Commonwealth of Pennsylvania
Environmental Resources
October 17, 1990

Subject: Source Test Review

To: Data File
Commercial Stone Company, Inc.
Asphaltic Concrete Plant - Springfield Pike
Connellsville Township, Fayette 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

The asphaltic concrete plant at Commercial Stone Company's Springfield Pike facility is a batch-mix design with a rated capacity of 300 tons per hour. The burners servicing the unit are fired by No. 2 fuel oil. Effluent gases from the plant are controlled by a knock-out box and fabric filter collector both manufactured by McCarter Corporation.

Particulate emission testing was conducted at the source on August 24, 1990 by Comprehensive Safety Compliance, Inc. The three tests appear to have been conducted in accordance with all applicable test methods and are acceptable to the Department.

The following data was extracted from the test report:

Test Run Number	1	2	3
Asphalt Production Rate (tons/hour)	287.9	297.2	241.0
Volumetric Flowrate (dscfm)	24,500	25,300	26,000
Particulate Concentration (gr/dscf)	0.010	0.011	0.012
Particulate Emission Rate (lb/hr)	2.1	2.3	2.7
Allowable Emission Rate (lb/hr)	17.4	17.6	16.1

cc: Mr. Richard L. Murray - Greensburg District Office
Mr. Joseph Pezze - Pittsburgh Regional Office
Permit File No. 26-303-006
EPA/RSL
Reading File-Stack Test
Douglas Lesher

JSP:bad

PARTICULATE EMISSION TESTING
ASPHALT PLANT BAGHOUSE
SPRINGFIELD PIKE QUARRY
COMMERCIAL STONE
CONNELLSVILLE, PA

Report to:

Mr. Ted Dinardo
Commercial Stone Inc.
2200 Springfield Pike
Connellsville, PA 15425

Report by:

Mr. Richard L. Campbell
Division Manager

Comprehensive Safety Compliance, Inc.
295 William Pitt Way
Pittsburgh, PA 15238

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TABLE OF CONTENTS

APPENDIX

1.0 INTRODUCTION

On August 24, 1990, particulate emission testing and opacity observations were performed on the Asphalt Plant Baghouse at Commercial Stone Company's Springfield Pike plant in Connellsville, PA.

The test program was authorized by Ms. Leah Trielle of Commercial Stone Company. Testing was performed by Mr. Richard Campbell, Mr. Darren Midberry and visible emission readings by Mr. Kevin Kennedy of Comprehensive Safety Compliance, Inc. (CSC). Testing was observed by Mr. Tim Kunz and Mr. Dick Murray of the Pennsylvania Department of Environmental Resources Air Pollution Control Bureau.

2.0 SUMMARY OF RESULTS

Table No. 1 below is a summary of Particulate Emission Data and Opacity Data from tests on the Sand Plant Baghouse.

Table No. 2 is a summary of flue gas parameters.

TABLE NO. 1

Particulate Emissions and Opacity Data

Test Data 1990	Test No.	Test Location	Particulate Emission Data: Conc.[a] Gr/dscf	Emission Rate[b] lb/hr.	Allowable lb/hr	Opacity Data[c]: Min. %	Max. %	Highest 6 min. Avg. %
8/24	SA-1	Baghouse Outlet	0.010	2.1	17.4	0	0	0
8/24	SA-2	Baghouse Outlet	0.011	2.3	17.6	0	0	0
8/24	SA-3	Baghouse Outlet	0.012	2.7	16.1	0	0	0

(a) Grains per dry standard cubic foot
(b) Pounds per hour
(c) Opacity data from EPA Method 9 observations

TABLE NO. 2

Summary of Flue Gas Parameters

Test Date 1990	Test No.	Test Location	Percent Moisture	Stack Temp. °F	Percent		Flow Rates	
					CO_2[a]	O_2[b]	ACFM[c]	DSCFM[d]
8/24	SA-1	Baghouse Outlet	15.0	274	5.9	13.1	41,500	24,500
8/24	SA-2	Baghouse Outlet	16.5	276	5.4	14.0	43,600	25,300
8/24	SA-3	Baghouse Outlet	16.9	252	5.0	14.2	43,500	26,000

a percent carbon dioxide by volume
b percent oxygen by volume
c actual cubic feet per minute
d dry standard cubic feet per minute

