AP42 Section: 11.1

Reference Number: 218

Title: Source Sampling For Particulate Emissions Great Valley Construction Co., Devault, PA,

Ramcon Environmental Corp., Memphis, TN,

December 18, 1987.

AP-42 Section 11.1
Reference
Report Sect. 4
Reference 218

RAMCON
ENVIRONMENTAL CORPORATION

SOURCE SAMPLING
for
PARTICULATE EMISSIONS
GREAT VALLEY CONSTRUCTION COMPANY
November 13, 1987

Rick Young
Great Valley Construction Co.

G. Sumner Buck, III
President

Cameron Mitchell
Team Leader

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

RAMCON
ENVIRONMENTAL CORPORATION

December 16, 1987

Mr. Rick Young
Great Valley Materials Company
Route 29
Devault, PA 19432

Re: Particulate Emissions Test - Devault, Pennsylvania

Dear Mr. Young:

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

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

Mr. Jim Donelly
Engineering Services Chief
Pennsylvania D.E.R.
1875 New Hope Street
Norristown, PA 19401

You will need to keep one copy of the report at the plant. 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

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

TABLE OF CONTENTS

I. INTRODUCTION

On November 13, 1987, personnel from RAMCON Environmental Corporation (REC) conducted a source emissions test for particulate emissions compliance at Great Valley Material's Standard Havens drum mix asphalt plant located in Devault, Pennsylvania at Route 29 and Charlestown Road. RAMCON personnel conducting the test were Cameron Mitchell, Team Leader and Shawn Greenwood. Kim Rea 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. Mitchell and Ms. Rea.

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

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 Pennsylvania are the same as those set by EPA.

Shawn Greenwood conducted the opacity test (Reference Method 9), which ranged from 0% to 10% on all three test runs and therefore, meets N.S.P.S. requirements.

TABLE I

SUMMARY OF TEST RESULTS
November 13, 1987

Test Run	Time	Grain Loading	Isokinetic Variation	Actual Emissions
1	08:32 to 09:57	0.0321 gr/DSCF	100%	4.0 lbs/hr
2	10:36 to 12:02	0.0357 gr/DSCF	102%	5.0 lbs/hr
3	12:30 to 13:35	0.0393 gr/DSCF	100%	5.4 lbs/hr
	Average:	0.0357 gr/DSCF	-	4.8 lbs/hr

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

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.

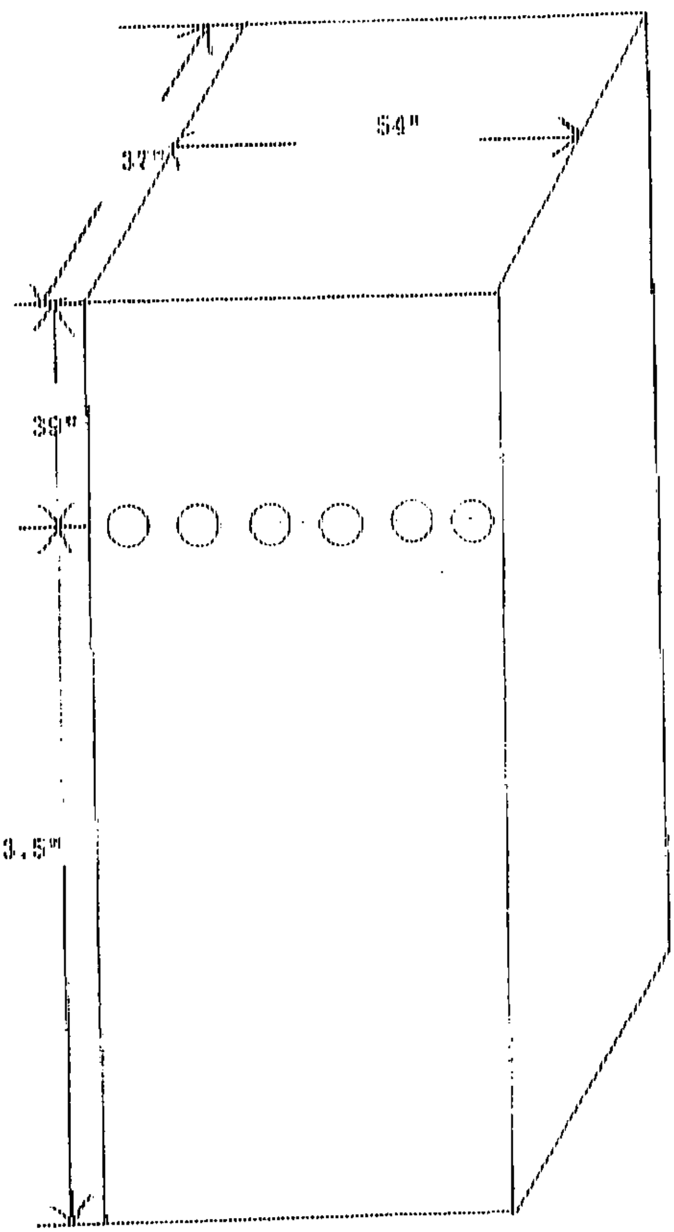
B. Problems Encountered: *No problems were encountered that affected testing.*

C. Sampling Site: The emissions test was conducted after a baghouse on a rectangular stack measuring 54" x 37" with an equivalent diameter of 43.9". Six sampling ports were placed 39" down (0.9 diameters upstream) from the top of the stack and 93.5" up (2.1 diameters downstream) from the last flow disturbance. On test run one, thirty points were sampled, five through each port for 2.5 minutes each. The points on test run two were sampled at 2.15 minutes each and the points on test run three were sampled at two minutes each.

2:09 ?

Points on a Diameter	Probe Mark
1	*10.7"
2	18.1"
3	25.5"
4	32.9"
5	40.3"

*Measurements include a 7.0" standoff.



