RAMCON
ENVIRONMENTAL CORPORATION

SOURCE SAMPLING
for
PARTICULATE EMISSIONS
MASTERS & JACKSON, INC.
BUTLER, MISSOURI
September 19, 1987

Jack Bridges
Masters & Jackson, Inc.

G. Sumner Buck, III
President

J. Cameron Mitchell
Team Leader

RAMCON
ENVIRONMENTAL CORPORATION

September 25, 1987

Mr. Jack Bridges
Masters & Jackson, Inc.
4166 West Kearney
Springfield, MO 65803

Re: Particulate Emissions Test - Butler, Missouri

Dear Mr. Bridges:

Enclosed you will find four copies of our report on the particulate emissions test we conducted at your plant. Based on our test results, the average grain loading of the three test runs does pass both New Source Performance Standards and those set by the State of Missouri. Therefore, the plant is operating in compliance with Federal and State Standards.

You will want to sign the report covers and send two copies to:

Mr. Tom Scheppers
Missouri DNR
P.O. Box 176
Jefferson City, MO 65102

We certainly have enjoyed working with you and look forward to serving you again in the future.

Sincerely,

G. Sumner Buck, III
President

GSBIII:kr

Enclosures

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I. INTRODUCTION

On September 19, 1987, personnel from RAMCON Environmental Corporation (REC) conducted a source emissions test for particulate emissions compliance at Masters & Jackson's Barber-Greene drum mix asphalt plant located in the Batesco Quarry in Butler, Missouri. RAMCON personnel conducting the test were Cameron Mitchell, Team Leader and Murphy O'Neil. Kim Rea was responsible for the final particulate laboratory analysis including taring the beakers and filters and recording final data in the laboratory record books. Custody of the samples was limited to Mr. Mitchell and Ms. Rea.

The purpose of the test was to determine if the rate of particulate emissions from the plant's scrubber and the total contaminants by weight (grain loading) are below the N.S.P.S. limits set by EPA and the State of Missouri.

II. TEST RESULTS

Table I summarizes the test results. The grain loading limitation for EPA is .04 gr/DSCF and is specified in 39 FR 9314, March 8, 1974, 60.92 Standards for Particulate Matter (1), as amended. The allowable emissions for the State of Indiana are the same as those set by EPA.

Mr. Daniel Hancock of Indiana's Department of Environmental Management observed the testing conducted by RAMCON.

TABLE I
SUMMARY OF TEST RESULTS
September 19, 1987

Test Run	Time	Grain Loading	Isokinetic Variation	Actual Emissions
6	08:07 to 09:10	0.0314 gr/DSCF	95%	6.0 lbs/hr
7	10:20 to 11:23	0.0426 gr/DSCF	106%	7.6 lbs/hr
8	11:59 to 13:01	0.0342 gr/DSCF	107%	6.1 lbs/hr
	Average:	0.0361 gr/DSCF		6.6 lbs/hr

On the basis of these test results, the average grain loading on test runs six, seven and eight was below the .04 gr/DSCF emissions limitation set by EPA and the State of Missouri. Therefore, the plant is operating in compliance with Federal and State Standards.

Voided Test Runs

Test Run	Grain Loading
1	0.0356 gr/DSCF
2	0.0190 gr/DSCF
3	0.0181 gr/DSCF
4	0.0217 gr/DSCF
5	0.0233 gr/DSCF

III. TEST PROCEDURES

A. Method Used: The source sampling was conducted in accordance with requirements of the U.S. Environmental Protection Agency as set forth in 39 FR 9314, March 8, 1974, 60.93, as amended.

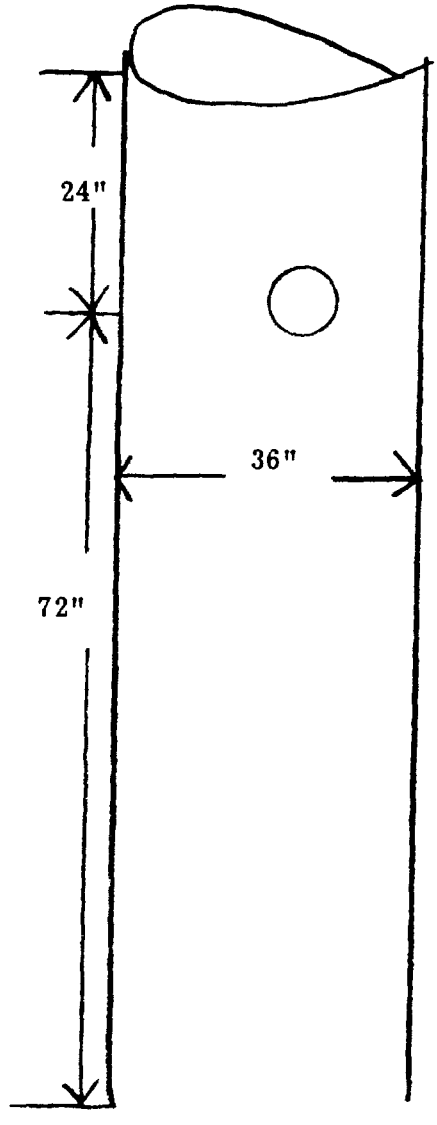
B. Problems Encountered: Test runs one through five were not accepted for compliance testing per Tom Scheppers due to cyclonic flow in the stack. Straightening vanes were added in the stack and test runs six, seven and eight were conducted and accepted for demonstration of compliance.

Test run six had a leak rate of .032 ft^3/min. The sample gas volume was corrected according to paragraph 6.3 of Method 5. Pipe cleaners were used when cleaning the nozzles because the pipet brushes on hand at the test site were too large to fit inside the nozzle.

C. Sampling Site: The emissions test was conducted after a scrubber on a round stack with a diameter of 36". The sampling ports were placed 24" down (0.7 diameters upstream) from the top of the stack and 72" up (2.0 diameters downstream) from the last flow disturbance. Twenty four points were sampled, twelve through each traverse for 2.5 minutes each.

Points on a Diameter	Probe Mark
1	*7.0"
2	8.4"
3	10.2"
4	12.4"
5	15.0"
6	18.8"
7	29.2"
8	33.0"
9	35.6"
10	37.8"
11	39.6"
12	41.2"

*Measurements include a 6" standoff.



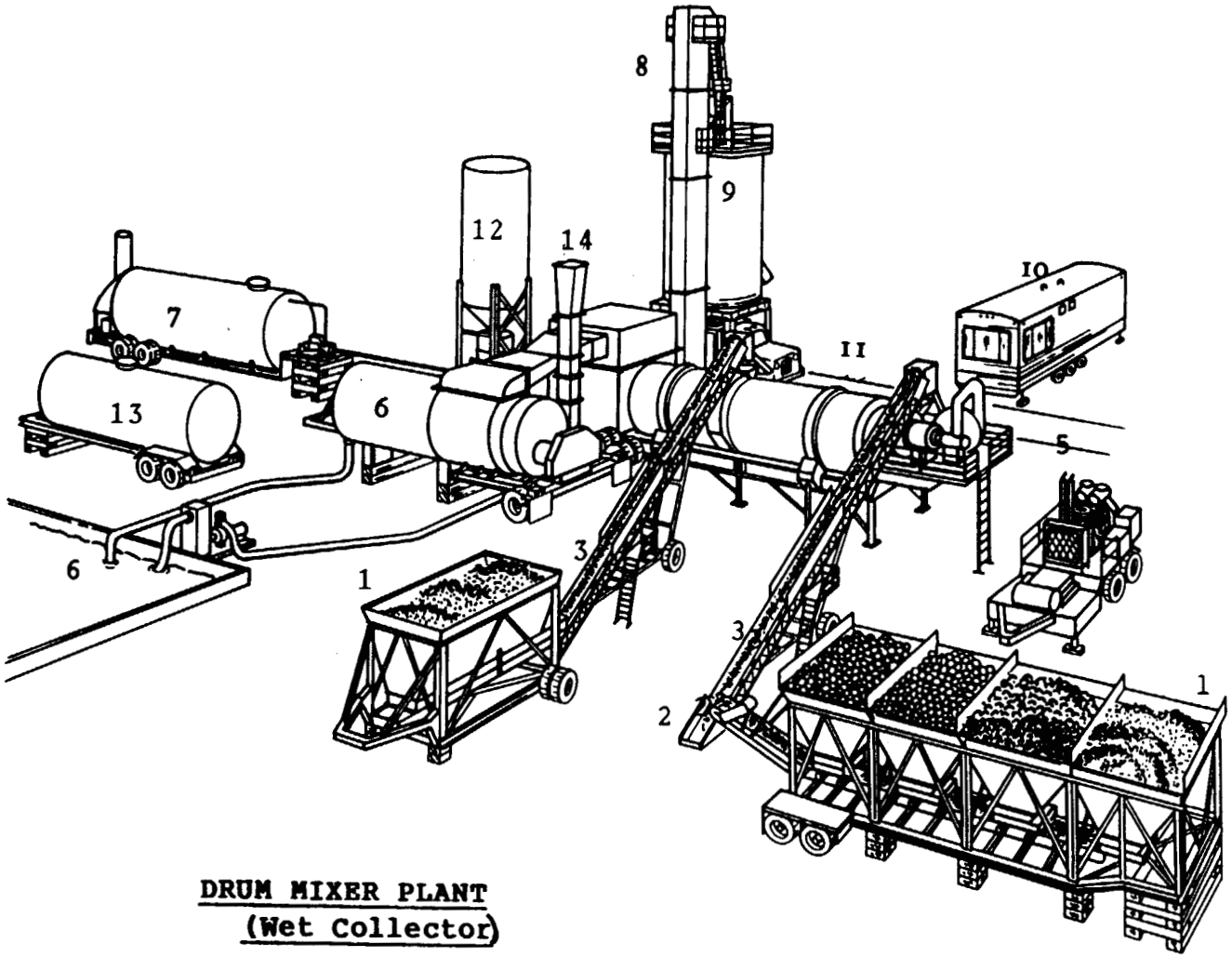
IV. THE SOURCE

IV. THE SOURCE

Masters & Jackson employs a Barber-Greene drum mix asphalt plant which is used to manufacture hot mix asphalt for road pavement. The process consists of blending prescribed portions of cold feed materials (sand, gravel, screenings, chips, etc.) uniformly and adding sufficient hot asphalt oil to bind the mixture together. After the hot asphalt mix is manufactured at the plant, it is transported to the location where it is to be applied. The hot asphalt mix is spread evenly over the surface with a paver and then compacted with a heavy roller to produce the final product.

The following is a general description of the plant's manufacturing process: The cold feed materials (aggregate) are dumped into four separate bins which in turn feed a common continuous conveyor. The aggregate is dispensed from the bins in accordance with the desired formulation onto the cold feed system conveyor to an inclined weigh conveyor then to a rotating drum for continuous mixing and drying at approximately 300°F. The required amount of hot asphalt oil is then injected onto and mixed into the dried aggregate. The now newly formed hot asphalt mix is pulled to the top of a storage silo by converyor. The hot asphalt mix is then discharged from the storage silo through a slide gate into waiting dump trucks, which transport the material to a final destination for spreading. The rated capacity of the plant will vary with each aggregate mix and moisture content with a 5% surface moisture removal.

The drum mixer uses a burner fired with #2 fuel oil to heat air to dry the aggregate, and the motion of the rotating drum to blend the aggregate and hot asphalt oil thoroughly. The air is drawn into the system via an exhaust fan. After passing through the burner and the mixing drum, the air passes through a high efficiency scrubber. The scrubber was manufactured by Barber-Greene. The exhaust gasses are drawn through the scrubber and discharged to the atmosphere through the stack. The design pressure drop across the venturi is in excess of 8 inches of water. The particulate matter, which is removed by the scrubber, is fed into the scrubber pond where it drops out of suspension.



DRUM MIXER PLANT
(Wet Collector)

1. Aggregate bins: Virgin and recycled aggregate is fed individually into each of the bins by type. It is metered onto a conveyor belt running under the bins to a shaker screen. The proportion of each aggregate type is determined by the job mix formula and pre-set to be metered out to meet these specifications.

2. Preliminary oversize screen: The aggregate is fed through a shaker screen where oversize rocks and foreign material is screened out of the mix.

3. Weigh conveyor belt: The aggregate is conveyed to the rotary drum dryer on a conveyor belt which weighs the material. The production rate is determined by this weight reading.

4. Rotary drum dryer/mixer: The aggregate is fed into the rotary drum dryer where it is tumbled by flighting into a veil in front of a gas flame which drives off the moisture. Further mixing is also accomplished in this drum. Hot liquid asphalt is injected approximately one-third of the way down the inclined drum where it is mixed with the aggregate.

5. Burner: The fuel fired burner is used to dry the rough aggregate and sand in the rotating drum as well as reheat recycled asphalt when it is part of the mix.

6. Wet scrubbing system: A system of cyclonic action, spray nozzles and a venturi removes 99% of particulates in the gas stream.

7. Liquid asphalt storage: The liquid asphalt is stored in this heated tank until it is needed in the mixer. The amount of asphalt content and its temperature are pre-set for each different type job.

8. Conveyor to surge/storage bin: The finished product of aggregate mixed with liquid asphalt is conveyed to a surge bin.

9. Surge/storage bin: The asphaltic cement is dumped into this surge bin and metered out to dump trucks which pull underneath the slide gate at the bottom of the bin.

10. Control/operators house: The entire plant operation is controlled from this operator's house.

11. Truck loading scale: As the trucks receive the asphalt from the storage/surge bin they are weighed on the loading scale which tells the plant operator the amount of asphalt that is being trucked on each individual load.

12. Mineral filler system (when used).

13. Burner fuel storage (when used).

14. Stack.

DATA SUMMARY

Plant

1. Manufacturer of plant Barber Greene.
2. Designed maximum operating capacity 250 TPH @ 25 % moisture.
3. Actual operation rate 200 TPH @ 4.5 % moisture.
4. Startup date 8/87.
5. Type of fuel used in dryer #2.
6. Quanity of fuel consumption 5 gal per min.