3.0 PROCESS AND TEST PROGRAM DESCRIPTION

Process Description

The Commercial Stone plant at Springfield Pike has an Asphalt plant manufactured by the McCarter Corporation. The process begins with the loading of different sized aggregate from stockpiles, usually into four "cold" bins. From these cold bins calibrated vibratory feeders control the amounts of each aggregate falling onto a conveyor that leads to the inlet of the dryer. The function of the dryer is to remove surface moisture and heat the aggregate in order to be coated with asphalt cement in the pugmill. The dryer is an inclined rotary drum, 108 inches in diameter and 34 feet long, in which the aggregate is dried and heated by a natural gas burner. The dryer is designed with "flights" on the inside that tumble the aggregate and increase exposure to the hot gases. The burner is located at the aggregate discharge or low end of the dryer; therefore, the combustion gases flow counter current to aggregate flow. The effluent gases from the dryer are directed to a primary cyclone and a fabric filter secondary collector. The plant is rated for production of 350 tons/hr. A schematic of the process is shown in Figure No.1. Production data is provided in Table No. 3.

Emission Control System

Emissions from the plant are controlled by a McCarter Model McC-756-5 baghouse. The baghouse has 756 nine foot bags. The bag material is NOMEX. Control System Process Data is provided in Appendix D.

Test Program Description

Testing was conducted on the Particulate Emissions from the Asphalt Plant Baghouse. The sampling location is shown in Figure No. 2 Sample duration was 72 minutes for all three tests.

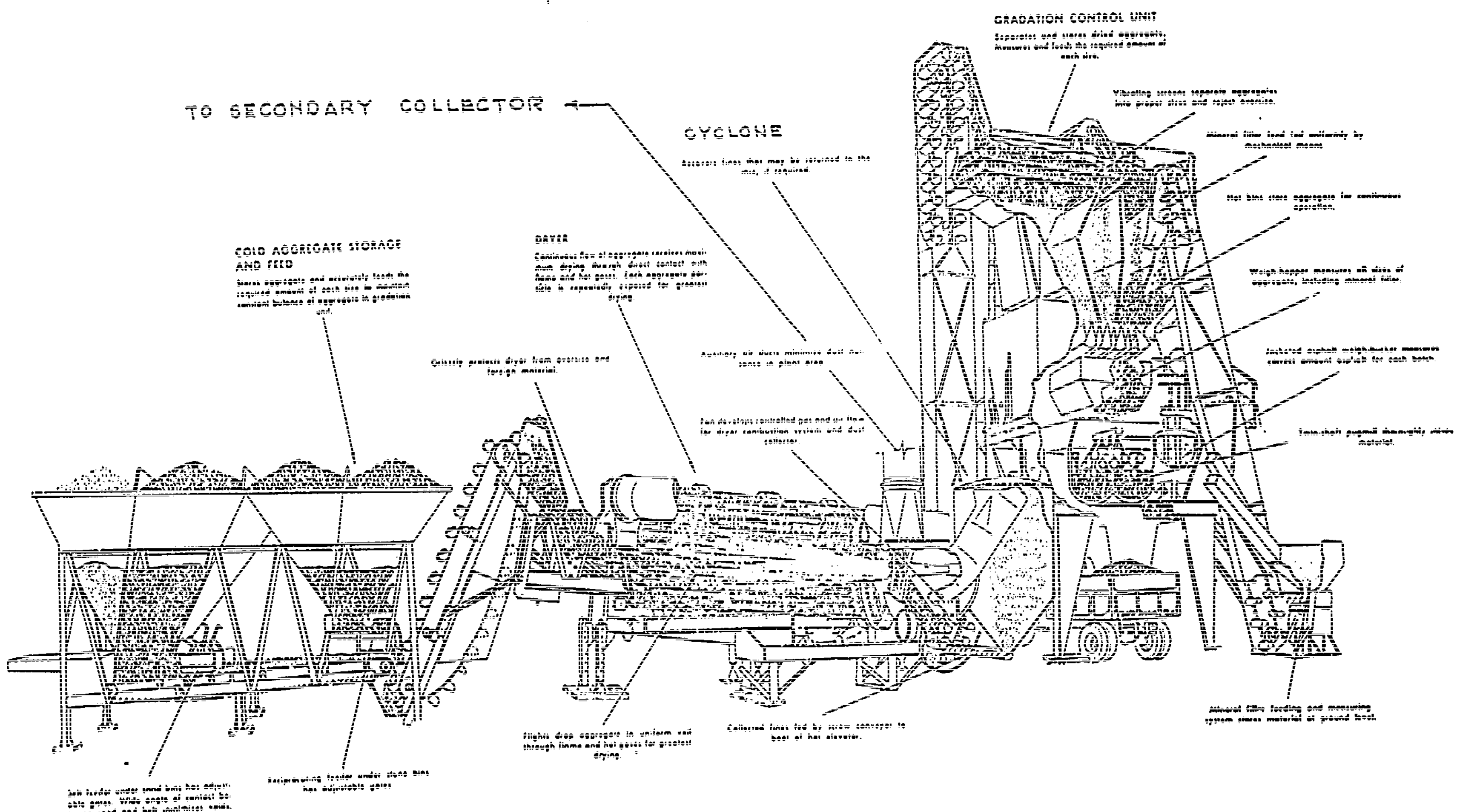
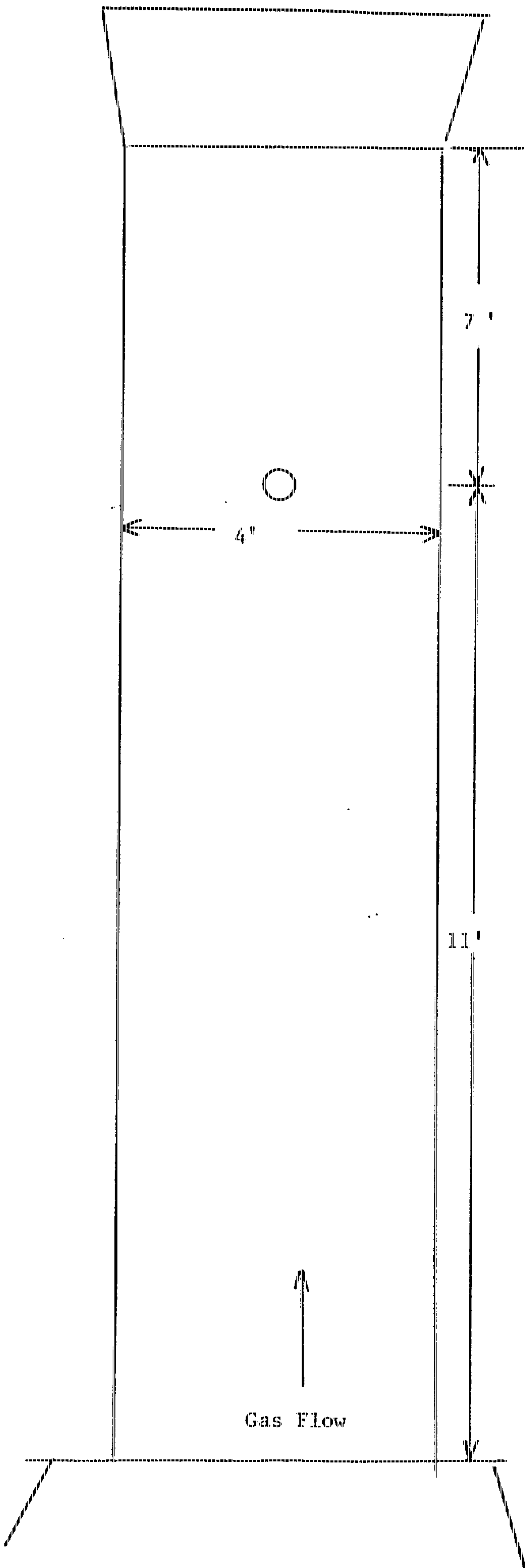