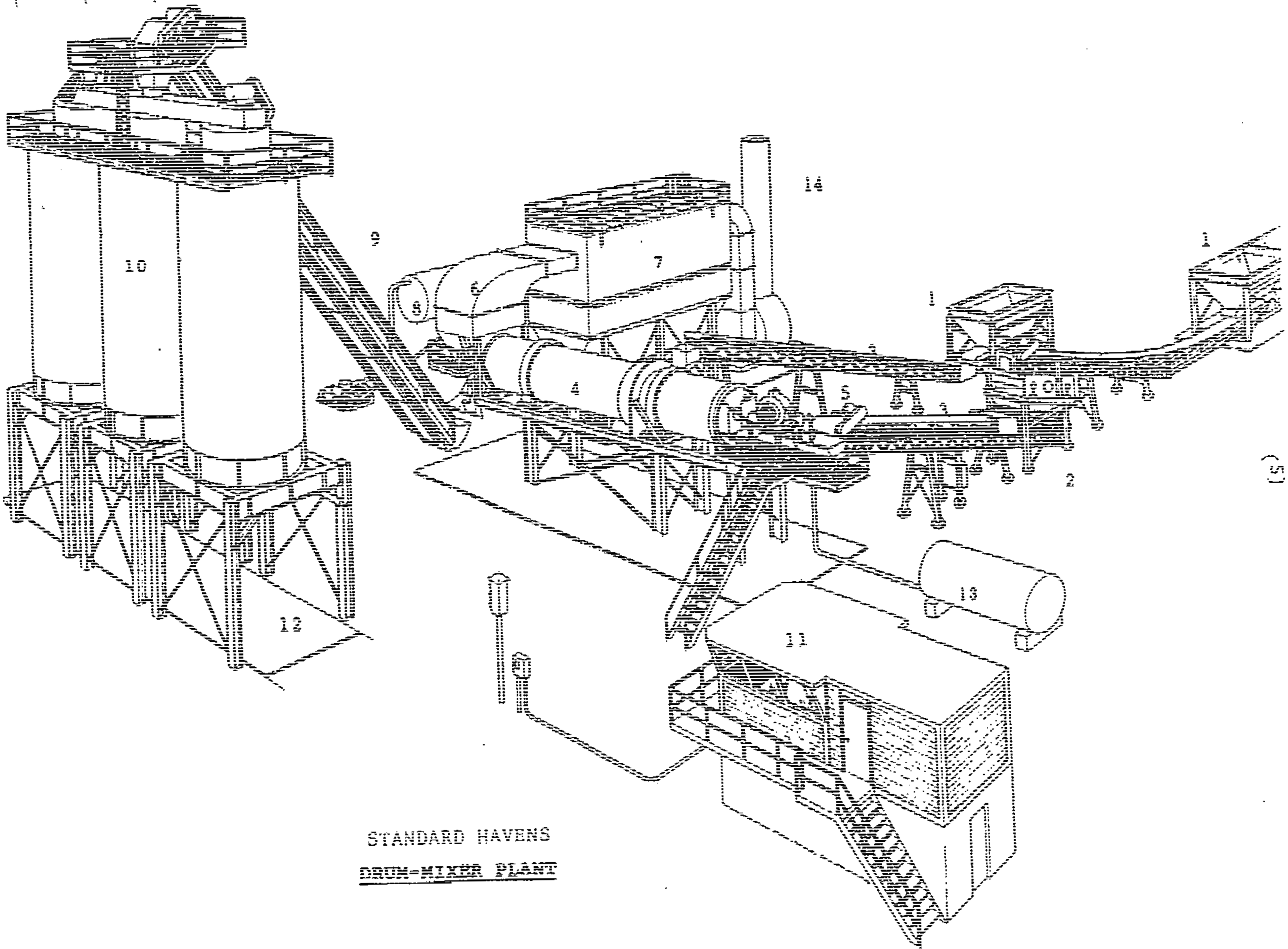
IV. THE SOURCE

IV. THE SOURCE

Great Valley Materials employs a Standard Havens 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 conveyor. 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 exhaust gasses pass through a baghouse. The baghouse is manufactured by Standard Havens. The exhaust gasses are drawn through the baghouse and discharged to the atmosphere through a stack. The design pressure drop across the tube-sheet is 3 - 6 inches of water. The particulate matter, which is removed by the baghouse, is reinjected into the drum mixer.



STANDARD HAVENS

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 proporation 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 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 provide the flame which drys the aggregate.

6. Knock off baffleing: A baffeling 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 project.

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 loading scale which tells the plant operator the amount of asphalt that is being trucked on each individual load.

13. Fuel Storage

14. Stack

(7)

DATA SUMMARY

Plant

1. Manufacturer of plant Standard - Havens.
2. Designed maximum operating capacity 275 TPH @ 5 % moisture.
3. Actual operation rate 215 TPH @ 5.5 % moisture.
4. Startup date 6/77.
5. Type of fuel used in dryer #2.
6. Quanity of fuel consumption 1500 gal.

Aggregate

7. Name/type of mix PG AC-2 75%.
8. Percent asphalt in mix 5.5 %.
9. Temperature of asphalt 305°.
10. Sieve/Screening analysis: % Passing: #16 26.9 % #30 22.1 %

1"	100 %	3/8"	90.3 %	#50	18.4 %
3/4"	100 %	# 4	57.4 %	#100	12.4 %
1/2"	100 %	# 8	40.6 %	#200	5.9 %

Baghouse

11. Manufacturer Standard - Havens.
12. No. of bags 320 each. Type of bags Nomex.
13. Air to cloth ratio 5.4 to 1. Designed ACFM 46,500.
14. Square feet of bags 320 ea. 14½' long 6" Dia..
15. Type of cleaning: pulse jet ✓, reverse air ____.
    plenum pulse ____, other ____.
16. Cleaning cycle time N/A.
17. Interval between cleaning cycle 20 sec.
18. Pressure drop across baghouse 3.5 in. water psi.
19. Pulse pressure on cleaning cycle 110 psi.

COMPANY NAME Great Valley Materials DATE 11-13-87

COMPANY REPRESENTATIVE Richard C. [illegible]

Form #REC-03

(8)
PLANT DATA

COMPANY NAME Great Valley Materials

COMPANY REP. [illegible] DATE 11-13-87 PHONE # 215-[illegible]-2770

DATA SOURCE Control Room Computer

PLANT LOCATION Devault, Pa.

PLANT MFG. Std. Havens PLANT MODEL # 75 K45 [illegible] PLANT TYPE Drum Mix

MIX SPECIFICATION # PA. ID-2 Top OIL SPECIFICATION # AC-20

Time 24 Hour	✓ Fuel Oil #2 / Nat. Gas / Propane / Coal — gallons/Ton	Burner Setting % Open	Aggregate TPH (at reading)	Recycle TPH (N/A)	Liquid Asphalt TPH	Mix Temp. °F	✓ Venturi / Baghouse Pressure Drop Inches Water
7:00am	1.7	54	168		2.3	307	4.1
7:15am	Down						
7:30am	Down						
7:45am	2.1	52	123		7.4	305	3.3
8:00am	1.5	55	185		11.1	305	3.2
8:15am	1.6	57	208		11.4	310	3.7
8:30am	1.6	53	205		11.3	303	3.7
8:45am	1.5	58	212		11.8	308	3.6
9:00am	1.6	59	211		11.8	309	3.7
9:15am	1.5	56	219		12.3	321	3.6
9:30am	1.4	51	230		8.4	318	3.7
9:45am	1.4	54	224		8.9	320	3.0
10:00am	1.4	52	227		9.6	315	3.6
10:15am	1.3	55	214		9.3	313	3.4
10:30am	1.6	38	156		6.4	322	3.5
10:45	Down						
11:00am	1.7	53	125		9.5	308	3.6
11:15am	1.6	57	200		10.9	301	4.3
11:30am	1.6	49	188		11.1	320	3.9
11:45am	1.6	54	183		8.3	324	3.5
12:00pm	1.5	54	199		8.6	314	3.1
12:15pm	1.5	55	200		8.6	313	3.0
12:30pm	1.5	52	188		8.6	308	3.9
12:45PM	1.5	42	191		8.6	310	3.0
1:00pm	1.6	57	201		11.2	313	3.7