Aggregate

7. Name/type of mix Type C (state mix).
8. Percent asphalt in mix 4.8 %.
9. Temperature of asphalt 330° F.
10. Sieve/Screening analysis: % Passing;

1"	none	3/8"	26.3	#40	13.4
3/4"	3.0	#4	18.9	#80	4.8
1/2"	11.5	#10-40	11.7	#200	6.0

Scrubber Control System

11. Manufacturer Barber Greene.
12. Type; Venturi _____; Wet Washer X;
    Spray Booth _____; Other _____.
13. Water line pressure 39 psi.
14. Pressure drop across system 11 in H_2O
15. Gallons per minute through system 270.
16. Water source pond (i.e., lagoon, pond, etc.)
17. Number of spray nozzles 13.

COMPANY NAME Masters-Jackson Paving Co.

COMPANY REPRESENTATIVE L. J. Hunt

DATE 9-19-87

PLANT DATA

COMPANY NAME Masters & Jackson Inc.
COMPANY REP. K. J. Yount DATE 9-19-87 PHONE #417-881-5581
DATA SOURCE Computer
PLANT LOCATION Batesco quarry, Butler Mo.
PLANT MFG. Barber Greene PLANT MODEL # Dmco PLANT TYPE Thermoadrum
MIX SPECIFICATION # Type C OIL SPECIFICATION # AC 60/70

Time 24 Hour	___ Fuel Oil ___ Nat. Gas___ Propane___ Coal ___ _____	Burner Setting % open	Aggregate TPH	N/A Recycle TPH	Liquid Asphalt TPH	Mix Temp. °F	✓ Venturi ___ Baghouse Pressure Drop Inches Water
7:30		43	206		9.2	310	6
7:45		43	205		9.2	300	6
8:00	NOT available	46	208		9.3	300	5
8:15		46	208		9.3	305	7
8:30		46	206		9.2	310	7.5
8:45		46	204		9.1	315	7.5
9:00		46	204		9.2	310	8
9:15		46	205		9.1	305	7.5
9:30		46	204		9.2	310	8
9:45		46	206		9.3	315	9
10:00		46	206		9.3	320	9
10:15		46	204		9.2	300	10
10:30		46	204		9.1	305	10.5
10:45		46	205		9.2	310	11
11:00		46	204		9.2	305	11
11:15		46	205		9.1	315	11.5
11:30		46	204		9.1	320	12
11:45		46	206		9.3	300	13
12:00		46	204		9.2	320	13
12:15		46	204		9.3	320	14
12:30		46	205		9.3	320	14
12:45		46	210		9.6	310	14
1:00		46	209		9.5	320	14
1:15							
			4726	205.48	212.9	9.26	

DATA SUMMARY

Plant

1. Manufacturer of plant Barber Greene.
2. Designed maximum operating capacity 250 TPH @ 2.5 % moisture.
3. Actual operation rate 200 TPH @ 4.5 % moisture.
4. Startup date 8/87.
5. Type of fuel used in dryer #2.
6. Quanity of fuel consumption 5 gal Per Min.

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7. Name/type of mix Type C (State Mix).
8. Percent asphalt in mix 4.4 %.
9. Temperature of asphalt 330°F.
10. Sieve/Screening analysis: % Passing;

1"	None	3/8"	26.3	#40-80	13.4
3/4"	3.0	#4-10	18.9	#80-200	4.8
1/2"	11.5	#10-40	11.7	#200	6.0

Scrubber Control System

11. Manufacturer Barber Greene.
12. Type; Venturi _____; Wet Washer X;
    Spray Booth _____; Other _____.
13. Water line pressure 39 psi.
14. Pressure drop across system 11 in H_2O.
15. Gallons per minute through system 270.
16. Water source pond (i.e., lagoon, pond, etc.)
17. Number of spray nozzles 13.

COMPANY NAME Master & Jackson Paving Co.

COMPANY REPRESENTATIVE K.J. Yount

DATE 9/16/87

PLANT DATA

COMPANY NAME Masters - Jackson

COMPANY REP. K.J. Yount DATE 9-16-37 PHONE #417-881-5581

DATA SOURCE Computer

PLANT LOCATION Batesco quarry Butler Mo.

PLANT MFG. Barber Greene PLANT MODEL # DM60 PLANT TYPE Thermodrum

MIX SPECIFICATION # Type C OIL SPECIFICATION # AC 60/70

Time 24 Hour	2 Fuel Oil 4 Nat. Gas__ Propane__ Coal__	Burner Setting % open	Aggregate TPH	Recycle TPH	Liquid Asphalt TPH	Mix Temp. °F	✓ Venturi Baghouse Pressure Drop Inches Water
9.30	[redacted]	58 %	190	N/A	8.3	300	8
9.45	"	60 %	188		8.1	300	8.5
10.00	Not Available	54 %	188		8.1	305	9.5
10.15		54 %	190		8.1	310	11.
10.30		43	190		8.2	300	9
10.45		48	192		8.3	310	11.
11.00		48	190		8.3	295	10
11.15		48	190		8.4	300	11
11.30		48	192		8.5	310	10
11.45		48	190		8.3	310	11
12.00		43	189		8.3	310	11
12.15		42	192		8.4	290	11.5
12.30		41	190		8.3	310	10.
12.45		43	193		8.5	300	11
1.00		43	190		8.5	305	11
1.15		43	194		8.6	305	12
1.30		44	190		8.4	300	12
1.45		45	192		8.4	300	12
2.00		45	194		8.4	305	12
2.15		45	196		8.6	305	12
2.30		45	194		8.5	305	12
2.45		45	196		8.6	310	13
3.00		45	195		8.6	300	13
3.15		45	192		8.5	310	14
3.30		45	196		8.6	315	15

PLANT DATA

COMPANY NAME _____

COMPANY REP. _____ DATE _____ PHONE # _____

DATA SOURCE _____

PLANT LOCATION _____

PLANT MFG. _____ PLANT MODEL # _____ PLANT TYPE _____

MIX SPECIFICATION # _____ OIL SPECIFICATION # _____

Time 24 Hour	✓ #2 Fuel Oil __ Nat. Gas __ Propane __ Coal __ _____	Burner Setting % open	Aggregate TPH	Recycle TPH	Liquid Asphalt TPH	Mix Temp. °F	✓ Venturi __ Baghouse Pressure Drop Inches Water
345	Not	45	194	N/A	8.5	315	15
400	Available	45	197		8.7	310	15
415		45	194		8.5	315	14.5
430		45	194		8.5	305	14
445		45	194		8.5	315	12
		9-17-87					
7.30		40	198		9.1	310	5
7.45		43	205		8.8	310	5
8.00		43	201		8.7	305	5
815		43	196		8.6	300	6
830		43	198		8.7	300	6.5
845		43	202		8.8	300	7
900		43	198		8.7	295	7

V. EQUIPMENT USED

V. EQUIPMENT USED

Equipment used on conducting the particulate emissions test was:

A. The Lear Siegler PM-100 stack sampler with appropriate auxillary equipment and glassware. The train was set up according to the schematic on the nex page.

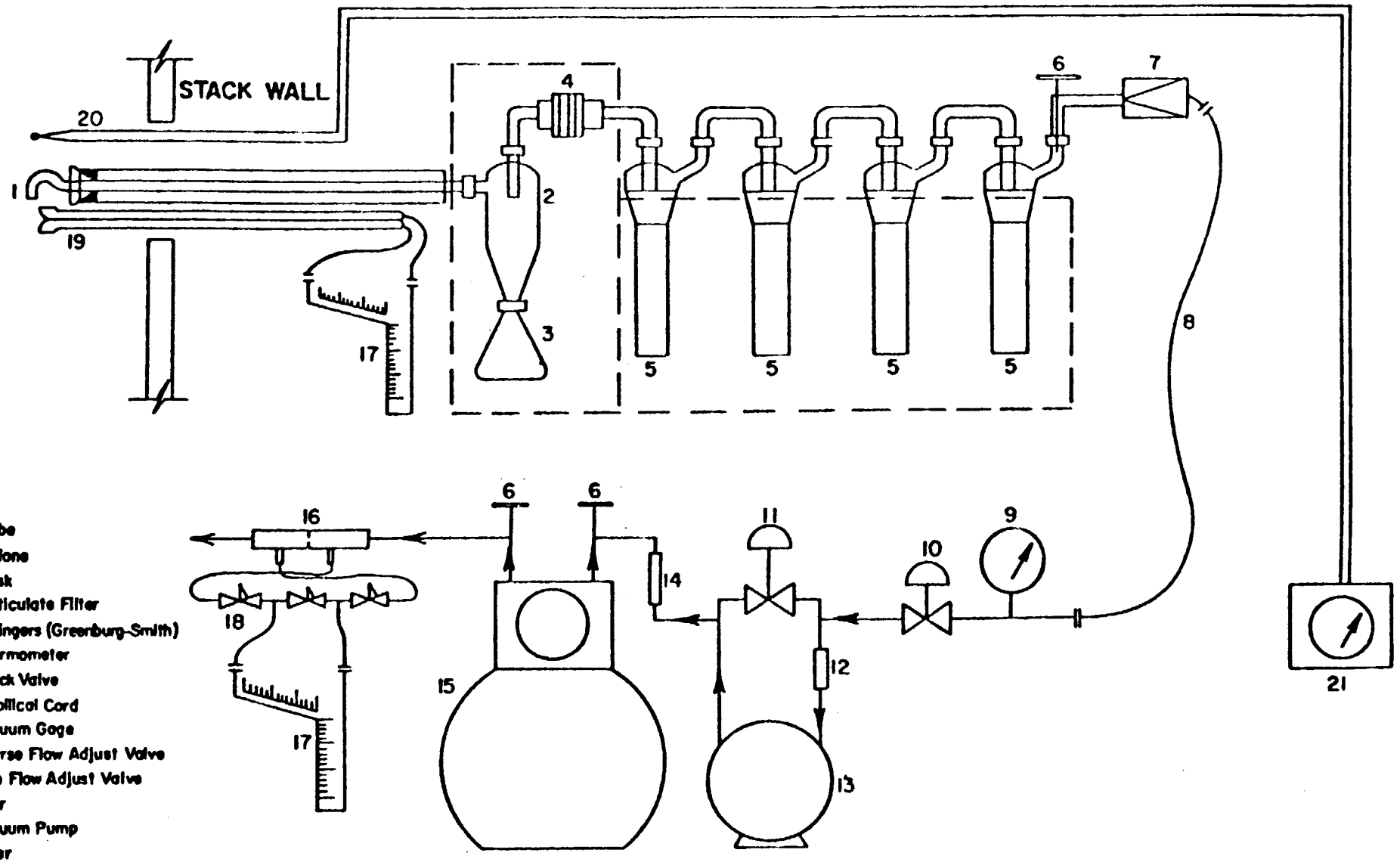
B. An Airguide Instruments Model 211-B (uncorrected) aneroid barometer was used to check the barometric pressure.

C. Weston dial thermometers are used to check meter temperatures. An Analogic Model 2572 Digital Thermocouple is used for stack temperatures.

D. A Hays 621 Analyzer was used to measure the oxygen, carbon dioxide and carbon monoxide content of the stack gases. For non-combustion sources, A Bacharach Instrument Company Fyrite is used for the gas analysis.

E. Filters are mady by Schleicher and Schuell and are type 1-HV with a porosity of .03 microns.

F. The acetone is reagent grade or ACS grade with a residue of $\leq$ .001.



1) Probe
2) Cyclone
3) Flask
4) Particulate Filter
5) Impingers (Greenburg-Smith)
6) Thermometer
7) Check Valve
8) Umbilical Cord
9) Vacuum Gage
10) Course Flow Adjust Valve
11) Fine Flow Adjust Valve
12) Oiler
13) Vacuum Pump
14) Filter
15) Dry Gas Meter
16) Orifice Tube
17) Incline Manometer
18) Solenoid Valves
19) Pitot
20) Thermocouple
21) Pyrometer

SAMPLING TRAIN
USED FOR ISOKINETIC SAMPLING

VI. LABORATORY PROCEDURES & RESULTS

LABORATORY PROCEDURES FOR PARTICULATE SAMPLING

I. Field Preparation

A. FILTERS: Fiberglass 4" sampling filters are prepared as follows:

Filters are removed from their box and numbered on the back side with a felt pen. The numbering system is continuous from job to job. The filters are placed in a dessicator to dry for at least 24 hours. Clean plastic petri dishes, also numbered, top and bottom, are placed in the dessicator with the filters. After dessication, the filters are removed one at a time and weighed on the Sartorius analytical balance, then placed in the correspondingly numbered petri dish. Weights are then recorded in the lab record book. Three filters are used for each complete particulate source emissions test and there should be several extra filters included as spares.

B. SILICA GEL: Silica Gel used for the test is prepared as follows:

Approximately 200 g of silica gel is placed in a wide mouth "Mason" type jar and dried in an oven (175°C for two hours). The open jars are removed and placed in a dessicator until cool (2 hours) and then tightly sealed. The jars are then numbered and weighed on the triple beam balance to the closest tenth of a gram, and this weight is recorded for each sealed jar. The number of silica gel jars used is the same as the number of filters. Silica gel should be indicating type, 6-16 mesh.

II. Post-Testing Lab Analysis

A. FILTERS: The filters are returned to the lab in their sealed glass filter holder which was used in field sampling. In the lab these holders are opened. The filter is placed in its petri dish with the lid off and returned to the dessicator for at least 24 hours. The top half of the filter holder is washed into the corresponding probe wash bottle and the bottom half of the filter holder is washed into the corresponding impinger catch bottle. (See II, C and D). After dessication, the filters are reweighed. The final weight is recorded in the lab record book. The filter pick up weight is calculated and recorded also. This procedure is repeated for all filters used in the field.

Alternately, the test team may opt to oven dry the filters at 220°F for two to three hours, weigh the sample, and use this weight as a final weight.

B. SILICA GEL: The sealed silica gel jars should be reweighed on the triple-beam balance and their weights recorded as shown on previous page.

