ENTROPY
ENVIRONMENTALISTS INC.

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STATIONARY SOURCE SAMPLING REPORT

REFERENCE NO. 6780

BARNHILL CONTRACTING COMPANY

ROCKY MOUNT, NORTH CAROLINA

PARTICULATE EMISSIONS AND

PLUME OPACITY TESTING

DRYER STACK

JUNE 11, 1990

REPORT CERTIFICATION

DATE June 25, 1990

The project was carried out under my direction and supervision.

Signature _____

Christopher M. Wrenn

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

Signature _____

George W. Walsh

The preparation of this report was carried out under my direction and supervision.

Signature _____

Tony Wong

I hereby certify that this report is authentic and accurate.

Signature _____

Frank J. Phoenix, P.E.

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INTRODUCTION

1.1 Outline of Test Program. Stationary source sampling was performed for the Barnhill Contracting Company in Rocky Mount, North Carolina on June 11, 1990. Three sets of EPA Method 5 and EPA Method 9 runs were performed at the dryer stack to determine the particulate emissions and plume opacity, respectively. Table 1-1 is a test log which presents the test parameters, sampling methods, and run numbers for the test program.

TABLE 1-1

DRYER STACK TEST LOG

Test Parameter	Sampling Method	Run Numbers - Repetition 1	2	3
CO_2,O_2	EPA 3	M3-1	- -	- -
Particulate	EPA 5	M5-1	M5-2	M5-3
Plume Opacity	EPA 9	M9-1	M9-2	M9-3

1.2 Test Participants. Table 1-2 lists the personnel involved in the test program.

TABLE 1-2

TEST PARTICIPANTS

Barnhill Contracting Company	Mr. Lee Cooper Test Coordinator
Entropy Environmentalists Inc.	Christopher M. Wrenn Project Manager
	Stuart R. Davis Project Supervisor
	Charles G. McRae Engineering Technician

SUMMARY OF RESULTS

2.1 Presentation. Table 2-1 presents a run-by-run summary of the particulate emissions testing performed on June 11, 1990 at the dryer stack. Detailed test results are presented in Appendix A.1; field and analytical data are given in Appendix B.1.

2.2 Plume Opacity. For runs M9-1 and M9-3, the highest 6-minute average opacity readings were 2%,and 1%, respectively. For runs M9-1, M9-2, and M9-3, the highest single opacity readings were 10%, 5%, and 10%, respectively. Detailed test results are presented in Appendix A.2; field data is given in Appendix B.2.

TABLE 2-1

PARTICULATE TESTS SUMMARY

Dryer Stack

	M5-1	M5-2	M5-3	Average
Run Date	6/11/90	6/11/90	6/11/90	
Run Start Time	1205	1412	1541	
Run Finish Time	1319	1522	1651	
Test Train Parameters:				
Volume Of Dry Gas Sample, SCF *	53.301	60.246	57.498	
Percent Isokinetic	105.8	98.5	99.3	
Flue Gas Parameters:				
CO2, Percent By Volume, Dry	6.0	6.0	6.0	6.0
O2, Percent By Volume, Dry	12.7	12.7	12.7	12.7
Temperature, °F	296	281	281	286
Air Flow Rate, Dry SCFM *	24,232	29,437	27,851	27,173
Air Flow Rate, Wet ACFM	49,416	58,343	55,969	54,576
Excess Air, Percent	145	145	145	145
Filterable Particulate:				
Concentration, grains/DSCF *	0.0147	0.0274	0.0333	0.0251
Emission Rate, lb/hr	3.05	6.92	7.95	5.97

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

PROCESS DESCRIPTION AND OPERATION

3.1 General. The Barnhill Contracting Company operates an oil-fired asphalt dryer at their facility in Rocky Mount, North Carolina.

3.2 Source Air Flow. Figure 3-1 is an air flow schematic which shows the passage of flue gases exhausted from the dryer.

3.3 Operation During Testing. The dryer is rated at 360 tons per hour but was producing 310 tons per hour during this test program.

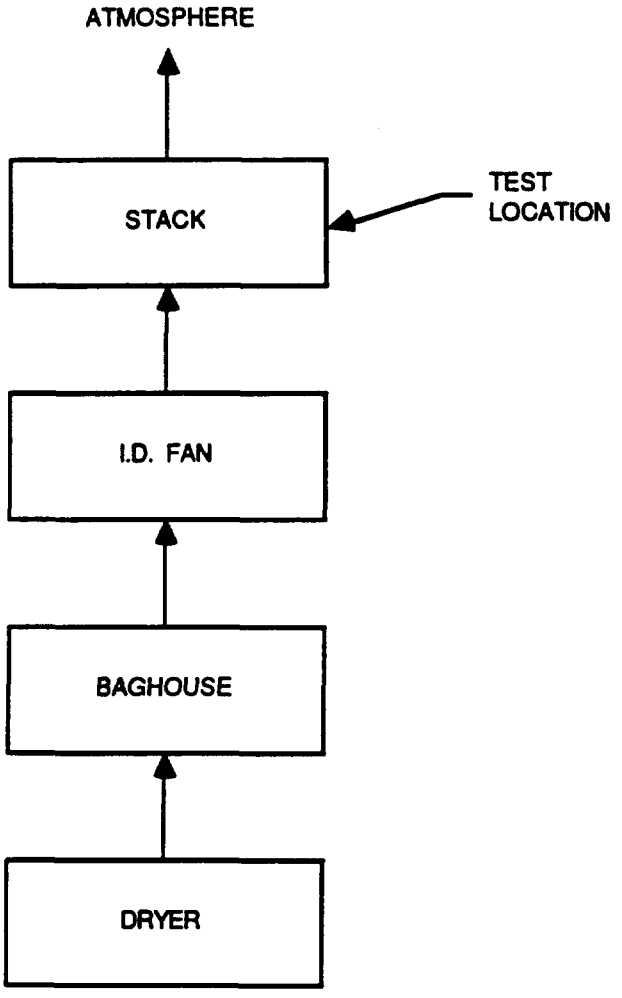

FIGURE 3-1. DRYER AIR FLOW SCHEMATIC.

SAMPLING AND ANALYTICAL PROCEDURES

4.1 General. All sampling and analytical procedures were those recommended by the United States Environmental Protection Agency and the State Air Pollution Control Board, Commonwealth of Virginia. This section provides brief descriptions of the sampling and analytical procedures. Detailed descriptions of the procedures 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 30 equal areas with five sampling points on each of six 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 each run, a multipoint, integrated flue gas sample was collected and analyzed according to the procedures outlined in EPA Method 3. The analytical results were used to determine the flue gas composition, molecular weight, and excess air.

4.3.3 Flue Gas Moisture Content. 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. Each of the 30 points was sampled for two minutes, resulting in net run times of 60 minutes.

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

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

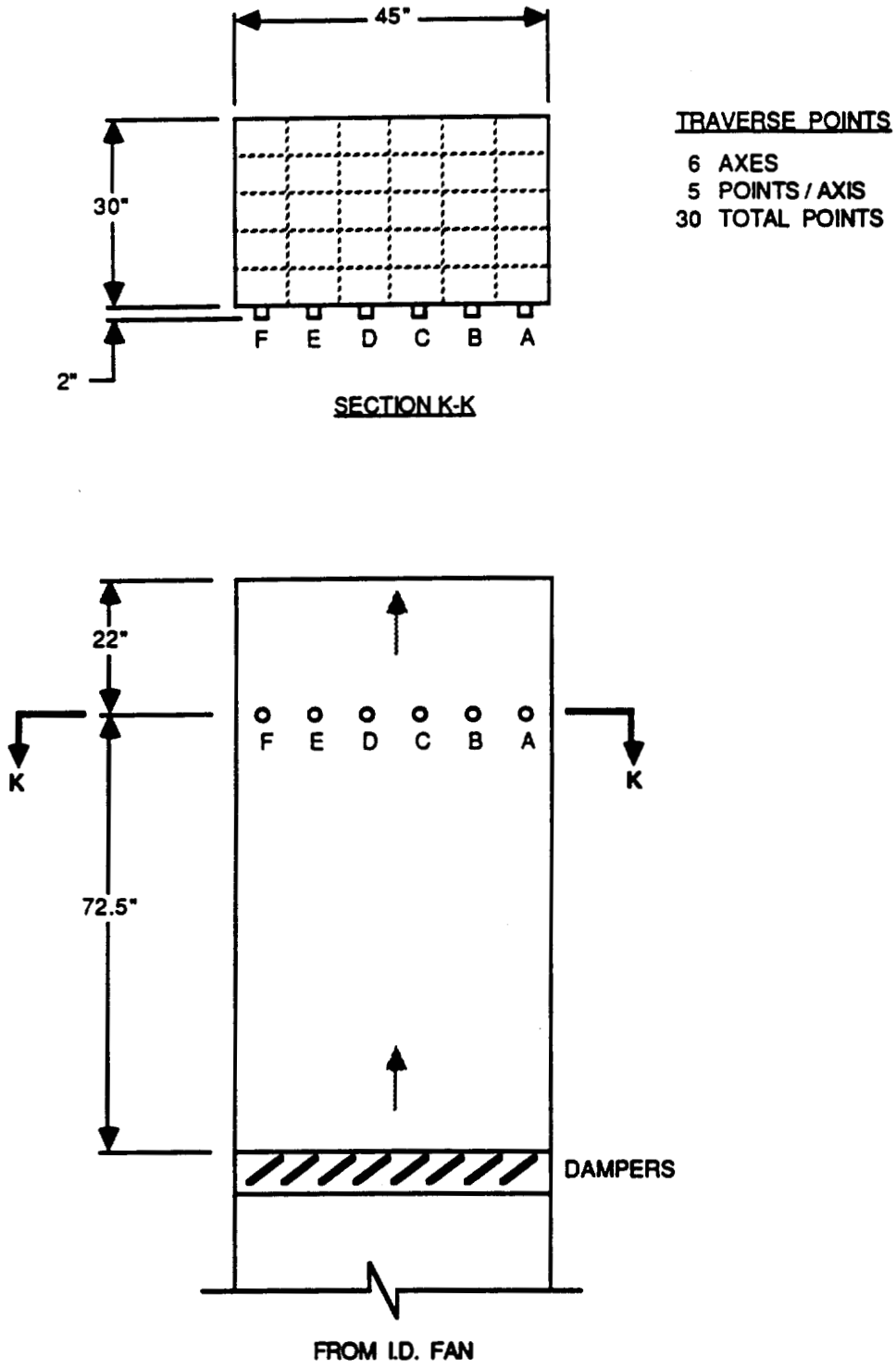

FIGURE 4-1. DRYER STACK TEST LOCATION.

QUALITY ASSURANCE/QUALITY CONTROL

5.1 General. Entropy Environmentalists Inc. (EEI) is committed to the continued implementation of a Quality Assurance Program to assure the quality of sampling and analytical procedures of environmental measurement data. The Quality Assurance measures taken during this test project equals or exceeds the minimum QA/QC recommendations as set forth by the U.S. Environmental Protection Agency (EPA) for a particular method.

The following sections outline the QA program implemented by EEI to justify the validity of test procedures. As applicable, the QA system for the various test programs addresses the following areas:

- Project Organization
- Preventive Maintenance & Equipment Calibration
- QA Sample Processing
- Analytical Instrument Calibration
- Blanks and Spiked Samples
- Internal/External System Checks
- Data Reduction & Validation
- Continuous Emissions Monitoring
- QA/QC Summary

5.2 Project Organization. The organization of the project team, including QA functions, are shown in Figure 5-1. Note that the QA structure is independent of the organizational groups which generate measurement data during the test program.

5.3 Preventive Maintenance and Equipment Calibration. An effective preventive maintenance program decreases downtime and thus increases data completeness and quality. Pretest and posttest equipment calibrations are conducted in a manner and at a frequency which meets or exceeds U.S. EPA specifications.

Each item transported to the field is inspected to detect equipment problems which may originate during periods of storage. All equipment returning from the field are cleaned, repaired, reconditioned, and recalibrated as necessary. Routine maintenance on equipment (dry gas meters, pumps, magnehelics/manometers, pitot tubes, and nozzles) is carried out periodically for leaks, corrosion, dents, or any other damage. Table 5-1 shows the activities for equipment calibration.

