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.

NORTH CAROLINA DIVISION OF ENVIRONMENTAL MANAGEMENT

Air Quality Action Request

Computer _____

Name	Location	Reg/Co./Prem. No.
C. Nelson Sigmon Paving, Inc.	Conover/Catawba County	03/18/0336

Contact Randy Fox Telephone

Type Action: CI ___ EE ___ SR ___ PC ___ VE ___ PI ___ Other Initial Inspectic

Air Program Status 03 93 ___ ___ ___ Class A1A Chg ___

Action Requested By: Address/Phone Rec'd Date

Last Insp. Date ___ Action Date 5/27/87 Next Insp. Date 11/1/87

Permit # 6025 Issued 3/30/87 Expires 3/1/92 Stip. # ___ Met Y/N ___

Recommendations: | Signature B. Pittman Bernie Pittman | Date 6/3/87

Dist: Yellow (Central File) - Blue (Region) - White (Opt.) Specify ___

1. This plant is a drum mix asphalt plant.

2. The plant operates a No. 2 oil fired (63.8 MBTU maximum heat input) rotary drum mix asphalt facility.

3. Particulate and visible emissions are controlled by a fabric filter (5620 square feet of filter area).

4. The facility has been permitted.

5. The plant was seen in operation and visible emissions were between 0 and 5 percent opacity.

6. The operational start-up date was March 31, 1987. The plant is an NSPS source and was required to conduct a performance test within 60 days of maximum operation or 180 days of initial start-up.

7. This facility is considered to be in compliance by inspection. Results of the stack test should confirm compliance status.

/pb

NORTH CAROLINA DIVISION OF ENVIRONMENTAL MANAGEMENT

Air Quality Action Request

Computer _____

Name	Location	Reg/Co./Prem. No.
C. Nelson Sigmon Paving, Inc.	Conover/Catawba County	03/18/0836

Contact _____ Telephone _____

Type Action: CI ___ EE ___ SR ___ PC ___ VE ___ PI ___ Other Stack Test

Air Program Status _____ _____ _____ _____ _____ Class _____ Chg _____

Action Requested By: _____ Address/Phone _____ Rec'd Date _____

Last Insp. Date _____ Action Date 5/27/87 Next Insp. Date _____

Permit # _____ Issued _____ Expires _____ Stip. # _____ Met Y/N _____

Recommendations: _____

Signature Bernie Pittman B. Pittman Date 6/3/87

Dist: Yellow (Central File) - Blue (Region) - White (Opt.) Specify _____

Discussion: On May 27, 1987, the writer observed a stack test performed on a bagfilter exhaust which is installed on a drum mix asphalt plant. The stack test was performed as required by the NSPS regulation. The test was conducted by Entrophy Environmentalists Inc. of Research Triangle Park and appeared to be done in accordance with EPA method 5. Visible emissions during the first run were between 0 and 5 percent opacity. See attached AQ-92 and AQ-23.

/pb

SOURCE TEST
OBSERVERS CHECKLIST

N. C. Division of Environmental Management / Air Quality Section

Source Name: C. Nelson Sigmon Paving	Testing Firm: Entrophy
Address: Rt. 5 Box 10	Address: RTP, NC
Conover	
Plant Location: Conover	Phone:
Source Contact: Randy Fox	Test Engineer: Bob Bridges
Phone: 464-1 0328 office 464-8203 plant	Assistant:

Other Personnel Involved	Affiliation
Tom McDonald (VEI)	Entrophy
Kent Daeke	"

Process Description: Asphalt rotary dryer	Soot Blowing Parameters:
Process Rate During Test: 200 ton/hr	A = ____ Hr B = ____ Hr
Maximum Process Rate: 250 ton/hr	R = ____ Hr S = ____ Hr
Burner Sizes (Incin.) Pri: ____ Sec: ____	A = Hours of soot blowing during sample(s) B = Hours not soot blowing during sample(s) containing soot blowing R = Average hours of operation per 24 hours S = Average hours of soot blowing per 24 hours

TEST PARAMETERS

Duct Size: 43 x 52	Pollutant Sampled: Particulate
Distance Before Ports: 18'	E. P. A. Method No.: 5
Distance After Ports: 4'	If method differs from E. P. A. method, explain:
Number of Test Points: 25	
Number of Runs: 3	
Sampling Time Per Run (min.): 62.5	For Method 5 sampling train record ΔH@ 1.75 Y 0.9974

		Run #1	Run #2	Run #3
Leakage Rate (ft^3/min.) (0.02 ft^3/min. or less)		0.001	/	/
Time Started	24 hr. Clock	9:150		
Time Ended				
Test Date(s)		5/27/87	/ /	/ /

See Graph on Reverse Side For Number of Test Points. Use Reverse Side for Comments.	Request 2 Copies of Report Bob Bridges OBSERVERS SIGNATURE

AO-92 4/1/86 WCR

ENTROPY
ENVIRONMENTALISTS INC.

POST OFFICE BOX 12291
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27709-2291
919-781-3550

N. C. DEPT. OF NATURAL
RESOURCES AND
COMMUNITY DEVELOPMENT

JUN 10 1987

DIVISION OF ENVIRONMENTAL MANAGEMENT
MOORESVILLE REGIONAL OFFICE

STATIONARY SOURCE SAMPLING REPORT

EEI REF. NO. 5527

C. NELSON SIGMON PAVING COMPANY
CONTINUOUS MIX ASPHALT PLANT
CONOVER, NORTH CAROLINA

PARTICULATE EMISSIONS AND PLUME OPACITY COMPLIANCE TESTING

DRUM MIXER BAGHOUSE STACK

MAY 27, 1987

REPORT CERTIFICATION

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

Date June 4, 1987 Signature _____

Robert W. Bridges

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 4, 1987 Signature _____

D. James Grove, P.E.

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APPENDICES

A. Particulate Test Results and Example Calculations

B. Field and Analytical Data

C. Calibration Data

D. Sampling and Analytical Procedures

INTRODUCTION

1.1 Outline of Test Program. Stationary source sampling was performed for C. Nelson Sigmon Paving Company, at the continuous mix asphalt plant in Conoyer, North Carolina on May 27, 1987. Three EPA Method 5 runs were performed at the baghouse stack to determine the particulate emissions. EPA Method 9 plume opacity determinations were conducted concurrently with the particulate emissions testing.

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

TABLE 1-1

TEST PARTICIPANTS

C. Nelson Sigmon Paving Company	Randy Fox Test Coordinator
North Carolina Department of Natural Resources and Community Development	Bernie O. Pittman Test Observer
Entropy Inc.	Robert W. Bridges Project Supervisor
	A. Thomas McDonald Visible Emissions Observer
	Kent G. Daeke Engineering Technician

SUMMARY OF RESULTS

2.1 Presentation. Table 2-1 summarizes the results of the particulate emissions and plume opacity testing performed May 27, 1987, at the baghouse stack. Detailed particulate test results are given in Appendix A; field and/or analytical data for the particulate and plume opacity testing are presented in Appendix B.