C. PROBE RINSINGS: In all tests, a probe wash-out analysis will be necessary. These samples are returned in sealed Mason jars and consist of A.R. Acetone with an unknown solid content. Clean 250 ml beakers are used to make this analysis. These should be immaculately washed and rinsed with deionized water, then oven dried at 105°C for about one hour. The beakers should be moved to the dessicator to cool for ninety (90) minutes, then labeled with a pencil and weighed on the Sartorius analytical balance. Any variance from this procedure should be duplicated exactly when reweighing, as this procedure has been found to be quite sensitive. After preparing the necessary number of beakers (one for each probe wash and one blank) the Mason jars should be opened, poured into the beaker, and any material remaining on the jar walls rinsed with an acetone wash bottle into the beaker. The amount of liquid in the beaker should be noted on the analysis form. The acetone rinsings are evaporated on a warming plate. The liquid is kept swirled with an air sweep to prevent "bumping". When the acetone is evaporated the beakers are weighed as in Section II A.

D. IMPINGER CATCH: In some testing cases, the liquid collected in the impingers must be analyzed for solids content. This involves a similar procedure to the probe wash solids determination, except that the liquid is deionized water.

E. ACETONE: Conduct a blank analysis of acetone in the 1 gallon glass container. This acetone will be used in the field for rinsing the probe, nozzle, and top half of the filter holder. Performing such a blank analysis prior to testing will insure that the quality of the acetone to be used will not exceed the .001% residual purity standard.

SPECIAL NOTE

When sampling sources high in moisture content, (such as asphalt plants) the filter paper sometimes sticks to the filter holder. When removing the filter it may tear. In order to maintain control of any small pieces of filter paper which may be easily lost, they are washed with acetone into the probe washing. This makes the filter weight light (sometimes negative) and the probe wash correspondingly heavier. The net weight is the same and no particulate is lost. This laboratory procedure is taught by EPA in the Quality Assurance for Source Emissions Workshop at Research Triangle Park and is approved by EPA.

WEIGHING PROCEDURE - SARTORIUS ANALYTICAL BALANCE

The Sartorius balance is accurate to 0.1 mg and has a maximum capacity of 200 grams. The balance precision (standard deviation) is 0.05 mg. Before weighing an item, the balance should first be zeroed. This step should be taken before every series of weighings. To do this, the balance should have all weight adjustments at "zero" position. The beam arrest lever (on the lower left hand side toward the rear of the balance) is then slowly pressed downward to full release position. The lighted vernier scale on the front of the cabinet should align the "zero" with the mark on the cabinet. If it is not so aligned, the adjustment knob on the right hand side (near the rear of the cabinet) should be turned carefully until the marks align. Now return the beam arrest to horizontal arrest position. The balance is now "zeroed".

To weigh an item, it is first placed on the pan. And the sliding doors are closed to avoid air current disturbance. The weight adjustment knob on the right hand side must be at "zero". The beam arrest is then slowly turned upward. The lighted scale at the front of the cabinet will now indicate the weight of the item in grams. If the scale goes past the divided area, the item then exceeds 100 g weight (about 3-1/2 ounces) and it is necessary to arrest the balance (beam arrest lever) and move the lever for 100 g weight away from you. It is located on the left hand side of the cabinet near the front, and is the knob closest to the side of the cabinet. The balance will not weigh items greater than 200 grams in mass, and trying to do this might harm the balance. Remember -- this is a delicate precision instrument.

After the beam is arrested, in either weight range, the procedure is the same. When the weight of the item in grams is found, "dial in" that amount with the two knobs on the left hand side (near the 100 g lever) color coded yellow and green. As you dial the weight, the digits will appear on the front of the cabinet. When the proper amount is dialed, carefully move the arrest lever down with a slow, steady turn of the wrist. The lighted dial will appear, and the right hand side knob (front of cabinet) is turned to align the mark with the lower of the two lighted scale divisions which the mark appears between. When these marks are aligned, the two lighted digits along with the two indicated on the right hand window on the cabinet front are the fractional weight in grams (the decimal would appear before the lighted digits) and the whole number of grams weight is the amount "dialed in" on the left.

In general, be sure that the beam is in "arrest" position before placing weight on or taking weight off of the pan. Don't "dial in" weight unless the beam is arrested. The balance is sensitive to even a hand on the table near the balance, so be careful and painstaking in every movement while weighing.

Form REC#8

SAMPLE ANALYTICAL DATA FORM

Plant Location Masters & Jackson Relative humidity in lab 51 %

Sample Location hot mix asphalt plant Density of Acetone (pa) .7853 mg/ml

Blank volume (V_a) 200 ml

Date/Time wt. blank 9/21/87 Gross wt. 96.3079 mg

Date/Time wt. blank 9/22/87 Gross wt. 96.3078 mg

Ave. Gross wt. 96.3079 mg

Tare wt. 96.3075 mg

Weight of blank (m_{ab}) .0004 mg

Acetone blank residue concentration (C_a) (C_a) = (M_{ab}) / (V_a) (P_a) = (.0000025 mg/g)

Weight of residue in acetone wash: $W_a = C_a V_{aw} P_a$ = (.000025)(200)(.7853) = (.004)

		Run # 6	Run # 7	Run # 8
Acetone rinse volume (V_{aw})	ml	200	200	200
Date/Time of wt 9/21/87 4:30 pm Gross wt	g	159.7445	127.9826	133.0962
Date/Time of wt 9/22/87 9:50 am Gross wt	g	159.7441	127.9824	133.0958
Average Gross wt	g	159.7443	127.9825	133.0960
Tare wt	g	159.6993	127.9039	133.0443
Less acetone blank wt (W_a)	g	.0004	.0004	.0004
Wt of particulate in acetone rinse (m_a)	g	.0446	.0782	.0513

Filter Numbers	#	JB-2285	JB-2286	JB-2287
Date/Time of wt 9/21/87 4:30 pm Gross wt	g	.5381	.5392	.5448
Date/Time of wt 9/22/87 9:50 AM Gross wt	g	.5380	.5389	.5445
Average Gross wt	g	.5381	.5391	.5447
Tare wt	g	.5069	.5104	.5093

Weight of particulate on filters(s) (m_f)	g	.0312	.0287	.0354
Weight of particulate in acetone rinse	g	.0446	.0782	.0513
Total weight of particulate (m_n)	g	.0758	.1069	.0867

Note: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Remarks Runs 6, 7 & 8 for compliance

Signature of analyst Kim Rea Signature of reviewer S Rush

Form REC#8

SAMPLE ANALYTICAL DATA FORM

Plant Location Masters & Jackson Relative humidity in lab ____ %

Sample Location ____ Density of Acetone (pa) .78 mg/ml

Blank volume (V_a) ____ ml

Date/Time wt. blank ____ Gross wt. ____ mg

Date/Time wt. blank ____ Gross wt. ____ mg

Ave. Gross wt. ____ mg

Tare wt. ____ mg

Weight of blank (m_{ab}) .0004 mg

Acetone blank residue concentration (C_a) (C_a) = (M_{ab}) / (V_a) (p_a) = (.000025 mg/g)

Weight of residue in acetone wash: $W_a = C_a V_{aw} p_a$ = (.000025)(200)(.7853) = (.0004)

		Run # 1	Run # 2	Run # 3
Acetone rinse volume (V_{aw})	ml	200	200	200
Date/Time of wt ____ Gross wt	g	163.0581	149.4823	134.5796
Date/Time of wt ____ Gross wt	g	163.0579	149.4820	134.5792
Average Gross wt	g	163.0580	149.4822	134.5794
Tare wt	g	163.0041	149.4618	134.5563
Less acetone blank wt (W_a)	g	.0004	.0004	.0004
Wt of particulate in acetone rinse (m_a)	g	.0535	.0200	.0227

		KR-2327	KR-2328	KR-2329
Filter Numbers	#			
Date/Time of wt ____ Gross wt	g	.5393	.5415	.5395
Date/Time of wt ____ Gross wt	g	.5390	.5412	.5391
Average Gross wt	g	.5392	.5414	.5393
Tare wt	g	.5161	.5150	.5173

Weight of particulate on filters(s) (m_f)	g	.0231	.0264	.0220
Weight of particulate in acetone rinse	g	.0535	.0200	.0227
Total weight of particulate (m_n)	g	.0766	.0464	.0447

Note: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Remarks Run 1 - Preliminary; Runs 2 & 3 void due to cyclonic flow in stack

Signature of analyst ____ Signature of reviewer [signature]

Form REC#8

SAMPLE ANALYTICAL DATA FORM

Plant Location Masters & Jackson Relative humidity in lab ____ %

Sample Location ____ Density of Acetone (pa) .78 mg/ml

Blank volume (V_a) ____ ml

Date/Time wt. blank ____ Gross wt. ____ mg

Date/Time wt. blank ____ Gross wt. ____ mg

Ave. Gross wt. ____ mg

Tare wt. ____ mg

Weight of blank (m_{ab}) ____ mg

Acetone blank residue concentration (C_a) (C_a) = (M_{ab}) / (V_a) (p_a) = (mg/g)

Weight of residue in acetone wash: $W_a = C_a V_{aw} p_a$ = ( )( )( ) = ( )

		Run # 4	Run # 5	Run #
Acetone rinse volume (V_{aw})	ml			
Date/Time of wt ____ Gross wt	g	133.6306	167.9780	
Date/Time of wt ____ Gross wt	g	133.6303	167.9776	
Average Gross wt	g	133.6305	167.9778	
Tare wt	g	133.6075	167.9495	
Less acetone blank wt (W_a)	g	.0004	.0004	
Wt of particulate in acetone rinse (m_a)	g	.0226	.0279	

Filter Numbers	#	KR-2325	KR-2324	
Date/Time of wt ____ Gross wt	g	.5311	.5300	
Date/Time of wt ____ Gross wt	g	.5309	.5300	
Average Gross wt	g	.5310	.5300	
Tare wt	g	.5062	.5039	

Weight of particulate on filters(s) (m_f)	g	.0248	.0261	
Weight of particulate in acetone rinse	g	.0226	.0279	
Total weight of particulate (m_n)	g	.0474	.0540	

Note: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Remarks Runs 4 & 5 void due to cyclonic flow in stack.

Signature of analyst Kim Rea Signature of reviewer [signature]

VII. CALCULATIONS

NAME: MASTERS & JACKSON, INC.

LOCATION: BUTLER, MISSOURI

			date	9/19/87	9/19/87	9/19/8
	SUMMARY OF TEST DATA			RUN #6	RUN #7	RUN #8
	SAMPLING TRAIN DATA		start	08:07	10:20	11:59
			finish	09:10	11:23	13:01
1	Sampling time, minutes		θ	60	60	60
2	Sampling nozzle diameter, in.		Dn	.195	.195	.195
3	Sampling nozzle cross-sectional area, ft^2		An	.000207	.000207	.000207
4	Isokinetic variation		I	95	106	107
5	Sample gas volume - meter conditions, cf.		Vm	38.12	41.76	41.67
6	Average meter temperature, °R		Tm	540	568	561
7	Average oriface pressure drop, in.H_2O		ΔH	.80	.91	.90
8	Total particulate collected mg.		Mn	75.8	106.9	86.7
	VELOCITY TRAVERSE DATA					
9	Stack area, ft^2		A	7.1	7.1	7.1
10	Absolute stack gas pressure, in. Hg.		Ps	29.68	29.68	29.68
11	Barometric pressure, in. Hg.		Pbar	29.68	29.68	29.68
12	Average absolute stack temperature, °R		Ts	600	605	605
13	Average $\bar{\sqrt{\text{velocity head}}}$, (Cp= .80)		$\bar{\sqrt{\Delta P}}$	1.28	1.27	1.26
14	Average stack gas velocity ft. / sec.		Vs	74	75	74
	STACK MOISTURE CONTENT					
15	Total water collected by train, ml.		Vic	191.0	273.0	266.0
16	Moisture in stack gas, %		Bws	19.5	24.9	24.2
	EMISSIONS DATA:					
17	Stack gas flow rate, dscf/hr. (000's)		Qsd	1,338	1,248	1,247
18	Total particulate concentration, gr/dscf		Cs	.0314	.0426	.0342
19	Total particulate concentration, lbs/hr		E	6.0	7.6	6.1
20	Total particulate concentration, lbs/mbtu		E^1	.0000	.0000	.0000
	ORSAT DATA					
21	Percent CO2 by volume		CO2	10.0	10.0	10.0
22	Percent O2 by volume		O2	11.0	11.0	11.0
23	Percent CO by volume		CO	.0	.0	.0
24	Percent N2 by volume		N2	79.0	79.0	79.0

Dry Gas Volume :

$$V_{m(std)} = V_m \left[\frac{T_{(std)}}{T_m} \right] \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{P_{(std)}} \right] = 17.64 \frac{^\circ R}{in.Hg.} \; Y \; V_m \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m} \right]$$

Where:

$V_{m(std)}$ = Dry Gas Volume through meter at standard conditions, cu.ft.

V_m = Dry Gas Volume measured by meter, cu.ft.

P_{bar} = Barometric pressure at oriface meter, in. Hg.

P_{std} = Standard absolute pressure,(29.92 in. Hg.)

T_m = Absolute temperature at meter $^\circ R$

T_{std} = Standard absolute temperature ($528^\circ R$)

ΔH = Average pressure drop across oriface meter, in.H_2O

Y = Dry gas meter calibration factor

13.6 = Inches water per inches Hg.

Run # 6 $V_{m(std)} = 17.64 \quad (1.00)(38.12) \left[\frac{(29.68) + \frac{.80}{13.6}}{540} \right] = 37.14$ dsc

Run # 7 $V_{m(std)} = 17.64 \quad (1.00)(41.76) \left[\frac{(29.68) + \frac{.91}{13.6}}{568} \right] = 38.69$ dsc

Run # 8 $V_{m(std)} = 17.64 \quad (1.00)(41.67) \left[\frac{(29.68) + \frac{.90}{13.6}}{561} \right] = 39.09$ dsc

Total contaminants by weight: 'GRAIN LOADING'

Particulate concentration C_s' gr./dscf.

$$C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{M_n}{V_{m(std)}} \right]$$

Where:

C_s' = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, gr./dscf.