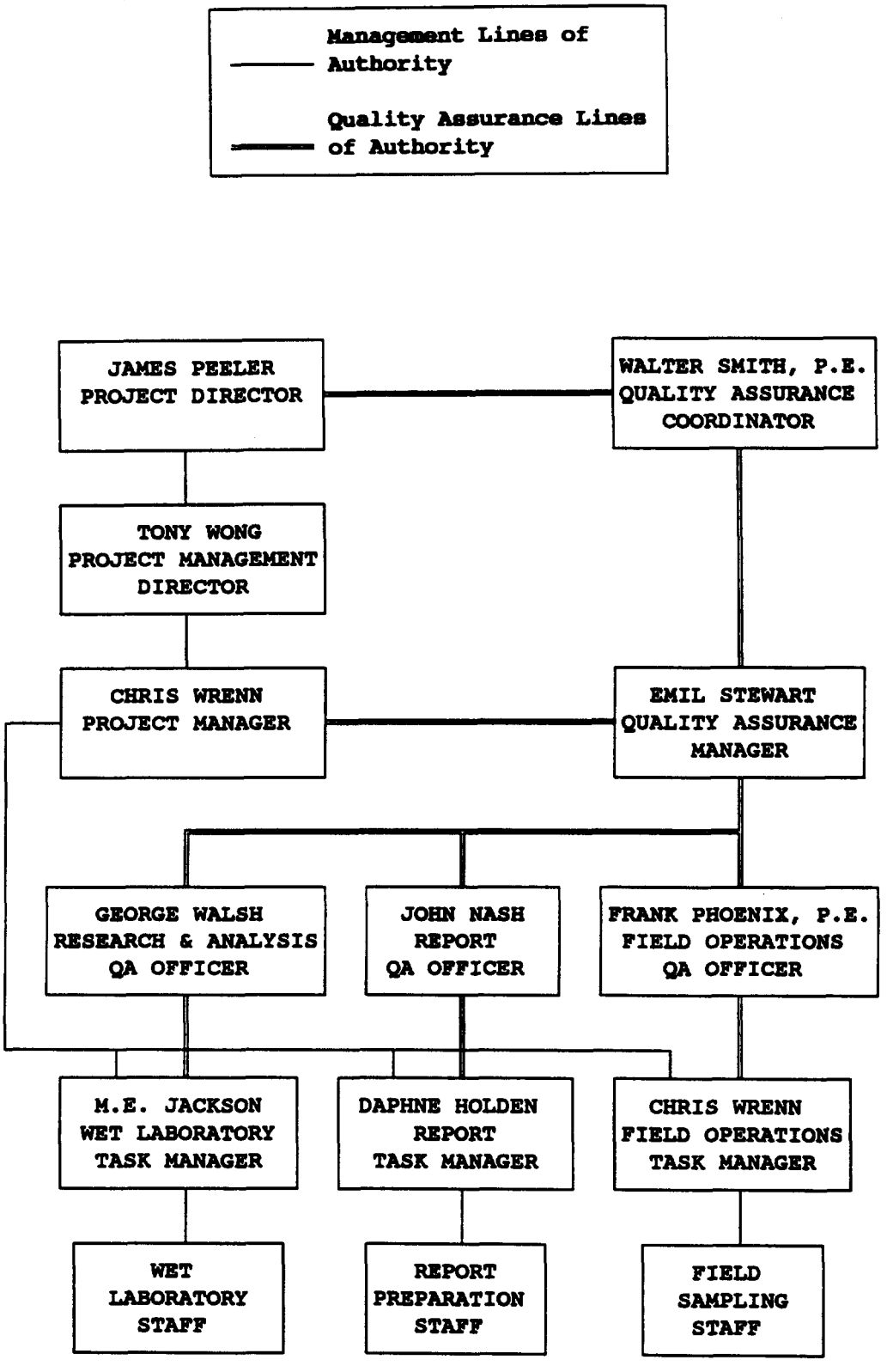

FIGURE 5-1 PROJECT ORGANIZATION

TABLE 5-1

IN-HOUSE EQUIPMENT CALIBRATION

Apparatus	Calibration Method And Frequency	Specifications	Corrective Action
Type S Pitot Tubes	Standards contained in EPA Method 2.	Coefficient of 0.84 ± 0.02	Refurbish or recalibrate.
	Visual inspection prior to shipment to test site and again prior to each day of testing.		
Manometers	Leak checked before and after each field use.		Repair or replace
Magnehelic Gauges	Initially calibrated over full range.	0-10" water column	
	After each field use, checked against inclined manometer at average settings encountered during testing.	Within ± 5%	Repair and Recalibrate.
Thermometers -Impinger -Dry Gas Meter -Filter Box	After purchase and prior to each field use, using ASTM mercury-in-glass thermometer.	Imp = ± 2°F DGM = ± 5.4°F FB = ± 5.4°F	Adjust, determine correction factor, or reject.
Thermocouple/ Potentiometer	After purchase. 3-point (ice bath, boiling water, and hot oil) using ASTM mercury-in-glass thermometer.	± 1.5% of absolute temperature.	Adjust, determine correction factor, or reject.
	Before and after each field use, compared to ASTM mercury-in-glass thermometer at ambient conditions.		
Dry Gas Meter and Orifice	Full calibration (every 6 months) over wide range of orifice settings to obtain calibration factor.	DGM = ± 0.02 from avg.coeff. for each run. Ori. = ± 0.15" H20 over delta H range of 0.4" to 4.0".	Adjust or replace
	10-minute quick calibration before sending to test site and again prior to each day of field use.	± 3% of full. ± 5% of full.	Use if no backup. Do not use.
	Posttest (at average delta H and highest vacuum) to determine if meter gamma has changed.	± 5% of full calibration. Factor (initial or recalibration) that yields the lowest sample volume for the testing is used.	Meter calibration, meter coefficient
Dry Gas Meter Transfer Standard	Annual calibrations conducted in triplicate using EPA wet test meter. Calibrations conducted at 7 flow rates from 0.25 to 1.40 cfm.	± 2% of average factor for each calibration run.	Adjust and recalibrate.
Barometer	Before and after each field use against an aneroid barometer.	± 0.1" mercury.	Adjust to agree.
	Reference barometer adjusted for elevation differences.		
Probe Nozzle	Average of 5 I.D. measurements using a micrometer. Visual inspection before and after each field use.	Difference between high and low measurement < 0.004"	Repair and recalibrate.

5.4 Sample Processing. Entropy employs systems which ensure the integrity of an environmental sample from the time of acquisition, through analysis, and ultimately to proper disposal. These systems are necessary to allow valid conclusions to be drawn from analytical results separated in time and space from the sampling operation. In addition, these systems recognize that samples are occasionally of value even after analytical results have been reported.

Samples are collected, transported, and stored in clean containers which are constructed of materials inert to the analytical matrix. Containers are used which allow air tight seals. When necessary, containers are employed which prevent photochemical reactions. All sample containers are labeled with the following information:

- Unique source identifier
- Sample run identifier
- Analyte identifier
- Sample matrix identifier
- Sample analyst identifier

Additional information relating to the sample is recorded on the data sheet for the sampling run that afforded the subject sample. Accordingly, the sampling data sheet contains all the information listed above, plus the date and time the sample was acquired and supplemental information such as observations pertinent to the quality of the sample. For condensed samples, e.g., samples in liquid media, the sample levels are marked on the outside of the container; this mark is used to indicate sample loss, and as such, may serve as a reference in adjusting results accordingly.

For transport from the field to the laboratory, samples are stored in locked boxes and secured in a fashion which minimizes movement and thus prevents breakage of containers. Boxes used for transporting glass containers are packed with foam.

Samples remain in the custody of the sampler from acquisition until conveyance to the laboratory analyst, if the analyst is different from the sampler. The sampler initiates a sample chain of custody record at the time of sample collection in the field. All custody transfers are documented on the chain of custody form, which remains with the sample at all times.

Analytical data are identified in a manner identical to that of the sampling data. Accordingly, all data generated from the analysis of samples are documented with the following information:

- Source identifier
- Sample run identifier
- Analyte identifier
- Sample matrix identifier
- Analyst identifier
- Analysis date

Portions of samples remaining after analysis are returned to their original sample containers. These samples are stored in designated storage areas until their destruction is authorized.

5.5 Instrument Calibration. Instrument calibration is one of the most important functions in generating precise and accurate quality data. A listing of major in-house instrumentation and the corresponding Quality Assurance program is given in Table 5-2.

All of the contract laboratories involved in the analytical testing for the test program maintained rigorous QA programs for instrument calibration.

5.6 Blanks and Spikes. Field blanks, method blanks, trip blanks, lab-proof blanks and filter blanks are obtained, digested and analyzed when applicable. The blanks reflect the background contamination obtained from the various sources during the sampling and analysis. Thus, data adjustment or correction can be made accordingly.

In most cases, it is not necessary to digest and analyze the method blanks, reagent blanks or the lab-proof blanks unless the field blank shows a high level of contamination. If a high level of contamination is present, it is imperative to individually analyze the above blanks to help determine the cause of contamination.

Spiked samples are used to check on the performance of a routine analysis or the recovery efficiency of a method. During spiking, a known amount of stock solutions of the substance of interest is added to the sample prior to sample extraction, digestion, and analysis.

TABLE 5-2

IN-HOUSE INSTRUMENT CALIBRATION

Apparatus	Calibration Method And Frequency	Corrective Specifications	Action
Analytical & Top Loading Balance	Daily and monthly checks with a series of class S weights. Balance serviced annually by a qualified service representative and checked with a series of NBS weights.	± 1 mg of class S weights.	Adjust or repair.
Gas Chromatograph	3-point calibration curve at the expected range. Duplicate injection of the sample until ± 5% variation is achieved. Calibration repeated at the end of each test series.		
HPLC/Ion Chromatograph	Calibrations conducted at the beginning, after the first injection, and after the second injection.		
Fisher Accument 925 pH/Selective Ion Meter	5- point calibration prior to analyzing the samples for the specific ions.		

5.7 Internal/External System Audit Checks. System and performance audits are routine elements of all Entropy QA/QC programs.

Internal Systems Audit: The following sampling equipment checks were conducted prior to sample collection.

- All sampling equipment was thoroughly checked to ensure clean and operable components.
- Equipment was inspected for possible damage from shipment.
- The oil manometers or Magnehelic gauges were leveled and zeroed.
- The temperature measurement systems were checked for damage and operability by measuring the ambient temperature.

Performance Audits: Performance audits of the laboratory are conducted prior to the processing of any compliance samples for analysis. Audit materials typically include samples available from the EPA prior to new source testing. Also, samples of known concentration are specially prepared in-house or obtained from the EPA for Internal QA checks.

External Sytems Audits: Entropy is subject to a system audit each time a test is conducted for any Air Pollution Control agency. This procedure entails an EPA observer on-site to do qualitative evaluation of performance to demonstrate compliance with the applicable regulations.

5.8 Data Reduction and Validation. The test team leader is responsible for reviewing and validating data as they are acquired. Each team leader has extensive knowledge of sampling methodology and the characteristics of the process being measured and is capable of evaluating the accuracy, representativeness, and completeness of raw data on-site, where action to replace inadequate data can be taken immediately.

Data obtained during calibrations and test runs are recorded on standardized forms which are checked twice for completeness and accuracy by the QA Director or his designated representative. Data reduction and consistency are achieved by using the standardized forms and using Entropy's in-house computer facilities.

5.9 QA/QC Summary. All chemicals used were American Chemical Society (ACS), High Purity Liquid Chromatography (HPLC), or pesticide grade. The distilled, deionized water utilized met or exceeded the American Society for Testing and Materials (ASTM) specifications for Type-I reagent water. Pretest and posttest leak checks were conducted on each sampling train.

APPENDIX A.1

A. TEST RESULTS

1. Particulate

PLANT: Barnhill Contracting Company, Rocky Mount, N.C.