TABLE 2-1

PARTICULATE AND PLUME OPACITY TESTS SUMMARY OF RESULTS

	1	2	3
Run Date	5/27/87	5/27/87	5/27/87
Method 5			
Test Train Parameters			
Volume of Dry Gas Sampled, SCF*	55.033	48.044	52.131
Percent Isokinetic	108.4	100.1	98.1
Flue Gas Parameters			
Temperature, Deg. F	247	257	259
Flue Gas Flow Rates			
SCFM*, Dry	15,690	14,826	16,413
ACFM, Wet	33,142	31,497	33,708
Particulate Results			
Catch, milligrams	19.4	19.6	23.5
Concentration, grains/DSCF*	0.00544	0.00630	0.00696
Emission Rate, lbs per hour	0.732	0.800	0.979
Method 9			
Plume Opacity, %	0.2	0.3	0.1

* 68 Deg. F - 29.92 in. Hg

2.2 Discussion. The average particulate concentration was 0.0062 grains per dry standard cubic foot (gr/DSCF). The maximum concentration of particulate allowed by the United States EPA New Source Performance Standards for Asphalt Concrete Plants is 0.04 gr/DSCF. Plume opacity observations were conducted concurrently with the particulate emissions testing. The majority of the readings were zero, with the highest single reading at 10%. Due to the near absense of a visible plume, the observations were not summarized; refer to the field data sheets for the results.

PROCESS DESCRIPTION AND OPERATION

3.1 General. C. Nelson Sigmon Paving Company, in Conover, North Carolina operates a continuous mix process to produce asphalt. A Caterpillar/C.M.I. drum mix dryer is used in the production process. The aggregate is dropped into the drum mix dryer, where it is mixed, dried, and heated; liquid asphalt is then added to the aggregate in the mixing chamber and the product is transferred to a holding silo. The dryer is fired with #2 diesel fuel.

3.2 Process Emissions. Particulates are emitted from the process during drying and mixing due to the release of dust from the surface of the aggregate mix. The exhaust gases from the dryer pass through a mixing chamber, baghouse, and a fan before exiting the stack to the atmosphere, as shown schematically in Figure 3-1.

3.3 Operation During Testing. Approximately 200 tons per hour of asphalt were produced during testing.

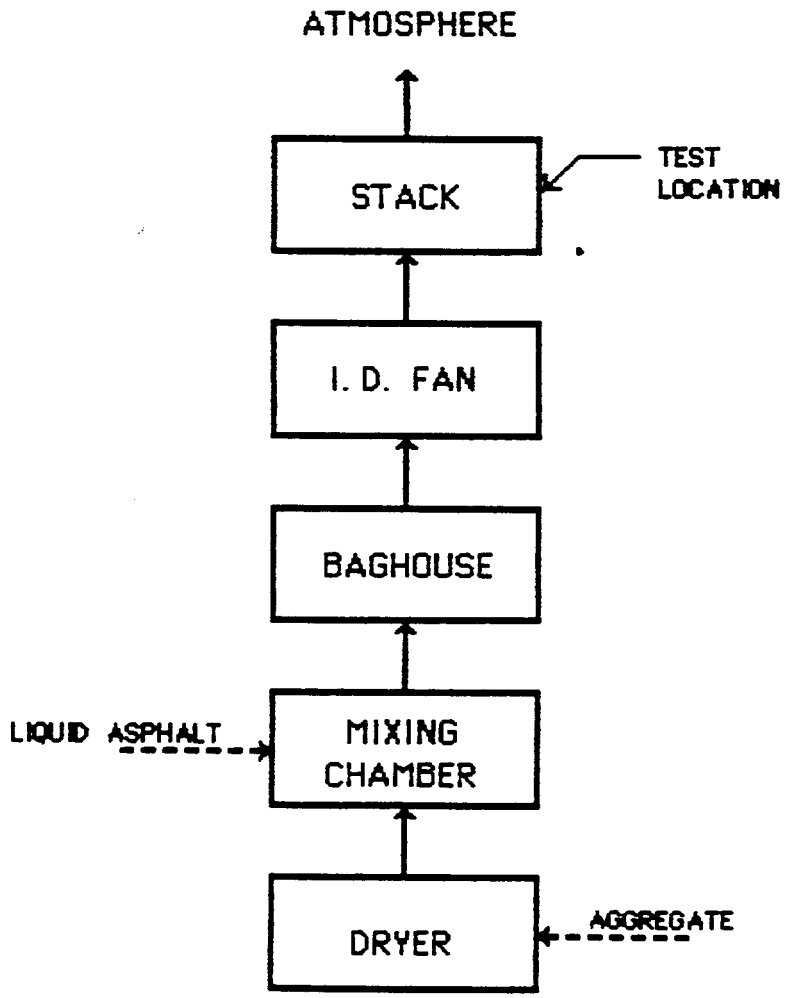


FIGURE 3-1. DRUM MIXER AIR FLOW SCHEMATIC SHOWING TEST LOCATION

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 25 equal areas, i.e., five sample points on each of the five traverse axes labeled A through E, 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, molecular weight, and emissions correction factor (excess air) for each run.

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 Particulate Emissions. EPA Method 5 sampling and analytical procedures were used to determine the particulate emissions. The centroid of each of the 25 equal areas was sampled for 2.5 minutes, resulting in a net run time of 62.5 minutes during the emissions testing.

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

4.6 Sampling Equipment. All sampling equipment was manufactured by Nutech Corporation or Entropy. Pertinent calibration data are provided in Appendix C.