M_n = Total amount of particulate matter collected, mg.

$V_{m(std)}$ = Dry gas volume through meter at standard conditions, cu.ft.

Run #6 : $C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{75.8}{37.14} \right] = .0314$ gr./dscf.

Run #7 : $C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{106.9}{38.69} \right] = .0426$ gr./dscf.

Run #8 : $C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{86.7}{39.09} \right] = .0342$ gr./dscf.

Dry molecular weight:

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + \%N_2).$$

Where:

M_d	= Dry molecular weight, lb./lb.-mole.
$\%CO_2$	= Percent carbon dioxide by volume (dry basis).
$\%O_2$	= Percent oxygen by volume (dry basis).
$\%N_2$	= Percent nitrogen by volume (dry basis).
%CO	= Percent carbon monoxide by volume (dry basis).
0.264	= Ratio of O_2 to N_2 in air, v/v.
0.28	= Molecular weight of N_2 or CO, divided by 100.
0.32	= Molecular weight of O_2 divided by 100.
0.44	= Molecular weight of CO_2 divided by 100.

Run # 6 : $M_d = 0.44(10.0\%) + 0.32(11.0\%) + 0.28(\ .0\% + 79.0\%) = 30.0$ lb./lb.-mole

Run # 7 : $M_d = 0.44(10.0\%) + 0.32(11.0\%) + 0.28(\ .0\% + 79.0\%) = 30.0$ lb./lb.-mole

Run # 8 : $M_d = 0.44(10.0\%) + 0.32(11.0\%) + 0.28(\ .0\% + 79.0\%) = 30.0$ lb./lb.-mole

Water vapor condensed :

$$V_{wc_{std}} = \left| V_f - V_i \right| \left| \frac{\rho_w R T_{(std)}}{M_w P_{(std)}} \right| = 0.04707 \left| V_f - V_i \right|$$

$$V_{wsg_{std}} = \left| W_f - W_i \right| \left| \frac{R T_{(std)}}{M_w P_{(std)}} \right| = 0.04715 \left| W_f - W_i \right|$$

Where:

0.04707 = Conversion factor $ft.^3/ml.$

0.04715 = Conversion factor $ft.^3/g.$

$V_{wc_{std}}$ = Volume of water vapor condensed (standard conditions) scf.

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel (standard conditions)

V_f = Final volume of impinger contents, ml.

V_i = Initial volume of impinger contents

ρ = Density of water, (0.002201 lb/ml).

R = Ideal gas constant, 21.85 (in.Hg.)(cu.ft./lb.-mole)($^\circ$R)

M_w = Molecular weight of water vapor (18.0 lb/lb-mole).

T_{std} = Absolute temperature at standard conditions, 528°R.

P_{std} = Absolute pressure at standard conditions, 29.92 inches Hg.

Run #6 : $V_{wc(std)}$ = (0.04707) (166.0) = 7.8 cu.ft

$V_{wsg(std)}$ = (0.04715) (25.0) = 1.2 cu.ft

Run #7 : $V_{wc(std)}$ = (0.04707) (262.0) = 12.3 cu.ft

$V_{wsg(std)}$ = (0.04715) (11.0) = .5 cu.ft

Run #8 : $V_{wc(std)}$ = (0.04707) (248.0) = 11.7 cu.ft

$V_{wsg(std)}$ = (0.04715) (18.0) = .8 cu.ft

Moisture content of stack gases: $$B_{ws} = \frac{V_{wc_{std}} + V_{wsg_{std}}}{V_{wc_{std}} + V_{wsg_{std}} + V_{m\ std}} \times 100$$

Where:

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

V_m = Dry gas volume measured by dry gas meter,(dcf).

$V_{wc_{std}}$ = Volume of water vapor condensed corrected to standard conditions (scf).

$V_{wsg_{std}}$ = Volume of water vapor collected in silica gel corrected to standard conditions (scf).

Run #6 : $$B_{ws} = \frac{7.8 + 1.2}{7.8 + 1.2 + 37.14} \times 100 = 19.5\ \%$$

Run #7 : $$B_{ws} = \frac{12.3 + .5}{12.3 + .5 + 38.69} \times 100 = 24.9\ \%$$

Run #8 : $$B_{ws} = \frac{11.7 + .8}{11.7 + .8 + 39.09} \times 100 = 24.2\ \%$$

Molecular weight of stack gases: $M_s = M_d\ (1-B_{ws}) + 18\ (B_{ws})$.

Where:

M_s = Molecular weight of stack gas, wet basis, (lb./lb.-mole).

M_d = Molecular weight of stack gas, dry basis, (lb./lb.-mole).

Run #6 : $M_s = 30.0\ (1-\ .195\ ) + 18\ (\ .195\ ) = 27.7$ (lb./lb.-mole).

Run #7 : $M_s = 30.0\ (1-\ .249\ ) + 18\ (\ .249\ ) = 27.0$ (lb./lb.-mole).

Run #8 : $M_s = 30.0\ (1-\ .242\ ) + 18\ (\ .242\ ) = 27.1$ (lb./lb.-mole).

Stack gas velocity:

$$V_s = K_p\, C_p \left[\sqrt{\Delta P} \right]_{avg.} \sqrt{\frac{T_{s(avg.)}}{P_s\, M_s}}$$

Where:

V_s = Average velocity of gas stream in stack, ft./sec.

K_p = 85.49 ft/sec $\left[\frac{(g/g\text{-mole})\text{-}(mm\ Hg)}{(^\circ K)(mm\ H_2O)} \right]^{1/2}$

C_p = Pitot tube coefficient,(dimensionless).

ΔP = Velocity head of stack gas, in. H_2O.

P_{bar} = Barometric pressure at measurement site, (in.Hg).

P_g = Stack static pressure (in.Hg).

P_s = Absolute stack gas pressure, (in.Hg) = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in.Hg).

t_s = Stack temperature, ($^\circ$f).

T_s = Absolute stack temperature, ($^\circ$R). = 460 + t_s.

M_s = Molecular weight of stack gas, wet basis, (lb/lb-mole).

Run #6 : $V = (85.49)\,(.80)\,(1.28)\sqrt{\frac{600}{(29.68)(27.66)}} = 74.47$ ft/se

Run #7 : $V = (85.49)\,(.80)\,(1.27)\sqrt{\frac{605}{(29.68)(27.01)}} = 75.08$ ft/se

Run #8 : $V = (85.49)\,(.80)\,(1.26)\sqrt{\frac{605}{(29.68)(27.10)}} = 74.36$ ft/se

Stack gas flow rate:

$$Q_{sd} = 3600 \left[1-B_{wc}\right] V_s A \left[\frac{T_{std}}{T_{stk}}\right] \left[\frac{P_s}{P_{std}}\right]$$

Where:

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, (dscf/hr).

A = Cross sectional area of stack $(ft.)^2$.

3600 = Conversion factor, sec./hr.

t_s = Stack temperature ($^\circ$f).

T_s = Absolute stack temperature, ($^\circ$R).

T_{std} = Standard absolute temperature, (528°R).

P_{bar} = Barometric pressure at measurement site, (in.Hg.).

P_g = Stack static pressure, (in.Hg.).

P_s = Absolute stack gas pressure, (in.Hg.); = $P_{bar} + P_g$

P_{std} = Standard absolute pressure, (29.92 in.Hg.)

Run #6 :

$$Q_{sd} = 3600\ (1-.195)\ (\ 74.47)\ (\ \ 7.1) \left[\frac{528}{600}\right] \left[\frac{29.68}{29.92}\right] = 1337590 \text{ dscf.}$$

Run #7 :

$$Q_{sd} = 3600\ (1-.249)\ (\ 75.08)\ (\ \ 7.1) \left[\frac{528}{605}\right] \left[\frac{29.68}{29.92}\right] = 1247688 \text{ dscf.}$$

Run #8 :

$$Q_{sd} = 3600\ (1-.242)\ (\ 74.36)\ (\ \ 7.1) \left[\frac{528}{605}\right] \left[\frac{29.68}{29.92}\right] = 1247241 \text{ dscf.}$$

Emissions rate from stack:

$$E = \frac{(C_s)(Q_{sd})}{7000 \text{ gr./lb.}} = \text{lb. / hr.}$$

Where:

E = Emissions rate, lb./hr.

C = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions (gr/dscf).

Q = Dry volumetric stack gas flow rate corrected to standard conditions, (dscf/hr).

Run #6 : $E = \frac{(.0314)(1337590)}{7000} = 6.0$ lb. / hr.

Run #7 : $E = \frac{(.0426)(1247688)}{7000} = 7.6$ lb. / hr.

Run #8 : $E = \frac{(.0342)(1247241)}{7000} = 6.1$ lb. / hr.

Isokinetic variation : $I = 100\ T_s \left| \dfrac{0.002669\ V_{ic} + (V_m/T_m)(P_{bar} + \Delta H/13.6)}{60\ \ \theta\ \ V_s\ \ P_s\ \ A_n} \right|$

Where:

I	=	Percent isokinetic sampling.
100	=	Conversion to percent.
T_s	=	Absolute average stack gas temperature, °R.
0.002669	=	Conversion factor, Hg - ft^3/ml - °R.
V_{ic}	=	Total volume of liquid collected in impingers and silica gel, m
T_m	=	Absolute average dry gas meter temperature, °R.
P_{bar}	=	Barometric pressure at sampling site, (in.Hg).
ΔH	=	Average pressure differential across the oriface meter, (in.H_2O
13.6	=	Specific gravity of mercury.
60	=	Conversion seconds to minutes
θ	=	Total sampling time, minutes.
V_s	=	Stack gas velocity, ft./sec.
P_s	=	Absolute stack gas pressure, in.Hg.
A_n	=	Cross sectional area of nozzle, ft^2.

Run #6 :

$$I = 100 \times 600 \left| \frac{(0.002669)(191.0) + \frac{38.1}{540}\left| 29.68 + \frac{.80}{13.6} \right|}{60\ (\ 60\ )\ (\ 74.47\ )\ (29.68\ )\ (\ .000207\ )} \right| = 95\ \%$$

Run #7 :

$$I = 100 \times 605 \left| \frac{(0.002669)(273.0) + \frac{41.8}{568}\left| 29.68 + \frac{.91}{13.6} \right|}{60\ (\ 60\ )\ (\ 75.08\ )\ (29.68\ )\ (\ .000207\ )} \right| = 106\ \%$$

Run #8 :

$$I = 100 \times 605 \left| \frac{(0.002669)(266.0) + \frac{41.7}{561}\left| 29.68 + \frac{.90}{13.6} \right|}{60\ (\ 60\ )\ (\ 74.36\ )\ (29.68\ )\ (\ .000207\ )} \right| = 107\ \%$$

VIII. FIELD DATA

RAMCON ENVIRONMENTAL CORPORATION

Plant Master-Jackson

Location Butler, Mo

Operator C. Mitchell

Date 9-19-87

Run No. 6

Sample Box No. 2

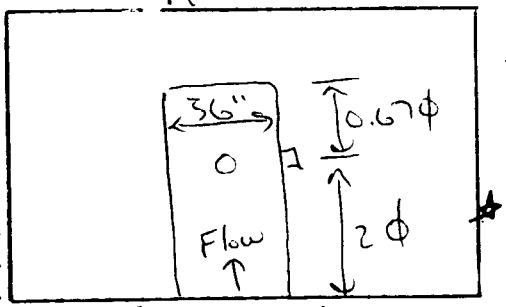
Meter Box No. 700205

Meter H @ 1.15

C Factor 1.003

Pitot Tube Coefficient Cp 0.796

M=0.49



Schematic of Stack Cross Section

		IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature	69°F		
Barometric Pressure	29.68 FINAL	366	527
Assumed Moisture, %	25 INITIAL	200	502
Probe Length, m(ft)	4ft DIFFERENCE	166	25
Nozzle Identification No.	0.0002074		
Avg. Calibrated Nozzle Dia., (in.)	0.195	0.195	0.195
Probe Heater Setting	3		
★ Leak Rate, m^3/min. (cfm)	0.032		
Probe Liner Material	316 Stainless		
Static Pressure, mm Hg (in.Hg)	+0.01	13.6	
Filter No.	JB-2285		

★ Vm Corrected: 38.84 (.032 - .02) 60 = 38.12 Vm

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A) 1	8:07 / 8:09 30	4	140	1.7	0.83	119.68 / 121.58	65	65	210	55
2	8:12	4	140	1.7	0.83	123.10	70	65	230	52
3	8:14 30	4	140	1.6	0.78	124.70	75	65	245	51
4	8:17	4	140	1.6	0.78	126.20	80	65	235	53
5	8:19 30	4	140	1.6	0.78	127.78	80	65	240	53
6	8:22	4	140	1.5	0.74	129.47	80	65	255	54
7	8:24 30	5	140	1.6	0.78	130.93	80	65	250	56
8	8:27	5	140	1.7	0.83	132.58	85	70	250	55
9	8:29 30	5	140	1.7	0.83	134.38	85	70	240	53
10	9:32	4	140	1.4	0.69	135.68	85	70	255	53
11	9:34 30	4	140	1.4	0.69	137.24	90	70	245	56
12	9:37	4	140	1.4	0.69	138.47	90	70	245	55
B) 1	8:40 / 8:42 30	5	140	1.8	0.88	140.90	90	75	230	58

RAMCON emissions test log sheet, cont. DATE 9-19-87 LOCATION Butler, Mo TEST NO. 6