RUN #	DATE	SAMPLING LOCATION	OPERATOR
M5-1	6/11/90	Dryer Stack	Stuart R. Davis
M5-2	6/11/90	Dryer Stack	Stuart R. Davis
M5-3	6/11/90	Dryer Stack	Stuart R. Davis

		M5-1	M5-2	M5-3
	Run Start Time	1205	1412	1541
	Run Finish Time	1319	1522	1651
	Net Traversing Points	30	30	30
Theta	Net Run Time, Minutes	60.00	60.00	60.00
Dia	Nozzle Diameter, Inches	0.244	0.244	0.244
Cp	Pitot Tube Coefficient	0.840	0.840	0.840
Y	Dry Gas Meter Calibration Factor	0.9895	0.9895	0.9895
Pbar	Barometric Pressure, Inches Hg	29.90	29.90	29.90
Delta-H	Avg. Pressure Differential of Orifice Meter, Inches H_2O	2.80	3.37	3.07
Vm	Volume Of Metered Gas Sample, Dry ACF	56.598	64.228	61.233
tm	Dry Gas Meter Temperature, Degrees F	98	101	100
Vmstd	Volume Of Metered Gas Sample, Dry SCF*	53.301	60.246	57.498
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, ml	475.0	522.5	524.5
Vwstd	Volume of Water Vapor, SCF*	22.358	24.594	24.688
$\%H_2O$	Moisture Content, Percent by Volume	29.6	29.0	30.0
Mfd	Dry Mole Fraction	0.704	0.710	0.700
$\%CO_2$	Carbon Dioxide, Percent By Volume, Dry	6.0	6.0	6.0
$\%O_2$	Oxygen, Percent By Volume, Dry	12.7	12.7	12.7
Fo	Fuel Factor	1.367	1.367	1.367
Md	Gas Molecular Weight, lb/lb-Mole, Dry	29.47	29.47	29.47
Ms	Gas Molecular Weight, lb/lb-Mole, Wet	26.07	26.14	26.03
Pg	Flue Gas Static Pressure, Inches H_2O	-0.75	-0.75	-0.70
Ps	Absolute Flue Gas Pressure, Inches Hg	29.84	29.84	29.85
ts	Flue Gas Temperature, Degrees F	296	281	281
Delta-p	Average Velocity Head, Inches H_2O	1.5400	2.1960	2.0130
vs	Flue Gas Velocity, Feet/Second	87.85	103.72	99.50
A	Stack/Duct Area, Square Inches	1,350	1,350	1,350
Qsd	Volumetric Air Flow Rate, Dry SCFM*	24,232	29,437	27,851
Qaw	Volumetric Air Flow Rate, Wet ACFM	49,416	58,343	55,969
%I	Isokinetic Sampling Rate, Percent	105.8	98.5	99.3
%EA	Excess Air, Percent	145	145	145

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg)

(Continued next page)

FIELD DATA AND RESULTS TABULATION
(Continued)

PLANT: Barnhill Contracting Company, Rocky Mount, N.C.

		M5-1	M5-2	M5-3
	Filterable Particulate			
mg	Catch Weight, Milligrams	50.7	107.1	124.1
gr/DSCF	Concentration, grains/DSCF *	0.0147	0.0274	0.0333
lb/hr	Emission Rate, lb/hr	3.05	6.92	7.95

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg)

APPENDIX A.2

A. TEST RESULTS

2. Plume Opacity

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa Grosshandler

File Name: M5-1

Start Time: 1205 Stop Time: 1305 Date of Test: 06-11-1990

- O R I G I N A L D A T A -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	0	5	0	0	31	0	5	10	0
2	0	0	0	0	32	0	0	0	0
3	0	0	10	5	33	0	0	0	0
4	5	5	0	0	34	0	10	0	0
5	0	10	0	0	35	0	0	0	5
6	0	5	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	10
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	10
12	0	0	0	0	42	0	0	5	0
13	0	0	0	0	43	5	0	0	0
14	0	0	0	0	44	0	0	0	0
15	5	0	0	0	45	0	5	0	0
16	0	0	0	0	46	0	0	0	0
17	0	5	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	5
21	0	0	0	0	51	0	5	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

NOTE: _____

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DATE PRINT: 06-18-1990 TIME PRINT: 15:44:31

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa Grosshandler

File Name: M5-1

Start Time: 1205 Stop Time: 1305 Date of Test: 06-11-1990

- R O L L I N G A V E R A G E S -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	-	-	-	-	31	0	0	1	1
2	-	-	-	-	32	1	1	1	1
3	-	-	-	-	33	1	1	1	1
4	-	-	-	-	34	1	1	1	1
5	-	-	-	-	35	1	1	1	1
6	-	-	-	2	36	1	1	1	1
7	2	2	2	2	37	1	1	1	1
8	2	2	2	2	38	1	1	1	1
9	2	2	1	1	39	1	1	1	1
10	1	1	1	1	40	1	1	1	1
11	1	0	0	0	41	1	1	1	1
12	0	0	0	0	42	1	1	1	1
13	0	0	0	0	43	1	1	1	1
14	0	0	0	0	44	1	1	1	1
15	0	0	0	0	45	1	1	1	1
16	0	0	0	0	46	1	1	1	1
17	0	0	0	0	47	1	1	1	1
18	0	0	0	0	48	1	1	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

BLOCK SIZE (for Rolling Averages) = 24 READINGS

*The highest BLOCK in this ROLLING AVERAGE is at 6 Min and 45 Sec

>> OPERATION WAS PERFORMED ON THE: original DATA. <<

NOTE: _____

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DATE PRINT: 06-18-1990 TIME PRINT: 15:44:51

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa Grosshandler

File Name: M5-1

Start Time: 1205 Stop Time: 1305 Date of Test: 06-11-1990

- B L O C K A V E R A G E S -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	-	-	-	-	31	-	-	-	-
2	-	-	-	-	32	-	-	-	-
3	-	-	-	-	33	-	-	-	-
4	-	-	-	-	34	-	-	-	-
5	-	-	-	-	35	-	-	-	-
6	-	-	-	2	36	-	-	-	1
7	-	-	-	-	37	-	-	-	-
8	-	-	-	-	38	-	-	-	-
9	-	-	-	-	39	-	-	-	-
10	-	-	-	-	40	-	-	-	-
11	-	-	-	-	41	-	-	-	-
12	-	-	-	0	42	-	-	-	1
13	-	-	-	-	43	-	-	-	-
14	-	-	-	-	44	-	-	-	-
15	-	-	-	-	45	-	-	-	-
16	-	-	-	-	46	-	-	-	-
17	-	-	-	-	47	-	-	-	-
18	-	-	-	0	48	-	-	-	0
19	-	-	-	-	49	-	-	-	-
20	-	-	-	-	50	-	-	-	-
21	-	-	-	-	51	-	-	-	-
22	-	-	-	-	52	-	-	-	-
23	-	-	-	-	53	-	-	-	-
24	-	-	-	0	54	-	-	-	0
25	-	-	-	-	55	-	-	-	-
26	-	-	-	-	56	-	-	-	-
27	-	-	-	-	57	-	-	-	-
28	-	-	-	-	58	-	-	-	-
29	-	-	-	-	59	-	-	-	-
30	-	-	-	0	60	-	-	-	0

BLOCK SIZE = 24 READINGS

>> OPERATION WAS PERFORMED ON THE: original DATA. <<

NOTE: _____

DATE PRINT: 06-18-1990 TIME PRINT: 15:45:07

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa M. Grosshandler

File Name: M5-2

Start Time: 1315 Stop Time: 1415 Date of Test: 06-11-1990

- O R I G I N A L D A T A -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	5	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	5	0	37	0	0	0	0
8	5	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	5	0	5	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	5	0	56	0	0	0	0
27	5	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

NOTE: _____

DATE PRINT: 06-18-1990 TIME PRINT: 15:48:46

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa M. Grosshandler

File Name: M5-2

Start Time: 1315 Stop Time: 1415 Date of Test: 06-11-1990

- R O L L I N G A V E R A G E S -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	-	-	-	-	31	0	0	0	0
2	-	-	-	-	32	0	0	0	0
3	-	-	-	-	33	0	0	0	0
4	-	-	-	-	34	0	0	0	0
5	-	-	-	-	35	0	0	0	0
6	-	-	-	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	1	1	1	1	38	0	0	0	0
9	1	1	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	1	1	56	0	0	0	0
27	1	1	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

BLOCK SIZE (for Rolling Averages) = 24 READINGS

*The highest BLOCK in this ROLLING AVERAGE is at 8 Min and 0 Sec

>> OPERATION WAS PERFORMED ON THE: original DATA. <<

NOTE: _____

DATE PRINT: 06-18-1990 TIME PRINT: 15:49:17

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa M. Grosshandler

File Name: M5-2

Start Time: 1315 Stop Time: 1415 Date of Test: 06-11-1990

- B L O C K A V E R A G E S -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	-	-	-	-	31	-	-	-	-
2	-	-	-	-	32	-	-	-	-
3	-	-	-	-	33	-	-	-	-
4	-	-	-	-	34	-	-	-	-
5	-	-	-	-	35	-	-	-	-
6	-	-	-	0	36	-	-	-	0
7	-	-	-	-	37	-	-	-	-
8	-	-	-	-	38	-	-	-	-
9	-	-	-	-	39	-	-	-	-
10	-	-	-	-	40	-	-	-	-
11	-	-	-	-	41	-	-	-	-
12	-	-	-	0	42	-	-	-	0
13	-	-	-	-	43	-	-	-	-
14	-	-	-	-	44	-	-	-	-
15	-	-	-	-	45	-	-	-	-
16	-	-	-	-	46	-	-	-	-
17	-	-	-	-	47	-	-	-	-
18	-	-	-	0	48	-	-	-	0
19	-	-	-	-	49	-	-	-	-
20	-	-	-	-	50	-	-	-	-
21	-	-	-	-	51	-	-	-	-
22	-	-	-	-	52	-	-	-	-
23	-	-	-	-	53	-	-	-	-
24	-	-	-	0	54	-	-	-	0
25	-	-	-	-	55	-	-	-	-
26	-	-	-	-	56	-	-	-	-
27	-	-	-	-	57	-	-	-	-
28	-	-	-	-	58	-	-	-	-
29	-	-	-	-	59	-	-	-	-
30	-	-	-	0	60	-	-	-	0

BLOCK SIZE = 24 READINGS

>> OPERATION WAS PERFORMED ON THE: original DATA. <<

NOTE: _____

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_____

DATE PRINT: 06-18-1990 TIME PRINT: 15:49:32

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa M. Grosshandler

File Name: M5-3

Start Time: 1541 Stop Time: 1641 Date of Test: 06-11-1990

- O R I G I N A L D A T A -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	0	0	0	0	31	0	5	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	5	0	35	0	0	0	0
6	5	0	10	0	36	0	0	5	10
7	0	0	0	0	37	0	5	0	0
8	0	0	0	5	38	0	0	0	0
9	0	0	0	0	39	0	5	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	5	0	10	0
13	0	0	0	0	43	0	5	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	10	5	10	0
16	0	0	0	0	46	0	0	0	0
17	0	5	0	0	47	0	0	0	5
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	5	0	5
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	5	0	5	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	5	0	0
26	0	5	0	0	56	0	0	5	0
27	0	0	0	0	57	0	0	0	0
28	0	0	5	0	58	0	0	0	0
29	0	0	0	0	59	0	0	5	0
30	0	0	0	0	60	0	0	0	0

NOTE: _____

DATE PRINT: 06-18-1990 TIME PRINT: 15:54:10

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa M. Grosshandler

File Name: M5-3

Start Time: 1541 Stop Time: 1641 Date of Test: 06-11-1990

- R O L L I N G A V E R A G E S -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	-	-	-	-	31	0	1	1	1
2	-	-	-	-	32	1	0	0	0
3	-	-	-	-	33	0	0	0	0
4	-	-	-	-	34	0	0	0	0
5	-	-	-	-	35	0	0	0	0
6	-	-	-	1	36	0	0	0	1
7	1	1	1	1	37	1	1	1	1
8	1	1	1	1	38	1	1	1	1
9	1	1	1	1	39	1	1	1	1
10	1	1	1	1	40	1	1	1	1
11	1	1	1	1	41	1	1	1	1
12	1	1	0	0	42	1	1	1	1
13	0	0	0	0	43	1	1	1	1
14	0	0	0	0	44	1	1	1	1
15	0	0	0	0	45	1	1	2	2
16	0	0	0	0	46	2	2	2	2
17	0	0	0	0	47	2	2	2	2
18	0	0	0	0	48	2	2	1	1
19	0	0	0	0	49	1	1	1	1
20	0	0	0	0	50	1	1	1	2
21	0	0	0	0	51	1	1	1	1
22	0	0	0	0	52	1	1	1	1
23	0	0	0	0	53	1	1	1	1
24	0	0	0	0	54	1	1	1	1
25	0	0	0	0	55	1	1	1	1
26	0	0	0	0	56	1	1	1	1
27	0	0	0	0	57	1	1	1	1
28	0	0	0	0	58	1	1	1	1
29	0	0	0	0	59	1	1	1	1
30	0	0	0	0	60	1	1	1	1