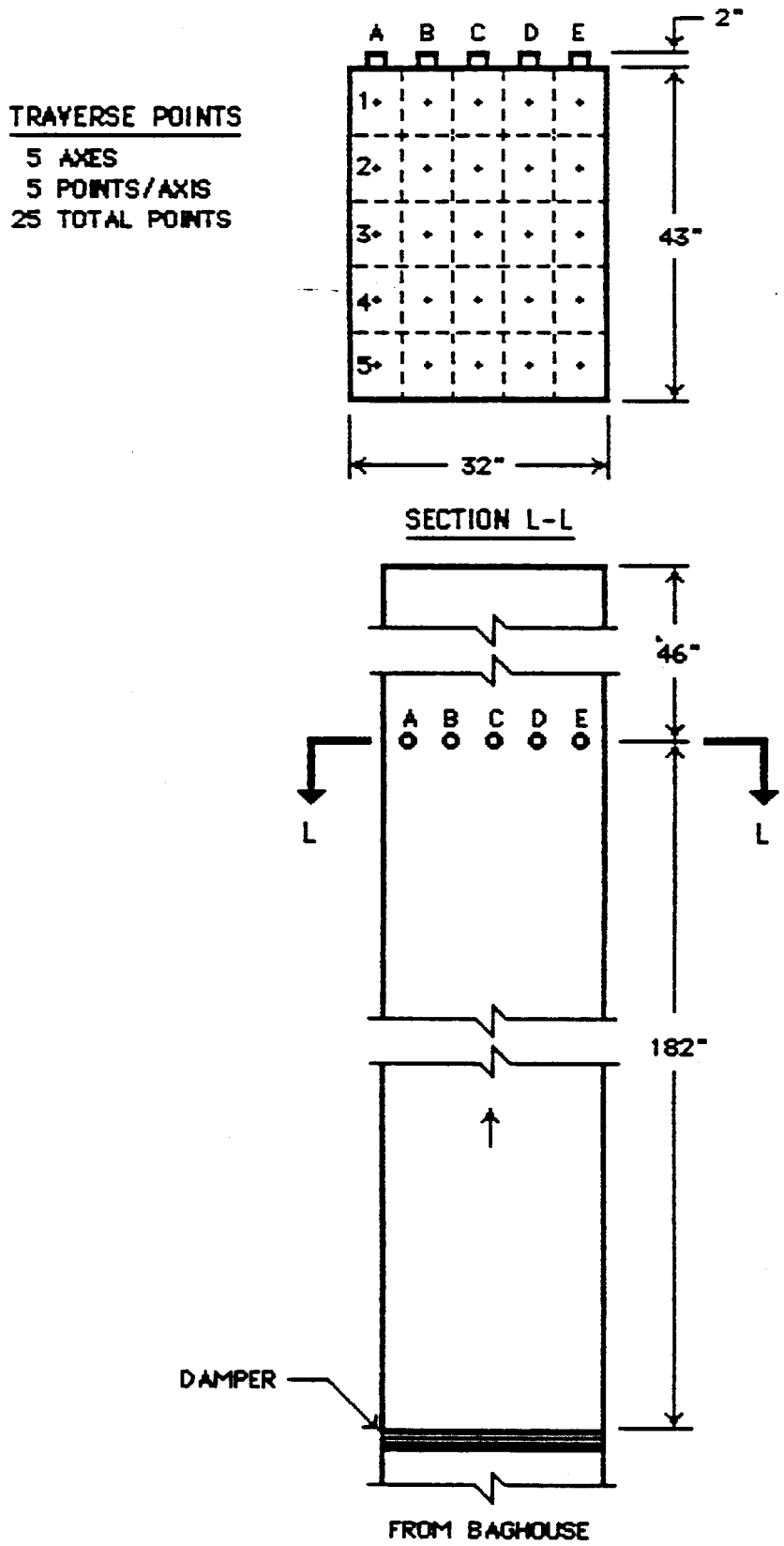


FIGURE 4-1. BAGHOUSE STACK TEST LOCATION

APPENDIX A

PARTICULATE TEST RESULTS AND EXAMPLE CALCULATIONS

ISOKINETIC SAMPLING TRAIN FIELD DATA & RESULTS TABULATION

PLANT: C. Nelson Sigmon Paving Company, Conover, North Carolina

RUN #	DATE	SAMPLING LOCATION	OPERATOR
1	5/27/87	Baghouse Stack	Robert W. Bridges
2	5/27/87	Baghouse Stack	Robert W. Bridges
3	5/27/87	Baghouse Stack	Robert W. Bridges

		1	2	3
	Run Start Time	915	1100	1455
	Run Finish Time	1030	1210	1713
	Net Sampling Points	25	25	25
Theta	Net Run Time, Minutes	62.50	62.50	62.50
Dia	Nozzle Diameter, Inches	0.301	0.301	0.301
Cp	Pitot Tube Coefficient	0.840	0.840	0.840
Y	Dry Gas Meter Calibration Factor	0.997	0.997	0.997
Pbar	Barometric Pressure, Inches Hg	29.40	29.40	29.40
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	2.629	2.090	2.411
Vm	Volume of Metered Gas Sample, Dry ACF	57.522	50.839	55.320
tm	Dry Gas Meter Temperature, Degrees F	84	90	92
Vm(std)	Volume of Metered Gas Sample, Dry SCF*	55.033	48.044	52.131
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	641.0	546.5	531.5
Vw(std)	Volume of Water Vapor, SCF*	30.172	25.724	25.018
%H2O	Moisture Content, Percent by Volume	35.4	34.9	32.4
Mfd	Dry Mole Fraction	0.646	0.651	0.676
%CO2	Carbon Dioxide, Percent by Volume, Dry	6.0	6.0	6.0
%O2	Oxygen, Percent by Volume, Dry	12.5	12.5	12.5
%CO+N2	CO + N2, Percent by Volume, Dry	81.5	81.5	81.5
Md	Dry Molecular Weight, Lb/Lb-Mole	29.46	29.46	29.46
Ms	Wet Molecular Weight, Lb/Lb-Mole	25.40	25.46	25.74
Pg	Flue Gas Static Pressure, Inches H2O	-0.32	-0.31	-0.39
Ps	Absolute Flue Gas Press., Inches HG	29.38	29.38	29.37
ts	Flue Gas Temperature, Degrees F	247	257	259
Delta p	Average Velocity Head, Inches H2O	0.6839	0.6106	0.7049
vs	Flue Gas Velocity, Feet/Second	57.81	54.94	58.79
A	Stack/Duct Area, Square Inches	1.376	1.376	1.376
Qsd	Volumetric Air Flow Rate, Dry SCFM*	15.690	14.826	16.413
Qaw	Volumetric Air Flow Rate, Wet ACFM	33.142	31.497	33.708
%I	Isokinetic Sampling Rate, Percent	108.4	100.1	98.1

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

(continued next page)

		1	2	3
	Method 5 Results:			
mg	Catch, Milligrams	19.4	19.6	23.5
gr/DSCF	Concentration, Grains per DSCF*	0.005440	0.006296	0.006957
Lb/Hr	Emission Rate, Lbs/Hour (PMRc)	0.7316	0.8001	0.9787

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

EXAMPLE PARTICULATE TEST CALCULATIONS NO. 1

Baghouse Stack

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

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

$$Vm(std) = 17.64 * 0.997 * 57.522 * \frac{(29.40 + 2.629/13.6)}{(460 + 84)} = 55.033 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

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

$$Vw(std) = 0.04707 * 641.0 = 30.172 \text{ SCF}$$

PERCENT MOISTURE, BY VOLUME, AS MEASURED IN FLUE GAS

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

$$\%H2O = \frac{30.172}{30.172 + 55.033} * 100 = 35.4\ \%$$

DRY MOLE FRACTION OF FLUE GAS

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

$$Mfd = 1 - 35.4/100 = 0.646$$

DRY MOLECULAR WEIGHT OF FLUE GAS

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

$$Md = 6.0*0.44 + 12.5*0.32 + 81.5*0.28 = 29.46 \text{ LB/LB-MOLE}$$

WET MOLECULAR WEIGHT OF FLUE GAS

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

$$Ms = 29.46 * 0.646 + (0.18 * 35.4) = 25.40 \text{ LB/LB-MOLE}$$

ABSOLUTE FLUE GAS PRESSURE

$$Ps = Pbar + Pg / 13.6$$

$$Ps = 29.40 + (-0.3 / 13.6) = 29.38 \text{ IN. HG.}$$

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

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

$$vs = 85.49 * 0.840 * SQRT\left[\frac{0.6839 * (460 + 247)}{29.38 * 25.40}\right] = 57.8 \text{ FT/SEC}$$

DRY VOLUMETRIC FLUE GAS FLOW RATE @ STANDARD CONDITIONS

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

$$Qsd = \frac{60}{144} * 0.646 * 57.8 * 1,376.0 * \frac{528}{247 + 460} * \frac{29.38}{29.92}$$

$$Qsd = 15,690 \text{ SCFM}$$

WET VOLUMETRIC STACK GAS FLOW RATE @ FLUE GAS CONDITIONS

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

$$Qaw = 60 / 144 * 57.8 * 1,376.0 = 33,142 \text{ ACFM}$$

PERCENT ISOKINETIC OF SAMPLING RATE

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

$$\%I = \frac{29.92}{528} * \frac{100}{60} * \frac{(247 + 460) * 55.033}{29.38 * 57.8 * 0.646 * 62.50 * 0.0004942}$$

$$\%I = 108.4 \ \%$$

GRAINS PER DRY STANDARD CUBIC FOOT

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

$$gr/DSCF = \frac{7000}{453.592} * \frac{19.4}{55.033} = 0.0054 \quad gr/DSCF$$

POUNDS PER HOUR

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

Lb/Hr = 60/7000 * 0.0054 * 15.690 = 0.73 LB/HR

APPENDIX B

FIELD AND ANALYTICAL DATA

Preliminary Field Data

PLANT NAME C. NELSON SIGMON PAVING Co.