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	8:45	5	140	1.7	0.84	142.29	90	75	240	55
3	8:47[30]	5	140	1.6	0.78	143.65	95	75	250	51
4	8:50	5	140	1.6	0.78	145.30	95	75	235	54
5	8:52[30]	4	140	1.5	0.74	146.91	95	80	235	52
6	8:55	4	140	1.5	0.74	148.40	95	80	240	54
7	8:57[30]	4	140	1.5	0.74	150.08	95	80	255	52
8	9:00	5	140	1.8	0.88	151.90	95	80	250	55
9	9:02[30]	5	140	1.9	0.93	153.46	100	80	240	53
10	9:05	5	140	1.9	0.93	155.29	100	80	245	56
11	9:07[30]	5	140	1.8	0.88	156.96	100	80	230	56
12	9:10	5	140	1.7	0.84	158.44	100	80	230	59

RAMCON ENVIRONMENTAL CORPORATION

Plant Master-Jackson

Location Butler Mo

Operator C. Mitchell

Date 9-19-87

Run No: 1

Sample Box No. 3

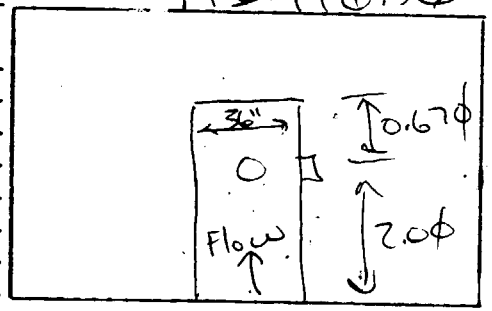
Meter Box No. 700205

Meter H @ 1.15

C Factor 1.003

Pitot Tube Coefficient Cp 0.796

M=SM 0.49 0.56



Schematic of Stack Cross Section

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	462	507
INITIAL	200	496
DIFFERENCE	262	11

Ambient Temperature 87°F

Barometric Pressure 29.69

Assumed Moisture, ~~2.25~~ 20

Probe Length, m(ft) 4ft

Nozzle Identification No. 0.0002074

Avg. Calibrated Nozzle Dia., (in.) 0.195 | 0.195 | 0.195

Probe Heater Setting 3

Leak Rate, m^3/min. (cfm) 0.01

Probe Liner Material 316 Stainless

Static Pressure, mm Hg (in. Hg) +0.01 | 13.6

Filter No. JB-2286

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A) 1	10:20 30 / 10:23	5	145	1.8	1.0	158.71 / 161.17	115	110	250	57
2	10:25 30	4	145	1.6	0.90	162.68	115	105	250	55
3	10:28	4	145	1.5	0.84	163.95	115	100	260	52
4	10:30 30	4	145	1.5	0.84	165.74	110	100	250	53
5	10:33	4	145	1.5	0.84	167.40	115	100	270	55
6	10:35 30	4	145	1.5	0.84	169.10	115	100	235	54
7	10:38	4	145	1.6	0.90	170.72	115	100	245	52
8	10:40 30	5	145	1.8	1.0	172.70	115	100	255	53
9	10:43	6	145	1.9	1.1	175.10	115	100	250	55
10	10:45 30	5	145	1.7	0.95	176.49	115	100	265	51
11	10:48	5	145	1.7	0.95	178.58	115	100	250	54
12	10:50 30	5	145	1.6	0.90	179.71	115	95	225	53
B) 1	10:53 30 / 10:56	5	145	1.8	1.0	182.00	110	100	240	60

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 9-19-87 LOCATION Butler, Mo TEST NO. 7

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	10:58[30]	5	145	1.7	0.95	183.78	115	100	190	57
3	11:01	5	145	1.6	0.90	185.45	115	100	225	53
4	11:03[30]	4	145	1.5	0.84	187.02	115	100	235	55
5	11:06	4	145	1.5	0.84	188.70	115	100	240	52
6	11:08[30]	5	145	1.5	0.84	190.66	115	100	245	56
7	11:11	5	145	1.6	0.90	1920	120	100	255	54
8	11:13[30]	5	145	1.7	0.95	193.80	120	100	240	57
9	11:16	5	145	1.7	0.95	195.88	120	100	255	53
10	11:18[30]	5	150	1.4	0.78	197.41	120	100	240	56
11	11:21	5	145	1.6	0.90	199.02	120	100	250	58
12	11:23[30]	5	145	1.5	0.84	200.47	120	100	230	61

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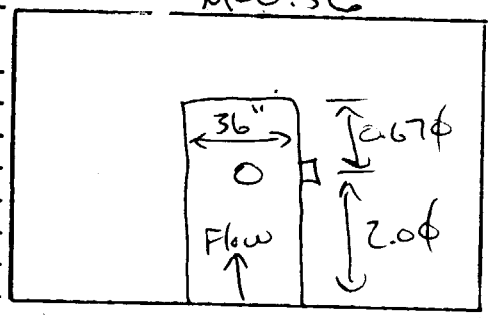
RAMCON ENVIRONMENTAL CORPORATION

Plant Master-Jackson

Location Butler Mo
Operator C. Mitchell
Date 9-19-87
Run No. 8
Sample Box No. 2
Meter Box No. 700205
Meter H @ 1.15
C Factor 1.003
Pitot Tube Coefficient Cp 0.796

M=0.56



Schematic of Stack Cross Section

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	448	521
INITIAL	200	503
DIFFERENCE	248	18

Ambient Temperature 85°F
Barometric Pressure 29.68
Assumed Moisture, % 20
Probe Length, m(ft) 4ft
Nozzle Identification No. 0.000207 4
Avg. Calibrated Nozzle Dia., (in.) 0.195 / 0.195 / 0.195
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) 0.008
Probe Liner Material 316 Stainless
Static Pressure, mm Hg (in. Hg) +0.01 / 13.6
Filter No. JB-2287

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A) 1	11:59 / 12:01:30	5	145	1.7	0.95	200.70 / 202.72	110	105	210	64
2	12:04	5	150	1.7	0.95	204.51	110	100	225	60
3	12:06:30	5	145	1.6	0.90	206.31	110	100	240	52
4	12:09	4	145	1.4	0.78	207.73	110	100	245	54
5	12:11:30	4	145	1.4	0.78	209.45	110	95	230	51
6	12:14	4	145	1.5	0.84	211.08	110	95	235	53
7	12:16:30	5	145	1.5	0.84	212.90	110	95	250	53
8	12:19	5	145	1.6	0.90	214.54	110	95	250	55
9	12:21:30	5	145	1.6	0.90	216.38	110	95	240	52
10	12:24	5	145	1.4	0.78	217.85	110	90	230	54
11	12:26:30	5	145	1.5	0.84	219.58	110	90	225	56
12	12:29	5	145	1.5	0.84	220.94	110	90	235	55
B) 1	12:31:30 / 12:34	5	145	1.7	0.95	223.38	100	90	245	50

Form #REC-06

P2 of 6

RAMCON emissions test log sheet, cont. DATE 9-19-87 LOCATION Butler, Mo TEST NO. 8

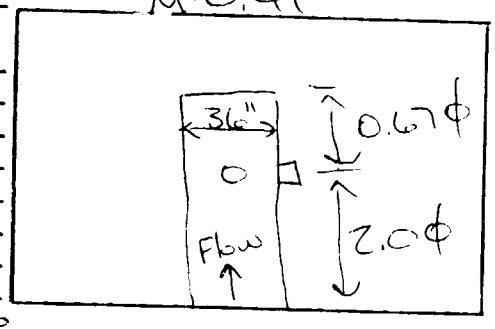
TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	12:36:30	5	145	1.5	0.84	224.75	105	90	230	55
3	12:39	5	145	1.5	0.84	226.39	105	90	230	55
4	12:41:30	5	150	1.5	0.84	228.00	105	90	240	53
5	12:44	5	145	1.5	0.84	229.80	105	90	250	56
6	12:46:30	5	145	1.5	0.84	231.74	105	90	250	55
7	12:49	5	145	1.7	0.95	233.25	105	90	250	55
8	12:51:30	6	145	1.8	1.0	235.25	110	90	250	55
9	12:54	7	145	1.9	1.1	237.20	110	90	250	55
10	12:56:30	7	145	1.9	1.1	239.38	110	90	250	55
11	12:59	6	145	1.7	0.95	240.89	110	90	250	55
12	13:01:30	6	145	1.7	0.95	242.37	110	90	250	55

RAMCON ENVIRONMENTAL CORPORATION

Plant Masters and Jackson

Location Butler Mo.
Operator C. Mitchell
Date 9-16-87
Run No. 1
Sample Box No. 2
Meter Box No. 7002.05
Meter H @ 1.15
C Factor 1.003
Pitot Tube Coefficient Cp ~~0.764~~ 0.796

M=0.41



		IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature 70°F			
Barometric Pressure 29.42	FINAL	436	518
Assumed Moisture, % 20	INITIAL	200	505
Probe Length, m(ft) 4ft	DIFFERENCE	236	13

Nozzle Identification No. 0.0001787
Avg. Calibrated Nozzle Dia., (in.) 0.18 / 0.181 / 0.18
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) 0.016
Probe Liner Material 316 Stainless
Static Pressure, mm Hg (in. Hg) 10.05 / 13.6
Filter No. KR-2527

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A) 1	9:42 / 9:44 30	3	150	1.6	0.66	928.14 / 929.91	70	70	250	64
2	9:47	3	150	1.3	0.53	931.32	75	70	255	59
3	9:49 30	2	150	0.74	0.30	932.19	80	70	245	55
4	9:52	1	155	0.36	0.15	932.90	80	70	250	53
5	9:54 30	2	150	0.84	0.34	933.81	80	70	240	52
6	9:57	3	150	1.1	0.45	935.12	85	70	230	55
7	9:59 30	4	150	1.7	0.70	936.66	90	70	220	57
8	10:02	5	150	2.1	0.86	938.20	90	70	235	59
9	10:04 30	5	150	2.1	0.86	940.00	90	70	240	56
10	10:07	5	155	2.0	0.82	941.78	90	70	260	54
11	10:09 30	5	155	1.8	0.74	943.30	90	70	245	58
12	10:12	4	155	1.5	0.62	944.38	90	75	255	55
B) 1	10:15 / 10:17 30	4	155	1.2	0.49	946.10	90	75	250	61

VOID

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Form #REC-06

RAMCON emissions test log sheet, cont. DATE 9-16-87 LOCATION Butler, Mo. TEST NO. 1

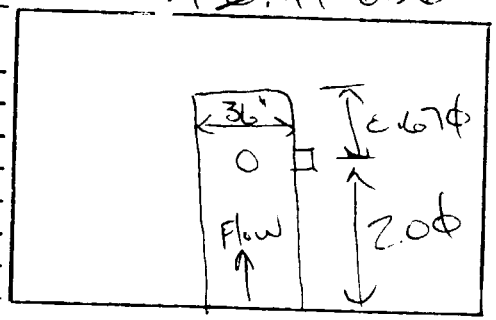
TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F) in	GAS SAMPLE TEMP. (°F) out	SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
2	10:20	3	150	0.94	0.39	947.11	90	80	250	56
3	10:22 30	3	155	0.65	0.27	948.05	90	80	230	53
4	10:25	2	150	0.32	0.13	948.64	90	80	220	54
5	10:27	2	145	0.30	0.12	949.32	90	80	235	58
6	10:29 30	2	145	0.45	0.18	950.40	90	80	245	55
7	10:32	4	150	1.4	0.57	952.07	95	80	255	53
8	10:34 30	11	150	3.8	1.6	953.88	100	80	260	51
9	10:37	12	150	3.9	1.6	956.05	95	80	245	55
10	10:39 30	12	150	3.9	1.6	958.40	95	80	250	58
11	10:42	12	150	3.8	1.6	961.00	95	80	240	58
12	10:44 30	12	150	3.8	1.6	962.58	95	80	220	62
						$V_{m(std)}$ = 33.13				
						M_N =	76.6			
					*	C_s =	.0356	gr/dscf		
					*	.0154	$\frac{M_N}{V_m}$ =	gr/dscf		

RAMCON ENVIRONMENTAL CORPORATION

Plant Masters and Jackson

Location Butler, Pa.
Operator C. Mitchell
Date 9-16-87
Run No. 2
Sample Box No. 3
Meter Box No. 700205
Meter H @ 1.15
C Factor 1.003
Pitot Tube Coefficient Cp 0.796

M=~~0.47~~ 0.36



Ambient Temperature 77°F
Barometric Pressure 29.42
Assumed Moisture, % ~~20~~ 25
Probe Length, m(ft) 4.4

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	351	511
INITIAL	200	502
DIFFERENCE	151	9

Nozzle Identification No. C.0000787
Avg. Calibrated Nozzle Dia., (in.) 0.181/0.181/0.181
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) 0.015
Probe Liner Material 316 Stainless
Static Pressure, mm Hg (in. Hg) +0.05/13.6
Filter No. KR-2328

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (Ps) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A) 1	11:33 / 11:35 30	4	150	2.0	0.82	963.25 / 965.55	85	80	270	60
2	11:39	4	155	1.6	0.66	967.34	90	80	260	54
3	11:40 30	2	150	0.62	0.25	967.67	95	80	250	53
4	11:43	2	150	0.48	0.20	968.47	95	80	250	55
5	11:45 30	2	155	0.85	0.35	969.91	95	80	250	53
6	11:48	7	155	2.9	1.2	972.18	95	80	270	55
7	11:50 30	8	155	3.5	1.4	974.17	100	80	250	56
8	11:53	8	150	~~AM~~ 3.7	1.3	976.50	100	80	195	53
9	11:55 30	8	150	3.8	1.4	978.88	100	80	210	58
10	11:58	8	150	3.9	1.4	980.90	100	80	250	54
11	12:00 30	8	150	3.8	1.4	983.14	100	80	250	52
12	12:03	8	150	3.9	1.4	985.05	100	80	225	52
B) 1	12:07 / 12:09 30	4	150	2.3	0.83	987.50	95	85	200	62

VOID

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RAMCON emissions test log sheet, cont. DATE 9-16-87 LOCATION Butler, Mo TEST NO. 2

