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

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

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Division of Energy
Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Divisionof Parks, Recreation, and Historic Preservation

MEMORANDUM

DATE: June 18, 1991

TO: Jackson County file: City Wide Asphalt, Sugar Creek, MO

FROM: Peter Yronwode / Doug Elley

SUBJECT: Asphalt plant stack test, April 16, 1991

Following several inspections and notices of violation, City Wide Asphalt received permit # 0390-006 to operate a dryer-drum asphalt plant near Sugar Creek Missouri. On April 16, 1991 a particulate and SO_2, SO_3 emission test was run on the plant by RAMCON.

During the test the plant was run at an average production rate of 305 tons per hour and pressure drop averaged 4.7 inches of water across the north baghouse and 4 inches of water across the south. The three test runs met isokinetic sampling criteria. Observed opacity was below the NSPS level of 20%. Compliance at the time of the test with particulate emission limitations in the permit are summarized below:

av concentration	NSPS	compliance	av emisssion rate	process wt rule	compliance
0.0314 gr/DSCF	0.04 gr	yes	10.6 lb/hr	69 lb/hr	yes

The screen model used to calculate permitted SO_2 emissions was run with the observed test data and generated the following results:

SO_2 emissions	max 1 hour concentration	max 1 hour concentration	allowable max 1 hr conc
av for 3 runs 163.4 lb/hr	387.6 mg/m_3	0.148ppm	0.25ppm
av runs 2 & 3 230.9 lb/hr	549.9 mg/m_3	0.21ppm	0.25ppm

Using the worst case data the facility was in compliance with 10CSR 10-2.160 at the time of the test. The permit limit of 3.4% coal sulfur content was exceeded by the coal burned during the test. (3.88% as received, 4.47% dry basis). Despite this exceedance of permitted coal sulfur levels, and obvious failure of the aggregate to control sulfur emissions at the assumed 50% efficiency, the facility met permitted emission limits when operating at the observed rate at the time of the test.

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RAMCON

ENVIRONMENTAL CORPORATION

SOURCE SAMPLING
for
PARTICULATE EMISSIONS
CITY WIDE ASPHALT COMPANY
SUGAR CREEK, MISSOURI
April 16, 1991

Harold Moody
City Wide Asphalt Company

G. Sumner Buck, III
President

Bobby Sanders
Team Leader

RAMCON BUILDING, 223 SCOTT STREET, MEMPHIS, TENNESSEE 38112
TELEPHONE 800/458-4567 IN TENNESSEE 901/458-7000 FAX 901-458-3868

RAMCON

ENVIRONMENTAL CORPORATION

April 25, 1991

Mr. Harold Moody
City Wide Asphalt Company
1701 North M291 Highway
Sugar Creek, MO 64056

Re: Particulate Emissions Test: April 16, 1991

Dear Mr. Moody:

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 do pass both EPA 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. Doug Elley
Missouri Dept. of Natural Resources
Air Pollution Control
P.O. Box 176
Jefferson City, MO 65102

You will need to keep one copy of the report at the plant. We certainly have enjoyed working with you. Please let us know if we can be of further assistance.

Sincerely,

G. Sumner Buck, III
President

GSBIII:kh

Enclosures

RAMCON BUILDING, 223 SCOTT STREET, MEMPHIS, TENNESSEE 38112
TELEPHONE 800/458-4567 IN TENNESSEE 901/458-7000 FAX 901-458-3868

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I. INTRODUCTION

On April 16, 1991 personnel from RAMCON Environmental Corporation conducted a source emissions test for particulate emissions compliance at City Wide Asphalt Company's H & B drum mix asphalt plant located in Sugar Creek, Missouri. RAMCON personnel conducting the test were Bobby Sanders, Team Leader, and Bill Turner. Heather Baldick was responsible for the 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. Sanders and Ms. Baldick.

The purpose of the test was to determine if the rate of particulate emissions from this plant's baghouse is below or equal to the allowable N.S.P.S. emissions limit set by US EPA and the State of Missouri. Sulfur dioxide emissions were also required because this facility used coal and gas as fuel.

II. TEST RESULTS

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

Mr. Dough Elley of Missouri's Department of Natural Resources observed the testing conducted by RAMCON Environmental. Bill Turner of RAMCON Environmental conducted the opacity test which was 0% on all three runs and therefore meets N.S.P.S. requirements.

TABLE I

SUMMARY OF TEST RESULTS

April 16, 1991

Test Run	Time	Grain Loading gr/dscf	Actual Emissions Lbs/Hr	SO2 Emissions Lbs/Hr	SO3 Emissions Lbs/Hr
1	08:39 to 09:45	0.0698	23.7	28.5	0.32
2	12:18 to 13:24	0.0165	5.4	327.4 } avr	0.20
3	15:20 to 16:25	0.0080	2.6	134.4 } 230.9	0.18
	Average:	0.0314	10.6	163.4	0.23
NSPS				429 ppm/SO	1.6 mg/m³

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

III. TEST PROCEDURES

A. Method Used: Method 8 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 run one was found to be out of compliance. Apparently, the plant operator installed fresh sample bags in the fabric filter collector prior to the test, but dod not clean the particulate from the top of the tubesheet or the fan before the test. This particulate matter was entrained during the first test run and caused a failure. By the time the second run started, all of the particulate matter was gone and the next two test runs easily passed.

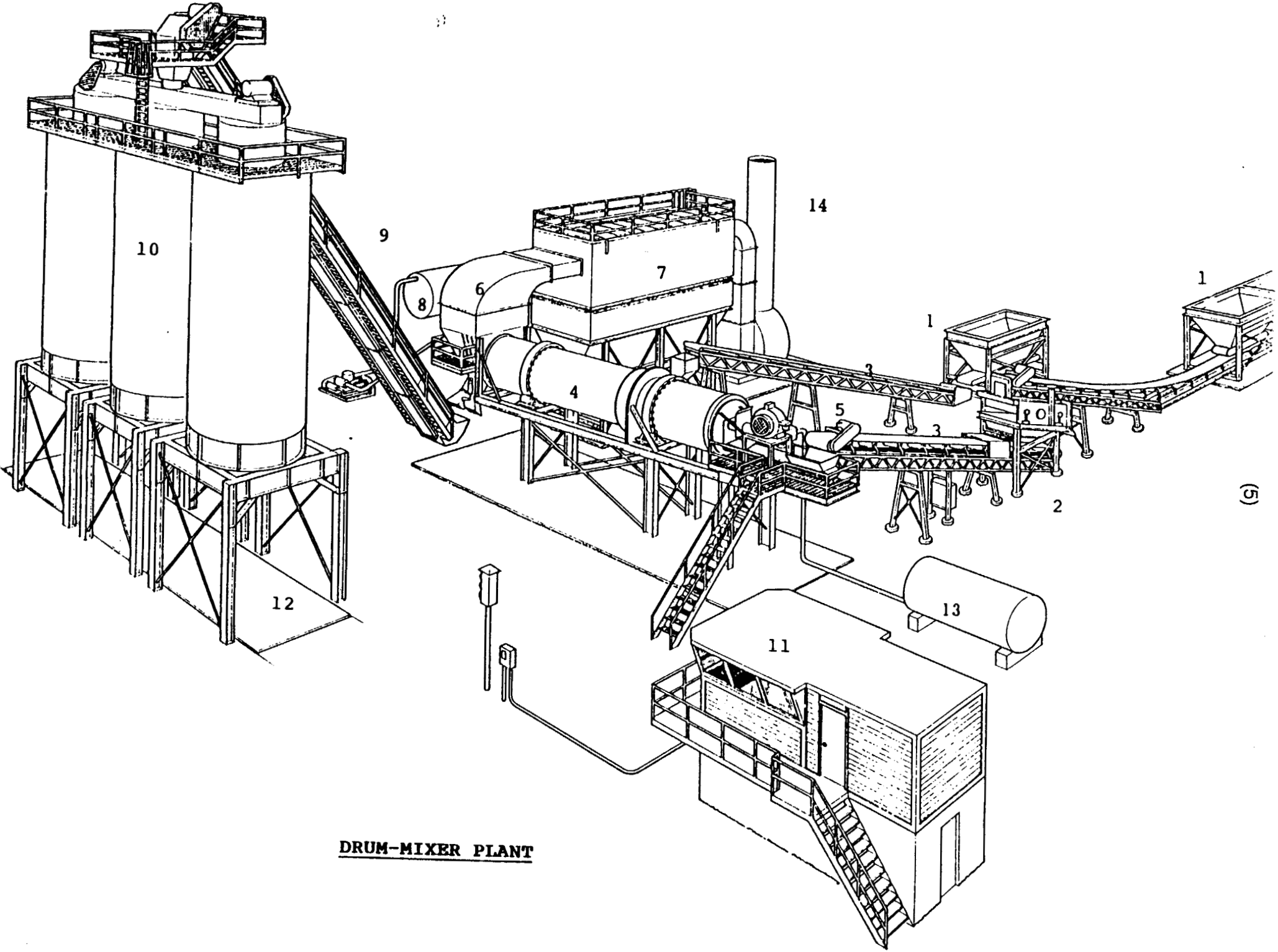
IV. THE SOURCE

IV. THE SOURCE

City Wide Asphalt Company employs an H & B 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 then compacted with a heavy roller to produce the final product.

The following to 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 a conveyor. The hot asphalt mix is then discharged from the storage silo through a slide gate into waiting dump trucks which transports 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 a mixture of coal and natural gas to heat air to dry the aggregate, and the motion of the rotating drum to blend the aggregate. The air is drawn into the system via an exhaust fan. After passing through the gas burner and the mixing drum, the air passes through a baghouse. The baghouse is manufactured by H & B. The exhaust gasses are drawn through the baghouse and discharged to the atmosphere through the stack. The design pressure drop across the tube sheet is 2-6 inches of water. The particulate matter, which is removed by the baghouse, is reinjected into the drum mixer.



DRUM-MIXER PLANT

1. Aggregate bins: Virgin aggregate is fed individually into each of four bins by type. It is metered onto a conveyor belt running under the bins to a shaker screen. The proportion to 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 flame which drives off the moisture. Further mixing is also accomplished in an outer shell of this drum. Hot liquid asphalt is injected in the outer shell of the drum where it is mixed with the aggregate.

5. Burner: The fuel fired burner is used to provide the flame which drys the aggregate.

6. Knock off baffling: A baffling plate is inserted in the "dirty" side plenum as a knock out for heavy particles in the air stream. These particles fall to the bottom of the baghouse.

7. Baghouse: The hot gases are pulled through the bags into the clean air plenum. The solid particulate matter is trapped on the dust coat buildup on the bags. A bag cleaning cycle consisting of jet burst of air from the inside (or clean air side) of the bags sends a large bubble of air down the inside of the bags shaking loose buildup on the bag surface. This particulate matter is collected at the bottom of the baghouse and reinjected into the drum mixer where it is used as part of the finished product.

8. 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.