LOCATION Conover, NC

SAMPLING LOCATION Baghouse Stack

DUCT DEPTH

FROM INSIDE FAR WALL TO OUTSIDE OF PORT 45"

NIPPLE LENGTH 2"

DEPTH OF DUCT 43"

WIDTH (RECTANGULAR DUCT) 32"

EQUIVALENT DIAMETER:

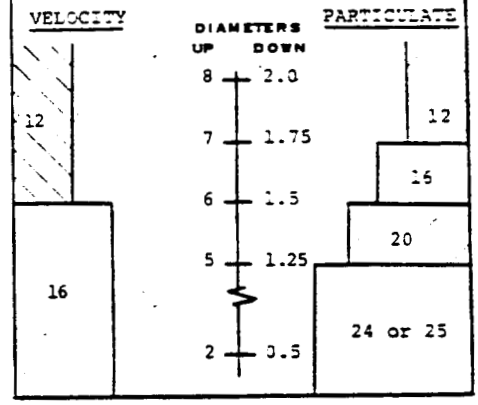
$$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(43'')(32'')}{(43'' + 32'')} = 36.7''$$

DISTANCE FROM PORTS TO NEAREST FLOW DISTURBANCE	UPSTREAM	DOWNSTREAM
	182"	46"
DIAMETERS		

STACK AREA = 32" X 43" = 1376 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	10	4 3/8"	6 3/8"
2	30	12 7/8"	14 7/8"
3	50	21 1/2"	23 1/2"
4	70	30 1/8"	32 1/2"
5	90	38 3/4"	40 3/4"
6			
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

F-0003
8/86

ENTROPY ENVIRONMENTALISTS, INC.

ORSAT FIELD DATA

Plant Name C. NELSON SIGMON PRUING

Sampling Location BAG-HOUSE STACK Fuel Type COAL

Run and/or Sample No. 3 Leak Test? ✓ Date 5/20/87 Operator R.W.B.

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
16:30	18:00	6.0	18.5		12.5		
		6.1	18.5		12.4		
		6.0	18.5		12.5		
	Avg.	6.0		Avg.	12.5		81.5

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.			

F-1009
8/86

PARTICULATE FIELD DATA

COMPANY NAME C. NELSON
ADDRESS CONOVER, N.C.
SAMPLING LOCATION BALHOUSE STACK
DATE 5/27/87 TEAM LEADER BB TECHNICIANS RGD
BAROMETRIC PRESSURE, IN. HG 29.4 STATIC PRESSURE, IN. H_2O -.32
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 5
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. .000 .000

RUN NUMBER 1
TIME START ~~08:05~~ 09:15
TIME FINISH 10:30

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE @ 300 °F

IDENTIFICATION NUMBERS

REAGENT BOX 211 NOZZLE .308 DIAMETER .301
METER BOX N-4 T/C READOUT 25
UMBILICAL U-2 T/C PROBE 5-2
SAMPLE BOX 16 ORSAT PUMP —
PROBE 4-4 TEDLAR BAG —

FILTER #	TARE
E5649	.4660

NOMOGRAPH SET-UP NOMOGRAPH # RB

$\Delta H_@$ 1.75 C FACTOR .56
METER TEMP 80 STACK TEMP 250
% MOISTURE 30 REF. ΔP .48
K = 3.8333333

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	219.500	.95	3.64	3.64	80	5	250	45	228	
2	2½	222.250	.75	2.86	2.86	80	5	250	47	230	
3	5	224.680	.75	2.86	2.86	80	5	252	47	232	
4	7½	227.050	.70	2.68	2.68	80	5	255	49	238	
5	10	229.400	.50	1.92	1.92	80	3	255	50	239	
B-1	12½/0	231.386	.77	2.95	2.95	80	4	258	50	248	
2	2½	233.450	.70	2.68	2.68	82	4	258	50	250	PYRITE
3	5	235.370	.60	2.30	2.30	82	4	259	52	251	72
4	7½	236.120	.75	2.86	2.86	83	5	260	52	250	
5	10	240.445	.75	2.86	2.86	84	5	260	52	251	
C-1	25/0	242.861	.75	2.86	2.86	84	5	258	54	250	
2	2½	245.280	.60	2.30	2.30	85	4	257	54	252	
3	5	247.465	.63	2.42	2.42	86	4	255	55	252	
4	7½	249.675	.72	2.76	2.76	86	5	255	56	250	
5	10	252.010	.75	2.86	2.86	86	5	253	56	249	
D-1	37½/0	254.442	.77	2.95	2.95	85	5	251	55	251	
2	2½	256.900	.60	2.30	2.30	86	4	250	55	253	
3	5	259.120	.68	2.61	2.61	88	5	250	52	253	
4	7	261.370	.70	2.68	2.68	88	5	248	50	251	
5	10	263.670	.70	2.68	2.68	88	5	248	50	251	
E-1	50/0	266.090	.65	2.49	2.49	86	5	245	52	250	PYRITE
2	2½	268.345	.56	2.15	2.15	87	4	247	53	248	7%
3	5	270.470	.62	2.38	2.38	88	5	249	55	250	
4	7½	272.645	.62	2.38	2.38	88	5	250	56	251	
5	10	274.860	.60	2.30	2.30	88	5	250	56	249	
	62½/OFF	277.022									

57.522	2.6839	2.629	84	247
V_M	$(\sqrt{\Delta P})^2$	ΔH	T_M	T_S

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME C. NELSON PRUING — RUN NUMBER 2
ADDRESS CONQUER, N.C. — TIME START 11:00
SAMPLING LOCATION BAG HOUSE STACK — TIME FINISH 12:10
DATE 5/22/87 — TEAM LEADER BB — TECHNICIANS KD
BAROMETRIC PRESSURE, IN. HG 29.4 — STATIC PRESSURE, IN. H_2O -.31
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. .000

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE @ 300°F

IDENTIFICATION NUMBERS

REAGENT BOX 211 — NOZZLE 308 — DIAMETER .301
METER BOX N-4 — T/C READOUT 25
UMBILICAL U-2 — T/C PROBE 4-1
SAMPLE BOX 21 — ORSAT PUMP —
PROBE U-12 — TEDLAR BAG —