Screen #1

Fraction #1

Screen #2

Fraction #2

Screen #3

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	✓ Fuel Oil #2 / Nat. Gas / Propane / Coal — Gallons Per TON	Burner Setting % Open	Aggregate TPH	None Recycle TPH	Liquid Asphalt TPH	Mix Temp. °F	Venturi / X Baghouse Pressure Drop Inches Water
11:15 AM	1.6	43	176		7.5	312°	2.1
11:30 AM	1.5	42	179		7.7	310	2.1

Finish of 3

V. EQUIPMENT USED

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 103°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 ballance. 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 REC08

(14)

SAMPLE ANALYTICAL DATA FORM

Plant Location Sheet Valley Materials 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 11/30/87 — Gross wt. 98.0638 mg

Date/Time wt. blank 12/1/87 — Gross wt. 98.0637 mg

Ave. Gross wt. 98.0638 mg

Tare wt. 98.0634 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: $W_a = C_a V_{aw} P_a$ = (.0000025)(200)(.7853) = (.0004)

		Run # 1	Run # 2	Run # 3
Acetone rinse volume (V_{aw})	ml	200	200	200
Date/Time of wt 11/30/87 1:15 pm Gross wt	g	131.1122	159.7440	159.0502
Date/Time of wt 12/1/87 9:25 am Gross wt	g	131.1119	159.7438	159.0500
Average Gross wt	g	131.1121	159.7439	159.0501
Tare wt	g	130.9913	159.6089	158.9162
Less acetone blank wt (W_a)	g	.0004	.0004	.0004
Wt. of particulate in acetone rinse (m_a)	g	.1204	.1346	.1335

Filter Numbers	#	CB-2260	AT-2267	KB-2323
Date/Time of wt 11/30/87 1:15 pm Gross wt	g	.5298	.5286	.5099
Date/Time of wt 12/1/87 9:25 am Gross wt	g	.5294	.5283	.5094
Average Gross wt.	g	.5296	.5285	.5097
Tare wt.	g	.5202	.5237	.5037

Weight of particulate on filters(s) (m_f)	g	.0094	.0048	.0060
Weight of particulate in acetone rinse	g	.1204	.1346	.1335
Total weight of particulate (m_n)	g	.1298	.1394	.1395

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 Signature of reviewer

VII. CALCULATIONS

NAME: GREAT VALLEY MATERIALS

LOCATION: DEVAULT, PENNSYLVANIA		date	11/13/87	11/13/87	11/13/8
	SUMMARY OF TEST DATA		RUN # 1	RUN # 2	RUN #
	SAMPLING TRAIN DATA	start	08:32	10:36	12:30
		finish	09:57	12:02	13:35
1	Sampling time, minutes	Θ	75	64 ?	60
2	Sampling nozzle diameter, in.	Dn	.380	.380	.380
3	Sampling nozzle cross-sectional area, ft^2	An	.000788	.000788	.000788
4	Isokinetic variation	I	100	102	100
5	Sample gas volume - meter conditions, cf.	Vm	61.09	60.11	55.05
6	Average meter temperature, °R	Tm	523	533	537
7	Average oriface pressure drop, in.H_2O	ΔH	1.33	1.55	1.57
8	Total particulate collected mg.	Mn	129.8	139.4	139.5
	VELOCITY TRAVERSE DATA				
9	Stack area, ft^2	A	13.9	13.9	13.9
10	Absolute stack gas pressure, in. Hg.	Ps	29.54	29.54	29.54
11	Barometric pressure, in. Hg.	Pbar	29.54	29.54	29.54
12	Average absolute stack temperature, °R	Ts	737	733	737
13	Average "$\sqrt{\text{velocity head}}$", (Cp= .80)	"$\sqrt{\Delta P}$	.49	.53	.53
14	Average stack gas velocity ft. / sec.	Vs	32	35	35
	STACK MOISTURE CONTENT				
15	Total water collected by train, ml.	Vic	400.0	335.0	322.0
16	Moisture in stack gas, %	Bws	23.3	20.8	21.7
	EMISSIONS DATA:				
17	Stack gas flow rate, dscf/hr. (000's)	Qsd	878	973	968
18	Total particulate concentration, gr/dscf	Cs	.0321	.0357	.0393
19	Total particulate concentration, lbs/hr	E	4.0	5.0	5.4
20	Total particulate concentration, lbs/mbtu	E'	.0000	.0000	.0000
	ORSAT DATA				
21	Percent CO2 by volume	CO2	3.5	5.5	3.0
22	Percent O2 by volume	O2	13.8	14.5	13.3
23	Percent CO by volume	CO	.0	.0	.0
24	Percent N2 by volume	N2	82.7	80.0	83.7

Buzzycalc

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 °R

T_{std} = Standard absolute temperature (528°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 # 1 $V_{m(std)} = 17.64 \; (1.02)(61.05) \left[\frac{(29.54) + \frac{1.33}{13.6}}{523}\right] = 62.29$ dsc

Run # 2 $V_{m(std)} = 17.64 \; (1.02)(60.11) \left[\frac{(29.54) + \frac{1.55}{13.6}}{533}\right] = 60.17$ dsc

Run # 3 $V_{m(std)} = 17.64 \; (1.02)(55.05) \left[\frac{(29.54) + \frac{1.57}{13.6}}{537}\right] = 54.70$ 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 # 1: $C_s' = \left[0.0154 \ \frac{gr}{mg} \right] \left[\frac{129.9}{62.29} \right] = .0321$ gr./dscf.

Run # 2: $C_s' = \left[0.0154 \ \frac{gr}{mg} \right] \left[\frac{139.4}{60.17} \right] = .0357$ gr./dscf.

Run # 3: $C_s' = \left[0.0154 \ \frac{gr}{mg} \right] \left[\frac{139.5}{54.70} \right] = .0393$ 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(3.5%) + 0.32(13.8%) + 0.28(.0% + 82.7%) = 29.1 lb./lb.-mole

Run # 2: M_d = 0.44(5.5%) + 0.32(14.5%) + 0.28(.0% + 80.0%) = 29.5 lb./lb.-mole

Run # 3: M_d = 0.44(3.0%) + 0.32(13.3%) + 0.28(.0% + 83.7%) = 29.0 lb./lb.-mole

Water vapor condensed :

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

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

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

p = 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 # 1:	$V_{wc(std)}$	= (0.04707) (386.0) =	18.2	cu.ft
	$V_{wsg(std)}$	= (0.04715) (14.0) =	.7	cu.ft
Run # 2:	$V_{wc(std)}$	= (0.04707) (324.0) =	15.3	cu.ft
	$V_{wsg(std)}$	= (0.04715) (11.0) =	.5	cu.ft
Run # 3:	$V_{wc(std)}$	= (0.04707) (307.0) =	14.5	cu.ft
	$V_{wsg(std)}$	= (0.04715) (15.0) =	.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: $B_{ws} = \dfrac{18.2 + .7}{18.2 + .7 + 62.29} \times 100 = 23.3\ \%$

Run # 2: $B_{ws} = \dfrac{15.3 + .5}{15.3 + .5 + 60.17} \times 100 = 20.8\ \%$

Run # 3: $B_{ws} = \dfrac{14.5 + .7}{14.5 + .7 + 54.70} \times 100 = 21.7\ \%$

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: $M_s = 29.1\ (1 - .233) + 18\ (.233) = 26.5$ (lb./lb.-mole).

