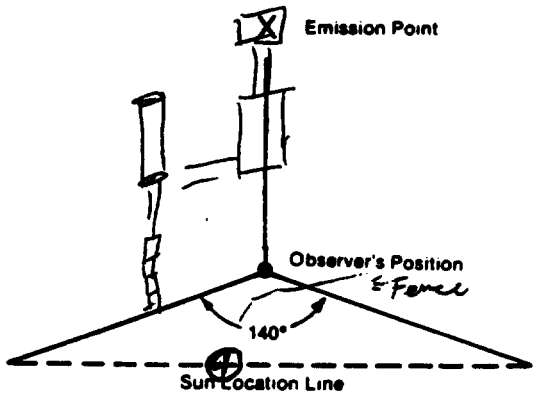
BACKGROUND COLOR: Start Blue End Blue | SKY CONDITIONS: Start Clear End Clear

WIND SPEED: Start 3-5 mph End 3-5 mph | WIND DIRECTION: Start NE End NE

AMBIENT TEMP: Start 66°F End 66°F | WET BULB TEMP: 62°F | RH, percent:

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION: 40° slant Angle

OBSERVATION DATE	START TIME	END TIME
5-26-88	1213	1221

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
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29					
30					

OBSERVER'S NAME (PRINT): Paul A. Minor

OBSERVER'S SIGNATURE: Paul Minor | DATE: 5-26-88

ORGANIZATION: Eastern Technical Associates

CERTIFIED BY: Eastern Technical Associates | DATE: 3-7-88

CONTINUED ON VEO FORM NUMBER:

APPENDIX C

CALIBRATION DATA

QUALITY ASSURANCE PROCEDURES

General. Each item of field test equipment purchased or constructed by Entropy is assigned a unique, permanent identification number. New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or with time is inspected in the field before testing begins, and again upon return from each field use. When an item of equipment is found to be out of calibration, it is adjusted and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner and at a frequency which meet or exceed U. S. EPA specifications. Entropy follows the calibration procedures outlined in EPA Reference Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When the Reference Methods are inapplicable, Entropy uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy by the Quality Assurance Manager or the Quality Assurance Director. Data reduction and subsequent calculations are performed using Entropy's in-house computer facilities. Calculations are generally performed at least twice as a check for accuracy. Copies of calibration data are included in the test or project reports.

Inspection and Maintenance. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary.

Each item of equipment transported to the field for this test program was inspected again before being packed. Entropy performs these quality assurance activities prior to departure for the job site to detect equipment problems which may originate during periods of storage. This minimizes lost time on site due to equipment failure.

Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, Entropy routinely transports sufficient backup equipment to the job site to have complete redundancy of all critical sampling train components.

Calibration. Emissions sampling equipment that requires calibration includes the nozzle, pitot tube, pressure gauges, thermometers, flow meters, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by Entropy for these items of equipment. Calibration data for the specific items of equipment used for this test program follow the text.

Nozzles. Each probe nozzle is uniquely and permanently identified at the time of purchase, and calibrated before initial field use. The inside diameter of the nozzle is measured to the nearest 0.001 in. using a micrometer. Five measurements are made using different diameters each time. If the difference between the high and the low numbers does not exceed 0.004 inch, the average of the five measurements is used. If the difference exceeds this amount, or when the nozzle becomes nicked, dented, or corroded, the nozzle is reshaped, sharpened, and recalibrated.

Pitot Tubes. All Type S pitot tubes used by Entropy, whether separate or attached to a sampling probe, are constructed in-house or by Nutech Corporation. Each pitot is calibrated when new in accordance with the geometry standards contained in EPA Reference Method 2. A Type S pitot tube, constructed and positioned according to these standards, will have a coefficient of 0.84 $\pm$ 0.02. This coefficient should not change as long as the pitot tube is not damaged.

Each pitot tube is inspected visually before it is transported to the field. If this inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube is not used until it has been refurbished and recalibrated.

Differential Pressure Gauges. Some meter consoles used by Entropy are equipped with 10 in. W.C. inclined-vertical manometers. Fluid manometers

do not require calibration other than leak checks. Manometers are leak-checked in the field prior to each test series, and again upon return from the field.