BLOCK SIZE (for Rolling Averages) = 24 READINGS

*The highest BLOCK in this ROLLING AVERAGE is at 47 Min and 45 Sec

>> OPERATION WAS PERFORMED ON THE: original DATA. <<

NOTE: _____

_____

_____

DATE PRINT: 06-18-1990 TIME PRINT: 15:54:29

Name of Source: Barnhill Contracting Co., Tarboro, NC Oil Fired Dryer

Observer: Lisa M. Grosshandler

File Name: M5-3

Start Time: 1541 Stop Time: 1641 Date of Test: 06-11-1990

- B L O C K A V E R A G E S -

Sec>> Min	00	15	30	45	Sec>> Min	00	15	30	45
1	-	-	-	-	31	-	-	-	-
2	-	-	-	-	32	-	-	-	-
3	-	-	-	-	33	-	-	-	-
4	-	-	-	-	34	-	-	-	-
5	-	-	-	-	35	-	-	-	-
6	-	-	-	1	36	-	-	-	1
7	-	-	-	-	37	-	-	-	-
8	-	-	-	-	38	-	-	-	-
9	-	-	-	-	39	-	-	-	-
10	-	-	-	-	40	-	-	-	-
11	-	-	-	-	41	-	-	-	-
12	-	-	-	0	42	-	-	-	1
13	-	-	-	-	43	-	-	-	-
14	-	-	-	-	44	-	-	-	-
15	-	-	-	-	45	-	-	-	-
16	-	-	-	-	46	-	-	-	-
17	-	-	-	-	47	-	-	-	-
18	-	-	-	0	48	-	-	-	1
19	-	-	-	-	49	-	-	-	-
20	-	-	-	-	50	-	-	-	-
21	-	-	-	-	51	-	-	-	-
22	-	-	-	-	52	-	-	-	-
23	-	-	-	-	53	-	-	-	-
24	-	-	-	0	54	-	-	-	1
25	-	-	-	-	55	-	-	-	-
26	-	-	-	-	56	-	-	-	-
27	-	-	-	-	57	-	-	-	-
28	-	-	-	-	58	-	-	-	-
29	-	-	-	-	59	-	-	-	-
30	-	-	-	0	60	-	-	-	1

BLOCK SIZE = 24 READINGS

>> OPERATION WAS PERFORMED ON THE: original DATA. <<

NOTE: _____

_____

_____

DATE PRINT: 06-18-1990 TIME PRINT: 15:54:42

APPENDIX A.3

A. TEST RESULTS

3. Example Calculations

Dryer Stack

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

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

$$Vmstd = 17.64 * 0.9895 * 56.598 * \frac{29.90 + (2.800/13.6)}{(460 + 98)} = 53.301 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

$$Vwstd = 0.04707 * Vlc$$

$$Vwstd = 0.04707 * 475.0 = 22.358 \text{ SCF}$$

PERCENT MOISTURE, BY VOLUME, AS MEASURED IN FLUE GAS

$$\%H_2O = 100 * Vwstd / (Vwstd + Vmstd)$$

$$\%H_2O = \frac{22.358}{22.358 + 53.301} * 100 = 29.6\ \%$$

ABSOLUTE FLUE GAS PRESSURE

$$Ps = Pbar + (Pg / 13.6)$$

$$Ps = 29.90 + (-0.75/13.6) = 29.84 \text{ inches Hg}$$

DRY MOLE FRACTION OF FLUE GAS

$$Mfd = 1 - \%H_2O / 100$$

$$Mfd = 1 - 29.6/100 = 0.704$$

DRY MOLECULAR WEIGHT OF FLUE GAS

$$Md = (\%CO_2/100 * 44) + (\%O_2/100 * 32) + ((100 - \%CO_2 - \%O_2)/100 * 28)$$

$$Md = (6.0/100 * 44) + (12.7/100 * 32) + ((100 - 6.0 - 12.7)/100 * 28)$$

$$Md = 29.47 \text{ lb/lb-Mole}$$

WET MOLECULAR WEIGHT OF FLUE GAS

$$Ms = (Md * Mfd) + (0.18 * \%H_2O)$$

$$Ms = (29.47 * 0.704) + (0.18 * 29.6) = 26.07 \text{ lb/lb-Mole}$$

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

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

$$vs = 85.49 * 0.840 * \text{SQUARE ROOT}\left[\frac{1.5400 * (460 + 296)}{29.84 * 26.07}\right] = 87.85 \text{ ft/sec}$$

DRY VOLUMETRIC FLUE GAS FLOW RATE AT STANDARD CONDITIONS

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

$$Qsd = \frac{60}{144} * 0.704 * 87.85 * 1{,}350.0 * \frac{528}{460 + 296} * \frac{29.84}{29.92}$$

Qsd = 24,232 DSCFM

WET VOLUMETRIC FLUE GAS FLOW RATE AT ACTUAL CONDITIONS

Qaw = 60 / 144 * vs * A

Qaw = 60 / 144 * 87.85 * 1,350.0 = 49,416 ACFM

PERCENT ISOKINETIC OF SAMPLING RATE

$$\%I = \frac{Pstd}{Tstd} * \frac{100}{60} * \frac{(ts + 460) * Vmstd}{Ps * vs * Mfd * Theta * (\pi * (NozzleDia/2)^2/144)}$$

$$\%I = \frac{29.92}{528} * \frac{100}{60} * \frac{(296 + 460) * 53.301}{29.84 * 87.85 * 0.704 * 60.00 * (\pi * (0.244/2)^2/144)}$$

%I = 105.8 %

PERCENT EXCESS AIR

$$\%EA = \frac{\%O_2 - (0.5 * \%CO)}{0.264 * (100 - \%CO_2 - \%O_2) - (\%O_2 - (0.5 * \%CO))} * 100$$

$$\%EA = \frac{12.7 - (0.5 * 0.0)}{0.264 * (100 - 6.0 - 12.7) - (12.7 - (0.5 * 0.0))} * 100 = 145.0 \%$$

CONCENTRATION, GRAINS PER DRY STANDARD CUBIC FOOT, FILTERABLE PARTICULATE

$$gr/DSCF = \frac{7{,}000}{453.592} * \frac{(mg / 10^3)}{Vmstd}$$

$$gr/DSCF = \frac{7{,}000}{453.592} * \frac{(50.7/10^3)}{53.301} = 0.0147 \text{ gr/DSCF}$$

EMISSION RATE, POUNDS PER HOUR, FILTERABLE PARTICULATE

$$lb/hr = \frac{60}{453.592} * \frac{(mg / 10^3)}{Vmstd} * Qsd$$

$$lb/hr = \frac{60}{453.592} * \frac{(50.7/10^3)}{53.301} * 24{,}232 = 3.05 \text{ lb/hr}$$

APPENDIX B.1

B. FIELD AND ANALYTICAL DATA

1. Particulate

Preliminary Field Data

PLANT NAME BARN HILL CONTRACTING

LOCATION ROCKY MOUNT N.C.

SAMPLING LOCATION ~~BAGHOUSE~~ Dryer STACK

NO. OF PORTS 6

PORT INSIDE DIAMETER 3"

DUCT DEPTH
FROM INSIDE FAR WALL TO OUTSIDE OF PORT 32"

NIPPLE LENGTH 2"

DEPTH OF DUCT 30"

WIDTH (RECTANGULAR DUCT) 45"

EQUIVALENT DIAMETER:

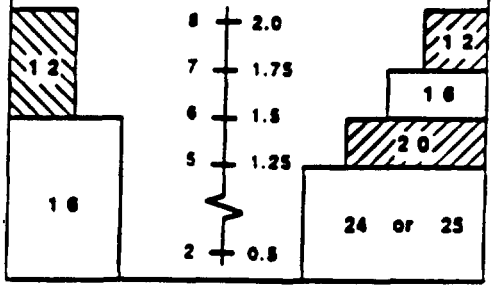
$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(30)(45)}{(30+45)} = 36$

DISTANCE FROM PORTS TO NEAREST FLOW DISTURBANCE	UPSTREAM	DOWNSTREAM
	72 1/2	22
DIAMETERS	2	.61

STACK AREA = LXW 30 x 45 = 1350 IN²

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.



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		96.8	80.6	65.8	35.6	28.9	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										98.8	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

POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	10	3	5"
2	30	9	11"
3	50	15	17"
4	70	21	23"
5	90	27	29"
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

ENTROPY ENVIRONMENTALISTS, INC.

ORSAT FIELD DATA

Plant Name BARNHILL CONST.

Sampling Location ~~BOILER~~ Dryer STACK Fuel Type _____

Run and/or Sample No. S-MS-1 Leak Test? ✓ Date 6-11-90 Operator RLM

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
1412	1700	6.0	18.7		12.7		
1	1	6.0	18.7		12.7		
1522	1720	6.0	18.6		12.6		
	Avg.	6.0			Avg. 12.7		81.3

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.		

ISOKINETIC TYPE FIELD DATA SHEET

COMPANY NAME BARNHILL CONST. RUN NUMBER ~~5~~ MS-1
ADDRESS ROCKY MOUNT N.C. TIME START 1205
SAMPLING LOCATION ~~BAGHOUSE STACK~~ Dryer Stack TIME FINISH 1319
DATE 6-11-90 TEAM LEADER JRD TECHNICIANS CGM
BAROMETRIC PRESSURE. IN. HG 29.90 STATIC PRESSURE IN. H_2O -.75
TRAIN LEAK CHECK VACUUM IN. HG 15 6
TRAIN LEAK RATE, CU.FT/MIN .001 .001

EQUIPMENT CHECKS

- PITOTS, PRETEST
- PITOTS, POSTTEST
- N/A M3 SAMPLING SYS/TED BAG
- THERMOCOUPLE @ 290 PRE
- THERMOCOUPLE @ 290 POST

IDENTIFICATION NUMBERS

REAGENT BOX 0550 NOZZLE 205 DIAMETER .244
METER BOX N14 Y .9895 T/C READOUT F25
UMBILICAL 017 T/C PROBE R139
SAMPLE BOX 8 ORSAT PUMP N/A
PROBE 4-20 PITOT 4-20 TEDLAR BAG N/A

LEAK CHECK READINGS

B 1	
B 2	
B 3	
B 4	
B 5	
B 6	

FILTER #	TARE
E9966	.5087

DELTA $H_@$	1.698
METER TEMP	100
EST. $\%H_2O$	25
C FACTOR	.643
STACK TEMP	290
REF DELTA P	1.099
K-FACTOR	1.674

FYRITE 65% 65% 65%

C_p .84

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READINGS CUBIC FEET	PITOT READING IN. H_2O	ORIFICE SETTING IN. H2O IDEAL	ORIFICE SETTING IN. H2O ACTUAL	GAS METER TEMP. °F	VACUUM IN. HG GAUGE	GAS TEMPERATURES FILTER BOX °F	GAS TEMPERATURES IMPINGER EXIT °F	STACK TEMP. °F	LK CHK #
1	A 1	0	919.300	2.00	3.29	3.28	88	2	255	55	291	
2	2	2	921.38	.63	1.03	1.03	88	2	250	54	295	
3	3	4	922.71	.25	.41	.41	89	1	250	50	294	
4	4	6	923.50	.23	.38	.38	89	1	250	48	296	
5	5	8	924.26	.30	.49	.49	89	1	250	48	297	
6	B 1	10/0	925.192	2.30	3.76	3.76	90	4	255	49	299	
7	2	2	927.44	1.10	1.78	1.78	91	3	255	45	298	
8	3	4	929.04	.60	.98	.98	92	2	255	45	298	
9	4	6	930.27	.55	.91	.91	92	2	255	45	295	
10	5	8	931.41	.45	.74	.74	93	2	260	98	289	
11	C 1	10/0	932.412	2.25	3.71	3.71	94	4	260	52	295	
12	2	2	934.65	1.75	2.86	2.86	96	3	260	50	300	
13	3	4	936.55	1.36	2.23	2.23	98	3	255	50	302	
14	4	6	938.30	1.55	2.55	2.55	98	4	255	50	300	
15	5	8	940.15	1.18	1.95	1.95	98	3	255	50	297	
16	D 1	10/0	941.833	1.95	3.21	3.21	98	4	250	55	301	
17	2	2	943.94	1.85	3.02	3.02	100	4	250	55	306	
18	3	4	945.99	2.00	3.28	3.28	101	4	250	52	305	
19	4	6	948.11	3.20	5.29	5.29	102	6	250	52	301	
20	5	8	950.75	2.40	3.96	3.96	104	5	250	52	302	
21	E 1	10/0	953.122	2.10	3.48	3.48	103	4	250	57	298	
22	2	2	955.32	2.70	4.46	4.46	104	5	250	55	303	
23	3	4	957.80	3.20	5.31	5.31	106	5	250	55	300	
24	4	6	960.41	2.60	4.31	4.31	107	5	250	55	301	
25	5	8	962.89	1.25	2.08	2.08	106	3	250	55	299	