FILTER #	TARE
E-4990	~~.469~~ .4623

NOMOGRAPH SET-UP — NOMOGRAPH # 1313

ΔH@ 1.215 — C FACTOR ~~.56~~ .52
METER TEMP 90 — STACK TEMP 250
% MOISTURE 35% — REF. ΔP ~~.48~~ .54

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	K=3.40 74074 FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 1	0/0	277.200	.50	1.70	1.70	83	2	250	45	229	
2	2½	279.060	.65	2.22	2.22	84	2	250	45	235	
3	5	281.100	.70	2.39	2.39	86	2	253	47	242	
4	7½	283.275	.57	1.95	1.95	88	2	255	48	243	
5	10	285.300	.55	1.87	1.87	88	2	255	49	242	
B 1	15/0	287.106	.75	2.56	2.56	89	3	255	53	245	PYRITE
2	2½	289.465	.65	2.22	2.22	90	2	256	50	252	7.5%
3	5	291.585	.60	2.04	2.04	91	2	258	52	260	
4	7½	293.750	.65	2.22	2.22	91	2	258	52	261	
5	10	295.670	.65	2.22	2.22	92	2	260	53	261	
C 1	25/0	297.778	.68	2.32	2.32	92	3	258	54	250	
2	2½	299.950	.60	2.04	2.04	93	2	255	55	262	
3	5	301.945	.60	2.04	2.04	93	2	255	55	264	
4	7½	303.955	.70	2.39	2.39	92	3	253	56	259	
5	10	306.080	.70	2.39	2.39	92	3	251	56	258	
D 1	37½/0	308.259	.53	1.81	1.81	91	2	250	57	259	
2	2½	310.125	.60	2.04	2.04	91	2	250	57	266	7.5%
3	5	312.160	.65	2.22	2.22	92	3	249	58	267	PYRITE
4	7½	314.275	.70	2.39	2.39	92	3	248	58	269	
5	10	316.460	.63	2.15	2.15	92	3	248	58	267	
E 1	50/0	318.663	.45	1.53	1.53	91	2	250	57	268	
2	2½	320.540	.53	1.81	1.81	91	2	250	57	264	
3	5	322.240	.60	2.04	2.04	92	3	252	55	261	
4	7½	324.250	.58	1.98	1.98	92	3	252	55	260	
5	10	326.200	.50	1.70	1.70	92	3	252	55	261	
	62½/60	328.039									

V_M	$(\sqrt{\Delta P})^2$	ΔH	T_M	T_S
50.339	2.6106	2.090	90	257

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME C. NELSON SIGMON PAVING — RUN NUMBER 3
ADDRESS CONOVER, N.C. — TIME START 14:55
SAMPLING LOCATION BAG-HOUSE STACK — TIME FINISH 17:13
DATE 5/27/87 — TEAM LEADER BB — TECHNICIANS RGD
BAROMETRIC PRESSURE, IN. HG 29.4 — STATIC PRESSURE, IN. H_2O -.39
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. .000

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ___ TEDLAR BAG
- ✓ THERMOCOUPLE @ 300 °F

IDENTIFICATION NUMBERS

REAGENT BOX 211 — NOZZLE 308 — DIAMETER .301
METER BOX N-4 — T/C READOUT 25
UMBILICAL U-2 — T/C PROBE 5-2
SAMPLE BOX 11 — ORSAT PUMP 8
PROBE U-4 — TEDLAR BAG 10

FILTER #	TARE
E5552	.4815

NOMOGRAPH SET-UP — NOMOGRAPH # BB

$\Delta H_@$ 1.75 — C FACTOR .52
METER TEMP 90 — STACK TEMP 250
% MOISTURE 35% — REF. ΔP .54
K = 3.4074074

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A1	0	337.200	.50	1.70	1.70	90	3	255	49	241	
2	2½	339.540	.65	2.22	2.22	90	3	255	50	249	
3	5	341.610	.72	2.45	2.45	90	4	258	50	255	7½ @
4	7½	343.860	.80	2.73	2.73	92	5	260	52	258	
5	10	346.100	.70	2.39	2.39	92	4	260	54	253	
B 1	12½	348.350	.75	2.56	2.56	92	4	257	55	247	
2	2½	350.660	.73	2.49	2.49	93	4	255	55	250	
3	5	352.955	.65	2.22	2.22	94	4	255	56	258	
4	7½	355.010	.75	2.56	2.56	94	4	252	57	259	
5	10	357.345	.80	2.73	2.73	94	4	250	55	260	
C 1	20	359.681	.75	2.56	2.56	93	4	250	55	261	
2	2½	362.000	.67	2.28	2.28	94	4	248	56	264	
3	5	364.200	.70	2.39	2.39	94	4	245	56	266	7½ @
4	7½	366.400	.82	2.79	2.79	94	5	245	57	262	
5	10	368.785	.85	2.90	2.90	96	5	248	57	260	
D 1	37½	371.256	.65	2.22	2.22	95	4	250	55	255	
2	2½	373.385	.67	2.28	2.28	96	4	250	51	263	15:50 DC
3	5	375.100	.75	2.56	2.56	96	4	250	50	262	16:50
4	7½	377.830	.67	2.28	2.28	88	4	255	55	265	
5	10	380.060	.77	2.62	2.62	88	5	256	57	266	
E 1	50	382.291	.70	2.39	2.39	88	5	258	58	265	
2	2½	384.480	.55	1.87	1.87	90	4	260	58	266	
3	5	386.435	.60	2.04	2.04	90	4	260	58	264	
4	7½	388.470	.75	2.56	2.56	91	5	260	59	262	
5	10	390.775	.73	2.49	2.49	92	5	260	60	260	
	62½	393.020									

V_M	$(\sqrt{\Delta P})^2$	ΔH	T_M	T_S
55.320	0.7049	2.411	92	259

F-1010
8/86

ENTROPY

PARTICULATE SAMPLING LABORATORY RESULTS

Plant Name C. NELSON PAVING EEI Ref. # 5527

Sampling Location BAGHOUSE STACK

Date Received 05/28 Date Analyzed 6/1 Reagent Box(es) 02116220

Run Number	1	2	3
Run Date	05/27	05/27	05/27

SUMMARY OF PARTICULATE ANALYSES

Sum of Particulate, mg.	485.6	482.1	505.2
Total Filter Tare mg.	466.0	462.3	481.5
Blank Residue, mg.	(100 mL) 0.2	(75 mL) 0.2	(100 mL) 0.2
TOTAL PARTICULATE CATCH, mg.	19.4	19.6	23.5

ANALYSIS OF MOISTURE CATCH

Reagent 1 (H_2O):			
Final Weight, g.	810.0	710.0	680.0
Tared Weight, g.	200.0	200.0	200.0
Water Catch, g.	610.0	510.0	480.0
Reagent 2 (—):			
Final Weight, g.	—	—	—
Tared Weight, g.	—	—	—
Water Catch, g.	—	—	—
CONDENSED WATER, g.	610.0	510.0	480.0
Silica Gel:			
Final Weight, g.	231.0	236.5	451.5
Tared Weight, g.	200.0	200.0	400.0
ADSORBED WATER, g.	31.0	36.5	51.5
TOTAL WATER COLLECTED, g.	641.0	546.5	531.5

Blank Beaker # 16

Final wt. mg. 1173345

Tare wt. mg. 1173341

Residue, mg. .004

Volume, mL. 200

Concen., mg/mL .002

--- Legend ---

= Final Weight

L = Loose Particulate

F = Filter D = Dish

R = Rinse P = Pan

Notes and Comments

ENTROPY

LABORATORY SAMPLE WEIGHT CALCULATIONS

Plant Name C. NELSON PAVING EEI Ref. # 5527

Run Number	1	2	3
Run Date	05/27	05/27	05/27
Sample ID/Container #	F&R 2053	F&R 2054	F&R 2055
	✓109.1665 109.1665 109.1681 109.1691 ~~108~~.	✓104.2009 104.2010 104.2020 104.2035	✓107.4713 107.4713
Tare Wt., g.	108.6809	103.7188	106.9661
SAMPLE WT., g.	.4856	.4821	.5052
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

ENTROPY

CUSTODY SHEET FOR REAGENT BOX # 0211

Date of Makeup 5/15 Initials MS 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 C. Nelson Paving Co.