Most of Entropy's meter consoles are equipped with Magnehelic differential pressure gauges. Each set of gauges is calibrated initially over its full range, 0-10 inches W.C. After each field use, the calibration of the gauge set is checked against an inclined manometer at the average delta p encountered during the test. If the agreement is within $\pm$ 5 percent, the calibration is acceptable.

Thermometers

Impinger Thermometer. On site, prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger is compared with a mercury-in-glass thermometer which meets ASTM E-1 specifications. The impinger thermometer is adjusted if necessary until it agrees within 2°F of the reference thermometer. (If the thermometer is not adjustable, it is labeled with a correction factor).

Dry Gas Meter Thermometer. The thermometer used to measure the temperature of the metered gas sample is checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within 5.4°F. Thermometers not meeting this requirement are adjusted or labeled with a correction factor.

Flue Gas Temperature Sensor. All thermocouples employed by Entropy for the measurement of flue gas temperatures are calibrated upon receipt. Initial calibrations are performed at three points (ice bath, boiling water, and hot oil). An ASTM mercury-in-glass thermometer is used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On site, prior to the start of testing, the reading from the stack gas thermocouple-potentiometer combination is compared with a mercury-in-glass reference thermometer. If the two agree within 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order for the test series.

After each field use, the thermocouple-potentiometer system is compared with an ASTM mercury-in-glass reference thermometer at a temperature within 10 percent of the average absolute flue gas temperature. If the absolute temperatures agree within 1.5 percent, the temperature data are considered valid.

Dry Gas Meter and Orifice. The dry gas meter and orifice are calibrated simultaneously. There are two calibration procedures. The full calibration is a complete laboratory procedure used to obtain the calibration factor of the dry gas meter before its first use and periodically thereafter. Full calibrations are performed at three different orifice settings (flow rates). A simpler procedure, the posttest calibration, is designed to check whether the calibration factor has changed. Posttest calibrations are performed after each field test series at an intermediate orifice setting (based on the test data) and at the maximum vacuum reached during the test.

Entropy uses as a transfer standard a dry gas meter that is calibrated annually against a spirometer. During the annual calibration, triplicate calibration runs are performed at seven flow rates ranging from 0.25 to 1.40 cfm.

Dry Gas Meter. Each metering system receives a full calibration at the time of purchase, and a posttest calibration after each field use. If the calibration factor, Y, deviates by less than five percent from the initial value, the test data are acceptable. If Y deviates by more than five percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Reference Method 5 calls for another full calibration anytime the posttest calibration check indicates that Y has changed by more than five percent. Standard practice at Entropy is to recalibrate the dry gas meter anytime Y is found to be outside the range $0.98 \leq Y \leq 1.02$.

Orifice. An orifice calibration factor is calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.15 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration is used.

Barometer. Each field barometer is adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer is checked weekly against the station pressure value (corrected for elevation difference) reported by the National Weather Service station at the Raleigh-Durham airport, approximately 2.5 miles from Entropy's location.