Figure No. 1

Process Schematic



Sample Point Location

Point No.	Percent of Diameter	Point Location Inches
1	2.1	1.0
2	6.7	3.2
3	11.8	5.7
4	17.7	8.5
5	25.0	12.0
6	35.6	17.1
7	64.4	30.9
8	75.0	36.0
9	82.3	39.5
10	88.2	42.3
11	93.3	44.8
12	97.9	47.0

Circular Duct

2 sample ports 90° apart
12 points per port
24 total sample points

FIGURE NO. 2

Commercial Stone Asphalt Plant
Sampling Location

TABEL NO. 3

Process Production

Springfield Pike Asphalt Plant

DATE 1990	TEST NO	AVERAGE PRODUCTION RATE TONS/HR
8/24	SA-1	287.9
8/24	SA-2	297.2
8/24	SA-3	241.0

Additional process data is provided in Appendix D.

Method 5 Sampling Procedures

After selecting the sampling site and the minimum number of traverse points, the stack pressure, temperature, moisture and range of velocity head were measured according to the procedures described in the Federal Register*.

Approximately 200 grams of silica gel was weighed in a sealed impinger prior to each test. Glass fiber filters** (4 inch diameter) desiccated for at least 24 hours, dried at 105°C for 2 hours and weighed to the nearest 0.1mg. on an analytical balance. One hundred ml of distilled water was placed in each of the first two impingers; the third impinger was initially empty; and the impinger containing the silica gel was placed next in series. The sampling train was leak-checked at the sampling site prior to each test run by plugging the inlet to the nozzle and pulling 15-inch Hg vacuum, at the conclusion of the test by plugging the inlet to the nozzle and pulling a vacuum equal to the highest vacuum reached during the test run. A more detailed description of the sampling and analytical procedures is provided in Appendix B.