SAMPLING LOCATION Baghouse Stack

Run Number	Date Used	Initials	Locked?	Date Cleanup	% S. Gel Spent	Initials	Locked?
1	5-27	RWB	✓	5-27	100	✓	✓
2	5-27	RWB	✓	5-2	100	✓	✓
3A	—	—	—	—	—	—	—

Received in Lab Date 5-28-87 Initials MJD Locked? _____

Zero & Span Balance Initials MJD

Sampling Method: MS

Filter #	Tare Weight (mgms)	Used on Test
✓E5649	.4660	1
✓E4990	~~.469~~ 462.3	2
—	—	3A

Remarks: 1- MS
2- MS
3A - Aborted

ENTROPY ENVIRONMENTALISTS, INC.

CUSTODY SHEET FOR REAGENT BOX # 0220

Date of Makeup 5/15 Initials MSY 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 C. Nelson

SAMPLING LOCATION Bayhome Outlet

Run Number	Date Used	Initials	Locked?	Date Cleanup	% S. Gel Spent	Initials	Locked?
3	5-27-87	RWB	✓	5-27-87	100	RWB	✓

Received in Lab Date 5-28-87 Initials MIF Locked? ✓

Sampling Method: M5

Zero & Span Balance Initials MIF

Filter #	Tare Weight (mgms)	Used on Test
✓ E5552	.4815	3

Remarks:

3 - good run

2 - Silica gel used

3A - Aborted

ENTROPY ENVIRONMENTALISTS, INC.

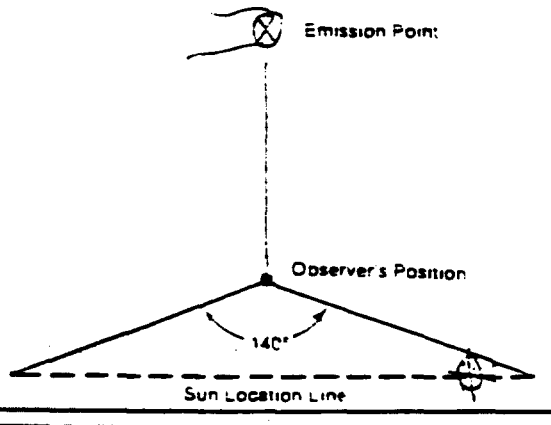
VISIBLE EMISSION OBSERVATION FORM — NO. 1 PAGE 1

COMPANY NAME	C. NELSON SISMON PAVING CO.
STREET ADDRESS	
CITY	CONCOVER
STATE	NC
ZIP	
PHONE (KEY CONTACT)	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	CAT. Asphalt Plant
OPERATING MODE	—
CONTROL EQUIPMENT	CAT. Baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT	Rectangular Stack
HEIGHT ABOVE GROUND LEVEL	~30'
HEIGHT RELATIVE TO OBSERVER	Start: 0' Enc: SAME
DISTANCE FROM OBSERVER	Start: ~300' Enc: SAME
DIRECTION FROM OBSERVER	Start: NE Enc: SAME
DESCRIBE EMISSIONS	Start: detached steam plume Enc: SAME
EMISSION COLOR	Start: light brown Enc:
IF WATER DROPLET PLUME	Attached ☐ Detached ☑
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	STACK EXIT Enc: SAME
DESCRIBE PLUME BACKGROUND	Start: TREES Enc: SAME
BACKGROUND COLOR	Start: GREEN Enc: GREEN
SKY CONDITIONS	Start: OVERCAST Enc: SAME
WIND SPEED	Start: 0-5 mph Enc: SAME
WIND DIRECTION	Start: FROM EAST Enc: SAME
AMBIENT TEMP	Start: 75°F Enc: 81°F
WET BULB TEMP	
RH, percent	

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
5-27-87	0915	1015

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	5	0	0	0	
9	0	0	5	0	
10	0	0	0	0	
11	5	0	0	0	
12	5	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	5	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	5	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	5	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	5	0	
28	0	0	0	0	
29	0	0	0	5	
30	0	0	0	0	

OBSERVER'S NAME (PRINT)	A. THOMAS McDONALD
OBSERVER'S SIGNATURE	A. Thomas McDonald
DATE	5-27-87
ORGANIZATION	ENTROPY
CERTIFIED BY	EASTERN TECH. ASS.
DATE	5-87

CONTINUED ON VEO FORM NUMBER

COMPANY NAME: C. WALSON SIGMON PAVING Co.

STREET ADDRESS:

CITY: CONOVER | STATE: NC | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: | OPERATING MODE:

CONTROL EQUIPMENT: | OPERATING MODE:

DESCRIBE EMISSION POINT:

HEIGHT ABOVE GROUND LEVEL: | HEIGHT RELATIVE TO OBSERVER: Start: End:

DISTANCE FROM OBSERVER: Start: End: | DIRECTION FROM OBSERVER: Start: End:

DESCRIBE EMISSIONS: Start: End:

EMISSION COLOR: Start: End: | IF WATER DROPLET PLUME: Attached ☐ Detached ☐

F T IN THE PLUME AT WHICH OPACITY WAS DETERMINED: S Enc

DESCRIBE PLUME BACKGROUND: Start: End:

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

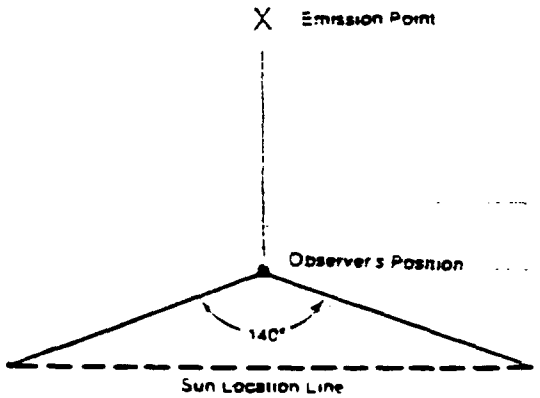
WIND SPEED: Start: End: | WIND DIRECTION: Start: End:

AMBIENT TEMP: Start: End: | WET BULB TEMP: | RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



OBSERVATION DATE: 5-27-82 | START TIME: | END TIME:

MIN \ SEC	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	5	0	0	
7	0	5	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): A. THOMAS McDONALD

OBSERVER'S SIGNATURE: A. Thomas McDonald | DATE:

ORGANIZATION: EnTROPY

CERTIFIED BY: EASTERN TECH. ASS | DATE: 5-87

ADDITIONAL INFORMATION:

CONTINUED ON VEO FORM NUMBER:

NO. 2 PAGE 1

COMPANY NAME: C. NELSON Sigmon PAVING Co.

STREET ADDRESS:

CITY: Conover | STATE: NC | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: CAT. Asphalt plant | OPERATING MODE:

CONTROL EQUIPMENT: CAT. Baghouse | OPERATING MODE:

DESCRIBE EMISSION POINT: Rectangular Baghouse stack

HEIGHT ABOVE GROUND LEVEL: ~30' | HEIGHT RELATIVE TO OBSERVER: Start 0' End SAME

DISTANCE FROM OBSERVER: Start ~300' End SAME | DIRECTION FROM OBSERVER: Start NE End SAME

DESCRIBE EMISSIONS: Start ~~light brown~~ steam plume End

EMISSION COLOR: Start light brown End SAME | IF WATER DROPLET PLUME: Attached ☐ Detached ☑

[illegible] IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Stack Exit End SAME