Dry Gas Meter Identification: 6838323 Calibration by: N. Henderson

Date: 3-26-86 Barometric Pressure (P_b): 30.12 in. Hg

*Date: _____ *Barometric Pressure (P_b): _____ in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Approx. Flow Rate (Q) cfm	Spirometer Gas Volume (V_s) ft^3	Spirometer Temp. (t_s) °F	Dry Gas Meter Gas Volume (V_{ds}) ft^3	Dry Gas Meter Temp. (t_{ds}) °F	Pressure (Δp) in. H_2O	Time (θ) min.	Flow Rate (Q) cfm	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
0.3	2.924	82.4	2.906	81	0.40	10.0	0.2864	1.0026	
	2.969	82.8	2.869	81	0.40	10.0	0.2906	1.0304	
	3.652	83.3	3.501	81	0.40	10.0	0.3571	1.0377	
0.4	4.235	80.6	4.330	77	0.85	10.0	0.4125	0.9700	
	4.545	80.6	4.370	78	0.85	10.0	0.4427	1.0329	
	4.417	80.6	4.345	79	0.85	10.0	0.4302	1.0114	
0.5	5.328	78.8	5.206	75	1.10	10.0	0.5271	1.0135	
	5.383	79.7	5.212	77	1.15	10.0	0.5299	1.0248	
	5.301	79.7	5.166	78	1.15	10.0	0.52A	1.020	
0.8	8.288	81	8.216	79	2.65	10.0	0.8067	0.9985	
	8.397	82	8.214	80	2.65	10.0	0.8158	1.0119	
	8.352	82.4	8.199	80	2.65	10.0	0.8108	1.0076	
1.0	10.638	83.3	10.442	81	4.15	10.0	1.040	1.0014	
	10.656	83.3	10.534	81.5	4.15	10.0	1.042	0.9981	
	10.528	83.3	10.450	81.5	4.15	10.0	1.0296	0.9941	

$$Y_{ds} = \frac{(V_s)\ (t_{ds} + 460)\ (P_b)}{(V_{ds})\ (t_s + 460)\ (P_b + (\ p\ /\ 13.6))}$$

$$Q = (17.64)\ \frac{(P_b)\ (V_s)}{(t_s + 460)\ (\theta)}$$

Dry Gas Meter Identification: _____ Calibration by: _____

Date: _____ Barometric Pressure (P_b): _____ in. Hg

*Date: _____ *Barometric Pressure (P_b): _____ in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Approx. Flow Rate (Q) cfm	Spirometer		Dry Gas Meter		Pressure (Δp) in. H_2O	Time (θ) min.	Flow Rate (Q) cfm	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
	Gas Volume (V_s) ft^3	Temp. (t_s) °F	Gas Volume (V_{ds}) ft^3	Temp. (t_{ds}) °F					
1.2	12.304	82.4	12.168	80	5.50	10.0	1.1945	0.9932	
	12.177	82.4	12.065	80	5.5	10.0	1.1821	0.9914	
	12.186	82.4	12.100	80	5.5	10.0	1.1830	0.9892	
1.3	13.698	82.4	13.494	79.5	6.85	10.0	1.3418	0.9931	
	13.552	82.4	13.505	80	6.85	10.0	1.3275	0.9826	
	13.752	81.5	13.712	80	7.0	10.0	1.3493	0.9833	

$\bar{Y}_{ds} = 1.0042$

$$Y_{ds} = \frac{(V_s)\,(t_{ds} + 460)\,(P_b)}{(V_{ds})\,(t_s + 460)\,(P_b + (\,p\,/\,13.6))}$$

$$Q = (17.64)\,\frac{(P_b)\,(V_s)}{(t_s + 460)\,(\theta)}$$

Dry Gas Meter Identification: 6838323 Calibration by: T. McDonald Page 1 of 2

Date: 2-26-88 Barometric Pressure (P_b): 29.26 in. Hg

*Date: 2-29-88 *Barometric Pressure (P_b): ~~29.74~~ 29.72 / 29.68 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Approx. Flow Rate (Q) cfm	Spirometer		Dry Gas Meter		Pressure (Δp) in. H_2O	Time (O) min.	Flow Rate (Q) cfm	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
	Gas Volume (V_s) ft^3	Temp. (t_s) °F	Gas Volume (V_{ds}) ft^3	Temp. (t_{ds}) °F					
	2.404	78.8	2.535	76	0.37	10:00	0.2303	0.9425	
	2.532	78.8	2.523	76.5	0.37	10:00	0.2426	0.9984	
	2.587	78.8	2.527	77	0.38	10:00	0.2478	1.0194	
	4.135	78.8	4.075	75	0.67	10:00	0.4026	1.0059	
	4.171	78.8	4.052	75	0.65	10:00	0.4061	1.0205	
	4.162	78.8	4.019	75.5	0.65	10:00	0.4052	1.0276	
	5.036	78.8	4.887	76	0.95	10:00	0.4824	1.0227	
	5.064	80.0	4.900	76	0.95	10:00	0.4840	1.0234	
	5.027	80.6	4.839	76	0.95	10:00	0.4800	1.0276	
	7.787	78.8	7.711	75	2.04	10:00	0.7582	0.9977	
	7.851	78.8	7.784	75	2.03	10:00	0.7644	1.0095	
	7.814	78.8	7.724	75	2.05	10:00	0.7608	0.9995	
	9.900	78.8	9.845	75	3.17	10:00	0.9639	0.9907	
	9.900	78.8	9.773	75	3.17	10:00	0.9639	0.9980	
	10.018	78.8	9.882	76	3.22	10:00	0.9754	1.0005	