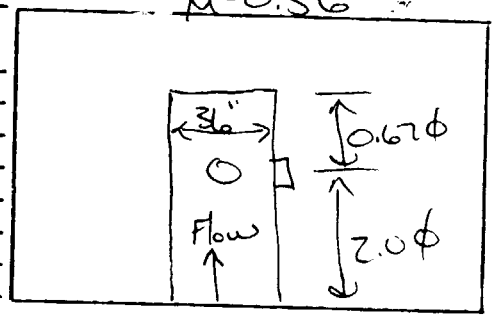
TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	12:27 30 SEC	3	150	1.1	0.40	988.35	95	85	200	58
3	12:14 30	2	155	0.70	0.25	989.36	95	85	210	54
4	12:17	2	150	0.51	0.18	990.00	95	85	200	52
5	[illegible]	2	150	0.55	0.20	990.83	95	85	225	53
6	12:[illegible]2	2	150	0.60	0.22	991.80	95	85	250	55
7	12:24 30	3	150	1.3	0.47	993.25	95	85	250	59
8	12:27	4	150	1.8	0.65	994.80	100	85	225	57
9	12:29 30	6	150	2.9	1.0	997.01	100	85	225	54
10	12:32	8	150	3.5	1.3	999.10	100	80	250	56
11	12:34 30	8	150	3.7	1.3	1001.15	100	85	235	59
12	12:37	8	150	3.9	1.4	1002.92	100	85	220	63
						m_N	46.4			
						$V_{m(std)}$	37.69			
						C_s =	.0190	gr/dscf		

RAMCON ENVIRONMENTAL CORPORATION

Plant Masters and Jackson

Location Butler Mo
Operator C. Mitchell
Date 9-16-87
Run No. 3
Sample Box No. 2
Meter Box No. 700205
Meter H @ 1.15
C Factor 1.003
Pitot Tube Coefficient Cp 0.796

M=0.36



Schematic of Stack Cross Section

Ambient Temperature 80°F
Barometric Pressure 29.42
Assumed Moisture, % 25
Probe Length, m(ft) 4ft
Nozzle Identification No. 0.000787
Avg. Calibrated Nozzle Dia., (in.) 0.181/0.18/0.18
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) 0.008
Probe Liner Material 316 Stainless
Static Pressure, mm Hg (in. Hg) 10.05/13.6
Filter No. KR-2329

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	448	510
INITIAL	200	498
DIFFERENCE	248	12

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F Inlet	GAS SAMPLE TEMP. AT DRY GAS METER °F Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
A) 1	13:17 / 13:19:30	4	150	2.0	0.72	3.31 / 5.06	90	90	220	65
2	13:22	3	150	1.3	0.47	6.33	95	90	235	59
3	13:24:30	2	150	0.56	0.20	7.10	100	90	245	53
4	13:27	1	150	0.44	0.16	7.95	100	90	250	55
5	13:29:30	2	150	0.98	0.35	9.41	100	90	230	52
6	13:32	4	150	1.9	0.68	10.73	100	90	220	54
7	13:34:30	8	150	3.5	1.3	13.24	105	90	220	55
8	13:37	9	150	3.8	1.4	15.10	105	90	235	53
9	13:39:30	9	150	3.8	1.4	17.51	105	90	250	51
10	13:42	9	150	3.7	1.3	19.80	105	90	240	54
11	13:44:30	9	150	3.8	1.4	22.44	105	90	255	58
12	13:47	8	150	3.7	1.3	24.53	105	90	250	56
B) 1	13:51 / 13:53:30	4	145	2.0	0.72	25.85	100	95	245	63

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Form #REC-06

1 of 2

RAMCON emissions test log sheet, cont. DATE 9-16-87 LOCATION Butler, Mo TEST NO. 3

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	~~0~~ 13:56	3	150	1.1	0.40	27.03	105	95	250	61
3	13:58 30	2	150	0.55	0.20	27.76	105	95	255	58
4	14:01	2	150	0.48	0.17	28.71	105	90	245	56
5	14:03 30	3	150	0.80	0.29	29.86	105	90	235	53
6	14:06	4	150	1.9	0.68	31.40	105	90	255	58
7	14:08 30	5	155	2.5	0.90	33.21	105	90	260	54
8	14:11	8	150	3.5	1.3	35.35	110	90	245	53
9	14:13 30	8	150	3.7	1.3	37.63	110	90	255	56
10	14:16	9	150	3.9	1.4	39.73	110	90	240	53
11	14:18 30	9	150	3.9	1.4	42.04	110	90	230	57
12	14:21	9	150	3.8	1.4	43.93	110	90	235	60
						M_N	44.7			
						$V_{m(STD)}$	38.04			
						C_S =	.0181 gr/dscf			

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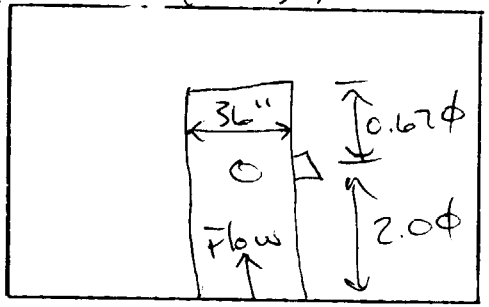
RAMCON ENVIRONMENTAL CORPORATION

Plant Masters and Jackson

Location Butler Mo
Operator C. Mitchell
Date 9-16-87
Run No. 4
Sample Box No. 3
Meter Box No. 700205
Meter H @ 1.15
C Factor 1.003
Pitot Tube Coefficient Cp 0.796

M=0.36



		IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature 83°F			
Barometric Pressure 29.42	FINAL	424	511
Assumed Moisture, % 25	INITIAL	200	500
Probe Length, m(ft) 4ft	DIFFERENCE	224	11

Nozzle Identification No. 0.000787
Avg. Calibrated Nozzle Dia., (in.) 0.181 | 0.181 | 0.181
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) 0.011
Probe Liner Material 316 Stainless
Static Pressure, mm Hg (in.Hg) +0.05 / 13.6
Filter No. KR-2325

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A) 1	15:41 / 15:43:30	4	145	2.3	0.83	44.37 / 46.53	110	105	250	65
2	15:46	3	145	1.6	0.58	47.88	110	100	255	60
3	15:48:30	2	150	0.88	0.32	48.84	110	100	240	53
4	2M 15:51 / 16:01	2	150	0.50	0.18	49.54	110	100	235	55
5	15:53:30	2	150	0.58	0.21	50.42	110	100	250	52
6	15:56	2	150	0.90	0.32	51.45	110	100	255	52
7	15:58:30	3	150	1.1	0.40	52.68	110	100	225	53
8	16:01	3	150	1.8	0.65	54.68	110	95	235	51
9	16:03:30	7	150	3.6	1.3	56.50	110	95	225	55
10	16:06	8	150	3.9	1.4	58.56	110	95	255	54
11	16:08:30	8	150	3.9	1.4	60.70	110	95	250	54
12	16:11	8	150	3.9	1.4	62.64	115	95	230	56
B) 1	16:15:30 / 16:18	4	145	2.1	0.76	64.50	110	100	265	64

VOID

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RAMCON emissions test log sheet, cont. DATE 9-16-87 LOCATION Butler, Mo TEST NO. 4

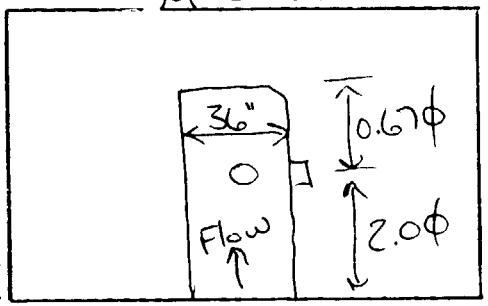
TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F) in	GAS SAMPLE TEMP. (°F) out	SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
2	16:20 30	3	145	1.5	0.54	66.15	110	100	250	60
3	16:23	3	150	1.6	0.58	67.22	110	100	220	56
4	16:25 30	1	150	0.38	0.14	67.80	115	100	225	57
5	16:28	1	150	0.33	0.12	68.51	110	100	235	54
6	16:30 30	2	155	0.45	0.16	69.34	110	95	250	55
7	16:33	2	150	0.75	0.27	70.50	110	95	240	52
8	16:35 30	5	150	2.8	1.0	72.63	110	95	250	54
9	16:38	7	150	3.5	1.3	74.38	110	90	240	58
10	16:40 30	8	150	4.1	1.5	76.85	110	90	235	57
11	16:43	8	150	4.0	1.4	79.00	110	90	220	59
12	16:45 30	8	150	4.0	1.4	80.86	110	90	210	63
						m_n	47.4			
						$V_{m(std)}$	33.69			
						C_s =	.0217	gr/dscf		

RAMCON ENVIRONMENTAL CORPORATION

Plant Masters and Jackson

Location Butler, Mo
Operator C. Mitchell
Date 9-17-87
Run No. 5
Sample Box No. 3
Meter Box No. 700205
Meter H @ 1.15
C Factor 1.003
Pitot Tube Coefficient Cp 0.796

$M = \frac{C_M}{0.4} T 0.36$



		IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature 83°F			
Barometric Pressure 29.46	FINAL	414	522
Assumed Moisture, % 25	INITIAL	200	507
Probe Length, m(ft) 4ft	DIFFERENCE	214	15

Nozzle Identification No. 0.000787
Avg. Calibrated Nozzle Dia., (in.) 0.181/0.181/0.181
Probe Heater Setting 3
Leak Rate, m^3/min. (cfm) 0.021
Probe Liner Material 316 Stainless
Static Pressure, mm Hg (in.Hg) 10.05/13.6
Filter No. KR-2324

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H_2O	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
A) 1	8:03 / 8:05 30	4	140	2.2	0.78	81.17 / 83.16	75	75	265	64
2	8:08	4	140	2.0	0.72	84.95	80	70	245	60
3	8:10 30	3	145	1.7	0.43	85.82	85	75	235	56
4	8:13	2	145	0.65	0.25	86.65	85	70	150	52
5	8:15 30	2	145	0.73	0.26	87.66	85	75	200	53
6	8:18	2	145	0.78	0.28	88.71	90	75	250	55
7	8:20 30	3	145	1.7	0.61	90.28	90	75	270	58
8	8:23	6	145	3.4	1.2	92.14	90	75	250	57
9	8:25 30	8	145	4.1	1.5	94.50	95	75	200	54
10	8:28	8	145	4.2	1.5	96.61	95	75	225	50
11	8:30 30	8	145	4.0	1.4	99.05	95	75	250	50
12	8:33	8	145	4.0	1.4	100.76	95	80	265	50
B) 1	8:36 / 8:38 30	4	140	2.4	0.86	102.97	95	80	200	55

VOID

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Form #REC-06

2 of 2

RAMCON emissions test log sheet, cont. DATE 9-17-87 LOCATION Butler, Mo TEST NO. 5

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	8:41	4	145	2.0	0.72	104.30	95	80	200	52
3	8:43:30	3	145	1.0	0.36	105.32	100	80	250	55
4	8:46	1	150	0.40	0.14	106.02	100	80	265	60
6	8:48:30	2	145	0.65	0.23	107.00	95	80	250	55
7	8:51	3	150	1.5	0.54	108.54	95	80	225	50
8	8:53:30	7	150	3.5	1.3	110.58	100	80	200	60
9	8:56	7	150	3.5	1.3	112.86	100	80	250	60
10	8:58:30	7	145	3.4	1.2	114.95	100	80	270	55
11	9:01	8	145	3.8	1.4	117.12	100	80	250	55
12	9:03:30	8	145	3.8	1.4	119.03	100	80	200	55
						M_n	54.0			
						$V_{m(std)}$	35.716			
						C_s =	.0233			

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IX. CALIBRATIONS

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number _____ Date 9-26-87 Meter box number C-282 Plant _____

Barometric pressure, P_b = 30.01 in. Hg Dry gas meter number 700205 Pretest Y 1.003

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$Y_i \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
.5	~~10~~ 5	5.02	78	105 104	85 85	95.75	10.25	5	1.027	1.16
1.0	10	10.21	78	108 109	85 86	97.0	7.30	5	1.012	1.17
1.5	10	10.12	78	109 112	86 85	98.0	6.00	5	1.021	1.18
									Y =	1.039

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number _____ Date 9-5-87 Meter box number 700205 Plant _____

Barometric pressure, P_b = 30.52 in. Hg Dry gas meter number 700205 Pretest Y 1.01

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	$\Delta H_@ / Y_i$	$\frac{Y_i \, V_w \, P_b \, (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
0.5	10	461.56 471.12	82	105	85	95	20.45	4	1.15	1.01
1.5	10	472.61 482.81	83	105	87	96	11.85	4	1.16	1.00
3.0	10	484.10 494.28	83	108	86	97	8.31	4	1.14	1.00
									Y =	1.003

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

RAMCON ENVIRONMENTAL CORPORATION

Date 9-5-87 Thermocouple number Inlet

Ambient temperature 83 °F Barometric pressure 30.52 in. Hg

Calibrator C. Mitchell Reference: mercury-in-glass ✓

other _____

Reference point number[a]	Source[b] (specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference,[c] %
A	Ice bath	33	33	0
B	oven	150	150	0
C	oven	175	175	0
D	Ambient	83	83	0
	9-16-87	70°F	70°F	0%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

Figure 2.5 stack temperature sensor calibration data form.

RAMCON ENVIRONMENTAL CORPORATION

Date 9-5-87 Thermocouple number Hotbox #2

Ambient temperature 84 °F Barometric pressure 30.52 in. Hg

Calibrator C. Mitchell Reference: mercury-in-glass ✓

other _____

Reference point number[a]	Source[b] (specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference,[c] %
A	Ice bath	33	33	0
B	Oven	150	150	0
C	Oven	175	175	0
D	Ambient	84	84	0
	9-16-87	70°F	70°F	0%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

Figure 2.5 stack temperature sensor calibration data form.

RAMCON ENVIRONMENTAL CORPORATION

Date 9-5-87 Thermocouple number 43

Ambient temperature 85 °F Barometric pressure 30.52 in. Hg

Calibrator C.M. Stehl Reference: mercury-in-glass ✓

other _____

Reference point number[a]	Source[b] (specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference,[c] %
A	Ice bath	33	33	0
B	Oven	150	150	0
C	Oven	175	175	0
D	Ambient	85	CM 85	0
	9-16-87	70°F	70°F	0%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 < 1.5\%$.