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

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

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

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

13. Fuel storage.

14. Stack

Agg Moisture 3.8

Observed by Doug Eddy MDNR 4-16-91

DATA ON FACILITY BEING STACK TESTED

COMPANY NAME CITY WIDE COMPANY REP. DREW STEAMAN PHONE ( ) 257-1403
LOCATION OF FACILITY SUGAR CREEK ORIGINAL START-UP DATE 7:30 DESIGNED CAPACITY 400+
OEM MODEL NO. TYPE AC TYPE

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use #Fuel Oil Nat. Gas ✓ Propane Coal ✓ other gas/coal	3 Burner Setting	4 Blower Pressure	5 Production Rate ✓ Mix Aggregate TPH	5 Production Rate RAP TPH	6 Asphalt Cement %	7 Mix Temp. °F	8 Exhaust Gas Temp. °F	9 Venturi Scrubber 2 ✓ Baghouse (North/South) Pressure Drop in w.g. North/South	9 Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
7:54	100% coal	40%		234	—	5.1	315	300	4/3		60		600 RPM
8:15	100/0	48		290		5.1	310	[illegible]	4/3.4		[illegible]		[illegible]
8:30	100/0	68		300		↓	300	[illegible]	4.2/3.4		66		600
9:00	50/50	70		320			315	[illegible]	5/4		68		650
9:30	40/60	70		320	305		315	305	5/4		69		650
9:50	10/90 MAX	90		320		↓	300	294	5/4		70		650
12:15	50/50	70		250		4.7	310	300	5/4		75		650
12:30	90/90	90		310	305	4.7	315	295	5/4.2		75		680
12:46	10/90	80		330		4.7	310	305	5/4.3		75		680
1:05	10/90	80		330		4.7	320	310	5/4.2		76		680
→													
3:00	40/60	50		250		4.7	310	300	5/4.2		78		680
3:15	20/80	60		280		4.7	305	295	5/4.2		78		680
3:30	10/90	65		300	294	4.7	305	295	5/4.2		78		680
3:50	10/90	80		320		4.7	305	290	5/4.2		78		680
4:15	10/90	75		320		4.7	302	290	5/4.2		78		680

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.

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 desiccator to dry for at least 24 hours. Clean plastic petri dishes, also numbered, top and bottom, are placed in the desiccator with the filters. After desiccation, 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 books. 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 at 175°C for two hours. The open jars are removed and placed in a desiccator until cool for two hours and then tightly sealed. The jars are then numbered and weighed on the triple beam balance to the closest tenth of a gram. 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 petri dishes. In the lab, the dishes are opened and placed into a desiccator for at least 24 hours. Then the filters are weighed continuously every six hours until a constant weight is achieved. All data is recorded on the laboratory forms that will be bound in the test report.

B. SILICA GEL: The silica gel used in the stack test is returned to the appropriate mason jar and sealed for transport to the laboratory where it is reweighed to a constant weight on a triple beam balance to the nearest tenth of a gram.

C. PROBE RINSINGS: In all tests where a probe washout analysis is necessary, this is accomplished in accordance with procedures specified in "EPA Reference Method 5". These samples are returned to the lab in sealed mason jars for analysis. The front half of the filter holder is washed in accordance with the same procedures and included with the probe wash. Reagent or ACS grade acetone is used as the solvent. The backhalf of the filter holder is washed with deionized water into the impinger catch for appropriate analysis.

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

E. ACETONE: A blank analysis of acetone is conducted from the one gallon glass container used in the field preparation. This acetone was used in the field for rinsing the probe, nozzle, and top half of the filter holder. A blank analysis is performed prior to testing on all new containers of acetone received from the manufacturer to insure that the quality of the acetone used will be 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. 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 the "zero" position. The beam arrest lever (on the lower left hand side toward the rear of the balance) is then slowly pressed downward to the full release position. The lighted vernier scale on the front of the cabinet should align with 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 the 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 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.

LABORATORY PROCEDURES FOR SO_2

Pour the catch from impingers two and three into a 1000 ml volumetric flask. Bring the solution in the flask up to the required 1000 ml volume by mixing it with deionized distilled water, then mix thoroughly. Pipette a 10 ml aliquot of sample into a 250 ml Erlenmeyer flask. Add 40 ml of isopropanol, 2 to 4 drops of thorin indicator and titrate to a pink endpoint using 0.0100 N barium perchlorate. Repeat the titration with a second aliquot of sample and average the titration values. Replicate titrations must agree within 1 percent or 0.2 ml, whichever is greater.

Prepare the blanks by adding 2 to 4 drops of thorin indicator to 100 ml of 80 percent isopropanol. Titrate the blanks in the same manner as the samples.

LABORATORY PROCEDURES FOR H_2SO_4

Pour the contents of the first impinger into a 250 ml graduated cylinder and bring the volume up to 250 ml with 80% isopropanol. Transfer the contents to a storage container and add the filter. Shake the container to coat the isopropanol solution on the filter. If the filter tears, allow the fragments to settle before taking a sample. Pipette a 25 ml aliquot (100 ml aliquot is too large for these particular samples because of the strength of the solution) of this solution into a 250 ml Erlenmeyer flask, add 2 to 4 drops of thorin indicator and titrate to a pink endpoint using 0.0100 N barium perchlorate. Repeat the titration with a second aliquot and average the titration values.

Form REC#8

(13)

SAMPLE ANALYTICAL DATA FORM

Plant Location City Wide

Relative humidity in lab 50 %

Sample Location hot mix asphalt plant

Density of Acetone (pa) .7843 mg/ml

Blank volume (V_a) 490 ml

Date/Time wt. blank 4-22-91 12:15 Gross wt. 157.8297 mg

Date/Time wt. blank 4-24-91 12:20 Gross wt. 157.8296 mg

Ave. Gross wt. 157.8297 mg

Tare wt. 157.8290 mg

Weight of blank (m_{ab}) 0.0007 mg

Acetone blank residue concentration (C_a) $(C_a) = (M_{ab}) / (V_a)(p_a) = (1.5 \times 10^{-6}$ mg/g)

Weight of residue in acetone wash: $W_a = C_a V_{aw} p_a = (1.5 \times 10^{-6})(490)(.7843) = (.0007)$

		Run # 1	Run # 2	Run # 3
Acetone rinse volume (V_{aw})	ml	490	490	490
Date/Time of wt 4-22-91 12:15 Gross wt	g	173.0389	170.7901	173.9789
Date/Time of wt 4-24-91 12:20 Gross wt	g	173.0388	170.7901	173.9785
Average Gross wt	g	173.0389	170.7901	173.9787
Tare wt	g	172.8418	170.7496	173.9593
Less acetone blank wt (W_a)	g	0.0007	0.0007	0.0007
Wt of particulate in acetone rinse (m_a)	g	0.1964	0.0398	0.0187

Filter Numbers	#	HB4685	RJ4624	HB4684
Date/Time of wt 4-22-91 12:20 Gross wt	g	0.5562	0.5621	0.5529
Date/Time of wt 4-24-91 12:25 Gross wt	g	0.5564	0.5621	0.5531
Average Gross wt	g	0.5563	0.5621	0.5530
Tare wt	g	0.5530	0.5557	0.5493

Weight of particulate on filters(s) (m_f)	g	0.0033	0.0064	0.0037
Weight of particulate in acetone rinse	g	0.1964	0.0398	0.0187
Total weight of particulate (m_n)	g	0.1997	0.0462	0.0224

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

Signature of analyst H Baldwin Signature of reviewer

SO_2 ANALYSIS
(Method 8)

Plant City Wide Date 4-19-91

Audit Samples

Audit Number								
	A	B	A	B	A	B	A	B
V_{soln} (ml)								
V_a (ml)								
N (N)								
V_t (ml)								
$V_{m(std)}$ (dscm)								
C_{SO_2} (mg/dscm)								

K_2 = 32.03 mg/meq

SO_2 Analysis for Impinger 2 & 3 Combined.

Run Number	1		2		3		Blank	
	A	B	A	B	A	B	A	B
V_{soln} (ml)	1000	1000	1000	1000	1000	1000		
V_a (ml)	10.0	10.0	5.0	5.0	5.0	5.0	100	100
N (N)	0.0106	0.0106	0.0106	0.0106	0.0106	0.0106	0.0106	0.0106
V_t (ml)	7.15	7.05	41.30	41.30	17.10	17.00	0.05	0.05
$V_{m(std)}$ (dscf)	44.04	44.04						
C_{SO_2} (lb/dscf)								

K_3 = 7.061×10^{-5} lb/meq

Analysis performed by: H Baldick Approved by: SB

SO_3 ~~SO_2~~ ANALYSIS
(Method 8)

Plant City Wide Date 4-19-91

Audit Samples

Audit Number								
	A	B	A	B	A	B	A	B
V_{soln} (ml)								
V_a (ml)								
N (N)								
V_t (ml)								
$V_{m(std)}$ (dscm)								
C_{SO_2} (mg/dscm)								

K_2 = 32.03 mg/meq

H_2SO_4
~~SO_2~~ Analysis for Impinger ~~2 & 3 Combined:~~ 1

Run Number	1		2		3		Blank	
	A	B	A	B	A	B	A	B
V_{soln} (ml)	400	400	400	400	250	250		
V_a (ml)	25.0	25.0	25.0	25.0	25.0	25.0	100	100
N (N)	0.0106	0.0106	0.0106	0.0106	0.0106	0.0106	0.0106	0.0106
V_t (ml)	3.20	3.40	2.05	2.10	3.05	3.05	0.05	0.05
$V_{m(std)}$ (dscf)								
C_{SO_2} (lb/dscf)								

K_3 = 7.061×10^{-5} lb/meq

Analysis performed by: [illegible] Approved by: [illegible]

City Wide
Company Name

4-16-91
Date

REFERENCE METHOD 3: GAS ANALYSIS BY FYRITE

FUEL	F_o FACTORS
WOOD	1.0540
BARK	1.0830
ANTHRACITE	1.0699
BITUMINOUS	1.1398
LIGNITE	1.0761
OIL	1.3465
GAS	1.7489
PROPANE	1.5095
BUTANE	1.4791

$O_2\% = 20.9 - [F_o \times CO_2\%]$

RUN #1: ____ = 20.9 - [____ x ____]

RUN #2: ____ = 20.9 - [____ x ____]

RUN #3 ____ = 20.9 - [____ x ____]

RUN 1:	$CO_2\%$	3	$CO_2\%$	3	$CO_2\%$	3	AVG.	3.0
	$O_2\%$	14.5	$O_2\%$	15	$O_2\%$	15	AVG.	14.8
	$N_2\%$		$N_2\%$		$N_2\%$		AVG.	82.2
RUN 2:	$CO_2\%$	3	$CO_2\%$	3	$CO_2\%$	3	AVG.	3.0
	$O_2\%$	15	$O_2\%$	14	$O_2\%$	15	AVG.	14.7
	$N_2\%$		$N_2\%$		$N_2\%$		AVG.	82.3
RUN 3:	$CO_2\%$	3	$CO_2\%$	3	$CO_2\%$	3	AVG.	3.0
	$O_2\%$	14	$O_2\%$	14	$O_2\%$	14	AVG.	14.0
	$N_2\%$		$N_2\%$		$N_2\%$		AVG.	83.0