DESCRIBE PLUME BACKGROUND: Start TREES End SAME

BACKGROUND COLOR: Start GREEN End SAME | SKY CONDITIONS: Start OVERCAST End SAME

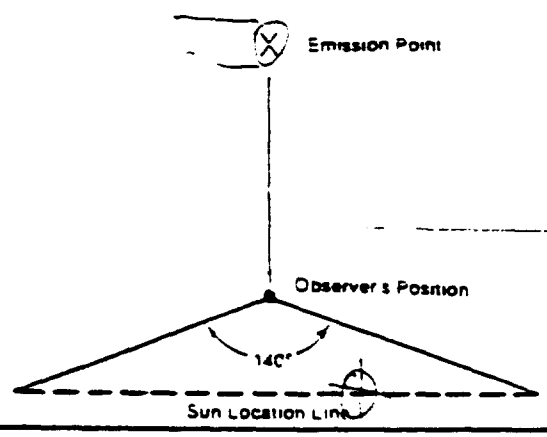
WIND SPEED: Start 0-5 mph End SAME | WIND DIRECTION: Start 2m EAST End SAME

AMBIENT TEMP: Start 82 End SAME | WET BULB TEMP: | RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE: 5-27-87 | START TIME: 1100 | END TIME: 1200

MIN \ SEC	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	5	
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	5	0	5	
23	5	0	5	0	
24	10	0	0	0	
25	0	0	0	0	
26			0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	5	0	0	0	

$\frac{30}{24} = 1.25$

OBSERVER'S NAME (PRINT): A. Thomas McDonald

OBSERVER'S SIGNATURE: A. Thomas McDonald | DATE: 5-27-87

ORGANIZATION: Entropy

CERTIFIED BY: Eastern Tech. Ass | DATE: 5-87

CONTINUED ON VEO FORM NUMBER:

NO. 2 PAGE 2

COMPANY NAME: C. NELSON STONE PAVING Co.

STREET ADDRESS:

CITY: CONOVER | STATE: NC | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Baghouse | OPERATING MODE:

DESCRIBE EMISSION POINT:

HEIGHT ABOVE GROUND LEVEL: | HEIGHT RELATIVE TO OBSERVER: Start: End:

DISTANCE FROM OBSERVER: Start: End: | DIRECTION FROM OBSERVER: Start: End:

DESCRIBE EMISSIONS: Start: End:

EMISSION COLOR: Start: End: | IF WATER DROPLET PLUME: Attached ☐ Detached ☐

T IN THE PLUME AT WHICH OPACITY WAS DETERMINED: End:

DESCRIBE PLUME BACKGROUND: Start: End:

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

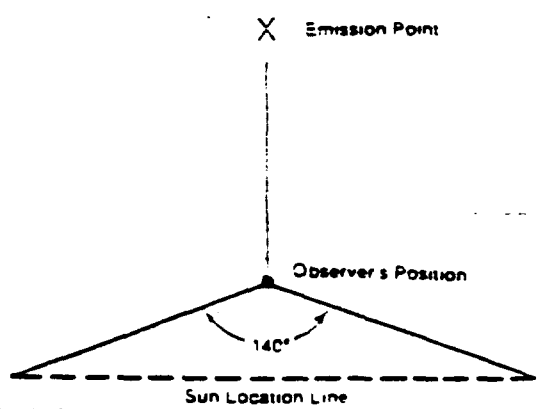
WIND SPEED: Start: End: | WIND DIRECTION: Start: End:

AMBIENT TEMP: Start: End: | WET BULB TEMP: | Rh, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE: 5-27-87 | START TIME: | END TIME:

MIN \ SEC	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	5	0	0	0	
11	0	0	5	0	
12	0	0	0	0	
13	0	5	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	5	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): A. Thomas McDonald

OBSERVER'S SIGNATURE: A. Thomas McDonald | DATE: 5-27-87

ORGANIZATION: Entropy

CERTIFIED BY: Eastern Tech. Ass. | DATE: 5-87

CONTINUED ON VEO FORM NUMBER:

NO. 3 PAGE 1

COMPANY NAME: C. Nelson Sigmon Paving Co.

STREET ADDRESS:

CITY: Conover | STATE: NC | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: CAT. Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: CAT. Baghouse | OPERATING MODE:

DESCRIBE EMISSION POINT: Rectangular Baghouse stack

HEIGHT ABOVE GROUND LEVEL: ~30' | HEIGHT RELATIVE TO OBSERVER: Start 0' End same

DISTANCE FROM OBSERVER: Start ~300' End | DIRECTION FROM OBSERVER: Start NE End same

DESCRIBE EMISSIONS: Start steam plume End same

EMISSION COLOR: Start light brown End same | IF WATER DROPLET PLUME: Attached ☐ Detached ☒

[illegible]T IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Stack Exit End same

DESCRIBE PLUME BACKGROUND: Start trees End same

BACKGROUND COLOR: Start GREEN End same | SKY CONDITIONS: Start Broken End same

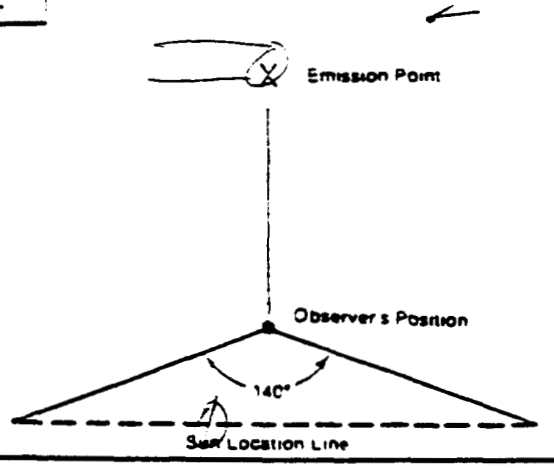
WIND SPEED: Start 0-5 mph End same | WIND DIRECTION: Start fm/Past End same

AMBIENT TEMP: Start 89 End same | WET BULB TEMP: | RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE: 5-27-87 | START TIME: 1510 | END TIME: 1705

MIN \ SEC	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	5	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	5	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	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): A. Thomas McDonald

OBSERVER'S SIGNATURE: A. Thomas McDonald | DATE: 5-27-87

ORGANIZATION: Entropy | May 13, 87

CERTIFIED BY: Eastern Tech. Ass. | CPT 21813 5-87

CONTINUED ON VEO FORM NUMBER:

COMPANY NAME: C. Nelson Sigmon Paving Co.

STREET ADDRESS:

CITY: Conover | STATE: NC | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Baghouse | OPERATING MODE:

DESCRIBE EMISSION POINT:

HEIGHT ABOVE GROUND LEVEL: | HEIGHT RELATIVE TO OBSERVER: Start End

DISTANCE FROM OBSERVER: Start End | DIRECTION FROM OBSERVER: Start End

DESCRIBE EMISSIONS: Start End

EMISSION COLOR: Start End | IF WATER DROPLET PLUME: Attached ☐ Detached ☐

[illegible]T IN THE PLUME AT WHICH OPACITY WAS DETERMINED: End

DESCRIBE PLUME BACKGROUND: Start End

BACKGROUND COLOR: Start End | SKY CONDITIONS: Start End

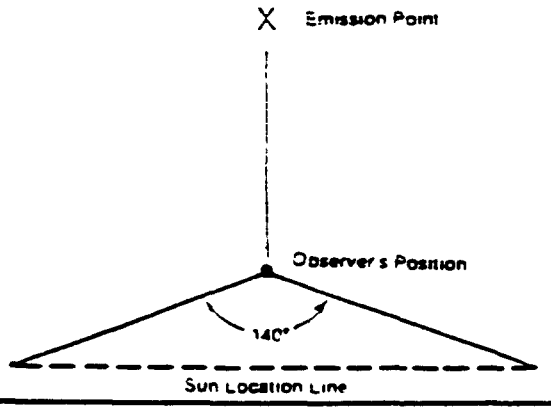
WIND SPEED: Start End | WIND DIRECTION: Start End

AMBIENT TEMP: Start End | WET BULB TEMP: | RH, percent:

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE: 5-27-87 | START TIME: | END TIME:

MIN \ SEC	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	5	5	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	plant down 43:00
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	5	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): A. Thomas McDonald

OBSERVER'S SIGNATURE: A. Thomas McDonald | DATE: 5-27-87

ORGANIZATION: Entropy

CERTIFIED BY: Eastern Tech. Ass | DATE: 5-87

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 with 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: 1017051 Calibration by: M. Hayden

Date: 4-1-86 Barometric Pressure (P_b): 27.86 in. Hg

ENTROPY ENVIRONMENTAL/UTB, INC.