Run # 2: $M_s = 29.5\ (1 - .208) + 18\ (.208) = 27.1$ (lb./lb.-mole).

Run # 3: $M_s = 29.0\ (1 - .217) + 18\ (.217) = 26.6$ (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 $\left[(g/g\text{-mole})\text{-}(mm\ Hg)\ /\ (^\circ K)(mm\ H_2O) \right]^{1/2}$

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 # 1: $V = (85.49)(\ .80)(\ .49)\sqrt{\dfrac{737}{(29.54)(26.51)}}$ = 32.35 ft/se

Run # 2: $V = (85.49)(\ .80)(\ .53)\sqrt{\dfrac{733}{(29.54)(27.11)}}$ = 34.51 ft/se

Run # 3: $V = (85.49)(\ .80)(\ .53)\sqrt{\dfrac{737}{(29.54)(26.61)}}$ = 34.93 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 (°f).

T_s = Absolute stack temperature, (°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:

$$Q_{sd} = 3600\ (1-.233)\ (32.35)\ (13.9) \left[\frac{528}{737}\right] \left[\frac{29.54}{29.92}\right] = 878218 \text{ dscf/}$$

Run # 2:

$$Q_{sd} = 3600\ (1-.208)\ (34.51)\ (13.9) \left[\frac{528}{733}\right] \left[\frac{29.54}{29.92}\right] = 972672 \text{ dscf/}$$

Run # 3:

$$Q_{sd} = 3600\ (1-.217)\ (34.92)\ (13.9) \left[\frac{528}{737}\right] \left[\frac{29.54}{29.92}\right] = 967762 \text{ dscf/}$$

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 # 1: $$E = \frac{(.0321)(878218)}{7000} = 4.0 \text{ lb./hr.}$$

Run # 2: $$E = \frac{(.0357)(972672)}{7000} = 5.0 \text{ lb./hr.}$$

Run # 3: $$E = \frac{(.0393)(967762)}{7000} = 5.4 \text{ lb./hr.}$$

$$\text{Isokinetic variation : } I = 100\ T_s \left[\frac{0.002669\ V_{ic} + (V_m/T_m)(P_{bar} + \Delta H/13.6)}{60\quad \Theta\quad V_s\quad P_s\quad A_n} \right]$$

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_2C
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:

$$I = 100 \times 737 \left[\frac{(0.002669)(400.0) + \frac{61.1}{523}\left[29.54 + \frac{1.33}{13.6}\right]}{60\ (\ 75\ )\ (\ 32.35\ )\ (29.54\ )\ (\ .000788\ )} \right] = 100\ \%$$

Run # 2:

$$I = 100 \times 733 \left[\frac{(0.002669)(335.0) + \frac{60.1}{533}\left[29.54 + \frac{1.55}{13.6}\right]}{60\ (\ 64\ )\ (\ 34.51\ )\ (29.54\ )\ (\ .000788\ )} \right] = 102\ \%$$

Run # 3:

$$I = 100 \times 737 \left[\frac{(0.002669)(322.0) + \frac{55.0}{537}\left[29.54 + \frac{1.57}{13.6}\right]}{60\ (\ 60\ )\ (\ 34.92\ )\ (29.54\ )\ (\ .000788\ )} \right] = 100\ \%$$

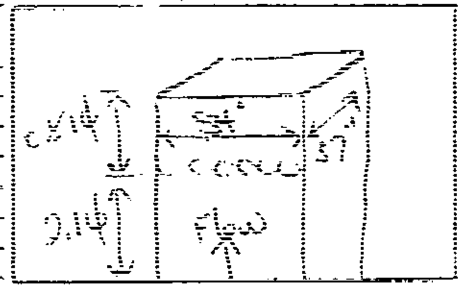
VIII. FIELD DATA

RAMCON ENVIRONMENTAL CORPORATION

Plant [illegible] Valley [illegible]

Location [illegible]
Operator [illegible]
Date [illegible]
Run No. 1
Sample Box No. 2
Meter Box No. [illegible]
Meter H @ 1.87
C Factor 1.03
Pitot Tube Coefficient Cp 0.796

M-5.39



Schematic of Stack Cross Section

Ambient Temperature 45°
Barometric Pressure [illegible]
Assumed Moisture, % [illegible]
Probe Length, m(ft) [illegible]
Nozzle Identification No. [illegible]
Avg. Calibrated Nozzle Dia., (in.) [illegible]
Probe Heater Setting 5
Leak Rate, m³/min. (cfm) [illegible]
Probe Liner Material [illegible] Stainless Steel
Static Pressure, mm Hg (in. Hg) [illegible]
Filter No. [illegible]

586	574
606	574
[illegible]	14

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_g) in H2O	PRESSURE DIFF. ORF. MTR in H2O	GAS SAMPLE VOLUME ft³	GAS SAMPLE TEMP. AT DRY GAS METER °F Inlet	Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
A1	~~8:32~~ 8:34	6	300	0.34	1.30	~~576.21~~ 577.73	50	48	255	40
2	8:37	15	266	0.37	1.65	579.84	55	50	255	40
3	8:39½	16	284	0.35	1.35	581.31	55	50	255	40
4	~~8:42~~ 8:47	12	270	0.36	1.50	583.47	55	50	240	40
5	8:44½	10	263	0.34	1.85	586.07	60	50	245	40
B1	~~8:52~~ 8:53	7	273	0.3[illegible]	1.30	588.01	65	50	240	40
2	8:55½	8	265	0.35	1.80	590.74	65	50	245	45
3	8:58	11	267	0.42	2.25	593.01	70	50	250	45
4	9:00½	11	267	0.37	2.00	595.36	70	50	250	45
5	9:03	8	288	0.23	1.35	597.62	70	50	255	45
C1	~~9:07~~ 9:06½	7	262	0.22	1.20	599.75	70	50	255	45
2	9:09	8	265	0.32	1.70	601.96	75	55	260	45
3	9:11½	8	267	0.36	1.95	604.39	75	55	260	45