VII. CALCULATIONS

CITY WIDE
SUGAR CREEK, MISSOURI

SUMMARY OF TEST DATA

		4-16-91 RUN #1	4-16-91 RUN #2	4-16-9 RUN #3
SAMPLING TRAIN DATA				
	start	08:39	12:18	15:20
	finish	09:45	13:24	16:25
1. Sampling time, minutes	θ	60.0	60.0	60.0
2. Sampling nozzle diameter, in.	D_n	.3000	.3000	.3000
3. Sampling nozzle cross-sect. area, ft^2	A_n	.000491	.000491	.000491
4. Isokinetic variation	I	104.2	106.0	106.1
5. Sample gas volume - meter cond., cf.	V_m	46.132	46.324	46.650
6. Average meter temperature, ^oR	T_m	545	560	562
7. Avg. oriface pressure drop, in. H_2O	dH	2.01	2.08	2.05
8. Total particulate collected, mg.	M_n	199.70	46.20	22.40
VELOCITY TRAVERSE DATA				
9. Stack area, ft^2	A	27.60	27.60	27.60
10. Absolute stack gas pressure, in. Hg.	P_s	29.98	29.98	29.98
11. Barometric pressure, in. Hg.	P_{bar}	29.98	29.98	29.98
12. Avg. absolute stack temperature, R^o	T_s	663	674	671
13. Average $-\sqrt{vel.\ head}$, (C_p= .86)	$-\sqrt{d\bar{P}}$	0.57	0.58	0.58
14. Average stack gas velocity, ft./sec.	V_s	38.14	39.49	39.43
STACK MOISTURE CONTENT				
15. Total water collected by train, ml.	V_{ic}	254.00	318.00	319.00
16. Moisture in stack gas, %	B_{ws}	21.40	25.82	25.88
EMISSIONS DATA				
17. Stack gas flow rate, dscf/hr.(000's)	Q_{sd}	2376	2284	2289
18. Stack gas flow rate, cfm	acfm	63160	65395	65296
19. Particulate concentration, gr/dscf	C_s	0.0698	0.0165	0.0080
20. Particulate concentration, lb/hr	E	23.70	5.39	2.62
21. Total SO_2 concentration, lb/dscf $x10^{-5}$	C'.	1.1969	14.3298	5.8685
22. Total SO_2 emissions, lbs/hr	ESO_2	28.45	327.39	134.36
ORSAT DATA				
23. Percent CO_2 by volume	CO_2	3.00	3.00	3.00
24. Percent O_2 by volume	O_2	14.80	14.70	14.00
25. Percent CO by volume	CO	.00	.00	.00
26. Percent N_2 by volume	N_2	82.20	82.30	83.00

Format: sumry4r

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

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 ^oR.

T_{std} = Standard absolute temperature (528^oR).

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

Y = Dry gas meter calibration factor.

13.6 = Inches water per inches Hg.

RUN 1:

$$V_{m(std)} = (17.64)(\ .980)(\ 46.132)\left[\frac{(29.98) + \frac{2.01}{13.6}}{545}\right] = 44.086 \text{ dscf}$$

RUN 2:

$$V_{m(std)} = (17.64)(\ .980)(\ 46.324)\left[\frac{(29.98) + \frac{2.08}{13.6}}{560}\right] = 43.091 \text{ dscf}$$

RUN 3:

$$V_{m(std)} = (17.64)(\ .980)(\ 46.650)\left[\frac{(29.98) + \frac{2.05}{13.6}}{562}\right] = 43.236 \text{ dscf}$$

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 1:

$$C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{199.70}{44.086} \right] = 0.0698 \text{ gr./dscf.}$$

Run 2:

$$C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{46.20}{43.091} \right] = 0.0165 \text{ gr./dscf.}$$

Run 3:

$$C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{22.40}{43.236} \right] = 0.0080 \text{ gr./dscf.}$$

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 1:

$$M_d = 0.44(\ \ 3.00\%) + 0.32(14.80\%) + 0.28(\ \ .00\% + 82.20\%) = 29.07 \ \frac{lb}{lb\text{-}mole}$$

Run 2:

$$M_d = 0.44(\ \ 3.00\%) + 0.32(14.70\%) + 0.28(\ \ .00\% + 82.30\%) = 29.07 \ \frac{lb}{lb\text{-}mole}$$

Run 3:

$$M_d = 0.44(\ \ 3.00\%) + 0.32(14.00\%) + 0.28(\ \ .00\% + 83.00\%) = 29.04 \ \frac{lb}{lb\text{-}mole}$$

Water Vapor Condensed

$$V_{wc_{std}} = \left[V_f - V_i \right] \left[\frac{p_w \; R \; T_{(std)}}{M_w \quad P_{(std)}} \right] = 0.04707 \left[V_f - V_i \right]$$

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

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), ml.

$V_f - V_i$ = Final volume of impinger contents less initial volume, ml.

$W_f - W_i$ = Final weight of silica gel less initial weight, g.

p_w = Density of water, 0.002201 lb/ml.

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

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

T_{std} = Absolute temperature at standard conditions, 528^oR.

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

Run 1:

$V_{wc(std)}$ = (0.04707) (242.0) = 11.4 cu.ft
$V_{wsg(std)}$ = (0.04715) (12.0) = 0.6 cu.ft

Run 2:

$V_{wc(std)}$ = (0.04707) (302.0) = 14.2 cu.ft
$V_{wsg(std)}$ = (0.04715) (16.0) = 0.8 cu.ft

Run 3:

$V_{wc(std)}$ = (0.04707) (305.0) = 14.4 cu.ft
$V_{wsg(std)}$ = (0.04715) (14.0) = 0.7 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 1:

$$B_{ws} = \frac{11.4 + 0.6}{11.4 + 0.6 + 44.086} \times 100 = 21.40\ \%$$

Run 2:

$$B_{ws} = \frac{14.2 + 0.8}{14.2 + 0.8 + 43.091} \times 100 = 25.82\ \%$$

Run 3:

$$B_{ws} = \frac{14.4 + 0.7}{14.4 + 0.7 + 43.236} \times 100 = 25.88\ \%$$

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 1:

M_s = 29.07 (1 - 21.40) + 18 (21.40) = 26.70 (lb./lb.-mole)

Run 2:

M_s = 29.07 (1 - 25.82) + 18 (25.82) = 26.21 (lb./lb.-mole)

Run 3:

M_s = 29.04 (1 - 25.88) + 18 (25.88) = 26.18 (lb./lb.-mole)

$$V_s = K_p\ C_p \left[\sqrt{dP} \right] \text{avg.} \sqrt{\frac{T_{s(avg.)}}{P_s\ M_s}}$$

Where:

V_s	=	Average velocity of gas stream in stack, ft./sec.
K_p	=	85.49 ft/sec $\left[(g/g\text{-mole})\text{-}(mm\ Hg)\ /\ (^oK)(\ mm\ H_2O \right]^{1/2}$
C_p	=	Pitot tube coefficient, (dimensionless).
dP	=	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, (^of).
T_s	=	Absolute stack temperature, (^oR). = 460 + t_s.
M_s	=	Molecular weight of stack gas, wet basis, (lb/lb-mole).

Run 1:

$$V = (85.49)\ (\ .86)\ (\ 0.57)\ \sqrt{\frac{663}{(29.98)(26.70)}} = 38.14 \text{ ft/sec.}$$

Run 2:

$$V = (85.49)\ (\ .86)\ (\ 0.58)\ \sqrt{\frac{674}{(29.98)(26.21)}} = 39.49 \text{ ft/sec.}$$

Run 3:

$$V = (85.49)\ (\ .86)\ (\ 0.58)\ \sqrt{\frac{671}{(29.98)(26.18)}} = 39.43 \text{ ft/sec.}$$

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, (^{o}f).

T_s = Absolute stack temperature, (^{o}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 1:

$$Q_{sd}=3600(1-\ .2140\ )(\ 38.14)(\ 27.60)\left[\frac{528}{663}\right]\left[\frac{29.98}{29.92}\right] = 2376869.0\ \frac{dscf}{hr}$$

Run 2:

$$Q_{sd}=3600(1-\ .2582\ )(\ 39.49)(\ 27.60)\left[\frac{528}{674}\right]\left[\frac{29.98}{29.92}\right] = 2284702.3\ \frac{dscf}{hr}$$

Run 3:

$$Q_{sd}=3600(1-\ .2588\ )(\ 39.43)(\ 27.60)\left[\frac{528}{671}\right]\left[\frac{29.98}{29.92}\right] = 2289576.8\ \frac{dscf}{hr}$$

Emissions Rate from Stack

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

Where:

E = Emissions rate, lb/hr.

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

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

Run 1:

$$E = \frac{(0.0698)(2376869.0)}{7000} = 23.70 \text{ lb. / hr.}$$

Run 2:

$$E = \frac{(0.0165)(2284702.3)}{7000} = 5.39 \text{ lb. / hr.}$$

Run 3:

$$E = \frac{(0.0080)(2289576.8)}{7000} = 2.62 \text{ lb. / hr.}$$

$$I = 100\ T_s \left[\frac{0.002669\ \frac{V_{ic}}{60} + \frac{(V_m / T_m)}{\theta}\ \frac{(P_{bar} + dH / 13.6)}{V_s\ P_s\ A_n}}{} \right]$$

Where:

I	=	Percent isokinetic sampling.
100	=	Conversion to percent.
T_s	=	Absolute average stack gas temperature, ^oR.
0.002669	=	Conversion factor, Hg - ft^3/ml - ^oR.
V_{ic}	=	Ttl vol of liquid collected in impingers and silica gel, ml.
T_m	=	Absolute average dry gas meter temperature, ^oR.
P_{bar}	=	Barometric pressure at sampling site, (in. Hg).
dH	=	Av 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 1:

$$I = (100)(\ 663\ ) \left[\frac{(0.002669)(\ 254\ ) + \frac{46.132}{545} \left[29.98 + \frac{2.01}{13.6} \right]}{60\ (\ 60.0\ )\ (\ 38.14\ )\ (\ 29.98\ )\ (\ .000491\ )} \right] = 104.2\%$$

Run 2:

$$I = (100)(\ 674\ ) \left[\frac{(0.002669)(\ 318\ ) + \frac{46.324}{560} \left[29.98 + \frac{2.08}{13.6} \right]}{60\ (\ 60.0\ )\ (\ 39.49\ )\ (\ 29.98\ )\ (\ .000491\ )} \right] = 106.0\%$$

Run 3:

$$I = (100)(\ 671\ ) \left[\frac{(0.002669)(\ 319\ ) + \frac{46.650}{562} \left[29.98 + \frac{2.05}{13.6} \right]}{60\ (\ 60.0\ )\ (\ 39.43\ )\ (\ 29.98\ )\ (\ .000491\ )} \right] = 106.1\%$$

Concentration of Sulfur Dioxide

$$CSO_2 = \frac{K_3 N\ (V_t - V_{tb})\ (V_{soln})}{V_a \quad V_{m(std)}}$$

Where:

CSO_2 = Sulfur dioxide concentration, lbs/dscf.

K_3 = 7.061×10^{-5}, lbs/meq.

N = Normality of barium perchlorate titrant, g. equivalent/liter.

V_t = Volume of barium perchlorate titrant used for the sample, ml.

V_{tb} = Volume of barium perchlorate titrant used for the blank, ml.

V_{soln} = Total volume of solution in which the sulfur dioxide sample is contained, ml.

$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter corrected to std. conditions, dscf.

V_a = Volume of sample aliquot titrated, ml.

Run # 1:

$$CSO_2 = 7.061 \times 10^{-5} \frac{[\ .01060(\ 7.10 - .05\ )(\frac{1000.0}{10.00})]}{(\ 44.086\ )} = .000011969 \text{ lbs/dscf}$$

Run # 2:

$$CSO_2 = 7.061 \times 10^{-5} \frac{[\ .01060(\ 41.30 - .05\ )(\frac{1000.0}{5.00})]}{(\ 43.091\ )} = .000143298 \text{ lbs/dscf}$$

Run # 3:

$$CSO_2 = 7.061 \times 10^{-5} \frac{[\ .01060(\ 17.00 - .05\ )(\frac{1000.0}{5.00})]}{(\ 43.236\ )} = .000058685 \text{ lbs/dscf}$$

Sulfur Dioxide Emissions

$$E = CSO_2 \times Q_{sd}$$

Where: E = Emissions of sulfur dioxide, lbs/hr.