*Federal Register, CFR 40, Part 60, July 1, 1989.

A. FORMULAS AND CALCULATIONS

NOMENCLATURE AND DIMENSIONS

A_s = cross-sectional area of stack, ft^2

A_n = area of sampling nozzle, ft^2

B_{ws} = proportional by volume of water vapor in the gas stream, dimensionless

C_p = pitot tube coefficient, diamensionless = .84

C_s = concentration of particulate matter in stack gas, gr/scf,dry basis

%CO = percent of carbon monoxide by volume, dry basis

$\%CO^2$ = percent of carbon dioxide by volume, dry basis

H = average pressure drop across the orifice meter, inches of H_2O

I = percent of isokinetic sampling

M_d = dry molecular weight, lb/lb-mole

M_n = total amount of particulate matter collected, mg.

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

$\%N_2$ = percent of nitrogen by volume, dry basis

$\%O_2$ = percent of oxygen by volume, dry basis

p = velocity head of stack gas, inches of H_2O

P_{bar} = barometric pressure, inches of Hg

P_s = absolute stack gas pressure, inches of Hg

pmr = particulate matter emission rate, lbs/hr

Q_s = volumetric flow rate, wet basis, standard conditions

$Q_{s\,std}$ = volumetric flow rate, dry basis, standard

T_m = average temperature of dry gas meter, °R

T_s = average temperature of stack gas, °R

V_{l_c} = total volume of liquid collected in impingers and silica gel, ml.

V_m = volume of sample through the dry gas meter at meter conditions, ft^3

$V_{m_{std}}$ = volume of gas sample through the dry gas meter at standard conditions, ft^3

V_s = stack gas velocity at stack conditions, fps

$V_{w_{std}}$ = volume of water in the gas sample at standard conditions, ft^3

θ = total sampling time, minutes

Note: Standard conditions = $70^{\circ}F$ and 29.92 inches of Hg.

Example Calculations for Particulate Emissions

Test No. SA-1

1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a.)

$$V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m} \right] =$$

$$V_{m_{std}} = 17.65 \times 55.603 \times (.995) \left[\frac{28.9 + \frac{1.4}{13.6}}{559} \right] = 50.664$$

2. Volume of water vapor at standard conditions, ft^3.

$$V_{w_{std}} = 0.04707 V_{1_c} =$$

$$V_{w_{std}} = 0.04707 \times 190.5 = 8.97$$

3. Moisture content in stack gas.

$$B_{ws} = \frac{V_{wc_{std}}}{V_{m_{std}} + V_{wc_{std}}} = B_{ws} = \frac{8.97}{50.664 + 8.97} = .150$$

4. Dry molecular weight of stack gas.

$$M_d = 0.440 (\% CO_2) + 0.320 (\% O_2) + 0.280 (\% N_2 + \% CO) =$$

$$M_d = 0.440 (5.9) + 0.32 (13.1) + 0.280 (81) = 29.47$$

5. Molecular weight of stack gas

$$M_s = M_d (1 - B_{ws}) + 18 B_{ws} =$$

$$M_s = 29.47 (1 - .150) + 18(.150) = 27.75$$

6. Stack velocity at stack conditions, fps

$$V_s = 85.49 \times C_p \times \sqrt{\Delta p \text{ avg.}} \times \sqrt{\frac{T_s}{P_s M_s}} =$$

$$V_s = 85.49 \times .84 \times (.801) \times \sqrt{\frac{734}{28.95 \times 27.75}} = 54.98$$

7. Stack gas volumetric flow rate at stack conditions, cfh

$$Q_s = 3600 \times V_s \times A_s$$

$$Q_s = 60 \times 54.98 \times 12.57 = 41{,}466 \text{ ACFM}$$

8. Dry stack gas volumetric flow rate at standard conditions, cfh.

$$Q_{s_{std}} = 17.65\ Q_s \frac{P_s}{T_s} (1 - B_{ws}) = \text{SCFM} \times 60 = \text{SCFH}$$

$$Q_{std} = 17.65 \times 41{,}466 \times \frac{28.95}{734} \times (1 - .15) = 24{,}536 \times 60 = 1{,}472{,}160 \text{ SCFH}$$