O_2 = 13.5% CO_2 = 3.5%

Form #RMC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE [illegible] LOCATION [illegible], Pa 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)
4	9:14	9	288	0.33 .5745	1.86	606.66	75	55	260	45
5	9:16½	8	285	0.26 .5099	1.70	608.88	75	55	255	50
D1	9:19 / 9:20	7	272	0.27 .5196	1.75	611.04	75	55	255	50
2	9:22½	8	275	0.34 .5831	1.85	613.54	75	55	250	50
3	9:25	8	285	0.25 .5	1.35	615.47	80	55	250	50
4	9:27½	7	288	0.23 .4796	1.25	617.64	80	55	245	50
5	9:30	6	287	0.20 .4472	1.10	619.70	80	55	245	50
E1	9:32 / 9:33½	5	280	0.16 .4	0.88	621.22	75	60	245	55
2	9:36	6	282	0.24 .4899	1.30	623.34	80	60	245	55
3	9:38½	6	284	0.21 .4583	1.15	625.23	80	60	245	55
4	9:41	5	284	0.17 .4123	0.92	627.25	80	60	250	55
5	9:43½	4	282	0.12 .3464	0.65	628.84	80	60	250	55
F1	9:45 / 9:47½	4	276	0.15 .3873	0.81	630.46	75	60	245	55
2	9:50	5	280	0.17 .4123	0.92	631.99	80	60	245	55
3	9:52½	5	277	0.18 .4243	0.97	633.89	80	60	245	55
4	9:55	4	283	0.13 .3606	0.70	635.23	80	60	240	55
5	9:57½	3	280	0.10 .3162	0.54	636.60	80	60	240	55

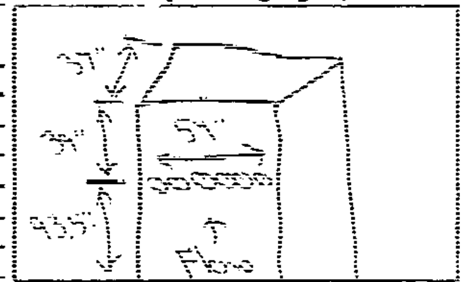
P. 143

RAMCON ENVIRONMENTAL CORPORATION

Plant [illegible]

M_i = 5.39

Location [illegible]
Operator [illegible]
Date [illegible]
Run No. 4
Sample Box No. 2
Meter Box No. [illegible] 700305
Meter H @ 1.97
C Factor 1.02
Pitot Tube Coefficient Cp 0.746



Schematic of Stack Cross Section

Ambient Temperature 55°
Barometric Pressure [illegible]
Assumed Moisture, % [illegible]
Probe Length, m(ft) [illegible]
Nozzle Identification No. [illegible]
Avg. Calibrated Nozzle Dia., (in.) [illegible]
Probe Heater Setting 5
Leak Rate, m^3/min,(cfm) 0.007
Probe Liner Material 316 Stainless Steel
Static Pressure, mm Hg (in.Hg) [illegible]
Filter No. [illegible]

TRAV. PT NO.	SAMPLING TIME (θ)min.	VACUUM in. Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (Ps) in H2O	PRESSURE DIFF. ORF. MTR in H2O	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
B1	[illegible]	8	268	0.37	2.00	[illegible]	70	65	240	45
2 *	[illegible]	6	276	0.32	1.80	641.25	70	65	240	45
3	10:55	7	278	0.29	1.55	643.15	75	65	245	45
4	10:57	7	260	0.24	1.30	645.07	80	65	250	45
5	11:00	9	268	0.39	2.10	647.24	80	65	250	45
B1	[illegible]	7	268	0.24	1.30	649.19	80	65	250	45
2	11:05	9	273	0.41	2.20	651.17	80	65	255	45
3	11:07	11	278	0.44	2.35	653.84	80	65	255	50
4	11:10	10	283	0.31	1.65	656.01	80	65	255	50
5	11:12	10	281	0.36	1.95	658.11	80	65	255	50
C1	[illegible]	6	277	0.26	1.10	659.98	80	65	255	50
2	11:17	7	283	0.33	1.75	661.88	80	65	260	50
3	11:19	9	284	0.35	1.90	664.10	80	65	260	50

* Plant Down

O_2 = 14.5%

CO_2 = 5.5%

Form #REC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 11/13/87 LOCATION [illegible] TEST NO. 2

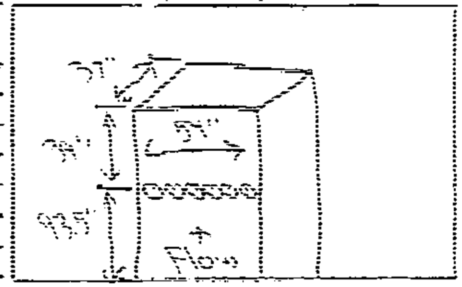
TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F) in	GAS SAMPLE TEMP. (°F) out	SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
4	11:32	10	286	0.33 .5745	1.80	666.18	85	65	260	55
5	11:33^30	9	285	0.30 .5477	1.60	668.19	85	65	255	55
B1	~~[illegible]~~	8	280	0.26 .5099	1.40	670.20	80	65	250	55
2	11:36	9	284	0.34 .5831	1.85	672.25	85	65	250	55
3	11:37^30	10	285	0.37 .6083	2.00	674.44	85	65	250	55
4	11:39^30	11	286	0.38 .6164	2.05	676.88	85	65	245	55
5	11:39^30	8	283	0.28 .5292	1.50	678.88	85	65	245	55
C1	~~[illegible]~~	6	276	0.19 .4359	1.00	680.74	80	65	240	55
2	11:42^30	8	278	0.29 .5385	1.55	682.67	85	65	240	55
3	11:44^30	9	285	0.35 .5916	1.90	684.77	85	65	235	55
4	11:47	8	285	0.25 .5	1.35	686.71	85	65	235	55
5	11:49^30	5	284	0.17 .4123	0.92	688.33	85	65	235	55
D1	~~[illegible]~~	5	256	0.18 .4243	0.97	689.97	80	65	240	55
2	11:55^30	6	254	0.21 .4583	1.15	691.77	85	65	240	55
3	11:57^30	7	278	0.25 .5	1.35	693.88	85	65	245	55
4	12:00	7	279	0.23 .4796	1.25 ~~1.45~~	695.54	85	65	245	55
5	12:02^30	5	280	0.15 .3873	0.81	697.11	85	65	250	55

P. 42

RAMCON ENVIRONMENTAL CORPORATION

M = 5.39

Plant: [illegible] Valley
Location: [illegible], Va.
Operator: [illegible]
Date: 11/13/87
Run No.: 3
Sample Box No.: 2
Meter Box No.: [illegible]
Meter H @: 1.51
C Factor: 1.02
Pitot Tube Coefficient Cp: 0.746



Schematic of Stack Cross Section

Ambient Temperature	60°		
Barometric Pressure	28.54	507	540
Assumed Moisture, %	[illegible]	308	523
Probe Length, m(ft)	[illegible]	307	15

Nozzle Identification No.: 0.3830 [illegible]
Avg. Calibrated Nozzle Dia., (in.): .383 .383 .383
Probe Heater Setting: 5
Leak Rate, m^3/min. (cfm): <0.015 @ 11 in.
Probe Liner Material: 316 Stainless Steel
Static Pressure, mm Hg (in. Hg): -0.06 [illegible]
Filter No.: HH-2323