Q_{sd} = Stack gas flow rate, dscf/hr.

CSO_2 = Sulfur dioxide concentration, lbs/dscf.

Run # 1:

E = (.000011969 lbs/dscf)(2376869.0 dscf/hr) = 28.45 lbs/hr

Run # 2:

E = (.000143298 lbs/dscf)(2284702.3 dscf/hr) = 327.39 lbs/hr

Run # 3:

E = (.000058685 lbs/dscf)(2289576.8 dscf/hr) = 134.36 lbs/hr

CITY WIDE
SUGAR CREEK, MISSOURI
4-16-91

Emissions of SO_2 PPM (Parts Per Million)

$$E = CSO_2 \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_2}{64g\ SO_2} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1{,}000{,}000$$

Where; CSO_2 = Concentration of SO_2 in lbs/dscf.

453.593 = Conversion to grams.

64/MOL SO_2 = Molar conversion of SO_2.

22.4 l/MOL = Volumetric molar conversion 273^oK.

$293^oK/273^oK$ = Temperature correction to std. conditions.

28.317 l = Conversion of liters to cubic feet.

1,000,000 = Conversion to parts per million.

Run # 1:

$$E = .000011969 \frac{lbs}{dscf} \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_2}{64g\ SO_2} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1{,}000{,}000 = 72.02ppm$$

Run # 2:

$$E = .000143298 \frac{lbs}{dscf} \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_2}{64g\ SO_2} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1{,}000{,}000 = 862.25ppm$$

Run # 3:

$$E = .000058685 \frac{lbs}{dscf} \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_2}{64g\ SO_2} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1{,}000{,}000 = 353.12ppm$$

Concentration of Sulfur Acid Mist and Sulfur Trioxide as H_2SO_4

$$CH_2SO_4 = \frac{K_2N\,(V_t - V_{tb})\,(V_{soln})}{V_a \; V_{m(std)}}$$

Where:

CH_2SO_4 = H_2SO_4 concentration, lbs/dscf.

K_2 = 1.081×10^{-4}, lbs/meq.

N = Normality of barium perchlorate titrant, g. equivalent/liter.

V_t = Volume of barium perchlorate titrant used for the sample, ml.

V_{tb} = Volume of barium perchlorate titrant used for the blank, ml.

V_{soln} = Total volume of solution in which the sulfur trioxide sample is contained, ml.

$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter corrected to std. conditions, dscf.

V_a = Volume of sample aliquot titrated, ml.

Run # 1:

$$CH_2SO_4 = 1.081 \times 10^{-4} \left[\frac{.01060(3.30 - .05)\left(\frac{400.0}{25.0}\right)}{(44.086)} \right] = .000000135 \text{ lbs/dscf}$$

Run # 2:

$$CH_2SO_4 = 1.081 \times 10^{-4} \left[\frac{.01060(2.08 - .05)\left(\frac{400.0}{25.0}\right)}{(43.091)} \right] = .000000086 \text{ lbs/dscf}$$

Run # 3:

$$CH_2SO_4 = 1.081 \times 10^{-4} \left[\frac{.01060(3.05 - .05)\left(\frac{250.0}{25.0}\right)}{(43.236)} \right] = .000000079 \text{ lbs/dscf}$$

Emissions of Sulfuric Acid Mist and Sulfur Trioxide as H_2SO_4

$$E = CH_2SO_4 \times Q_{sd}$$

Where:

E = Emissions of H_2SO_4, lbs/hr.

Q_{sd} = Stack gas flow rate, dscf/hr.

CH_2SO_4 = H_2SO_4 concentration, lbs/dscf.

Run # 1:

E = (.000000135 lbs/dscf)(2376869.0 dscf/hr) = 0.32 lbs/hr

Run # 2:

E = (.000000086 lbs/dscf)(2284702.3 dscf/hr) = 0.20 lbs/hr

Run # 3:

E = (.000000079 lbs/dscf)(2289576.8 dscf/hr) = 0.18 lbs/hr

Emissions of Sulfuric Acid Mist & Sulfur Trioxide as H_2SO_4 PPM (Parts Per Million)

$$E = CH_2SO_4 \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_4}{98g\ SO_4} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1,000,000$$

Where; CH_2SO_4 = Concentration of H_2SO_4 in lbs/dscf.

453.593 = Conversion to grams.

98/MOL H_2SO_4 = Molar conversion of H_2SO_4.

22.4 l/MOL = Volumetric molar conversion 273^oK.

$293^oK/273^oK$ = Temperature correction to std. conditions.

28.317 l = Conversion of liters to cubic feet.

1,000,000 = Conversion to parts per million.

Run # 1:

$$E = .000000135 \frac{lbs}{dscf} \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_4}{98g\ SO_4} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1,000,000 = 0.53\ ppm$$

Run # 2:

$$E = .000000086 \frac{lbs}{dscf} \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_4}{98g\ SO_4} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1,000,000 = 0.34\ ppm$$

Run # 3:

$$E = .000000079 \frac{lbs}{dscf} \left| \frac{453.593g}{1\ lb} \right| \frac{MOL\ SO_4}{98g\ SO_4} \left| \frac{22.4\ l}{MOL} \right| \frac{293^oK}{273^oK} \left| \frac{ft^3}{28.317\ l} \right| 1,000,000 = 0.31\ ppm$$

VIII. FIELD DATA

RAMCON ENVIRONMENTAL CORPORATION

Plant City WIDE

Location

Operator

Date 4-16-91

Run No. 1

Sample Box No. 1

Meter Box No. 004

Meter H @ 1.74

C Factor .979

Pitot Tube Coefficient Cp .86

6'

Ambient Temperature 68

Barometric Pressure 29.98

Assumed Moisture, % 25

Probe Length, m(ft) 6'

Nozzle Identification No. C2204906

Avg. Calibrated Nozzle Dia., (in.) ~~.309/.309/.309~~ .30

Probe Heater Setting 4

Leak Rate, m^3/min. (cfm) .003 @ 4"

Probe Liner Material 316 SS

Static Pressure, mm Hg (in.Hg) .01+

Filter No. HB-4685

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	542	514
INITIAL	300	502
DIFFERENCE	242	12

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 Inlet	Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
1	~~8:39~~ 8:41	3	165	.35	21	~~821:30~~ 822:85	62	62	235	38
2	8:43	3	178	.40	2.4	824:8	74	66	240	38
3	8:45	4	200	.38	2.3	826:31	80	66	240	38
4	8:47	4	200	.38	2.3	828:16	86	68	240	38
5	8:49	4	200	.40	2.4	829:37	88	68	240	38
1	~~8:50:10~~ 8:52	4	190	.40	2.4	831	88	68	240	38
2	8:54:10	4	205	.3	1.8	832:60	90	70	240	38
3	8:56:10	4	205	.3	1.8	834	90	70	240	38
4	8:58:10	4	205	.3	1.8	835:32	92	70	250	42
5	9:00:10	4	205	.4	2.4	837:41	94	70	250	42

(34)

CO_2 3 3 O_2 14 14 1

Observed by: Doug Talley 4-16-91

Form #REC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 4-16-91 LOCATION ma 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 Vm ($ft.^3$)	GAS SAMPLE TEMP. (°F) in	GAS SAMPLE TEMP. (°F) out	SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
1	~~9:01:40~~ 9:03:40	3	205	.32	2.0	838.71	92	72	255	50
2	9:05:40	3	208	.32	2.0	840.55	94	72	255	50
3	9:07:40	3	205	.3	1.8	842.36	98	74	255	50
4	9:09:40	3	202	.28	1.7	843.18	100	76	255	50
5	9:11:40	3	202	.28	1.7	844.60	100	76	255	50
1	~~9:15~~ 9:17	3	210	.3	1.8	846	96	78	255	50
2	9:19	3	210	.3	1.8	847.42	98	78	255	50
3	9:21	3	210	.28	1.7	848.86	100	78	255	50
4	9:23	3	210	.28	1.7	850.32	102	78	255	50
5	9:25	3	210	.25	~~1.6~~ 1.5	851.72	102	78	255	50
1	~~9:25:20~~ 9:27:20	3	210	.25	1.5	853	100	78	255	50
2	9:29:20	3	210	.3	1.8	854.68	104	80	256	50
3	9:31:20	3	210	.3	1.8	856	104	80	255	50
4	9:33:20	3	210	.38	2.3	857.50	106	80	255	50
5	9:35:20	3	210	.38	2.3	859.1	106	80	255	50
1	~~9:35:40~~ 9:37:40	3	208	.32	2.0	861.25	104	80	255	50
2	9:39:40	4	200	.45	2.7	863.05	108	82	255	50
3	9:41:40	4	200	.38	2.3	864.25	108	82	255	52
4	9:43:40	4	200	.3	1.8	866.11	108	82	255	52
5	9:45:40	4	200	.38	2.3	867.432	108	82	255	52

RAMCON ENVIRONMENTAL CORPORATION

Plant: City Wide
Location:
Operator: W.C. Turner
Date: 4-16-91
Run No.: 2
Sample Box No.: 1
Meter Box No.: 004
Meter H @: 1.74
C Factor: .979
Pitot Tube Coefficient Cp: .86

Ambient Temperature: 76
Barometric Pressure: 29.98
Assumed Moisture, %: 25
Probe Length, m(ft): 6'
Nozzle Identification No.: .0004906
Avg. Calibrated Nozzle Dia., (in.): .300
Probe Heater Setting: 4
Leak Rate, m^3/min. (cfm): .003 @ 4"
Probe Liner Material: 316 SS
Static Pressure, mm Hg (in. Hg): 0.081
Filter No.: RJ 4624

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	602	532
INITIAL	300	516
DIFFERENCE	302	16

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 H20	PRESSURE DIFF. ORF. MTR in H_2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F Inlet	Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
1	12:16:20 / 12:20:20	3	200	.2	1.2	878.20 / 879.50	82	84	260	58
2	12:22:20	3	210	.2	1.2	880.82	92	84	260	58
3	12:24:20	3	212	.3	1.8	882.42	98	84	260	58
4	12:26:20	4	212	.32	2.0	883.78	100	84	260	58
5	12:28:20	4	214	.35	2.1	885.16	102	84	260	50
1	12:30:30 / 12:32:30	3	210	.22	1.3	886.43	98	84	260	50
2	12:34:30	3	215	.25	1.5	887.78	102	86	260	50
3	12:36:30	3	218	.45	2.7	889.5	106	86	270	50
4	12:38:30	3	222	.4	2.4	891.48	108	88	270	50
5	12:40:30	3	222	.4	2.4	893.36	110	88	270	50