Figure 3
12/88
P1

minutes Vm $(\sqrt{\Delta p})^2$ ΔH tm ts

ISOKINETIC TYPE FIELD DATA SHEET (continued)

COMPANY NAME BARNHILL CONST RUN NUMBER EMS-1

SAMPLING LOCATION ~~BAGHOUSE STACK~~ Dryer Stack DATE 6-11-90

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READINGS CUBIC FEET	PITOT READING IN. H_2O	ORIFICE SETTING IN. H2O IDEAL	ORIFICE SETTING IN. H2O ACTUAL	GAS METER TEMP. °F	VACUUM IN. HG GAUGE	GAS TEMPERATURES FILTER BOX °F	GAS TEMPERATURES IMPINGER EXIT °F	STACK TEMP. °F	LK CHK #
26	F1	10/0	964.661	2.60	4.33	4.33	102	5	255	55	297	
27	2	2	967.100	3.00	4.97	4.97	103	6	255	55	296	
28	3	4	969.72	2.50	4.18	4.18	105	5	255	58	290	
29	4	6	972.12	1.90	3.24	3.24	106	4	260	58	280	
30	5	8	974.27	1.00	1.76	1.76	106	3	250	58	260	
31		60/OFF	975.898									
32												
33												
34												
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___	56.598	1.54	2.8	98	296
minutes	Vm	$(\sqrt{\Delta p})^2$	ΔH	tm	ts

F1010
9/89
p2

ISOKINETIC TYPE FIELD DATA SHEET

23

COMPANY NAME BARNHILL CONST. RUN NUMBER ~~5~~ MS-2
ADDRESS ROCKY MOUNT N.C. TIME START 1412
SAMPLING LOCATION ~~BAGHOUSE STACK~~ Dryer Stack TIME FINISH 1522
DATE 6-11-90 TEAM LEADER SRD TECHNICIANS GM
BAROMETRIC PRESSURE. IN. HG 29.90 STATIC PRESSURE IN. H_2O -.75
TRAIN LEAK CHECK VACUUM IN. HG 15 6
TRAIN LEAK RATE, CU.FT/MIN .001 001

EQUIPMENT CHECKS

- ✓ PITOTS, PRETEST
- ✓ PITOTS, POSTTEST
- N/A M3 SAMPLING SYS/TED BAG
- ✓ THERMOCOUPLE @ 295 PRE
- ✓ THERMOCOUPLE @ 273 POST

IDENTIFICATION NUMBERS

REAGENT BOX 0550 NOZZLE 205 DIAMETER .244
METER BOX N14 Y: .9995 T/C READOUT F25
UMBILICAL U17 T/C PROBE R159
SAMPLE BOX 18 ORSAT PUMP N/A
PROBE 4-10 PITOT 4-10 TEDLAR BAG 60

LEAK CHECK READINGS

B 1	
E 1	
B 2	
E 2	
B 3	
E 3	
B 4	
E 4	
B 5	
E 5	
B 6	
E 6	

FILTER #	TARE
E9965	.5121

DELTA $H_@$	1.698			
METER TEMP	110			
EST. $\%H_2O$	30			
C FACTOR	.582			
STACK TEMP	300			
REF DELTA P	1.232			
K-FACTOR	1.494			

FYRITE
6½%
6½%
4%
5%

C_p .84

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READINGS CUBIC FEET	PITOT READING IN. H_2O	ORIFICE SETTING IN. H2O IDEAL	ORIFICE SETTING IN. H2O ACTUAL	GAS METER TEMP. °F	VACUUM IN. HG GAUGE	GAS TEMPERATURES FILTER BOX °F	GAS TEMPERATURES IMPINGER EXIT °F	STACK TEMP. °F	LK CHK #
1	A 1	0	977.800	1.85	2.78	2.78	100	3	255	55	285	
2	2	2	979.75	2.20	3.28	3.28	100	4	260	55	299	
3	3	4	981.89	2.60	3.88	3.88	100	4	260	52	287	
4	4	6	984.15	2.85	4.25	4.25	101	4	260	50	288	
5	5	8	986.54	2.20	3.30	3.30	102	4	260	50	283	
6	B 1	10/0	988.674	1.70	2.53	2.53	102	3	260	50	287	
7	2	2	990.53	1.47	2.21	2.21	102	3	255	48	287	
8	3	4	992.29	2.00	3.01	3.01	101	3	255	48	283	
9	4	6	994.33	1.92	2.90	2.90	102	3	255	48	280	
10	5	8	996.36	1.80	2.72	2.72	102	3	250	48	280	
11	C 1	10/0	998.292	1.55	2.35	2.35	101	3	250	45	278	
12	2	2	1000.01	1.60	2.43	2.43	101	3	245	45	278	
13	3	4	1001.95	2.10	3.16	3.16	102	4	245	48	285	
14	4	6	1004.01	2.40	3.62	3.62	102	5	250	48	281	
15	5	8	1006.24	2.30	3.49	3.49	102	4	255	48	276	
16	D 1	10/0	1008.458	1.40	2.12	2.12	101	3	250	45	278	
17	2	2	1010.17	1.60	2.45	2.45	101	4	250	45	272	
18	3	4	1012.03	2.20	3.36	3.36	101	4	250	45	272	
19	4	6	1014.21	2.50	3.80	3.80	102	5	255	45	276	
20	5	8	1016.52	2.10	3.18	3.18	102	4	255	45	278	
21	E 1	10/0	1018.627	1.72	2.58	2.58	99	4	260	53	281	
22	2	2	1020.53	1.30	1.96	1.96	100	3	260	55	282	
23	3	4	1022.22	3.20	4.80	4.80	100	6	260	52	285	
24	4	6	1024.75	3.00	4.50	4.50	101	5	260	50	281	
25	5	8	1027.27	2.40	3.60	3.60	101	5	255	50	281	

Pi _____ minutes _____ Vm _____ $(\sqrt{\Delta p})^2$ _____ ΔH _____ tm _____ ts

ISOKINETIC TYPE FIELD DATA SHEET (continued)

COMPANY NAME BARNHILL CONST. RUN NUMBER ~~5~~ MS-2

SAMPLING LOCATION ~~BAGHOUSE STACK~~ Dryer Stack DATE 6-11-90

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READINGS CUBIC FEET	PITOT READING IN. H_2O	ORIFICE SETTING IN. H2O IDEAL	ORIFICE SETTING IN. H2O ACTUAL	GAS METER TEMP. °F	VACUUM IN. HG GAUGE	GAS TEMPERATURES FILTER BOX °F	GAS TEMPERATURES IMPINGER EXIT °F	STACK TEMP. °F	LK CHK #
26	F 1	0/0	1029.52	2.30	3.47	3.47	100	4	255	55	279	
27	2	2	1031.71	3.10	4.65	4.65	100	6	255	52	282	
28	3	4	1034.28	3.50	5.28	5.28	101	6	255	50	278	
29	4	6	1036.92	3.30	4.96	4.96	102	6	255	50	280	
30	5	8	1039.54	2.90	4.40	4.40	101	5	255	50	273	
31		On/OFF	1042.03									
32												
33												
34												
35												
36												
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65												

F1010
9/89
p2

____ minutes

64.288 Vm

2.196 $(\sqrt{\Delta p})^2$

3.37 ΔH

101 tm

281 ts

ISOKINETIC TYPE FIELD DATA SHEET

25

COMPANY NAME BARNHILL CONST. RUN NUMBER SM5-3
ADDRESS ROCKY MOUNT N.C. TIME START 1541
SAMPLING LOCATION ~~BAGHOUSE STACK~~ Dryer Stack TIME FINISH 1651
DATE 6-11-90 TEAM LEADER SAD TECHNICIANS CDM
BAROMETRIC PRESSURE. IN. HG 29.90 STATIC PRESSURE IN. H_2O -.70
TRAIN LEAK CHECK VACUUM IN. HG 15 6
TRAIN LEAK RATE, CU.FT/MIN .601 .001

EQUIPMENT CHECKS

- ✓ PITOTS, PRETEST
- ✓ PITOTS, POSTTEST
- N/A M3 SAMPLING SYS/TED BAG
- ✓ THERMOCOUPLE @ 275 PRE
- ✓ THERMOCOUPLE @ 285 POST

IDENTIFICATION NUMBERS

REAGENT BOX 0550 NOZZLE 205 DIAMETER .244
METER BOX N14 Y .9895 T/C READOUT F25
UMBILICAL 017 T/C PROBE R139
SAMPLE BOX 8 ORSAT PUMP N/A
PROBE 4-20 PITOT 4-20 TEDLAR BAG N/A

LEAK CHECK READINGS

B 1	
E 1	
B 2	
E 2	
B 3	
E 3	
B 4	
E 4	
B 5	
E 5	
B 6	
E 6	

FILTER #	TARE
E9967	.5065

DELTA H@	1.698
METER TEMP	100
EST. $\%H_2O$	30
C FACTOR	571
STACK TEMP	280
REF DELTA P	1.221
K-FACTOR	1.507

FYRITE
4 %
4 %
6 %

C_p .84

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READINGS CUBIC FEET	PITOT READING IN. H_2O	ORIFICE SETTING IN. H2O IDEAL	ORIFICE SETTING IN. H2O ACTUAL	GAS METER TEMP. °F	VACUUM IN. HG GAUGE	GAS TEMPERATURES FILTER BOX °F	GAS TEMPERATURES IMPINGER EXIT °F	STACK TEMP. °F	LK CHK #
1	A 1	0	42.300	1.70	2.56	2.56	94	3	240	58	277	
2	2	2	44.18	1.85	2.76	2.76	94	3	240	55	281	
3	3	4	46.15	2.20	3.28	3.28	95	3	240	55	282	
4	4	6	48.29	3.00	4.46	4.46	96	4	240	52	285	
5	5	8	50.74	2.80	4.17	4.17	98	4	245	52	284	
6	B 1	10/0	53.108	1.55	2.24	2.24	96	3	245	55	280	
7	2	2	54.87	1.40	2.09	2.09	96	3	250	50	284	
8	3	4	56.57	1.65	2.47	2.47	97	3	250	50	282	
9	4	6	58.93	2.40	3.62	3.62	98	4	250	50	277	
10	5	8	60.59	2.95	4.43	4.43	98	4	250	48	278	
11	C 1	10/0	63.018	1.55	2.34	2.34	96	3	255	50	275	
12	2	2	64.83	1.63	2.42	2.42	98	3	255	50	289	
13	3	4	66.67	1.95	2.91	2.91	99	4	255	47	287	
14	4	6	68.65	2.50	3.75	3.75	100	4	255	45	283	
15	5	8	70.90	2.90	4.35	4.35	101	5	255	45	283	
16	D 1	10/0	73.317	1.40	2.12	2.12	100	3	260	53	275	
17	2	2	75.03	1.65	2.50	2.50	100	3	260	50	278	
18	3	4	76.88	2.00	3.03	3.03	100	4	260	50	278	
19	4	6	78.99	2.20	3.34	3.34	101	4	255	50	276	
20	5	8	81.13	2.30	3.50	3.50	102	4	255	50	275	
21	E 1	10/0	83.324	1.65	2.50	2.50	100	4	255	50	274	
22	2	2	85.17	1.80	2.73	2.73	101	4	255	50	278	
23	3	4	97.10	3.00	4.55	4.55	102	5	255	48	279	
24	4	6	89.54	2.40	3.63	3.63	103	5	255	48	278	
25	5	8	91.90	1.75	2.67	2.67	104	4	250	46	275	