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H2O	PRESSURE DIFF. ORF. MTR in H2O	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
A) 1	~~12:30~~ 12:32	7	285	0.35 .5917	1.70	~~699.75~~ 699.43	70	70	245	45
2	12:34	8	275	0.40 .6325	2.15	701.76	80	70	245	45
3	12:36	10	279	0.44 .6633	2.35	703.52	85	70	250	45
4	12:38	9	280	0.34 .5831	1.85	705.60	85	70	250	45
5	12:40	7	279	0.22 .4690	1.20	707.15	85	70	250	45
B) 1	~~12:42~~ 12:43	7	272	0.26 .5099	1.40	709.22	80	65	250	50
2	12:45	8	282	0.39 .6245	2.10	711.21	85	65	255	50
3	12:47	10	282	0.43 .6557	2.30	713.39	85	65	255	50
4	12:49	9	283	0.34 .5831	1.85	715.47	85	65	255	50
5	12:51	6	283	0.21 .4583	1.15	717.11	85	65	250	50
C) 1	~~12:53~~ 12:54	4	278	0.17 .4123	0.92	718.54	80	65	250	50
2	12:56	6	283	0.25 .5	1.35	720.24	85	65	250	50
3	12:58	8	286	0.36 .6	1.45	722.27	85	65	255	50

O_2 = 13.5% CO_2 = 3.8
" = 13.5% " = 3.8

Form #REC-05

Form #REC-05

RAMCON emissions test log sheet, cont. DATE 11/13/87 LOCATION Dunold ?? 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)	ORIFICE 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)
4	13:00	8	286	0.32 5667	1.70	724.07	85	70	255	56
5	13:02	6	287	0.30 4474	1.10	725.82	85	70	260	55
6/1	~~13:04~~ 13:05	7	286	0.27 5174	1.45	727.87	80	65	255	55
2	13:07	7	282	0.29 5375	1.55	729.46	85	70	255	55
3	13:09	9	286	0.36 6164	2.05	731.44	85	70	250	55
4	13:11	7	286	0.24 4779	1.30	733.31	85	70	250	55
5	13:13	6	286	0.21 4573	1.15	734.94	85	70	245	55
6/1	~~13:15~~ 13:16	7	277	0.31 5568	1.65	736.90	85	70	245	55
2	13:18	7	279	0.26 5472	1.50	738.54	85	70	245	55
3	13:20	8	281	0.34 5881	1.85	740.49	85	70	240	55
4	13:22	7	281	0.30 5477	1.60	742.36	90	70	240	60
5	13:24	6	282	0.23 4796	1.25	744.02	90	70	240	60
6/1	~~13:26~~ 13:27	6	254	0.22 4769	1.20	745.74	85	65	235	60
2	13:29	7	265	0.30 5477	1.60	747.64	85	70	235	60
3	13:31	8	270	0.33 5745	1.80	749.53	90	70	230	60
4	13:33	6 8	274	0.21 4493	1.15	751.27	90	70	230	60
5	13:35	4	273	0.15 3873	0.81	752.55	90	70	225	60

IX. CALIBRATIONS

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number 1 Date 11-30-87 Meter box number C-282 Plant ______

Barometric pressure, P_b = 30.01 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 (t_d)[a], °F	Time (Θ), min	Vacuum setting, in. Hg	Y_i	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	10	9.65	78	78	82	80	14.00	5	1.017	1.11
1	10	10.06	78	83	88	85.5	14.11	5	1.006	1.12
1	10	10.07	77	65	92	86.5	14.13	5	1.009	1.11
									Y = 1.011	

[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 $\pm 0.05Y$.

P_b = Barometric pressure, in. Hg.

Θ = Time of calibration run, min.

Quality Assurance Handbook M4-2.4A

Form #REC-01

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number ________ Date 11-6-87 Meter box number C-282 Plant ________

Barometric pressure, P_b = 29.96 in. Hg . Dry gas meter number 702025 Pretest Y 1.011

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: $\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	10	10.01	76	85	89	87	14.20	5	1.012	1.12
1	10	10.20	76	86	96	91	14.25	5	1.005	1.12
1	10	10.16	76	96	99	97.5	14.21	5	1.010	1.11
									Y = 1.01	1.12

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

other

Reference point number[a]	Source[b] (specify)	Reference Thermometer Temperature, °C, °F	Thermocouple Potentiometer Temperature, °C, °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
	11-3-87	95 °F	95 °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 °C °F Barometric pressure 30.52 in. Hg

Calibrator CMH Reference: mercury-in-glass ✓

other

Reference point number[a]	Source[b] (specify)	Reference Thermometer Temperature, °C °F	Thermocouple Potentiometer Temperature, °C °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
	11-3-87	45 °F	45 °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 °C, °F Barometric pressure 30.56 in. Hg

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

other

Reference point number[a]	Source[b] (specify)	Reference Thermometer Temperature, °C, °F	Thermocouple Potentiometer Temperature, °C, °F	Temperature Difference,[c] %
A	Ice bath	35	35	0
B	Oven	150	150	0
C	Oven	175	175	0
D	Ambient	85	~~84~~ 85	0
	11-3-87	95	95	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

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. 93 Date 9-5-87

Calibrated by: [illegible]

"A" SIDE CALIBRATION [illegible]

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	0.35	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	0.35	0.54	0.782	-0.014
		$\bar{C}_p$ (SIDE B)	0.796	