Observed by: Tony Kelley - MDNR 4-16-91

Form #REC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 4-16-91 LOCATION 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 Vm (ft^3)	GAS SAMPLE TEMP. (°F) in	GAS SAMPLE TEMP. (°F) out	SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
1	~~12:41:30 12:43:30~~	3	212	.28	1.7	894:31	106	88	270	50
2	12:45:30	3	212	.3	1.8	896:10	110	88	270	50
3	12:47:30	3	220	.3	1.8	897:17	110	88	270	50
4	12:49:30	3	220	.35	2.1	898:72	112	90	270	50
5	12:51:30	3	220	.35	2.1	900:21	114	90	270	50
1	~~12:52:30 12:54:30~~	4	220	.45	2.7	902:12	112	90	270	50
2	12:56:30	4	215	.42	2.6	903:86	114	90	270	50
3	12:58:30	4	215	.35	2.1	905:61	114	90	265	50
4	1:00:30	4	215	.4	2.4	906:97	116	92	265	50
5	1:02:30	4	215	.42	2.6	908:63	116	92	265	50
1	~~1:03 1:05~~	4	212	.35	2.1	910:36	116	92	265	50
2	1:07	4	215	.32	2.0	911:84	118	92	300	50
3	1:09	4	215	.3	1.8	913:28	118	92	240	50
4	1:11	4	215	.28	1.7	914:82	118	92	250	50
5	1:13	4	215	.38	2.3	916:26	118	94	250	50
1	~~1:14 1:16~~	4	210	.42	2.6	918:14	114	94	250	50
2	1:18	4	210	.42	2.6	919:91	118	94	230	50
3	1:20	4	216	.32	2.0	921:47	118	94	240	50
4	1:22	4	212	.4	2.4	923:00	120	96	240	50
5	1:24	4	210	.4	2.4	924:524	120	96	240	50

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RAMCON ENVIRONMENTAL CORPORATION

Plant: City Wide
Location:
Operator: CKS
Date: 4-16-91
Run No.: 3
Sample Box No.: 1
Meter Box No.: 004
Meter H @: 1.74
C Factor: .979
Pitot Tube Coefficient Cp: .86

Schematic of Stack Cross Section

		IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
Ambient Temperature 68			
Barometric Pressure 29.98	FINAL	605	526
Assumed Moisture, % 25	INITIAL	300	512
Probe Length, m(ft) 6'	DIFFERENCE	305	14

Nozzle Identification No. 10004906
Avg. Calibrated Nozzle Dia., (in.) .30/.30/.30
Probe Heater Setting 5
Leak Rate, m^3/min. (cfm) .003 @ 6"
Probe Liner Material 316 SS
Static Pressure, mm Hg (in. Hg) .01
Filter No. A13-4684

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	Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
1	3:20 / 3:22	3	210	.2	1.2	934.50 / 935.92	90	90	235	54
2	3:24	3	210	.25	1.5	937.53	100	90	235	54
3	3:26	3	210	.25	1.5	938.91	104	90	240	54
4	3:28	3	210	.32	2.0	940.4	106	90	245	54
5	3:30	3	210	.32	2.0	942.63	108	90	250	54
1	3:31 / 3:33	4	210	.25	1.5	943.3	108	90	250	54
2	3:35	4	210	.25	1.5	944.68	108	90	250	54
3	3:37	4	212	.42	2.6	946.35	112	90	250	54
4	3:39	4	212	.4	2.4	948.36	114	90	250	54
5	3:41	4	212	.4	2.4	949.81	114	90	250	54

Form #REC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 4-16-91 LOCATION [illegible] 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 Vm ($ft.^3$)	GAS SAMPLE TEMP. (°F) in	GAS SAMPLE TEMP. (°F) out	SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
1	3:42 / 3:44	4	210	.28	1.7	951.41	114	92	250	54
2	3:46	4	205	.32	2.0	952.74	114	92	250	54
3	3:48	4	205	.32	2.0	954.67	116	92	250	58
4	3:50	4	210	.35	2.1	956.13	116	92	255	58
5	3:52	4	210	.35	2.1	957.45	118	92	255	58
1	3:53 / 3:55	4	215	.42	2.6	959.04	112	92	258	58
2	3:57	4	215	.42	2.6	960.72	114	92	255	58
3	3:59	4	212	.35	2.1	962.08	116	92	255	58
4	4:01	4	212	.35	2.1	963.87	118	92	255	58
5	4:03	4	210	.42	2.6	965.41	118	92	255	58
1	4:04 / 4:06	4	210	.32	2	966.72	112	92	255	58
2	4:08	4	210	.32	2	968.20	114	94	255	58
3	4:10	4	210	.32	2	969.86	118	94	255	58
4	4:12	4	210	.28	1.7	971.14	118	94	260	58
5	4:14	4	215	.28	1.7	972.58	118	94	260	58
1	4:15 / 4:17	4	215	.40	2.4	974.62	108	94	260	58
2	4:19	4	210	.40	2.4	976.32	110	94	260	58
3	4:21	4	210	.38	2.3	977.81	118	94	260	58
4	4:23	4	210	.38	2.3	979.59	118	94	260	58
5	4:25	4	210	.38	2.3	981.44	118	94	260	58

IX. CALIBRATION

METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 4-29-91 Meter box number 004

Barometric pressure, P_b = 29.82 in. Hg Calibrated by [illegible]

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: Avg[a] (t_d), °F	Time (Θ), min	Y_i	$\Delta H@_i$ in. H_2O
0.5	5								
1.0	5	133.5/138.575	75.2	90/102	76/78	86.5	8:12	1.01	1.5
1.5	10								
2.0	10	138.4/148.9	75.2	98/108	78/80	91	12:75	1.01	1.8
3.0	10	149.1/159.72	75.2	100/110	80/82	93	10:43	1.03	1.8
4.0	10								
							Avg	1.02	1.7

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t + 460)}$	$\Delta H@_i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\Theta}{V_w}\right]^2$
0.5	0.0368		
1.0	0.0737		
1.5	0.110		
2.0	0.147		
3.0	0.221		
4.0	0.294		

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

- Form #REC-02

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number _____ Date 4-15-91 Meter box number 004 Plant _____

Barometric pressure, P_b = _____ in. Hg Dry gas meter number _____ Pretest [illegible]

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	$Y_i \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
3	10	~~795.40~~ ~~805.55~~	68	~~90~~ ~~166~~	~~74~~ ~~78~~	87	10.7		.968	1.5
2	10	~~805.74~~ ~~815.895~~	68	~~100~~ ~~166~~	~~78~~ ~~78~~	96.5	13.2		.985	1.86
1	~~10.5~~	~~816.70~~ ~~821.15~~	68	~~102~~ ~~166~~	~~80~~ ~~80~~	92	8.32		.987	1.85
									Y = .979 / .174	

[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.

Form #REC-01

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 5-5-89 Thermocouple number Inlet/Outlet

Ambient temperature 20 °C Barometric pressure 29.88 in. Hg

Calibrator [illegible] Reference: mercury-in-glass ✓

other _____

Reference point number	Source[a] (specify)	Reference thermometer temperature, °C °F	Thermocouple potentiometer temperature, °C °F	Temperature difference,[b] %
A	Ice Bath	32	32	0
B	oven	200	200	0
C	oven	350°F	350	0
D	Ambient 4-18-91	63	63	0

[a]Type of calibration system used.

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

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 5-5-89 Thermocouple number Hotbox

Ambient temperature 20 °C Barometric pressure 29.88 in. Hg

Calibrator S Turner Reference: mercury-in-glass ✓

other _____

Reference point number	Source[a] (specify)	Reference thermometer temperature, ~~°C~~ F	Thermocouple potentiometer temperature, ~~°C~~ F	Temperature difference,[b] %
A	ice bath	32	32	0
B	oven	200	200	0
C	oven	350	350	0
D	ambient 4-16-91	63	63	0

[a]Type of calibration system used.

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

Date _____ Signature _____

(44)

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. 6-4 Date 5-11-90

Calibrated by: Bruce Shumaker

"A" SIDE CALIBRATION

Run No.	Δp std cm H_2O (in. H_2O)	Δp (s) cm H_2O (in. H_2O)	$C_p(s)$	DEVIATION $C_p(s)-\bar{C}_p(A)$
1	2.1	2.7	0.866	0.006
2	1.4	1.9	0.858	0.002
3	1.1	1.5	0.856	0.004
		$\bar{C}_p$ (SIDE A)	0.860	

"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	2.1	2.7	0.866	0.006
2	1.4	1.9	0.858	0.002
3	1.1	1.5	0.856	0.004
		$\bar{C}_p$ (SIDE B)	0.860	

$$\text{AVERAGE DEVIATION} = \sigma(\text{A OR B}) = \frac{\sum_1^3 |C_p(s)-\bar{C}_p(\text{A OR B})|}{3} \leftarrow \text{MUST BE} \leq 0.01$$

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

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

Form No. EED-17-1

RAMCON

Lear Siegler Stack Sampler

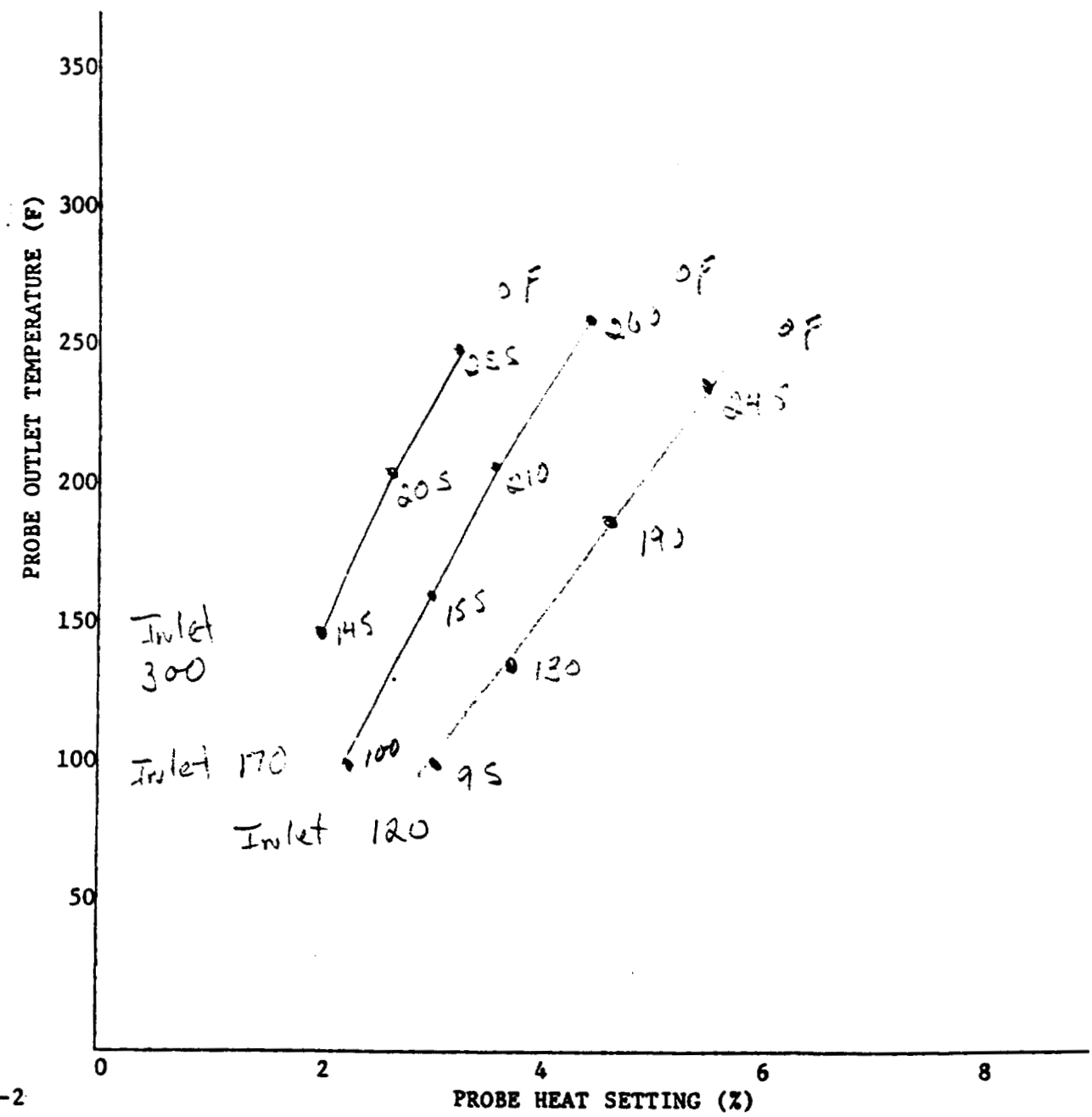
Heating Probe Calibration

Probe No. 64 Probe Length 6'

Date of Calibration 5-7-90 Signature Sam Turner

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



Form No. EED-17-2

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 5-5-90 Thermocouple number 64

Ambient temperature 20 °C Barometric pressure 29.88 in. Hg

Calibrator S Tuum. Reference: mercury-in-glass ✓

other _____

Reference point number	Source[a] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[b] %
A	Ice Bath	32	32	0
B	Boiling water	212	211	.005
C	Boiling oil	381	378	.008
D	Incubator 4-16-91	63	63	0

[a]Type of calibration system used.