Figure 2.5 stack temperature sensor calibration data form.

RAMCON ENVIRONMENTAL CORPORATION

Lear Siegler Stack Sampler

Nozzle Diameter Calibration

Date _____ Signature _____

Nozzle No.	Average Diameter	Nozzle No.	Average Diameter
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

Pitot Tube Calibration (S Type)

Pitot Tube Identification No. 43 Date 9-5-87

Calibrated by: C Mitchell

"A" SIDE CALIBRATION Impact

Run No.	Δp std cm H_2O (in. H_2O)	Δp (s) cm H_2O (in. H_2O)	$C_{p(s)}$	DEVIATION $C_{p(s)}-\bar{C}_p(A)$
1	1.10	1.71	0.802	+0.006
2	0.56	0.88	0.798	+0.002
3	0.33	0.53	0.789	-0.007
		$\bar{C}_p$ (SIDE A)	0.796	

"B" SIDE CALIBRATION

Run No.	Δp std cm H_2O (in. H_2O)	Δp(s) cm H_2O in. H_2O)	$C_{p(s)}$	DEVIATION $C_{p(s)}-\bar{C}_p(B)$
1	1.10	1.69	0.807	+0.011
2	0.56	0.88	0.798	+0.002
3	0.33	0.54	0.782	-0.014
		$\bar{C}_p$ (SIDE B)	0.796	

$$\text{AVERAGE DEVIATION} = \sigma(\text{A OR B}) = \frac{\sum_{1}^{3} |C_{p(s)} - \bar{C}_p(\text{A OR B})|}{3} \leftarrow \text{MUST BE} \leq 0.01$$

$$|\bar{C}_p(\text{SIDE A}) - \bar{C}_p(\text{SIDE B})| \leftarrow \text{MUST BE} \leq 0.01$$

$$C_{p(s)} = C_{p(std)} \sqrt{\frac{\Delta p\ std}{\Delta p_s}}$$

RAMCON

Lear Siegler Stack Sampler

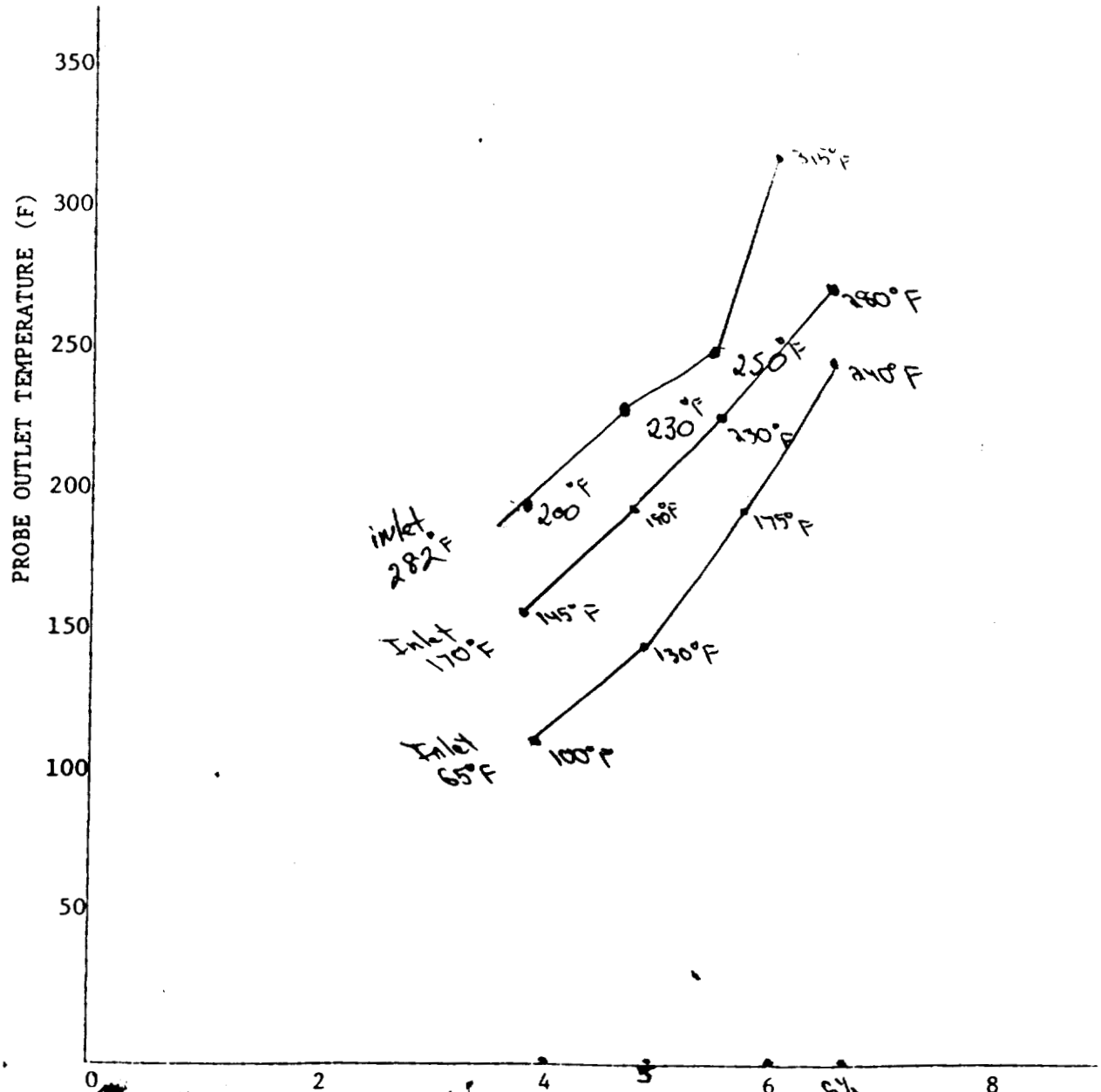
Heating Probe Calibration

Probe No. 42 Probe Length ~~4~~ 4 ft.

Date of Calibration 12/17/86 Signature Shawn A. Greenwood

Name of Company to be tested _____

Note: 3 ft. probe - 5 min. warmup
6 ft. probe - 15 min. warmup
10 ft. probe - 30 min. warmup
Calibration flow rate = .75 CFM



X. RAMCON PERSONNEL

RAMCON Environmental Stack Test Team

Sumner Buck - President

Sumner Buck is the President of RAMCON Environmental. He is a graduate of the EPA 450 "Source Sampling for Particulate Pollutants" course and the 474 "Continuous Emissions Monitoring" course all given at RTP. Mr. Buck is a qualified V.E. reader with current certification. Mr. Buck has personally sampled over 300 stacks including over 100 asphalt plants. He is 44 years old and a graduate of the University of Mississippi with graduate studies at Memphis State University and State Technical Institute of Memphis.

J. Cameron Mitchell - Team Leader

Cameron Mitchell has been employed by RAMCON for several years. He has undergone extensive training in Methods 1 through 9. He is qualified as a team leader and has personally sampled over 250 stacks including over 200 asphalt plants. He is currently certified as a V.E. reader. He recently graduated from Memphis State University with a Bachelors Degree in Civil Engineering and a minor in Mathematics.

XI. VISIBLE EMISSIONS

SOURCE NAME: Masters and Jackson

ADDRESS:

CITY: Butler | STATE: Mo | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Scrubber | OPERATING MODE:

DESCRIBE EMISSION POINT: Round Exit to scrubber

HEIGHT ABOVE GROUND LEVEL: 30ft | HEIGHT RELATIVE TO OBSERVER: 27 ft

DISTANCE FROM OBSERVER: 50 ft | DIRECTION FROM OBSERVER: NNE

DESCRIBE EMISSIONS: Dust from Drying Aggregate

EMISSION COLOR: Grey | PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]

WATER DROPLETS PRESENT: NO [ ] YES [X] | IS WATER DROPLET PLUME: ATTACHED [X] DETACHED [ ]

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: 40 ft from stack exit

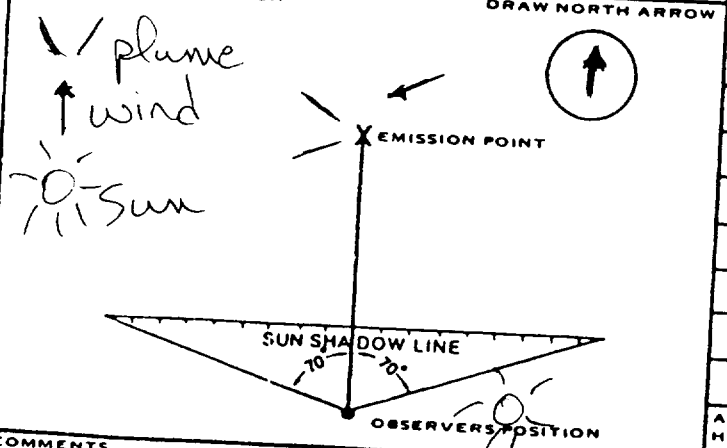
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: Grey | SKY CONDITIONS: Overcast

WIND SPEED: 2-5 mph | WIND DIRECTION: SW

AMBIENT TEMPERATURE: 70°F | RELATIVE HUMIDITY: 80-90%

SOURCE LAYOUT SKETCH



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

SEC / M	0	15	30	45
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0
60	0	0	0	0

OBSERVATION DATE: 9-16-87 | START TIME: 9:42 | STOP TIME: 9:47

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

COMMENTS: Run #1 - Void

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE: J. Cameron Mitchell | DATE: 9-16-87

ORGANIZATION: REC

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | TITLE | DATE

CERTIFIED BY: St. of Mo | DATE: 6-87

VERIFIED BY | DATE

REC#14

SOURCE NAME: Masters and Jackson

ADDRESS:

CITY: Butler | STATE: Mo | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Scrubber | OPERATING MODE:

DESCRIBE EMISSION POINT: Round Exit to scrubber

HEIGHT ABOVE GROUND LEVEL: 30 ft | HEIGHT RELATIVE TO OBSERVER: 27ft

DISTANCE FROM OBSERVER: 50 ft | DIRECTION FROM OBSERVER: NNE

DESCRIBE EMISSIONS: Dust from Drying Aggregate

EMISSION COLOR: Grey | PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]

WATER DROPLETS PRESENT: NO [ ] YES [X] | IS WATER DROPLET PLUME: ATTACHED [X] DETACHED [ ]

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: 40 ft from Stack exit

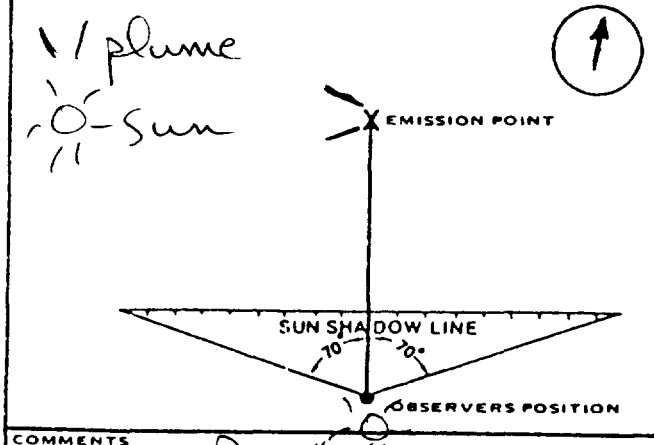
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Partly Cloudy

WIND SPEED: 5-15 mph | WIND DIRECTION: Variable

AMBIENT TEMPERATURE: 77°F | RELATIVE HUMIDITY: 70-80%

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 9-16-87 | START TIME: 11:33 | STOP TIME: 12:32:45

SEC / MIN	0	15	30	45	SEC / MIN	0	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	0	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	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	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	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

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: 0 % WERE 0

COMMENTS: Run #2 -Void

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE: J Cameron Mitchell | DATE: 9-16-87

ORGANIZATION: REC

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE:

TITLE: | DATE:

CERTIFIED BY: St. of TN | DATE: 6-87

VERIFIED BY: | DATE:

REC#14

SOURCE NAME: Masters and Jackson

ADDRESS:

CITY: Butler | STATE: Mo | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Scrubber | OPERATING MODE:

DESCRIBE EMISSION POINT: Round Exit from Scrubber

HEIGHT ABOVE GROUND LEVEL: 30 ft | HEIGHT RELATIVE TO OBSERVER: 27 ft

DISTANCE FROM OBSERVER: 50 ft | DIRECTION FROM OBSERVER: NNE

DESCRIBE EMISSIONS: Dust from Drying Aggregate

EMISSION COLOR: Grey | PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]

WATER DROPLETS PRESENT: NO [ ] YES [X] | IS WATER DROPLET PLUME: ATTACHED [X] DETACHED [ ]

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: 30 ft from stack exit

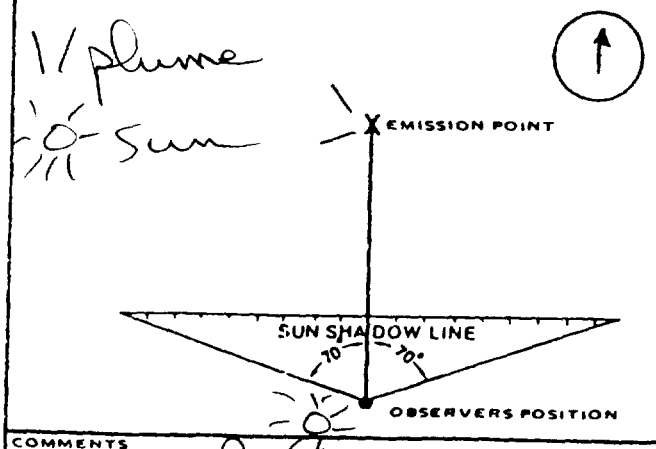
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Partly Cloudy