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

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

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

Form No. EED-17-1

RAMCON

Lear Siegler Stack Sampler

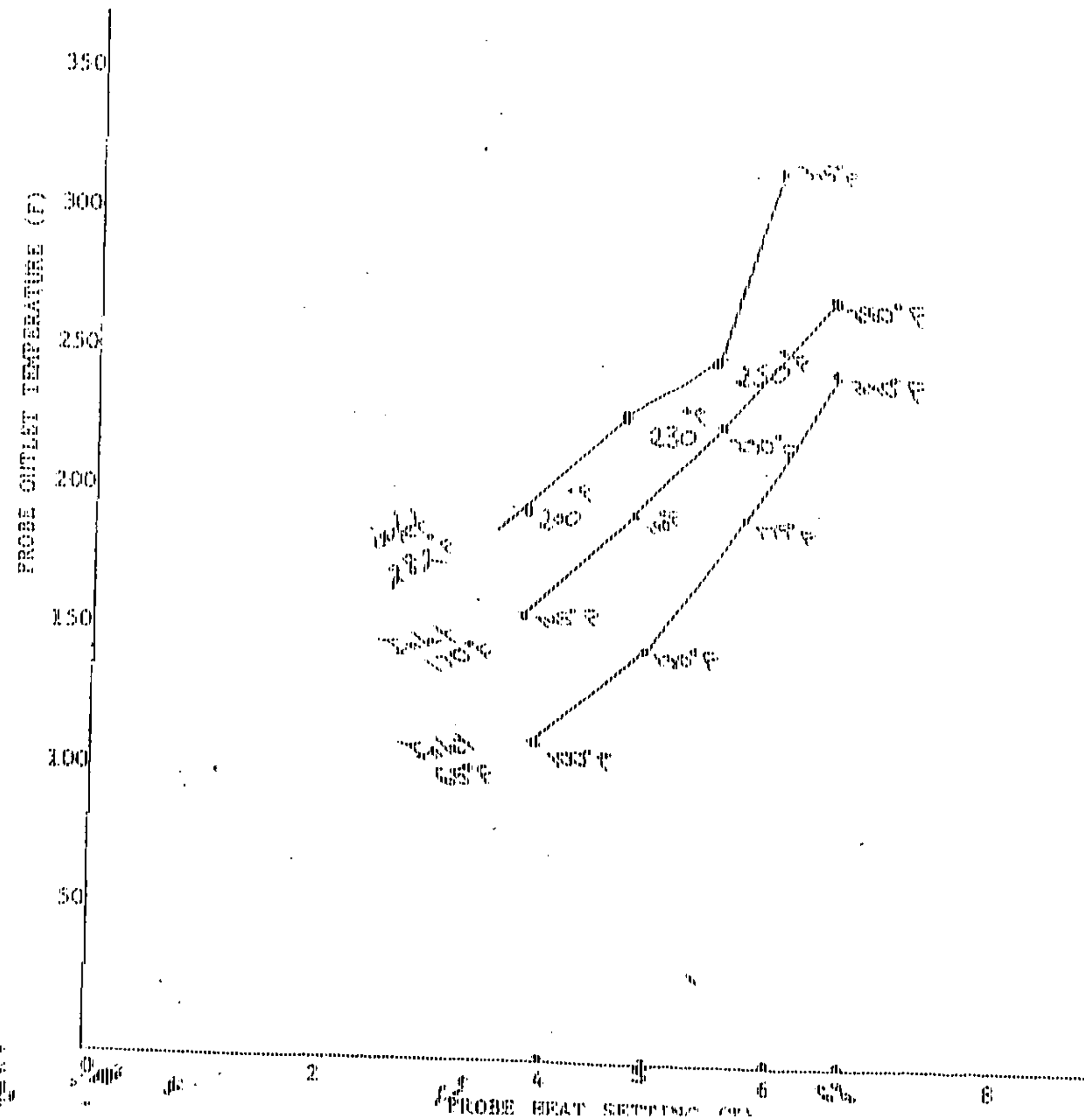
Heating Probe Calibration

Probe No. ________ Probe Length ________

Date of Calibration ________ Signature ________

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. RAMCOR 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

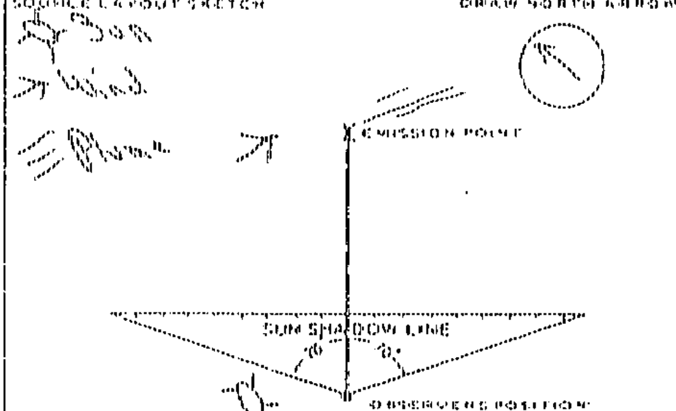
Cameron Mitchell has been employed by RAMCON for several years. He has undergone extensive training in Methods 1 through 9. He is qualified as a team leader and has personally sampled over 250 stacks including over 200 asphalt plants. He is currently certified as a V.E. reader. He recently graduated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

XI. VISIBLE EMISSIONS

(39)

SOURCE NAME		
[illegible]		
ADDRESS		
CITY: [illegible]	STATE: [illegible]	ZIP
PHONE	SOURCE ID NUMBER	
PROCESS EQUIPMENT: [illegible] Asphalt Plant	OPERATING MODE	
CONTROL EQUIPMENT	OPERATING MODE	
DESCRIBE EMISSION POINT: [illegible]		
HEIGHT ABOVE GROUND LEVEL: [illegible]	HEIGHT RELATIVE TO OBSERVER: 37 ft.	
DISTANCE FROM OBSERVER: [illegible]	DIRECTION FROM OBSERVER: [illegible]	
DESCRIBE EMISSIONS: [illegible]		
EMISSION COLOR: White	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: [illegible]		
DESCRIBE BACKGROUND: Sky		
BACKGROUND COLOR: Blue	SKY CONDITIONS: [illegible]	
WIND SPEED: 0-10 mph	WIND DIRECTION: West	
AMBIENT TEMPERATURE: 45°	RELATIVE HUMIDITY: 45%	

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



COMMENTS: [illegible]

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE | DATE

OBSERVATION DATE: [illegible] | START TIME: [illegible] | STOP TIME: [illegible]

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

AVERAGE OPACITY FOR HIGHEST PERIOD: 3.75%

NUMBER OF READINGS ABOVE 3.75% WERE 35

RANGE OF OPACITY READINGS: 0% MINIMUM 10% MAXIMUM

OBSERVER'S NAME (PRINT): [illegible]

OBSERVER'S SIGNATURE: [illegible] | DATE: [illegible]

ORGANIZATION: [illegible] Environmental

CERTIFIED BY: [illegible] | DATE: [illegible]

VERIFIED BY | DATE

RBCF 14

SOURCE NAME	[illegible]
ADDRESS	
CITY	[illegible]
STATE	[illegible]
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	[illegible]
OPERATING MODE	
CONTROL EQUIPMENT	[illegible]
OPERATING MODE	
DESCRIBE EMISSION POINT	[illegible]
HEIGHT ABOVE GROUND LEVEL	[illegible]
HEIGHT RELATIVE TO OBSERVER	[illegible]
DISTANCE FROM OBSERVER	[illegible]
DIRECTION FROM OBSERVER	[illegible]
DESCRIBE EMISSIONS	[illegible]
EMISSION COLOR	[illegible]
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	[illegible]
DESCRIBE BACKGROUND	[illegible]
BACKGROUND COLOR	[illegible]
SKY CONDITIONS	[illegible]
WIND SPEED	[illegible]
WIND DIRECTION	[illegible]
AMBIENT TEMPERATURE	[illegible]
RELATIVE HUMIDITY	[illegible]

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW

EMISSION POINT

SUN SHADOW LINE

OBSERVER'S POSITION

COMMENTS: [illegible]

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE — DATE

OBSERVATION DATE: [illegible] — START TIME: [illegible] — STOP TIME: [illegible]