F1010
12/89
p1

minutes Vm $(\sqrt{\Delta p})^2$ ΔH ts ts

COMPANY NAME BARNHILL CONST. RUN NUMBER ~~B~~-MS-3

SAMPLING LOCATION ~~BAGHOUSE STACK~~ Dryer Stack DATE 6-11-96

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READINGS CUBIC FEET	PITOT READING IN. H_2O	ORIFICE SETTING IN. H2O IDEAL	ORIFICE SETTING IN. H2O ACTUAL	GAS METER TEMP. °F	VACUUM IN. HG GAUGE	GAS TEMPERATURES FILTER BOX °F	GAS TEMPERATURES IMPINGER EXIT °F	STACK TEMP. °F	LK CHK #
26	F 1	10/0	93.751	2.00	3.04	3.04	102	4	250	50	276	
27	2	2	95.88	1.75	2.62	2.62	103	4	250	50	290	
28	3	4	97.79	1.85	2.78	2.78	104	4	250	50	289	
29	4	6	99.75	1.95	2.92	2.92	103	4	255	50	289	
30	5	8	101.75	1.50	2.25	2.25	103	4	255	50	286	
31		6/OFA	103.533									
32												
33												
34												
35												
36												
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65												

F1010
9/89
p2

____ minutes

61.233 Vm

2.013 $(\sqrt{\Delta p})^2$

3.07 ΔH

100 tm

281 ts

MOISTURE SAMPLING LABORATORY RESULTS

Plant Name: BARNHILL CONTRACTING COMPANY EEI Ref# 6780

Sampling Location: Dryer Stack

Date Received: 6/12 Date Analyzed: 6/12 Reagent Box(es): 0556

Run Number	M5-1	M5-2	M5-3
Run Date	6/11	6/11	6/11
ANALYSIS OF MOISTURE CATCH			
Reagent 1 (H2O)			
Final Weight, g.	997.5	1072.0	1080.5
Tared Weight, g.	544.5	575.5	573.5
Water Catch,g.	453.0	496.5	507.0
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.	453.0	496.5	507.0
Silica Gel:			
Final Weight, g.	222.0	226.0	217.5
Tared Weight, g.	200.0	200.0	200.0
ADSORBED WATER, g.	22.0	26.0	17.5
TOTAL WATER COLLECTED, g.	475.0	522.5	524.5

PARTICULATE SAMPLING LABORATORY RESULTS

Plant Name: BARNHILL CONTRACTING COMPANY EEI Ref# 6780

Sampling Location: Dryer Stack

Date Received: 6/12 Date Analyzed: 6/16 Reagent Box(es): 0556

Run Number	M5-1	M5-2	S-M5-3
Run Date	6/11	6/11	6/11
Sample ID/Container #	F / 211	F / 213	F / 215
	6.8332	6.9299	6.7489
	6.8331	6.9299	6.7487
Tare Weight., g.	6.2914	6.3404	6.1450
SAMPLE WT., g.	0.5417	0.5895	0.6037
Sample ID/Container #	R / 212	R / 214	R / 216
	6.3002	6.0149	6.0673
	6.3007	6.0153	6.0673
Tare Wt., g.	6.2821	5.9848	6.0400
SAMPLE WT., g.	0.0181	0.0301	0.0273
Sum of Particulate, mg.	559.8	619.6	631.0
Total Filter Tare, mg.	508.7	512.1	506.5
Blank Residue, mg.	0.4 (175 ml)	0.4 (200 ml)	0.4 (200 ml)
TOTAL PARTICULATE CATCH, mg.	50.7	107.1	124.1

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

REAGENT BOX CUSTODY SHEET

Box No. 0556 Assembly Date 6/7 Assembled By MW

Plant Name Barnhill Contr EEI Ref. No. 6780

Sampling Loc. Stack Method M5

Individual Tare of Reagent 200 (mL) of DI H2O

Individual Tare of Reagent _____ (mL)(gm) of _____

Individual Tare of Silica Gel 200 gm

Run Number	Run Date	Filter Number	Filter Tare (gm)	Liquid Tare at Mark? *	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
5-M5-1	6-11	E4966	0.5087	✓	CGM	6-12	100	✓	CGM

Sample Appearance Brown powder

5-M5-2	6-11	E4965	0.5121	✓	CGM	6-12	100	✓	CGM

Sample Appearance Brown powder

5M5-3	6-1	E4967	0.5065	✓	CGM	6-12	100	✓	CGM

Sample Appearance Brown powder

Date box received back in lab 6 12 90 Received by JVS

All liquid levels at mark (check) YES ✓ NO ___*

Balance zeroed and spanned (initials) _____

*** Estimate loss if not at mark; use "REMARKS" section.**

REAGENT BOX INTEGRITY (check if locked or explain in "REMARKS")	
Immediately after assembly in lab ✓	In field, just prior to use ___
Immediately after field sample recovery ___	When received back at lab ✓

REMARKS _____

L-0010 3-90

B. FIELD AND ANALYTICAL DATA

2. Plume Opacity

VISIBLE EMISSION OBSERVATION FORM

No. M5-1

COMPANY NAME: BARNHILL CONTRACTING CO.		
STREET ADDRESS: P.O. BOX 1529		
CITY: TARBORO	STATE: NC	ZIP: 27886
PHONE (KEY CONTACT): 977-9637	SOURCE ID NUMBER:	

PROCESS EQUIPMENT: OIL FIRED DRYER	OPERATING MODE: 300 Tons/hr
CONTROL EQUIPMENT: BAG HOUSE	OPERATING MODE:

DESCRIBE EMISSION POINT: rectangular stack 30" x 24" yellow

HEIGHT ABOVE GROUND LEVEL: ~12 ft	HEIGHT RELATIVE TO OBSERVER: Start 6 ft End ✓
DISTANCE FROM OBSERVER: Start 30ft End ✓	DIRECTION FROM OBSERVER: Start NW End ✓

DESCRIBE EMISSIONS

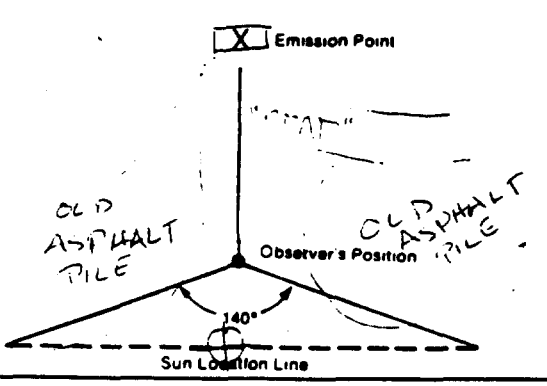
Start ~~white~~	End
EMISSION COLOR: Start White End ✓	IF WATER DROPLET PLUME: Attached ☐ N/A Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 1 ft from stack exit End	

DESCRIBE PLUME BACKGROUND: Start sky, clouds End clouds

BACKGROUND COLOR: Start White End ✓	SKY CONDITIONS: Start ~~cloudless~~ End Broken
WIND SPEED: Start 13mph End ✓	WIND DIRECTION: Start [redacted] N End ✓
AMBIENT TEMP: Start 80F End ✓	WET BULB TEMP: / RH, percent:

Stack with Plume ⊂ Sun ✦ Wind →

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE	START TIME	END TIME
11 JUNE '90	12 05	13 05

SEC / MIN	0	15	30	45	COMMENTS
1	0	5	0	0	
2	0	0	0	0	
3	0	0	10	5	
4	5	5	0	0	
5	0	10	0	0	
6	0	5	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	5	0	0	0	
16	0	0	0	0	
17	0	5	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): LISA M. GROSSHANDLER

OBSERVER'S SIGNATURE: [signature] DATE: 11 June '90

ORGANIZATION: ENTROPY ENVIRONMENTALISTS, INC.

CERTIFIED BY: EASTERN TECHNICAL ASSOC. DATE: 28 MARCH '90

CONTINUED ON VEO FORM NUMBER: M 5 - 1

VISIBLE EMISSION OBSERVATION FORM

No. M5-1 (cont.)

COMPANY NAME

STREET ADDRESS

CITY | STATE | 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 ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start | 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

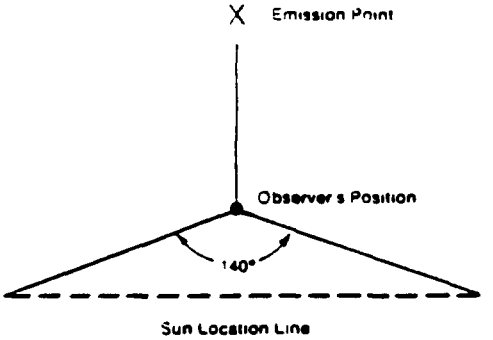
Stack with Plume

Sun

Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE | START TIME | END TIME

SEC / MIN	0	15	30	45	COMMENTS
1	0	5	10	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	10	0	0	
5	0	0	0	5	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	10	
10	0	0	0	0	
11	0	0	0	10	
12	0	0	5	0	
13	5	0	0	0	
14	0	0	0	0	
15	0	5	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	5	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	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)
LISA M. GROSSHANDLER

OBSERVER'S SIGNATURE | DATE
Lisa Grosshandler | 11 June 20

ORGANIZATION
Entropy Environmentalists, Inc.

CERTIFIED BY | DATE
Eastern Technical Assoc. | 28 March 20

CONTINUED ON VEO FORM NUMBER: M 5 - 1 C

VISIBLE EMISSION OBSERVATION FORM

No. M5-2

COMPANY NAME: BARNHILL
STREET ADDRESS:
CITY: STATE: N.C. ZIP:
PHONE (KEY CONTACT): SOURCE ID NUMBER:

PROCESS EQUIPMENT: COAL FIRED DRYER — OPERATING MODE: [illegible] T/hr
CONTROL EQUIPMENT: BAGHOUSE — OPERATING MODE:

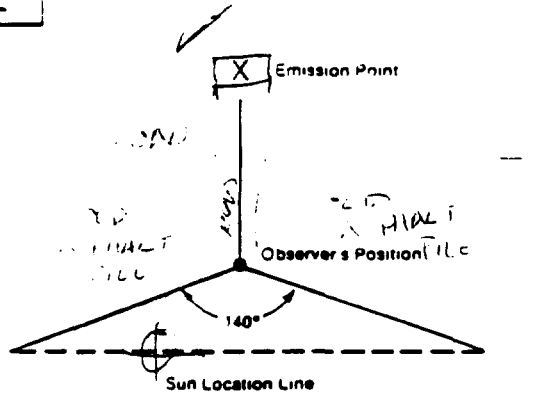
DESCRIBE EMISSION POINT: YELLOW RECTANGULAR STACK
30" x 24"
HEIGHT ABOVE GROUND LEVEL: [illegible] Ft — HEIGHT RELATIVE TO OBSERVER: Start [illegible] Ft End ✓
DISTANCE FROM OBSERVER: Start 0' End ✓ — DIRECTION FROM OBSERVER: Start NW End ✓

DESCRIBE EMISSIONS: Start End
EMISSION COLOR: Start White End ✓ — IF WATER DROPLET PLUME: Attached ☐ N/A Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start [illegible] above stack exit End

DESCRIBE PLUME BACKGROUND: Start [illegible] End ✓
BACKGROUND COLOR: Start White End ✓ — SKY CONDITIONS: Start Scattered End Broken
WIND SPEED: Start [illegible] mph End ✓ — WIND DIRECTION: Start [illegible] N End ✓
AMBIENT TEMP: Start [illegible] °F End ✓ — WET BULB TEMP: RH, percent

SOURCE LAYOUT SKETCH — Draw North Arrow

Stack with Plume
Sun
Wind



ADDITIONAL INFORMATION:

OBSERVATION DATE	START TIME	END TIME
11 JUNE '00	13:15	14:15

MIN \ SEC	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	5	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	5	0	
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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	
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25	0	0	0	0	
26	0	0	5	0	
27	5	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): LISA M GIESEHANDLER
OBSERVER'S SIGNATURE: Lisa M Giesehandler — DATE: 11 June '00
ORGANIZATION: ENTERGY ENVIRONMENTAL SERVICES INC.
CERTIFIED BY: EASTERN TECHNICAL ASSOCIATES — DATE: 28 MAR 2004

CONTINUED ON VEO FORM NUMBER: M 5 - 2 C

VISIBLE EMISSION OBSERVATION FORM

No. M5-2 (con

COMPANY NAME

STREET ADDRESS

CITY | STATE | 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 ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start | End