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

X. RAMCON PERSONNEL

RAMCON Environmental Stack Test Team

Sumner Buck - President

Sumner Buck is the President of RAMCON Environmental Corporation. He is a graduate of the EPA 450 "Source Sampling for Particulate Pollutant's" course and the 474 "Continuous Emissions Monitoring" course all given at RTP. Mr. Buck is a certified V.E. reader with current certification. Mr. Buck has personally sampled over 400 stacks including over 300 asphalt plants. He is 47 years old and a graduate of the University of Mississippi with graduate studies at Memphis State University and State Technical Institute of Memphis.

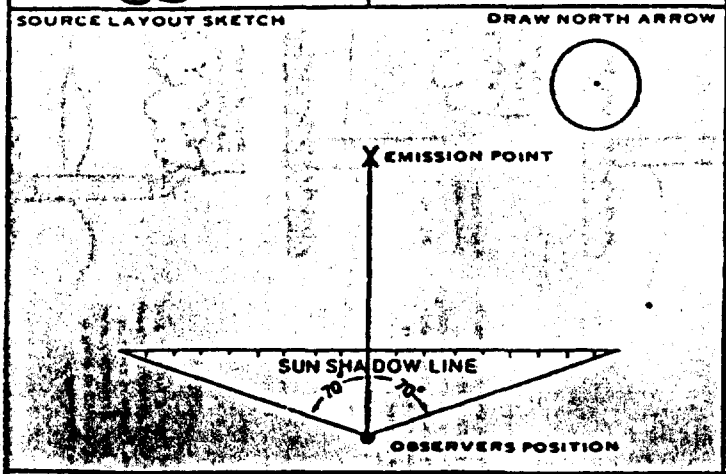
Bobby Sanders - Team Leader

Bobby Sanders has been employed by RAMCON for two years. He has undergone extensive training in Methods 1 through 9. He is qualified as a team leader and is currently certified as a V.E. reader.

XI. VISIBLE EMISSIONS

SOURCE NAME	City wide
ADDRESS	
CITY	
STATE	MO.
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	
OPERATING MODE	
CONTROL EQUIPMENT	
OPERATING MODE	
DESCRIBE EMISSION POINT	
HEIGHT ABOVE GROUND LEVEL	25'
HEIGHT RELATIVE TO OBSERVER	25'
DISTANCE FROM OBSERVER	40yds
DIRECTION FROM OBSERVER	WNW
DESCRIBE EMISSIONS	N/A
EMISSION COLOR	N/A
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	40yds
DESCRIBE BACKGROUND	Blue sky
BACKGROUND COLOR	BLUE
SKY CONDITIONS	CLEAR
WIND SPEED	15-20
WIND DIRECTION	
AMBIENT TEMPERATURE	68
RELATIVE HUMIDITY	

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



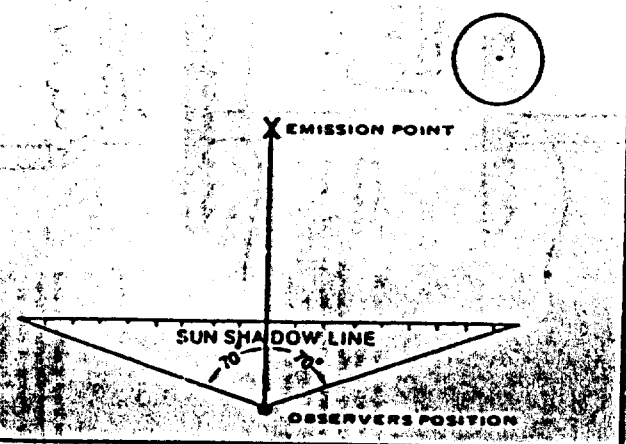
OBSERVATION DATE	START TIME	STOP TIME
4-16-91	8:39	9:38:45

M \ SEC	0	15	30	45	M \ 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 % WERE	1/60
RANGE OF OPACITY READINGS	MINIMUM / MAXIMUM
COMMENTS	Run #1
OBSERVER'S NAME (PRINT)	W.L. Turner
OBSERVER'S SIGNATURE	[signature]
DATE	4-16-90
ORGANIZATION	Ranger
WHAT AGENCY IS MAKING THESE OPACITY OBSERVATIONS	
CERTIFIED BY	[illegible]
DATE	[illegible]

SOURCE NAME	City Wide
ADDRESS	
CITY	STATE: ZIP:
PHONE	SOURCE ID NUMBER
PROCESS EQUIPMENT	OPERATING MODE
CONTROL EQUIPMENT	OPERATING MODE
DESCRIBE EMISSION POINT	
HEIGHT ABOVE GROUND LEVEL	25
HEIGHT RELATIVE TO OBSERVER	25
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	40 yds stack exit
DESCRIBE BACKGROUND	Blue Sky
BACKGROUND COLOR	Blue
SKY CONDITIONS	Clear
WIND SPEED	5-10
WIND DIRECTION	
AMBIENT TEMPERATURE	70
RELATIVE HUMIDITY	

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE	START TIME	STOP TIME
4-16-91	12:18	1:17:45

M \ SEC	0	15	30	45	M \ 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 10 % WERE: 0

RANGE OF OPACITY READINGS: MINIMUM 0 — MAXIMUM 0

COMMENTS: Run #2

OBSERVER'S NAME (PRINT): W. Turner

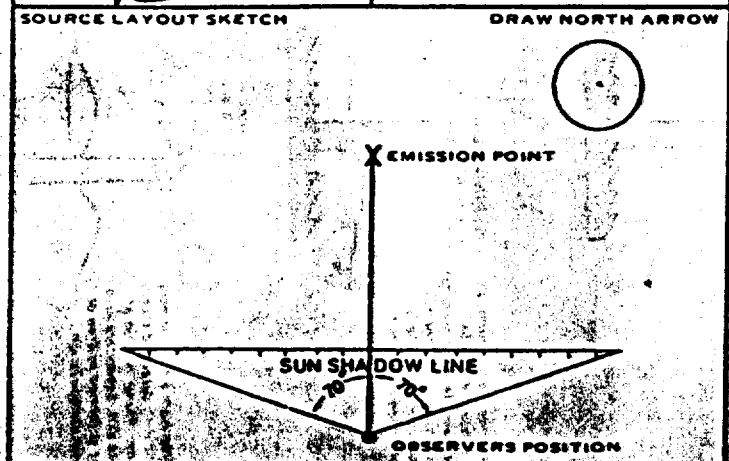
OBSERVER'S SIGNATURE: [signature] — DATE: 4-16-91

ORGANIZATION: Remtech

HAVE RECEIVED A COPY OF THIS OPACITY OBSERVATION: [signature] — DATE: 12-6-92

SOURCE NAME	City Wide
ADDRESS	
CITY	
STATE	MO
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	
OPERATING MODE	
CONTROL EQUIPMENT	
OPERATING MODE	
DESCRIBE EMISSION POINT	
HEIGHT ABOVE GROUND LEVEL	25
HEIGHT RELATIVE TO OBSERVER	25
DISTANCE FROM OBSERVER	30 yds
DIRECTION FROM OBSERVER	NE
DESCRIBE EMISSIONS	n/a
EMISSION COLOR	n/A
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	30 yds
DESCRIBE BACKGROUND	Blue Sky
BACKGROUND COLOR	Blue
SKY CONDITIONS	Clear
WIND SPEED	5-10
WIND DIRECTION	
AMBIENT TEMPERATURE	72
RELATIVE HUMIDITY	

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE	START TIME	STOP TIME
4-16-91	320	8:19:45

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
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	100 % WERE 0
RANGE OF OPACITY READINGS	MINIMUM MAXIMUM
COMMENTS	Run #3
OBSERVER'S NAME (PRINT)	[illegible]
OBSERVER'S SIGNATURE	[illegible]
DATE	4/16/91
ORGANIZATION	Lanco
PLEASE RECEIVER A COPY OF THESE OPACITY OBSERVATIONS	
DATE	4-16-91

(51)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
CUSTOMS HOUSE
701 BROADWAY
NASHVILLE, TENNESSEE 37219-5403

DEC 2 7 1990

Bill Turner
RAMCON
223 Scott
Memphis, TN 38112

RE: Certificate Number 1058

Dear Mr. Turner:

Enclosed you will find your certification card for successfully completing the November 6-7, 1990 Visible Emissions Evaluation School held in Nashville, Tennessee. In order to be certified as a qualified Visible Emissions Evaluator for all the methods approved by the Tennessee Air Pollution Control Board, one must meet an intensive array of criteria.

The individual reading criteria is as follows:

1. EPA Method 9 (6 Minute Average) requires a deviation of less than 7.5 on white and black smoke, and that the reader miss no reading by more than 15% opacity.

2. Tennessee Visible Emissions Evaluation Method 1 (Roads and Parking Areas) requires a worst-two-minute deviation of 8.8 or less.

3. TVEE Method 2 (Aggregate or Time Count) has the same criteria requirements as EPA Method 9.

4. TVEE Method 3 (Zero Percent Opacity) requires that the value assigned to a zero reading during a certification run shall not exceed 10% opacity, nor shall the combination of other zero readings exceed 10% opacity (i.e. two readings of five percent opacity).

5. TVEE Method 4 (Fugitive Dust Emissions from Non-Stack Emission Points) has the same criteria requirements as EPA Method 9.

Based on these criteria you are certified by the State of Tennessee to read EPA Method 9, and TVEE Methods 1, 2, 3, and 4 with sunglasses.

This certification is valid until May 07, 1991.

You must complete the requirements for recertification prior to this expiration date to retain your status as a qualified Visible Emissions Evaluator.

It was a pleasure having your participation in our Visible Emissions School. The Tennessee Division of Air Pollution Control would welcome any comments, or suggestions you may have concerning the operation of the school. Please forward any comments to the Division at (615)741-3931 or at the above address.