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

Approx. Flow Rate (Q) cfm	Spirometer Gas Volume (V_s) ft³	Spirometer Temp. (t_s) °F	Dry Gas Meter Gas Volume (V_{ds}) ft³	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. ($\bar{Y}_{ds}$)
0.40	4.062	79.8	4.002	80	0.85	10.0	0.3971	1.0001	
	4.117	79.3	4.061	80	0.85	10.0	0.4021	1.0130	
	4.159	79.7	4.065	80	0.85	10.0	0.4088	1.0289	
0.60	6.084	79.7	6.035	80	1.3	10.0	0.5938	1.0055	
	6.166	79.7	6.016	80	1.275	10.0	0.6018	1.0223	
	6.102	79.7	6.015	80	1.25	10.0	0.5955	1.0119	
0.80	8.097	79.7	7.996	80	2.35	10.0	0.7902	1.0074	
	8.132	79.7	8.003	80	2.40	10.0	0.7937	1.0107	
	8.114	79.3	7.996	80	2.45	10.0	0.7925	1.0100	
1.0	10.129	78.8	10.101	80	3.875	10.0	0.9901	0.9936	
	10.164	78.8	10.081	80	3.80	10.0	0.9936	1.0011	
	10.173	78.8	10.092	80	3.80	10.0	0.9945	1.0009	
1.2	12.359	78.8	12.305	80	5.5	10.0	1.2092	0.9932	
	12.368	78.8	12.316	80	5.3	10.0	1.2091	0.9935	
	12.313	78.8	12.274	80	5.3	10.0	1.2031	0.9929	

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

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

Dry Gas Meter Identification: 1017051 Calibration by: _____

Date: 4-1-86 Barometric Pressure (P_b): 29.86 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

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

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. ($\bar{Y}_{ds}$)
1.4	14.451	71.1	14.462	81	7.625	10.0	1.4107	0.9834	
	14.441	78.8	14.446	80.5	7.55	10.0	1.4120	0.9847	
	14.391	78.8	14.406	80	7.575	10.0	1.4076	0.9834	

$\bar{Y}_{ds}$ = 1.002

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

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

JOB NAME/NUMBER C. Nelson Sigmon Paving TEAM LEADER RWB

SAMPLING LOCATION Baghouse Stack

BAROMETER CHECK

DATE	ENTROPY IN-HOUSE REFERENCE BAROMETER	FIELD BAROMETER
5/26/87	29.70	29.70

THERMOMETERS AND THERMOCOUPLE CHECK

DATE 5/27/87 REFERENCE THERMOMETER AMBIENT TEMPERATURE 70 °F

	AMBIENT TEMPERATURE °F	MUST BE WITHIN ACCEPTANCE RANGE °F
THERMOMETERS		
Impinger Exit	69	±2°F
Filter Compartment	68	±5.4°F
Dry Gas Meter	71	±5.4°F
Other		
THERMOCOUPLE	67	±8°F

NOTE: Adjust thermometer until acceptable. If thermometer can't be adjusted, use a backup. If no back up, then use the unadjusted thermometer and record actual ambient temperature.

PITOT AND NOZZLE CHECK

	I.D. #	VISUAL INSPECTION CHECK
PITOTS	4-4	✓
	4-4	✓
	4-12	✓
NOZZLES	708	✓

ENTROPY

ON-SITE DRY GAS METER AUDIT

Date 5/26/87 Meter Box Identification Number N-4

Time 15:45 Pretest Gamma (Y) 0.9974 ΔH_a 1.75

Auditor RWB Barometric Pressure (P_{bar}) 29.4 in.Hg

Dry Gas Meter Readings, ft^3	Meter Temperatures, °F	Upper and Lower Limits for Audit Gamma
Initial 211.600	Initial 87	0.97 * Y = 0.9675
Final 219.197	Final 90	1.03 * Y = 1.0273

Dry Gas Volume Metered, ft^3	Average Meter Temperature, °F	Run Time, min.	Calculated Audit Gamma
Vm = 7.597	Tm = 89	10	Y_c = 1.0159

$$Y_c = \frac{10}{Vm} * \sqrt{\frac{0.0319\ (Tm + 460)}{P_{bar}}}$$

$$Y_c = \frac{10}{7.597} * \sqrt{\frac{0.0319\ (89 + 460)}{29.40}} = 1.0159$$

Audit Gamma Within Acceptable Limits? Yes ✓ No ___

F-1040
9/86

ENTERGY

Meter Box Number: N4 | Calibration by: T. McDonald

Standard Meter Number: 1017057 Standard Meter Gamma: 1.002

Date: 3/27/87 Barometric Pressure (P_b): 29.42 in. Hg

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

PRETEST 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
4.002	69	10.0	0.50	4.082	73	0.9886	1.759
4.114	69	10.0	0.50	4.211	75	0.9881	1.661
8.182	69	10.0	2.1	8.323	79	0.9984	1.748
8.177	69	10.0	2.1	8.350	~~8.350~~ 82	1.0001	1.74
12.168	69	10.0	4.8	12.355	84	1.0028	1.79
12.127	69	10.0	4.8	12.341	87	1.0061	1.79
					Average	0.9974	1.75

.997

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

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

F-1037
8/86

ENTROPY

Meter Box Number: N4

Calibration by: T. McDonald

Meter Box Vacuum: 5 in. Hg

Standard Meter Number: 1017057 Standard Meter Gamma: 1.002

Date: 5/28/87 Barometric Pressure (P_b): 29.74 in. Hg

POSTTEST 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
8.763	76	10.0	2.4	8.830	84	1.0033	1.75
8.707	76	10.0	2.4	8.869	86	1.0016	1.76
8.700	76	10.0	2.4	8.872	89	1.0005	1.76
					Average	1.0018	1.76

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

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

NOZZLE NUMBER: 308

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
12-2-82	ST	.308	.304	.308	.305	.306	0.306
04-07-83	HEC	0.306	0.303	0.307	0.306	0.305	0.305
7-6-84	TTM	.306	.308	.308	.307	.308	0.307
10-23-84	ATM	.302	.304	.303	.302	.304	0.303
6-30-86	BB	.300	.301	.300	.302	.303	0.301
10/23/86	G.E	.304	.306	.304	.304	.306	0.305
1/15/87	JE	.307	.306	.306	.305	.308	0.306
3/10/87	ST	.308	.307	.308	.309	.307	0.308
3-20-87	SH	.301	.305	.304	.305	.302	.303
5-12-87	TML	.300	.303	.301	.301	.300	0.301

NOTE: All diameters measured in inches.

ENTROPY ENVIRONMENTALISTS, INC.

APPENDIX D

SAMPLING AND ANALYTICAL PROCEDURES