DESCRIBE PLUME BACKGROUND: Start | End

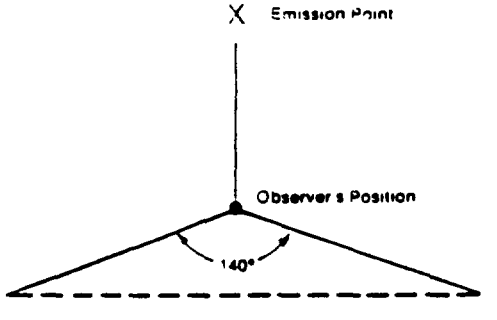
BACKGROUND COLOR: Start | End | SKY CONDITIONS: Start | End

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

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

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE: 11 JUNE '10 | START TIME: 13:15 | END TIME: 14:15

SEC / MIN	0	15	30	45	COMMENTS
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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	
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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): LISA GRASSHANDLER

OBSERVER'S SIGNATURE: Lisa Grasshandler | DATE: 11 June 10

ORGANIZATION: ENTROPY ENVIRONMENTALISTS, INC

CERTIFIED BY: EASTERN TECHNICAL ASSOC. | DATE: 30 MARCH 10

CONTINUED ON VEO FORM NUMBER

VISIBLE EMISSION OBSERVATION FORM

No. M5 - 3

COMPANY NAME: BARNHILL

STREET ADDRESS:

CITY: ROCKY MOUNT | STATE: NC | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: OIL FIRED DRYER | OPERATING MODE: 350 lbs/hr

CONTROL EQUIPMENT: BAG HOUSE | OPERATING MODE:

DESCRIBE EMISSION POINT: YELLOW RECTANGULAR STACK

30" x 24"

HEIGHT ABOVE GROUND LEVEL: 12 ft | HEIGHT RELATIVE TO OBSERVER: Start 17 ft End ✓

DISTANCE FROM OBSERVER: Start 30 ft End ✓ | DIRECTION FROM OBSERVER: Start North End ✓

DESCRIBE EMISSIONS: Start | End

EMISSION COLOR: Start White End ✓ | IF WATER DROPLET PLUME: Attached ☐ N/A Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 1 ft above stack exit End

DESCRIBE PLUME BACKGROUND: Start CLOUDS End CLOUDS

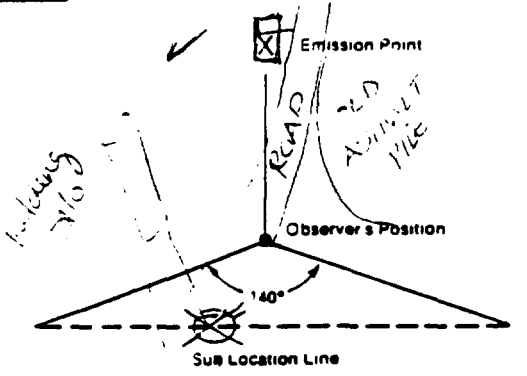
BACKGROUND COLOR: Start White End Blue | SKY CONDITIONS: Start Broken End ✓

WIND SPEED: Start 2-3 mph End ✓ | WIND DIRECTION: Start NE End ✓

AMBIENT TEMP: Start 85°F End ✓ | WET BULB TEMP: | RH, percent:

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE: 11 June '90 | START TIME: 15:41 | END TIME: 16:41

SEC / MIN	0	15	30	45	COMMENTS
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2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	5	0	
6	5	0	10	0	
7	0	0	0	0	
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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	5	0	0	
18	0	0	0	0	
19	0	0	0	0	
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25	0	0	0	0	
26	0	5	0	0	
27	0	0	0	0	
28	0	0	5	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): LISA GREENHANDLER

OBSERVER'S SIGNATURE: Lisa Greenhandler | DATE: 11 June 90

ORGANIZATION: ENTROPY ENVIRONMENTALISTS, INC

CERTIFIED BY: EASTERN TECHNICAL ASSOC. | DATE: 28 MARCH 90

CONTINUED ON VEO FORM NUMBER: M5-3b

VISIBLE EMISSION OBSERVATION FORM

No. M5-3 (cont

COMPANY NAME: HALNHILL

STREET ADDRESS:

CITY | STATE | 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 ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start | End

DESCRIBE PLUME BACKGROUND: Start | End

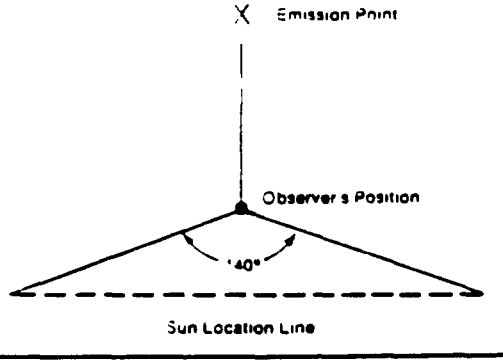
BACKGROUND COLOR: Start | End | SKY CONDITIONS: Start | End

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

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

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE: 11 June 90 | START TIME | END TIME

SEC / MIN	0	15	30	45	COMMENTS
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2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	5	10	
7	0	5	0	0	
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9	0	5	0	0	
10	0	0	0	0	
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12	5	0	10	0	
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25	0	5	0	0	
26	0	0	5	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	5	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT): LISA GROSSHANDLER

OBSERVER'S SIGNATURE: Lisa Grosshandler | DATE: 11 June 90

ORGANIZATION: ENTROPY ENVIRONMENTALISTS, INC

CERTIFIED BY: EASTERN TECHNICAL ASSOC. | DATE: 28 March 90

CONTINUED ON VEO FORM NUMBER:

APPENDIX C

CALIBRATION DATA

SAMPLING EQUIPMENT CHECKLIST.. 38

Plant Name/Address BARNHILL CONST. / ROCKYMOUNT N.C. Job No. 6780

Sampling Location BAGHOUSE STACK Team Leader SRD

BAROMETER CHECK

Date	Entropy In-House Reference Barometer	Field Barometer	Check OK?*
6.11.90	29.90	29.90	✓

* ± 0.1" Mercury

THERMOMETERS AND THERMOCOUPLE CHECK

Date 6-11-90 | Reference Thermometer Ambient Temperature, °F 80°

	Ambient Temperature, °F	Acceptance Range, °F	Check OK?
Thermometers			
Impinger Exit	81	± 2.0	✓
Filter Box	82	± 5.4	✓
Dry Gas Meter	82	± 5.4	✓

Adjust thermometer until acceptable. If it cannot be adjusted, use as back-up. If no backup, record ambient temp. indicated by unadjusted thermometer.

Thermocouple	80/80	± 8.0* (± 2.0)**	✓

* ± 1.5% of Absolute Temperature.

** Acceptance range is ± 2.0°F if used in saturated or water droplet-laden gas stream.

PITOT AND NOZZLE CHECK

Pitot No.	Visual Check	Nozzle No.	Visual Check
4-20	✓	205	✓

F-1039 rev. 2-90

ENTROPY

Dry Gas Meter Identification: 6838323 Calibration by: W.L. SHERRILL

Date: 10-3-89 Barometric Pressure (P_b): 29.73 in. Hg

*Date: 10-4-89 *Barometric Pressure (P_b): 29.82 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Approx. Flow Rate (Q) cfm	Spirometer		Dry Gas Meter		Pressure (Δp) in. H_2O	Time (0) 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					
	2.62	80	2.572	75	-.48	10	.2544		1.0104
	2.55		2.543	75	-.48		.2477		.9946
	2,614		2.559	75	-.48		.2539		1.0132
*	4.153		4.214	76	-.90		.4046		.9804
*	4.2987		4.204	76	-.90		.4187		1.0172
*	4.3169		4.214	76	-.90		.4205		1.0191
	4.9826		4.943	75	-1.20		.4801		.9937
	5.045		4.945	75	-1.20		.4900		1.0138
	4.973		4.963	75	-1.20		.4830		.9957
	7.96		7.807	75	-2.38		.7731		1.0161
	7.805		7.808	75	-2.38		.7580		.9962
	7,942		7.806	75	-2.38		.7713		1.0140
*	10.255		10.296	76	-3.80		.9990		.9980
*	10.264		10.293	76	-3.80		.9998		.9992
*	10.3826		10.381	76	-3.80		1.0114		1.0021

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

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

Dry Gas Meter Identification: 6838323 Calibration by: W.L. SHERRILL

Date: 10-3-89 Barometric Pressure (P_b): 29.73 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

*Date: 10-4-89 *Barometric Pressure (P_b): 29.82 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. ($\bar{Y}_{ds}$)
*	12.1403	86	12.032	76	-5.20	10	1.1826		1.0145
*	12.031		12.053	76	-5.20		1.1720		1.0036
*	12.0037		12.059	76	-5.20		1.1693		1.0009
	13.588		13.515	75	-6.40		1.3196		1.0121
	13.397		13.472	75	-6.40		1.3011		1.0011
	13.333		13.428	75	-6.40		1.2949		.9996

$Y_{ds} = 1.0045$

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

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

Dry Gas Meter Identification: 1017057 Calibration by: W.L SHERRILL

Date: 10-3-89 Barometric Pressure (P_b): 29.73 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

*Date: 10-4-89 *Barometric Pressure (P_b): 29.82 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. ($\bar{Y}_{ds}$)
	2.62	80	2.541	78	-.28	10	.2544		1.0280
	2.55	80	2.533	79	-.28		.2477		1.0055
	2.614	80	2.529	79	-.28		.2539		1.0324
*	4.153		4.188	79	-.60		.4046		.9913
*	4.2987		4.193	79	-.60		.4187		1.0248
*	4.3169		4.186	79	-.60		.4205		1.0309
	4.9826		4.923	80	-.84		.4839		1.0142
	4.973		4.936	80	-.84		.4830		1.0096
	5.045		4.926	80	-.84		.4900		1.0263
	7.960		7.809	80	-1.68		.7731		1.0236
	7.805		7.806	80	-1.68		.7580		1.0040
	7.942		7.818	80	-1.68		.7713		1.0201
*	10.255		10.144	79	-2.80		.9990		1.0161
*	10.264		10.266	79	-2.80		.9998		1.0049
*	10.3826		10.348	79	-2.80		1.0114		1.0084

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

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

Dry Gas Meter Identification: 10176 57 Calibration by: W.L. SHERRILL

Date: 10-3-89 Barometric Pressure (P_b): 29.73 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

*Date: 10-4-89 *Barometric Pressure (P_b): 29.82 in. Hg

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					
*	12.1403	80	11.962	78	-3.72	10	1.1826		1.0205
*	12,031		11.969	79	-3.72		1.1720		1.0126
*	12.0037		11.970	79	-3.72		1.1693		1.0102
	13.588		13.377	80	-4.60		1.3196		1.0275
	13.397		13.318	80	-4.60		1.3011		1.0175
	13.333		13.271	80	-4.60		1.2949		1.0162

$\bar{Y}_{ds} = 1.0164$

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

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

ISOKINETIC METERBOX FULLTEST CALIBRATION

Meterbox No. N14 Calibrated By MBC

Date 2-27-90 Barometric Pressure (P_b) 30.1 (In. Hg)

Date _____* Barometric Pressure (P_b) _____ (In. Hg)*

Standard Meter No. 6838323 Standard Meter Coefficient 1.0045

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (θ) Min.	Orifice Setting (ΔH) In. H2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H@$ In. H_2O
4.024	68	10	0.5	4.245	86	.9835	1.646
4.027	↓	↓	0.5	4.239	86	.9856	1.643
7.887			2.0	8.274	87	.9871	1.710
7.866			2.0	8.272	88	.9866	1.716
12.082			4.8	12.508	89	.9972	1.743
12.113	↓	↓	4.8	12.591	91	.9968	1.728
					Average	.9895	1.698

1. Coefficient range: 0.97-1.03.
2. Coefficient tolerance: for individual runs, ± 0.02 from average.
3. $\Delta H@$ range: 1.6-2.0.
4. $\Delta H@$ tolerance: ≤ 0.15 In. H_2O over ΔH range of 0.4 In.-4.0 In.