WIND SPEED: 5-15 mph | WIND DIRECTION: Variable

AMBIENT TEMPERATURE: 80°F | RELATIVE HUMIDITY: 70-80%

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 9-16-87 | START TIME: 13:17 | STOP TIME: 14:16

SEC / M	0	15	30	45	SEC / M	0	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	0	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	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	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	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

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: 0 % WERE 0

COMMENTS: Run #3 - Void

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE: J Cameron Mitchell | DATE: 9-16-87

ORGANIZATION: REC

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE | DATE

CERTIFIED BY: St. of Mo | DATE: 6-87

VERIFIED BY | DATE

REC#14

SOURCE NAME: Masters and Jackson

ADDRESS:

CITY: Butler | STATE: Mo | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Scrubber | OPERATING MODE:

DESCRIBE EMISSION POINT: Round exit from scrubber

HEIGHT ABOVE GROUND LEVEL: 30 ft | HEIGHT RELATIVE TO OBSERVER: 27 ft

DISTANCE FROM OBSERVER: 50 ft | DIRECTION FROM OBSERVER: NNE

DESCRIBE EMISSIONS: Dust from Drying Aggregate

EMISSION COLOR: Grey | PLUME TYPE: CONTINUOUS X FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES X | IS WATER DROPLET PLUME: ATTACHED X DETACHED ☐

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: 30 ft from stack exit

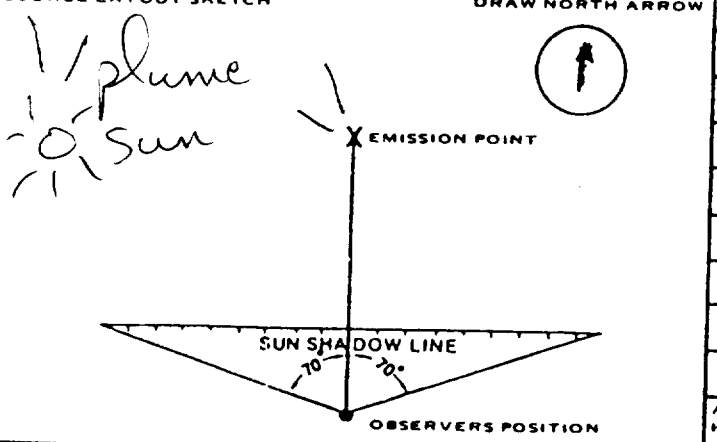
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Partly Cloudy

WIND SPEED: 5-10 mph | WIND DIRECTION: Variable

AMBIENT TEMPERATURE: 83 F | RELATIVE HUMIDITY: 75%

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 9-16-87 | START TIME: 15:41 | STOP TIME: 15:45 / 15:40

MIN	0	15	30	45	MIN	0	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	0	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	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	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	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

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

COMMENTS: Run #4 - Void

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE: J. Cameron Mitchell | DATE: 9-16-87

ORGANIZATION: REC

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SIGNATURE | TITLE | DATE

CERTIFIED BY: St of TN | DATE: 6-87

VERIFIED BY | DATE

REC#14

SOURCE NAME: Masters & JACKSON

ADDRESS:

CITY | STATE | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT | OPERATING MODE

CONTROL EQUIPMENT | OPERATING MODE

DESCRIBE EMISSION POINT

HEIGHT ABOVE GROUND LEVEL | HEIGHT RELATIVE TO OBSERVER

DISTANCE FROM OBSERVER | DIRECTION FROM OBSERVER

DESCRIBE EMISSIONS

EMISSION COLOR | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT NO ☐ YES ☐ | IS WATER DROPLET PLUME ATTACHED ☐ DETACHED ☐

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED

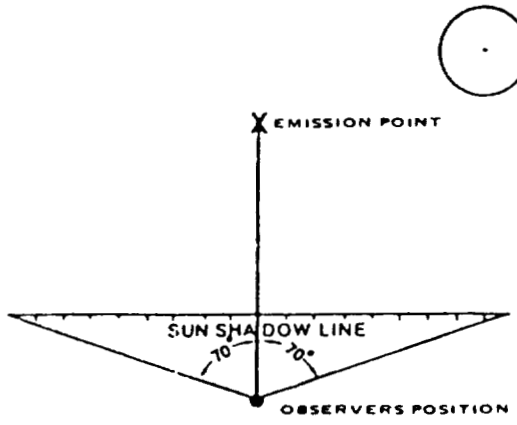
DESCRIBE BACKGROUND

BACKGROUND COLOR | SKY CONDITIONS

WIND SPEED | WIND DIRECTION

AMBIENT TEMPERATURE | RELATIVE HUMIDITY

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 9-17-87

START TIME: 8:03

STOP TIME: 45 (1HR) 8:02 9:02 45

MIN \ SEC	0	15	30	45	MIN \ SEC	0	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	0	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	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	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
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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	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

AVERAGE OPACITY FOR HIGHEST PERIOD: 0

NUMBER OF READINGS ABOVE 0 % WERE

RANGE OF OPACITY READINGS: 0 MINIMUM 0 MAXIMUM

COMMENTS: Run #5 - Void

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE | DATE

ORGANIZATION

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SIGNATURE

TITLE | DATE

CERTIFIED BY | DATE

VERIFIED BY | DATE

EPA FORM

REG#14

SOURCE NAME: Master-Jackson

ADDRESS:

CITY: Butler | STATE: Mo | ZIP:

PHONE: | SOURCE ID NUMBER: -

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Scrubber | OPERATING MODE:

DESCRIBE EMISSION POINT: Round Exit from scrubber

HEIGHT ABOVE GROUND LEVEL: 30 ft | HEIGHT RELATIVE TO OBSERVER: 27ft

DISTANCE FROM OBSERVER: 55ft | DIRECTION FROM OBSERVER: W.

DESCRIBE EMISSIONS: Dust from Drying Aggregate

EMISSION COLOR: Grey | PLUME TYPE: CONTINUOUS X FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES X | IS WATER DROPLET PLUME: ATTACHED X DETACHED ☐

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: ~~AM 100~~ 30 ft from stack exit

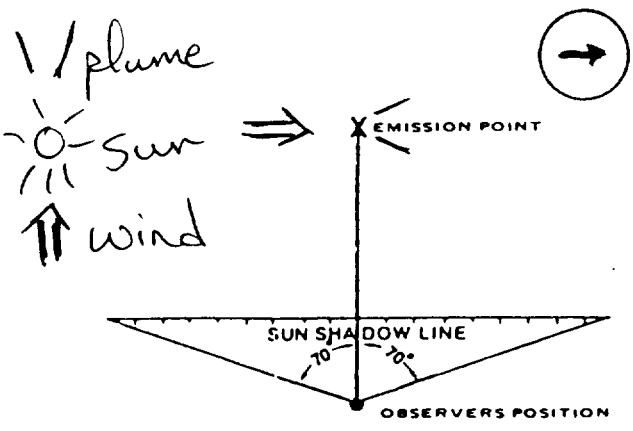
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Clear

WIND SPEED: 0-2 mph | WIND DIRECTION: N

AMBIENT TEMPERATURE: 69°F | RELATIVE HUMIDITY: 60%

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 9-19-87 | START TIME: 8:07 | STOP TIME: 9:06

MIN \ SEC	0	15	30	45	MIN \ SEC	0	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	0	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	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	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	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

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

COMMENTS: Run #6

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE: J. Cameron Mitchell | DATE: 9-19-87

ORGANIZATION: REC

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | DATE

TITLE | DATE

CERTIFIED BY: St. of TN | DATE: 6-87

VERIFIED BY | DATE

REC#14

SOURCE NAME: Master-Jackson

ADDRESS:

CITY: Butler | STATE: Mo | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Scrubber | OPERATING MODE:

DESCRIBE EMISSION POINT: Round exit from scrubber

HEIGHT ABOVE GROUND LEVEL: 30 ft | HEIGHT RELATIVE TO OBSERVER: 27 ft

DISTANCE FROM OBSERVER: 55 ft | DIRECTION FROM OBSERVER: W

DESCRIBE EMISSIONS: Dust from Drying Aggregate

EMISSION COLOR: Grey | PLUME TYPE: CONTINUOUS [X] INTERMITTENT [ ] FUGITIVE [ ]

WATER DROPLETS PRESENT: NO [ ] YES [X] | IS WATER DROPLET PLUME: ATTACHED [X] DETACHED [ ]

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: 100 ft from stack exit

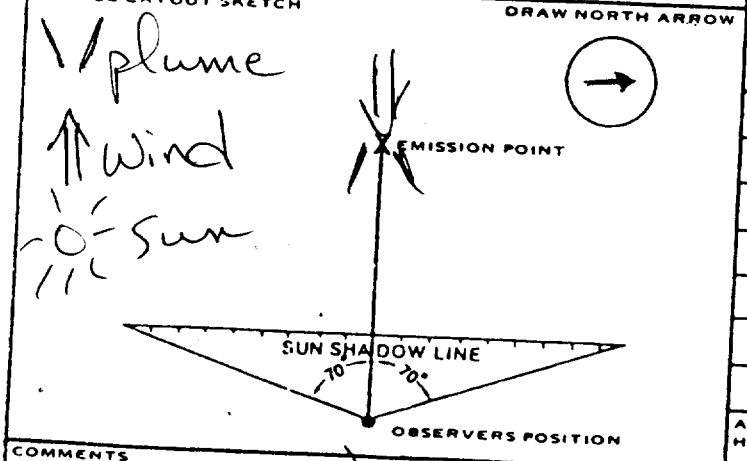
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Partly Cloudy

WIND SPEED: 0-2 mph | WIND DIRECTION: W

AMBIENT TEMPERATURE: 87°F | RELATIVE HUMIDITY: 60%

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



COMMENTS: Run #7

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | TITLE | DATE

OBSERVATION DATE: 9-19-87 | START TIME: 10:20 | STOP TIME: 11:20

MIN \ SEC	0	15	30	45	MIN \ SEC	0	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	0	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	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	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	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

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: 0% MINIMUM | 0% MAXIMUM

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE: J. Cameron Mitchell | DATE: 9-19-87

ORGANIZATION: REC

CERTIFIED BY: St of TN | DATE: 6-87

VERIFIED BY: | DATE:

REC#14

SOURCE NAME: Master-Jackson

ADDRESS:

CITY: Butler | STATE: Mo | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Asphalt Plant | OPERATING MODE:

CONTROL EQUIPMENT: Scrubber | OPERATING MODE:

DESCRIBE EMISSION POINT: Round Exit from scrubber

HEIGHT ABOVE GROUND LEVEL: 30ft | HEIGHT RELATIVE TO OBSERVER: 27ft

DISTANCE FROM OBSERVER: 55ft | DIRECTION FROM OBSERVER: W

DESCRIBE EMISSIONS: Dust from Drying Aggregate

EMISSION COLOR: Grey | PLUME TYPE: CONTINUOUS X FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES X | IS WATER DROPLET PLUME: ATTACHED X DETACHED ☐

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: 30 ft from Stack exit

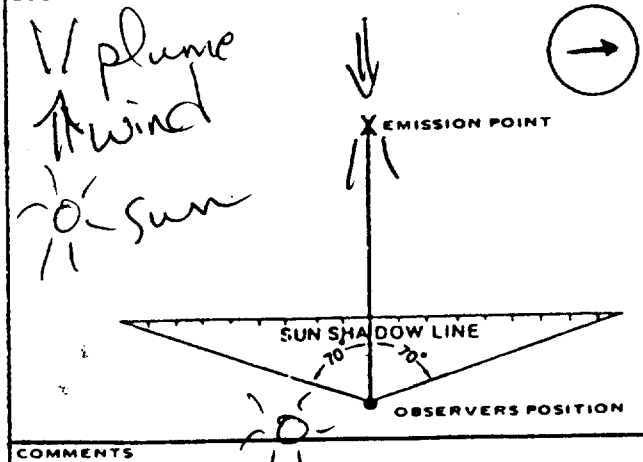
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Partly Cloudy

WIND SPEED: 2-4mph | WIND DIRECTION: W

AMBIENT TEMPERATURE: 85°F | RELATIVE HUMIDITY: 60%

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



COMMENTS: Run #3

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE: | DATE:

TITLE:

OBSERVATION DATE: 9-19-87 | START TIME: 11:59 | STOP TIME:

MIN \ SEC	0	15	30	45	MIN \ SEC	0	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	0	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	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	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	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

AVERAGE OPACITY FOR HIGHEST PERIOD: 0

NUMBER OF READINGS ABOVE: 0 % WERE

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S NAME (PRINT): J. Cameron Mitchell

OBSERVER'S SIGNATURE: J. Cameron Mitchell | DATE: 9-19-87

ORGANIZATION: REC

CERTIFIED BY: St of TN. | DATE: 6-87

VERIFIED BY: | DATE:

EPA FORM

REC#14

TENNESSEE AIR POLLUTION CONTROL SMOKE SCHOOL TRAINING FORM

NAME C. Mitchell RUN# 2 SUNGLASSES No

COMPANY PEC COURSE LOCATION STIM

DATE 6-3 SKY PC WIND L4V DISTANCE & DIRECTION TO STACK 30' NE

READING #	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	ERROR
1	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	1
2	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	2
3	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	3
4	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	4
5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	5
6	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	6
7	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	7
8	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	8
9	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	9
10	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	10
11	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	11
12	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	12
13	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	13
14	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	14
15	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	15
16	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	16
17	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	17
18	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	18
19	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	19
20	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	20
21	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	21
22	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	22
23	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	23
24	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	24
25	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	25

QUALIFIED

DEVIATION 4.6

READING #	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	ERROR
26	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	26
27	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	27
28	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	28
29	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	29
30	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	30
31	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	31
32	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	32
33	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	33
34	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	34
35	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	35
36	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	36
37	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	37
38	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	38
39	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	39
40	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	40
41	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	41
42	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	42
43	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	43
44	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	44
45	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	45
46	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	46
47	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	47
48	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	48
49	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	49
50	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	50

DEVIATION 4.6

I hereby certify that the above readings are my own. _____

PH-0458
APC 8/81