$$Y_{ds} = \frac{(V_s)\ (t_{ds} + 460)\ (P_b)}{\quad}$$

$$O = (17.64)\ \frac{(P_b)\ (V_s)}{\quad}$$

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Dry Gas Meter Identification: 6838323 Calibration by: T. McDowell

Date: 2-26-88 Barometric Pressure (P_b): 29.26 in. Hg

*Date: 2-29-88 *Barometric Pressure (P_b): 29.74 / 29.72 / 29.68 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Approx. Flow Rate (Q) cfm	Spirometer Gas Volume (V_s) ft^3	Spirometer Temp. (t_s) °F	Dry Gas Meter Gas Volume (V_{ds}) ft^3	Dry Gas Meter Temp. (t_{ds}) °F	Pressure (Δp) in. H_2O	Time (θ) min.	Flow Rate (Q) cfm	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
	11.658	77.9	11.640	76.5	4.20	10:00	1.1362	0.9887	
	11.694	77.9	11.594	77	4.275	10:00	1.1397	0.9964	
	11.548	77.9	11.547	77	4.23	10:00	1.1240	0.9881	
	13.042	77.9	12.946	77	5.25	10:00	1.2694	0.9928	
	12.857	78.8	12.784	77.5	5.23	10:00	1.2487	0.9823	
	12.933	79.7	12.859	78	5.17	10:00	1.2546	0.9899	

$Y_{ds} = 1.001$

$$Y_{ds} = \frac{(V_s)\ (t_{ds} + 460)\ (P_b)}{\text{---------------------------------}}$$

$$Q = (17.64)\ \frac{(P_b)\ (V_s)}{\text{---------------}}$$

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Meter Box Number: N8 Calibration by: DB

Standard Meter Number: 6838323 Standard Meter Gamma: 1.0042

Date: 1-5-88 Barometric Pressure (P_b): 29.95 in. Hg

*Date: _____ *Barometric Pressure (P_b): _____ in. Hg

METERBOX CALIBRATION

Standard Meter			Meter Box Metering System				
Gas Volume (V_{ds}) ft^3	Temp. (t_{ds}) °F	Time (θ) min.	Orifice Setting (ΔH) in. H_2O	Gas Volume (V_d) ft^3	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H_@$ in. H_2O
4.015	66	10	0.50	4.199	85	0.9937	1.653
4.008	66	10	0.50	4.176	84	0.9956	1.662
8.127	66	10	2.10	8.364	86	1.0077	1.691
8.111	66	10	2.10	8.331	88	1.0134	1.691
12.162	66	10	4.80	12.321	91	1.0263	1.710
12.142	66	10	4.80	12.317	93	1.0286	1.709
					Average	1.0109	1.686

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + H/13.6)}$$

$$\Delta H_@ = \frac{0.0317 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \theta}{Y_{ds} * V_{ds}}\right]^2$$

Meter Box Number: N8 Calibration by: JG

Meter Box Vacuum: 4 in. Hg Job 5911 Alliance

Standard Meter Number: 683823 Standard Meter Gamma: 1.001

Date: 6-3-88 Barometric Pressure (P_b): 29.34 in. Hg

POST TEST CALIBRATION

Standard Meter			Meter Box Metering System				
Gas Volume (V_{ds}) ft^3	Temp. (t_{ds}) °F	Time (θ) min.	Orifice Setting (ΔH) in. H_2O	Gas Volume (V_d) ft^3	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H_@$ in. H_2O
9.376	74	10	2.80	9.502	91	1.012	1.77
9.384	74	10	2.80	9.533	94	1.015	1.76
9.399	74	10	2.80	9.521	97	1.023	1.75
					Average	1.016	1.76