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

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

ON-SITE DRY GAS METER AUDIT · 44

Plant Name BARNHILL CONST. Job Number 6780

Date 6-11-90 Meter Box Identification Number N14

Time 0745 Fulltest Gamma (Y) .9895 $\Delta H_@$ 1.698

Auditor SRD Barometric Pressure (P_{bar}) 29.90 In. Hg

Zero Magnehelics? (check) ✓

Dry Gas Meter Reading (ft^3)	Meter Temperature (°F)	Upper and Lower Limits for Audit Gamma
Initial 911.10	Initial 78	0.96 * Y = .94992
Final 918.894	Final 86	1.04 * Y = 1.02908

Dry Gas Volume Metered (ft^3)	Average Meter Temperature (°F)	Run Time (Base = 10)	
		(Min.)	(Sec.)
Vm = 7.794	Tm = 82	10	0

$$Y_c = \frac{[\text{Min.} + (\text{Sec.} / 60)]}{Vm} * \left[\frac{0.0319\ (Tm + 460)}{P_{bar}}\right]^{0.5}$$

$$Y_c = \frac{[\ 10\ + (\ 0\ / 60)]}{7.794} * \left[\frac{0.0319\ (\ 82\ + 460)}{29.90}\right]^{0.5} = \underset{\text{Calculated Audit Y}}{.9756611}$$

Audit Gamma Within Acceptable Limits? Yes ✓ No ___

F-1040 rev. 3-90

ENTROPY

ISOKINETIC METERBOX POSTTEST CALIBRATION

METERBOX NO. N14

Date 6-15-90 Calibrated By MBC/SWS Job Number 6780

Barometric Pressure (P_b) 29.43 (In. Hg) Meterbox Vacuum 6 (In. Hg)

Standard Meter No. 1017057 Standard Meter Coefficient 1.0164

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (θ) Min.	Orifice Setting (ΔH) In. H_2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H@$ In. H_2O
9.243	76	10	2.7	9.540	90	1.0037	1.721
9.257	76	10	2.7	9.554	92	1.0074	1.710
9.255	76	10	2.7	9.564	93	1.0090	1.707
					Average	1.0067	1.713

Fulltest Y_d .9895 Date 2-27-90 % Dev. 1.7 Allowed Dev.: ± 5%

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

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

NOZZLE NUMBER: 205

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
11-30-82	TWA	.250	.251	.248	.250	.250	0.250"
11-18-83	PLO	.248	.251	.249	.249	.250	0.249"
3-8-84	JNC	.249	.247	.249	.250	.249	0.249"
7.3.84	GMC	.250	.249	.248	250	.250	0.249
2-1-85	SSH	.249	.249	.250	.250	.248	0.249
3 25-85	MRH	.244	.246	.243	.244	.243	0.244"
7-19-85	RWB	.244	.243	.247	.246	.247	0.246"
2-26-86	BB	.246	.244	.243	.247	.245	0.245
3-21-86	DE	.251	.248	.252	.249	.250	0.250
[illegible]	[illegible]	.244	.242	.244	.245	.245	[illegible]
3/10/87	ST						
4/12/88	JE	Missing					
9/1/88	BKG	missing					
4/10/89	BKG	Missing					
7/18/89	BKG	Missing					
8-22-89	JRW	Missing					
1-5-90	JRW	.251	.251	.251	.251	.251	.251
3 27-90	MLH	.242	.245	.245	.246	.242	.244

Nozzle replaced 1-5-89

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Lisa Grossgandler

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 Hose
President

Vice President

David Savage
Program Manager

225818
Certificate Number

Raleigh
Location

March 28, 1990
Date of Issue

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Environmental Management
512 North Salisbury Street • Raleigh, North Carolina 27611

James G. Martin, Governor
William W. Cobey, Jr., Secretary

R. Paul Wilms
Director

February 9, 1990

Mr. William Lee Cooper, Vice President
Barnhill Contracting Company
Post Office Box 1529
Tarboro, North Carolina 27886

Dear Mr. Cooper:

Subject: Air Permit No. 4876R2
Barnhill Contracting Company
Rocky Mount, North Carolina
Edgecombe County

In accordance with your completed application received January 25, 1990, we are forwarding herewith Permit No. 4876R2 to Barnhill Contracting Company, Rocky Mount, North Carolina for the construction and operation of air emission sources or air cleaning devices and appurtenances.

If any parts, requirements, or limitations contained in this permit are unacceptable to you, you have the right to request an adjudicatory hearing within thirty (30) days following receipt of this permit, identifying the specific issues to be contended. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, Post Office Drawer 11666, Raleigh, North Carolina 27604. Unless such demand is made, this permit shall be final and binding.

This permit shall be effective from February 9, 1990, until March 31, 1992, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

Sincerely,

George T. Everett

Enclosures

cc: Mr. Arthur Mouberry
Mr. Mike Aldridge

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL MANAGEMENT

A I R P E R M I T N O. 4876R2

Issue Date: February 9, 1990 Effective Date: February 9, 1990

Expiration Date: March 31, 1992 Replaces Permit: 4876R

To construct and operate air emission sources or air cleaning devices, and for the discharge of the associated air contaminants into the atmosphere. In accordance with the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules and Regulations,

PERMISSION IS HEREBY GRANTED TO

Barnhill Contracting Company
NC Highway 97 East
Rocky Mount, Edgecombe County, North Carolina

FOR THE

construction and operation of air emission sources or air cleaning devices and appurtenances consisting of:

one bagfilter (9,919 square feet of filter area) installed on a liquid propane/No. 2 oil-fired (100 million BTU per hour maximum heat input), rotary drum mix asphalt plant (340 tons per hour maximum production capacity),

to be constructed and operated in accordance with the completed application received January 25, 1990, and in conformity with the plans, specifications, and other supporting data, all of which are filed with the Department of Environment, Health, & Natural Resources and are incorporated as part of this Permit.

This Permit shall be subject to the following specified conditions and limitations including any testing, reporting, or monitoring requirements:

A. SPECIFIC CONDITIONS AND LIMITATIONS

1. The Permittee shall comply with applicable Environmental Management Commission Regulations, including 15A NCAC 2D .0516, .0524 Subpart I, and .0535.

2. Visible emissions from the facilities shall not be more than 20 percent opacity when averaged over a six-minute period, except that six-minute periods averaging not more than 87 percent opacity may occur not more than once in any hour nor more than four times in any 24-hour period.

3. The Permittee shall take all reasonable precautions with any operation, process, handling, transportation, or storage facilities to prevent fugitive particulate emissions from becoming airborne.

4. For the asphalt plant operating at a minimum of 90 percent of the maximum capacity, the Permittee shall comply with all provisions including the notification, testing, and monitoring requirements contained in Environmental Management Regulation 15A NCAC 2D .0524 "New Source Performance Standards" (NSPS) as promulgated in 40 CFR 60, Subpart I. NSPS performance testing is required for particulate and visible emissions using EPA Method(s) 1, 2, 3, 5, and 9. Within 60 days after achieving the maximum production rate at which the facility will be operated, but not later than 180 days after initial start-up of the affected facility, the Permittee shall conduct the required performance test(s) and submit a written report of the tests results to the Regional Supervisor, Division of Environmental Management. The Method 1 requirements of 40 CFR 60, Appendix A, "Sample and Velocity Traverses for Stationary Sources", should be considered during any construction and be met for emissions testing purposes. All associated testing costs are the responsibility of the Permittee.

5. When particulate, odorous, or visible emissions exceed Environmental Management Regulations for more than four hours the Regional Supervisor, Divisio of Environmental Management, Raleigh Region, (919)733-2314, shall be notified as promptly as possible but in no case later than 24 hours of becoming aware of the occurrence. Such notice shall specify the facility name and location, the nature and cause of the excess emissions, the time when first observed, the expected duration, and the estimated rate of emissions. This reporting requirement does not allow the operation of the facility in excess of Environmental Management Commission Regulations.

6. The Permittee shall provide written notice within 15 days of start-up of the new facilities to the Regional Supervisor, Division of Environmental Management.

7. To afford the Division of Environmental Management Regional Office the opportunity to have an observer present, the Permittee shall provide the Regional Office in writing at least 15 days notice of any required performance test(s).

8. The Permittee shall maintain dust control over the plant premises and access roads.

B. GENERAL CONDITIONS AND LIMITATIONS

1. All reports, test data, monitoring data, notifications, and requests for renewal shall be submitted to the:

   Regional Supervisor
   North Carolina Division of Environmental Management
   Post Office Box 27687
   Raleigh, North Carolina 27611

2. Reports on the operation and maintenance of the facility shall be submitted by the Permittee to the Regional Supervisor, Division of Environmental Management at such intervals and in such form and detail as may be required by the Division. Information required in such reports may include, but is not limited to process weight rates, firing rates, hours of operation, and preventive maintenance schedules.

3. Any changes in the information submitted in the application regarding facility emissions, or any changes that modify equipment or processes of existing permitted facilities, or any changes in the quantity or quality of materials processed that will result in previously unpermitted, new, or increased emissions must be reported to the Regional Supervisor, Division of Environmental Management. If appropriate, modifications to the permit may then be made by the Division of Environmental Management to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause violation of the emission limitations specified herein.

4. This Permit is subject to revocation or modification by this Division upon a determination that information contained in the application or presented in support thereof is incorrect, conditions under which this Permit was granted have changed, or violations of conditions contained in this Permit have occurred. The facility shall be properly operated and maintained at all times in such a manner to effect an overall reduction in air pollution.

5. Under the statutory authority of G.S. 143-215.3 (a)(2), no person shall refuse entry or access to any authorized representative of the Division of Environmental Management who requests entry for purposes of inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper, or interfere with any such representative while in the process of carrying out his official duties. Refusal of entry may constitute grounds for permit revocation and assessment of civil penalties.

6. This Permit is nontransferable by the Permittee. Future owners and operators must obtain a new air permit from the Division of Environmental Management.

7. This Permit does not relieve the Permittee of the responsibility of complying with all applicable requirements of any Federal, State, or Local water quality or land quality control authority.

8. The Permittee at least ninety (90) days prior to the expiration of this Permit shall request its extension by letter. The letter should include the permit number, the appropriate renewal fee, description of any modifications, and should be sent to the Regional Supervisor, Division of Environmental Management.

9. A violation of any term or condition of this Permit shall subject the Permittee to enforcement procedures contained in North Carolina General Statutes 143-215.114, including assessment of civil penalties.

Permit issued this the 9th day of February, 1990.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Mike Sewell for

George T. Everett, Director
Division of Environmental Management
By Authority of the Environmental Management Commission

Air Permit No. 4876R2

AIR PERMIT REVIEW

APPLICANT	SITE LOCATION				COUNTY
BARNHILL CONTRACTING CO.	ROCKY MOUNT				EDGECOMBE
CONTACT	**PHONE**	**APPLICABILITY: NSPS**	**NESHAP**	**TAX**	**OTHER**
LEE COOPER	919/823-1021	SUBPART I			
APP NO.	**REVIEWER:**	**SIGNATURE:**			**DATE**
011104	JERRY P. CLAYTON				02/06/90

RECOMMENDATION AND COMMENT:
ISSUE P/N 4876R2

****

1. APPLICATION IS MADE FOR:

one bagfilter [9,919 square feet of filter area] installed on a liquid propane/No. 2 oil-fired [100 million BTU per hour maximum heat input], rotary drum mix asphalt plant [340 tons per hour maximum production capacity],

2. CFM's are 55,000. Air to cloth ratio is 5.5:1. Efficiency is stated to be 99.9%. Emission rate before control is stated to be 16,650 lbs/hr. After control emissions would be 11.655 lbs/hr and 51.05 tpy. Pressure drop across the bagfilter is stated to be 5" to 8" water.

The existing plant was a 260 tph unit with a smaller NG/No. 2/No. 4 oil burner. Control was a bagfilter. New allowable per NSPS, Subpart I is:

[55,000] [1-.05] [29.92/29.92] [528/(460 + 300)] = 36,300 DSCF

[36,300 DSCF] [0.04 gr/DSCF] [1 lb/7,000 gr] [60 min] = 12.445 lbs/hr.

Annual allowable emissions would be 54.51 tpy. Emission factor per AP-42, T.8.1-3 [bagfilter] is 0.02 lb/ton. Old emissions at 260 tons per hour would be 5.2 lbs/hr and 22.776 tpy. Emissions are are increased: [12.445 - 5.2] = 7.2 lbs/hr. The bagfilter if properly maintained and operated will comply with applicable regulations. The existing plant burned LP/No. 2 oil. The new plant will also burn LP/No. 2 oil.

3. National Emission Standards for Hazardous Air Pollutants [NESHAP] do not apply. All applicable DEM air regulations should be met. Recommend issuance of the air permit. Regional Office concurs. Ref: telcon w/K. Schuster on 02/06/90.

4. The existing source is major. Emissions changes are less the de minimus; therefore Prevention of Significant Deterioration does not apply.

cc: Mike Aldridge