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	5	5	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	5	0	0
6	0	5	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	5	0	0
9	5	0	0	0	39	0	0	0	0
10	0	5	0	5	40	0	0	0	0
11	0	0	5	5	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	5	44	0	5	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	5	0	0
17	5	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	5	5	0
20	0	0	0	0	50	0	0	0	0
21	0	0	5	0	51	0	0	0	5
22	0	0	0	0	52	0	5	0	5
23	0	0	0	0	53	0	0	0	0
24	0	5	0	0	54	0	0	0	0
25	0	0	0	0	55	0	5	0	0
26	5	0	0	0	56	0	0	0	0
27	0	0	5	0	57	5	0	0	0
28	0	5	0	0	58	0	0	0	0
29	0	0	0	0	59	5	0	0	0
30	0	0	0	5	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: [illegible]

NUMBER OF READINGS ABOVE [illegible] WERE [illegible]

RANGE OF OPACITY READINGS: 0% MINIMUM 5% MAXIMUM

OBSERVER'S NAME (PRINT): [illegible]

OBSERVER'S SIGNATURE: [illegible] — DATE: [illegible]

ORGANIZATION: [illegible]

CERTIFIED BY: [illegible] — DATE: [illegible]

VERIFIED BY — DATE

REC#14

SOURCE NAME	[illegible] Asphalt
ADDRESS	
CITY	[illegible]
STATE	[illegible]
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	[illegible]
OPERATING MODE	
CONTROL EQUIPMENT	[illegible]
OPERATING MODE	
DESCRIBE EMISSION POINT	[illegible]
HEIGHT ABOVE GROUND LEVEL	25 ft.
HEIGHT RELATIVE TO OBSERVER	25 ft.
DISTANCE FROM OBSERVER	250 ft.
DIRECTION FROM OBSERVER	[illegible]
DESCRIBE EMISSIONS	[illegible]
EMISSION COLOR	White
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	Continuous
WATER DROPLETS PRESENT: NO ☐ YES ☐	Yes
IS WATER DROPLET PLUME ATTACHED ☐ DETACHED ☐	Attached
AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED	[illegible] 50' [illegible]
DESCRIBE BACKGROUND	Sky
BACKGROUND COLOR	[illegible]
SKY CONDITIONS	[illegible]
WIND SPEED	0-5 mph
WIND DIRECTION	[illegible]
AMBIENT TEMPERATURE	65
RELATIVE HUMIDITY	50%

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW

X EMISSION POINT

SUN SHADOW LINE

OBSERVER'S POSITION

COMMENTS

[illegible]

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE — DATE

OBSERVATION DATE: [illegible]

START TIME: [illegible]

STOP TIME: [illegible]

MIN \ SEC	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	5	0	0
6	0	0	0	0
7	0	0	0	0
8	0	5	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	5	5	0
15	0	5	0	0
16	0	0	0	0
17	0	0	0	0
18	5	0	0	0
19	0	0	5	0
20	0	0	0	0
21	0	5	0	0
22	0	0	0	0
23	0	0	0	5
24	0	0	0	0
25	0	5	0	0
26	0	0	0	0
27	0	0	0	0
28	5	0	0	0
29	0	0	0	0
30	0	0	5	0

MIN \ SEC	0	15	30	45
31	0	0	0	0
32	0	5	0	0
33	0	0	0	0
34	0	5	0	5
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	5	0	0
40	0	0	0	0
41	0	0	5	0
42	0	0	0	0
43	5	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	5	0	0
47	0	0	0	0
48	0	0	0	0
49	0	5	0	5
50	0	0	0	0
51	0	0	0	0
52	0	0	5	0
53	0	0	0	0
54	5	0	0	5
55	0	5	0	0
56	0	0	0	0
57	0	5	0	0
58	0	0	0	0
59	0	0	0	0
60	5	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: [illegible]

NUMBER OF READINGS ABOVE [illegible] WERE [illegible]

RANGE OF OPACITY READINGS: 0% MINIMUM 5% MAXIMUM

OBSERVER'S NAME (PRINT): [illegible]

OBSERVER'S SIGNATURE: [illegible] DATE: [illegible]

ORGANIZATION: [illegible]

CERTIFIED BY: [illegible] DATE: [illegible]

VERIFIED BY: DATE:

(42)

TENNESSEE AIR POLLUTION CONTROL SMOKE SCHOOL TRAINING FORM

NAME Shawn R. [illegible] RUN# 1 SUNGLASSES no

COMPANY [illegible] COURSE LOCATION [illegible]

DATE [illegible] SKY [illegible] WIND [illegible] DISTANCE & DIRECTION TO STACK 20'

READING #

READING #																						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 7.8

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

I hereby certify that the above readings are my own. DEVIATION 3.0

PH-0458
APC 8/81

Commonwealth of Pennsylvania
Environmental Resources
April 29, 1988

Subject: Source Test Review

To: Data File
Great Valley Materials, Inc.
Charlestown Township, Chester County

From: John S. Pitulski
Air Quality Program Specialist
Division of Technical Services and Monitoring
Bureau of Air Quality Control

Through: Chief, Source Testing and Monitoring Section

Great Valley Materials, Inc. operates a drum mix asphalt production facility at the aforementioned location. The plant is fired by No. 2 fuel oil and has a rated production capacity of 300 tons per hour. The operation is controlled by a Standard Havens baghouse collector system.

On November 13, 1987, particulate compliance testing was conducted by Ramcon Environmental Corporation at the exhaust stack servicing the baghouse. A laboratory analysis of the back-half of the sampling train for determination of soluble and insoluble particulate matter was not conducted. As the particulate concentrations for all three test runs were not calculated using the insoluble back-half portion of the sample as specified in the Department of Environmental Resources' Source Test Manual, the test results cannot be accepted.

The following data was extracted from the test report:

Test Run Number	1	2	3
Production Rate During Test (tons/hr)	217	178	189
Weight of Particulate Collected (grams)*	.1298	.1394	.1395
Mass Emission Rate (lb/hr)*	4.0	5.0	5.4
Particulate Concentration (gr/dscf)*	.0321	.0357	.0393
Allowable Particulate Concentration (gr/dscf)	.04	.04	.04

* Calculated excluding back-half insoluble particulate.

STD-801 1-84

COMMONWEALTH OF PENNSYLVANIA
Reading District Office
8-468-4175
March 29, 1988

SUBJECT: Stack Test:
Great Valley Materials, Inc.
Charlestown Township, Chester County
File 15-303-012

TO: L. BLAINE DeHAVEN, Chief
Source Testing & Monitoring Section
Division of Technical Services & Monitoring

→ 17th Floor Fulton Bldg.

FROM: ROGER A. FITTERLING
Air Pollution Control Engineer

Technical Services personnel are requested to review the attached stack test report to determine compliance with the requirements of Chapter 139. Sampling for particulate and visible emissions from the company's drum mix asphalt plant was conducted on November 13, 1987 by representatives of Ramcon Environmental Corporation. The source is covered by Plan Approval No. 15-303-012, and issuance of an Operating Permit will be based upon the acceptability of the test.

Attachments

cc: Norristown Regional Office
Central Office
File 15-303-012
Re30 BF29.2