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \Delta H/13.6)}$$

$$\Delta H_@ = \frac{0.0317 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \theta}{Y_{ds} * V_{ds}}\right]^2$$

ENTROPY

NOZZLE NUMBER: 407

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
11-30-82	ST	.321	.324	.322	.323	.322	0.322
4-18-83	PLO	.313	.316	.314	.313	.314	0.314
7-05-83	PH	.310	.312	.312	.313	.312	0.312
3-8-84	JNC	.312	.314	.312	.313	.312	0.313
7-9-84	JNC	.313	.312	.312	.313	.313	0.313
2-19-85	JDE	.308	.309	.308	.310	.310	0.309
2-13-86	JDE	.315	.317	.315	.314	.313	0.315
1/12/87	JE	.314	.312	.314	.316	.315	0.314
3/11/87	ST	.311	.315	.315	.312	.312	0.313
3-20-87	SH	.309	.313	.309	.313	.311	.311
4/21/87	JE	.308	.307	.308	.305	.305	.307
4/12/88	JE	.309	.308	.310	.310	.309	.309

NOTE: All diameters measured in inches.

APPENDIX D

SAMPLING AND ANALYTICAL PROCEDURES

Test #2 - 22

VISIBLE EMISSION OBSERVATION FORM

No. 005

COMPANY NAME: Alliance Construction Corp

STREET ADDRESS: 311 Plum st

CITY: Durham | STATE: N.C. | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Rotary kiln | OPERATING MODE: Running

CONTROL EQUIPMENT: | OPERATING MODE: Running

DESCRIBE EMISSION POINT: 4'x3' stack from Baghouse

HEIGHT ABOVE GROUND LEVEL: 28' | HEIGHT RELATIVE TO OBSERVER: Start 23' End 28'

DISTANCE FROM OBSERVER: Start 180' End 180' | DIRECTION FROM OBSERVER: Start NW End NW

DESCRIBE EMISSIONS: Start None End No visible Emissions

EMISSION COLOR: Start None End None | IF WATER DROPLET PLUME NO: Attached [ ] Detached [ ]

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 3' Above stack opening End 3' Above stack opening

DESCRIBE PLUME BACKGROUND: Start Clear Sky End Clear Sky

BACKGROUND COLOR: Start Blue End Blue | SKY CONDITIONS: Start Clear End Clear

WIND SPEED: Start 3-5 mph End 3-5 mph | WIND DIRECTION: Start NNE End NNE

AMBIENT TEMP: Start 53°F End 57°F | WET BULB TEMP: 45°F | RH, percent:

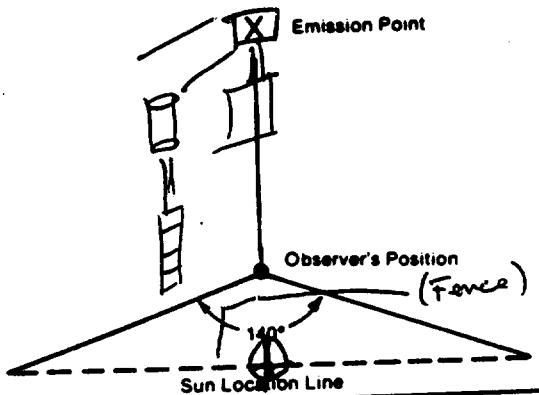
SOURCE LAYOUT SKETCH

Draw North Arrow

Stack with Plume

Sun

Wind



OBSERVATION DATE: 5-26-88 | START TIME: 1000 | END TIME: 1030

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	Position shift Due
23	0	0	0	0	To Truck (top of
24	0	0	0	0	10' pile Gravel)
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): Paul A. Minor

OBSERVER'S SIGNATURE: Paul Minor | DATE: 5-26-88

ORGANIZATION: Eastern Technical Associates

CERTIFIED BY: Eastern Technical Associates | DATE: 3/9/88

CONTINUED ON VEO FORM NUMBER: 006

ADDITIONAL INFORMATION

7° slant Angle