Sincerely yours,

Carl Koontz

Carl Koontz, Instructor
Visible Emissions Evaluation School
Division of Air Pollution Control

Enclosure

*USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK
ENTER STACK AREA IN D12

PLANT NAME: City Wide Asphalt Company
LOCATION: Sugar Creek, MO
RUN NO: 1
TEST UNIT: H & B Drum Mix Asphalt Plant
TEST DATE: 4/16/91

NUMBER OF POINTS	30	PERCENT OXYGEN	14.80
TIME, MINUTE/POINT	2.00	PERCENT CARBON DIOXIDE	3.00
LEAK RATE, FT3/MIN	0.003	PERCENT CARBON MONOXIDE	0.00
STACK AREA, FT2	27.560	Cp (PITOT COEFFICIENT)	0.860
BAR PRESS, INCH Hg	29.98	NOZZLE DIAMETER, INCHES	0.300
PARTIC COLLECTED, MG	199.7	INITIAL METER VOL, FT3	821.300
IMPINGER H20, ML	242.00	FINAL METER VOL, FT3	867.432
SILICA GEL H20, GM	12.00	METER CORR FACT, Y	0.9790

PT NO	STATIC PRESS (Ps)	STACK TEMP (Ts)	VELOC PRESS (dPs)	SQRT VEL PRESS (dPs)^.5	ORIFICE PRESS (dH)	GAS METER TEMP INLET (Tmi)	GAS METER TEMP OUTLET (Tmo)
1	0.01	165.0	0.350	0.592	2.10	62.0	62.0
2	0.01	178.0	0.400	0.632	2.40	74.0	66.0
3	0.01	200.0	0.380	0.616	2.30	80.0	66.0
4	0.01	200.0	0.380	0.616	2.30	86.0	68.0
5	0.01	200.0	0.400	0.632	2.40	88.0	68.0
6	0.01	190.0	0.400	0.632	2.40	88.0	68.0
7	0.01	205.0	0.300	0.548	1.80	90.0	70.0
8	0.01	205.0	0.300	0.548	1.80	90.0	70.0
9	0.01	205.0	0.300	0.548	1.80	92.0	70.0
10	0.01	205.0	0.400	0.632	2.40	94.0	70.0
11	0.01	205.0	0.320	0.566	2.00	92.0	72.0
12	0.01	208.0	0.320	0.566	2.00	94.0	72.0
13	0.01	205.0	0.300	0.548	1.80	98.0	74.0
14	0.01	202.0	0.280	0.529	1.70	100.0	76.0
15	0.01	202.0	0.280	0.529	1.70	100.0	76.0
16	0.01	210.0	0.300	0.548	1.80	96.0	78.0
17	0.01	210.0	0.300	0.548	1.80	98.0	78.0
18	0.01	210.0	0.280	0.529	1.70	100.0	78.0
19	0.01	210.0	0.280	0.529	1.70	102.0	78.0
20	0.01	210.0	0.250	0.500	1.50	102.0	78.0
21	0.01	210.0	0.250	0.500	1.50	100.0	78.0
22	0.01	210.0	0.300	0.548	1.80	104.0	80.0
23	0.01	210.0	0.300	0.548	1.80	104.0	80.0
24	0.01	210.0	0.380	0.616	2.30	106.0	80.0
25	0.01	210.0	0.380	0.616	2.30	106.0	80.0
26	0.01	208.0	0.320	0.566	2.00	104.0	80.0
27	0.01	200.0	0.450	0.671	2.70	108.0	82.0
28	0.01	200.0	0.380	0.616	2.30	108.0	82.0
29	0.01	200.0	0.300	0.548	1.80	108.0	82.0
30	0.01	200.0	0.380	0.616	2.30	108.0	82.0
AVG	0.01	202.8	0.332	0.574	2.01	96.1	74.8

STACK VELOCITY	38.43	FT/SEC
STANDARD VOLUME SAMPLED	44.01	SCF
AVERAGE DRY GAS METER TEMP	85.4	DEG F
PERCENT MOISTURE	21.37	PERCENT
STANDARD STACK FLOW RATE	39886.57	DSCFM — 38634.8
ISOKINETIC SAMPLING RATE	103.19	PERCENT
PARTICULATE EMISSION RATE	23.9429	LB/HR — 10.6
PARTICULATE EMISSION RATE	0.0700	GR/DSCF — .032

*USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK
ENTER STACK AREA IN D12

PLANT NAME: City Wide Asphalt Company
LOCATION: Sugar Creek, MO
RUN NO: 2
TEST UNIT: H & B Drum Mix Asphalt Plant
TEST DATE: 4/16/91

NUMBER OF POINTS	30	PERCENT OXYGEN	14.70
TIME, MINUTE/POINT	2.00	PERCENT CARBON DIOXIDE	3.00
LEAK RATE, FT3/MIN	0.003	PERCENT CARBON MONOXIDE	0.00
STACK AREA, FT2	27.560	Cp (PITOT COEFFICIENT)	0.860
BAR PRESS, INCH Hg	29.98	NOZZLE DIAMETER, INCHES	0.300
PARTIC COLLECTED, MG	46.2	INITIAL METER VOL, FT3	878.200
IMPINGER H20, ML	302.00	FINAL METER VOL, FT3	924.524
SILICA GEL H20, GM	16.00	METER CORR FACT, Y	0.9790

PT NO	STATIC PRESS (Ps)	STACK TEMP (Ts)	VELOC PRESS (dPs)	SQRT VEL PRESS (dPs)^.5	ORIFICE PRESS (dH)	GAS METER TEMP INLET (Tmi)	GAS METER TEMP OUTLET (Tmo)
1	0.01	200.0	0.200	0.447	1.20	82.0	84.0
2	0.01	210.0	0.200	0.447	1.20	92.0	84.0
3	0.01	212.0	0.300	0.548	1.80	98.0	84.0
4	0.01	212.0	0.320	0.566	2.00	100.0	84.0
5	0.01	214.0	0.350	0.592	2.10	102.0	84.0
6	0.01	210.0	0.220	0.469	1.30	98.0	84.0
7	0.01	215.0	0.250	0.500	1.50	102.0	86.0
8	0.01	218.0	0.450	0.671	2.70	106.0	86.0
9	0.01	222.0	0.400	0.632	2.40	108.0	88.0
10	0.01	222.0	0.400	0.632	2.40	110.0	88.0
11	0.01	212.0	0.280	0.529	1.70	106.0	88.0
12	0.01	212.0	0.300	0.548	1.80	110.0	88.0
13	0.01	220.0	0.300	0.548	1.80	110.0	88.0
14	0.01	220.0	0.350	0.592	2.10	112.0	90.0
15	0.01	220.0	0.350	0.592	2.10	114.0	90.0
16	0.01	220.0	0.450	0.671	2.70	112.0	90.0
17	0.01	215.0	0.420	0.648	2.60	114.0	90.0
18	0.01	215.0	0.350	0.592	2.10	114.0	90.0
19	0.01	215.0	0.400	0.632	2.40	116.0	92.0
20	0.01	215.0	0.420	0.648	2.60	116.0	92.0
21	0.01	212.0	0.350	0.592	2.10	116.0	92.0
22	0.01	215.0	0.320	0.566	2.00	118.0	92.0
23	0.01	215.0	0.300	0.548	1.80	118.0	92.0
24	0.01	215.0	0.280	0.529	1.70	118.0	92.0
25	0.01	215.0	0.380	0.616	2.30	118.0	94.0
26	0.01	210.0	0.420	0.648	2.60	114.0	94.0
27	0.01	210.0	0.420	0.648	2.60	118.0	94.0
28	0.01	216.0	0.320	0.566	2.00	118.0	94.0
29	0.01	212.0	0.400	0.632	2.40	120.0	96.0
30	0.01	210.0	0.400	0.632	2.40	120.0	96.0
AVG	0.01	214.3	0.343	0.583	2.08	110.0	89.5

STACK VELOCITY	39.68	FT/SEC
STANDARD VOLUME SAMPLED	43.06	SCF
AVERAGE DRY GAS METER TEMP	99.8	DEG F
PERCENT MOISTURE	25.79	PERCENT
STANDARD STACK FLOW RATE	38204.86	DSCFM
ISOKINETIC SAMPLING RATE	105.43	PERCENT
PARTICULATE EMISSION RATE	5.4215	LB/HR
PARTICULATE EMISSION RATE	0.0166	GR/DSCF

*USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK
ENTER STACK AREA IN D12

PLANT NAME: City Wide Asphalt Company
LOCATION: Sugar Creek, MO RUN NO: 3
TEST UNIT: H & B Drum Mix Asphalt Plant
TEST DATE: 4/16/91

NUMBER OF POINTS	30	PERCENT OXYGEN	14.00
TIME, MINUTE/POINT	2.00	PERCENT CARBON DIOXIDE	3.00
LEAK RATE, FT3/MIN	0.003	PERCENT CARBON MONOXIDE	0.00
STACK AREA, FT2	27.560	Cp (PITOT COEFFICIENT)	0.860
BAR PRESS, INCH Hg	29.98	NOZZLE DIAMETER, INCHES	0.300
PARTIC COLLECTED, MG	22.4	INITIAL METER VOL, FT3	934.500
IMPINGER H20, ML	305.00	FINAL METER VOL, FT3	980.140
SILICA GEL H20, GM	14.00	METER CORR FACT, Y	0.9790

PT NO	STATIC PRESS (Ps)	STACK TEMP (Ts)	VELOC PRESS (dPs)	SQRT VEL PRESS (dPs)^.5	ORIFICE PRESS (dH)	GAS METER TEMP INLET (Tmi)	GAS METER TEMP OUTLET (Tmo)
1	0.01	210.0	0.200	0.447	1.20	90.0	90.0
2	0.01	210.0	0.250	0.500	1.50	100.0	90.0
3	0.01	210.0	0.250	0.500	1.50	104.0	90.0
4	0.01	210.0	0.320	0.566	2.00	106.0	90.0
5	0.01	210.0	0.320	0.566	2.00	108.0	90.0
6	0.01	210.0	0.250	0.500	1.50	108.0	90.0
7	0.01	210.0	0.250	0.500	1.50	108.0	90.0
8	0.01	212.0	0.420	0.648	2.60	112.0	90.0
9	0.01	212.0	0.400	0.632	2.40	114.0	90.0
10	0.01	212.0	0.400	0.632	2.40	114.0	90.0
11	0.01	210.0	0.280	0.529	1.70	114.0	92.0
12	0.01	205.0	0.320	0.566	2.00	114.0	92.0
13	0.01	205.0	0.320	0.566	2.00	116.0	92.0
14	0.01	210.0	0.350	0.592	2.10	116.0	92.0
15	0.01	210.0	0.350	0.592	2.10	118.0	92.0
16	0.01	215.0	0.420	0.648	2.60	112.0	92.0
17	0.01	215.0	0.420	0.648	2.60	114.0	92.0
18	0.01	212.0	0.350	0.592	2.10	116.0	92.0
19	0.01	212.0	0.350	0.592	2.10	118.0	92.0
20	0.01	210.0	0.420	0.648	2.60	118.0	92.0
21	0.01	210.0	0.320	0.566	2.00	112.0	92.0
22	0.01	210.0	0.320	0.566	2.00	114.0	94.0
23	0.01	210.0	0.320	0.566	2.00	118.0	94.0
24	0.01	210.0	0.280	0.529	1.70	118.0	94.0
25	0.01	215.0	0.280	0.529	1.70	118.0	94.0
26	0.01	215.0	0.400	0.632	2.40	108.0	94.0
27	0.01	210.0	0.400	0.632	2.40	110.0	94.0
28	0.01	210.0	0.380	0.616	2.30	118.0	94.0
29	0.01	210.0	0.380	0.616	2.30	118.0	94.0
30	0.01	210.0	0.380	0.616	2.30	118.0	94.0
AVG	0.01	210.7	0.337	0.578	2.05	112.4	91.9

STACK VELOCITY	39.29	FT/SEC
STANDARD VOLUME SAMPLED	42.24	SCF
AVERAGE DRY GAS METER TEMP	102.2	DEG F
PERCENT MOISTURE	26.22	PERCENT
STANDARD STACK FLOW RATE	37812.83	DSCFM
ISOKINETIC SAMPLING RATE	104.49	PERCENT
PARTICULATE EMISSION RATE	2.6521	LB/HR
PARTICULATE EMISSION RATE	0.0082	GR/DSCF

CITY-WIDE ASPHALT CO., INC.

1701 N. M291 HIGHWAY
SUGAR CREEK, MISSOURI 64056
257-1332

STREETS AND HEAVY CONSTRUCTION
ASPHALT MANUFACTURERS

RUSSELL C. BUEHLER
President

May 28, 1991

Air Pollution Control Board
P.O. Box 176
Jefferson City, MO 65102

Attn: Mr. Peter Ironwood

RE: Coal Analysis
Sugar Creek Plant

Dear Sir:

As requested in our telephone conversation of May 24, we enclose copies of sample analysis of coal purchased in 1990 for use in our Sugar Creek, Missouri asphalt plant.

If you are in need of further information, please advise.

Sincerely,

CITY-WIDE ASPHALT CO., INC.

Harold L. Moody

Harold L. Moody
General Manager

HLM/ab
Enclosures

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210 B, LOMBARD, ILLINOIS 60148 • (708) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
10775 E. 51ST AVE., DENVER, CO 80239
TELEPHONE: (303) 373-4772
FAX: (303) 373-4791
TELEX: 255978

MARSHALL MUNICIPAL UTILITIES
74 East Arrow Street
Marshall, MO 65340

June 27, 1990

Sample identification
by
MARSHALL MUNICIPAL UTILITIES
Future Fuels

Kind of sample reported to us	COAL
Sample taken at	XXXXX
Sample taken by	MARSHALL MUNICIPAL UTILITIES
Date sampled	06/15/90
Date received	06/25/90

Analysis report no. 72-203052

PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	11.79	xxxxx
% Ash	10.46	11.86
% Volatile	31.87	36.13
% Fixed Carbon	45.88	52.01
	100.00	100.00
Btu/lb.	11458	12989
Sulfur	2.75	3.12

MAF Btu/lb.	14737	Moist Mm free Btu/lb.	12984 *
% MAF Volatile	40.99	% Dry Mm free Volatile	39.70
% MAF Fixed Carbon	59.01	% Dry, Mm free Fixed Carbon	60.30
Lbs. Sul. Dioxide / Mill. Btu	4.80	Lbs. Sul. / Mill. Btu	2.40
% Air Dry Loss	6.01	As Rec'd Net Sample Wt	10709.40 grams

* Based on As Received moisture

/vs

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Denver Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300
SINCE 1908
Member of the SGS Group (Societe Generale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO
P.O. BOX 752, HENDERSON, KY 4242
TELEPHONE: (502) 827-118
FAX: (502) 826-071

October 27, 1990

RIEDEL IND. WASTE MANAG., INC.
P. O. Box 314
Perry MO 63462

Sample identification by
Riedel Industrial

Blend

Kind of sample reported to us Coal

Sample taken at ------

Sample taken by Riedel Industrial

Date sampled October 25, 1990

Date received October 26, 1990

Analysis Report No. 63-91471

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis		
% Moisture	13.24	xxxxx		
% Ash	7.17	8.26		
Btu/lb	11621	13394	MAF	14600
% Sulfur	3.88	4.47		
SO_2 lb/million Btu @ 100%	6.68			

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Henderson Laboratory

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES
Original Copy Watermarked For Your Protection

F-465

Doug

RAMCON

ENVIRONMENTAL CORPORATION

April 3, 1991

Mr. Harold Moody
City Wide Asphalt Company
1701 N. M291 Highway
Sugar Creek, MO 64056
816/257-1332

Dear Mr. Moody:

Confirming our conversation, weather permitting, RAMCON Environmental will schedule the test for EPA and Missouri N.S.P.S. compliance on your H & B drum mix asphalt plant located in Sugar Creek, Missouri. We plan to test Tuesday, April 16, 1991 with Wednesday, April 17, 1991 as a backup date.

The State will want to demonstrate compliance <u>while operating the plant at or near capacity</u> for the duration of the test which will take six to eight hours. We will begin testing soon after you start production in the morning.

During the stack test, your plant operator will need to complete the enclosed "Plant Data" pages which will become part of the report we submit to the State. Also, I strongly suggest you have your plant manager read over the enclosed "Stack Test Preparation" manual as soon as possible.

Should anything come up to alter this schedule, call me and I will notify everyone concerned. We look forward to working with you.

Sincerely,

G. Sumner Buck, III
President

cc:
Mr. Doug Elley
EPA Missouri
P.O. Box 176
Jefferson City, MO 65102
314/751-4817

RAMCON BUILDING, 223 SCOTT STREET, MEMPHIS, TENNESSEE 38112
TELEPHONE 800/458-4567 IN TENNESSEE 901/458-7000 FAX 901-458-3868

Submitted to: Missouri Air Pollution Control Program (APCP)
Attention: Doug Elley
Date: 4/3/91

PROPOSED TEST PLAN

1. Facility Information

Name: City Wide Asphalt Company

Address: 1701 N. M291 Highway Sugar Creek, MO 64056

Name and title of contact: Harold Moody

Telephone number of contact: 816/257-1332

2. Air Pollution Source Information

Type of source: Hotmix Asphalt Plant

Permit number of source to be tested: 0390-006

Address of source: same

Directions to source (or map attached): On Highway 291, north of Highway 24 on East side of Road

Initial start-up date: _____

3. Testing Firm Information

Name of firm: Ramcon Environmental Corporation

Address: 223 Scott Street Memphis, TN 38112

Name and title of contact: Sumner Buck, President

Telephone number of contact: 901/458-7000

Number of employees of firm: 12

Number of employees actually engaged in air pollution source testing: 8

Organizational chart with names & titles of personnel: (please attach)

Sumner Buck - President
Joe Sewell - Chemical Engineer
Kim Hipson - Office Manager
Ken Allmendinger - Field Supervisor
Bruce Shrader - Lab Director

Location and description of laboratory facilities: _____

same address

Subcontractor(s) utilized by firm for source testing activities: _____

Number of air pollution sources previously tested by firm: over 400

Sources tested by firm in Missouri in past 3 years (source, test, date):

Masters & Jackson	Method 5	Jane, MO	4/24/89
Journagan Const	Method 5	Reed Springs, MO	7/24/89
Journagan Const	Method 5	Willow Springs, MO	7/25/89
Bowen Construction	Method 5	Lees Summit, MO	8/24/89

4. Performance Test Information

Pollutants to be sampled:

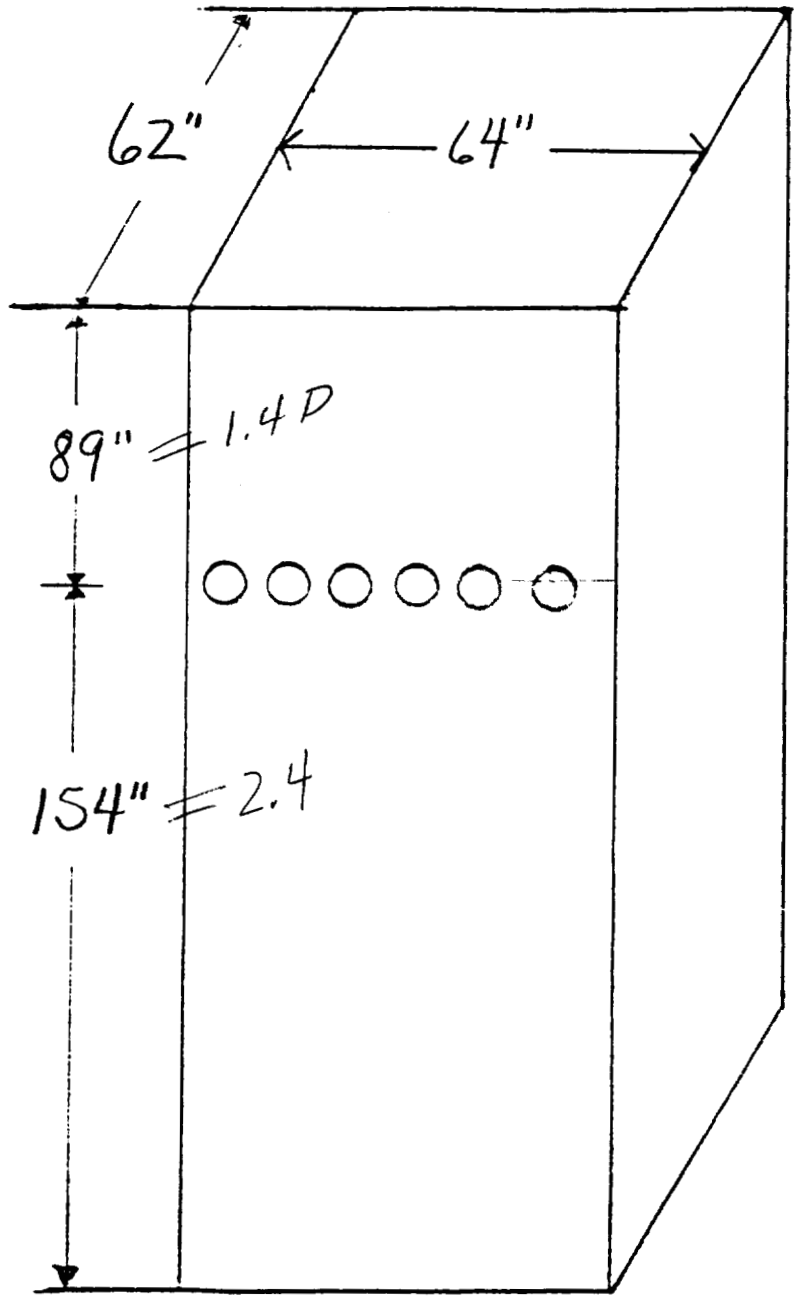
	Pollutant	Number of Sampling Points	Total Time Per Test Run	Number of Test Runs	Test Method to be Used
1	Particulate /SO_2		60	3	1-4 & 8
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Proposed test date: _____

METHOD 1

Sampling Site: The emissions test will be conducted after a baghouse on a rectangular stack measuring 64.0" x 62.0" with an equivalent diameter of 63.0". Six sampling ports are placed 89" down (1.4 diameters upstream) from the top of the stack and 154" up (2.4 diameters downstream) from the last flow disturbance. The ports are evenly spaced on 10.7" centers. The two outside ports are 5.35" from the side walls of the stack. Thirty points will be sampled, five through each port for two minutes each.

Points on a Diameter	Probe Mark
1	6.2"
2	18.6"
3	31.0"
4	43.4"
5	55.8"

Equivalent Diameter

$$D_e = \frac{2LW}{(L+W)} = 62.98'' = 5.25'$$