9. Concentration in g/scf

$$C'_s = 0.001 \text{ g/mg} \frac{M_n}{V_{m_{std}}} = 0.001 \times \frac{33.4}{50.664} = 0.00066$$

$$0.00066 \times 15.43 = 0.010 \text{ gr/dscf}$$

10. Particulate mass emission rate, lbs/hr.

$$\text{pmr} = \frac{C_s \times Q_{s_{std}}}{454} = \frac{0.00066 \times 1{,}472{,}160}{454} = 2.1 \text{ lb/hr}$$

11. Isokinetic variation

$$I = \frac{100\ T_s \left[0.002669\ V_{1_C} + \frac{V_m}{T_m}\ Y\ P_{bar} + \frac{H}{13.6} \right]}{60\ \theta\ V_s\ P_s\ A_n} =$$

$$I = \frac{100\ (734)\ [0.002669(190.5) + \frac{55.603}{559}\ (.995)\ (28.9 + \frac{1.4}{13.6})]}{60 \times 72 \times 54.98 \times 28.95 \times .000327} = 110.3\%$$

Example Calculations for Particulate Emissions

Test No. SA-2

1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a.)

$$V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right] =$$

$$V_{m_{std}} = 17.65 \times 56.245 \times (.995) \left[\frac{28.9 + \frac{1.6}{13.6}}{564}\right] = 50.820$$

2. Volume of water vapor at standard conditions, ft^3.

$$V_{w_{std}} = 0.04707 V_{1_c} =$$

$$V_{w_{std}} = 0.04707 \times 203.9 = 9.597$$

3. Moisture content in stack gas.

$$B_{ws} = \frac{V_{wc\ std}}{V_{m_{std}} + V_{wc_{std}}} = B_{ws_{std}} = \frac{9.597}{50.820 + 9.597} = .165$$

4. Dry molecular weight of stack gas.

$$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%O_2) + 0.280\ (\%\ N_2 + \%\ CO) =$$

$$M_d = 0.440\ (5.4) + 0.32\ (14.0) + 0.280\ (80.6) = 29.42$$

5. Molecular weight of stack gas

$$M_s = M_d\ (1-B_{ws}) + 18\ B_{ws} =$$

$$M_s = 29.42\ (1-.165) + 18(.165) = 27.53$$

6. Stack velocity at stack conditions, fps

$$V_s = 85.49 \times C_p \times \sqrt{\Delta p\ avg.} \times \sqrt{\frac{T_s}{P_s\ M_s}} =$$

$$V_s = 85.49 \times .84 \times (.837) \times \sqrt{\frac{736}{28.95 \times 27.53}} = 57.76$$

7. Stack gas volumetric flow rate at stack conditions, cfh

$$Q_s = 3600 \times V_s \times A_s$$

$$Q_s = 60 \times 57.76 \times 12.57 = 43{,}562 \text{ ACFM}$$

8. Dry stack gas volumetric flow rate at standard conditions, cfh.

$$Q_{s_{std}} = 17.65\ Q_s \frac{P_s}{T_s} (1-B_{ws}) = \text{SCFM} \times 60 = \text{SCFH}$$

$$Q_{std} = 17.65 \times 43{,}562 \times \frac{28.95}{736} \times (1-.165) = 25{,}253 \times 60 = 1{,}515{,}180$$

9. Concentration in g/scf

$$C'_s = 0.001 \text{ g/mg} \frac{M_n}{V_{m_{std}}} = 0.001 \times \frac{34.9}{50.820} = .00069$$

$$.00069 \times 15.43 = 0.011 \text{ gr/dscf}$$

10. Particulate mass emission rate, lbs/hr.

$$pmr = \frac{C_s \times Q_{s_{std}}}{454} = \frac{.00069 \times 1{,}515{,}180}{454} = 2.3 \text{ lb/hr}$$

11. Isokinetic variation

$$I = \frac{100\ T_s \left[0.002669\ V_{l_c} + \frac{V_m}{T_m}\ Y\ P_{bar} + \frac{H}{13.6}\right]}{60\ \theta\ V_s\ P_s\ A_n} =$$

$$I = \frac{100\ (736)\ \ 0.002669(203.9) + \frac{56.245}{564}\ (.995)\ (28.9 + \frac{1.6}{13.6})]}{60 \times 72 \times 57.76 \times 28.95 \times .000327} = 106.7$$

Example Calculations for Particulate Emissions

Test No. SA-3

1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a.)

$$V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right] =$$

$$V_{m_{std}} = 17.65 \times 57.120 \times (.995) \left[\frac{28.9 + \frac{1.8}{13.6}}{570}\right] = 51.093$$

2. Volume of water vapor at standard conditions, ft^3.

$$V_{w_{std}} = 0.04707 V_{l_c} =$$

$$V_{w_{std}} = 0.04707 \times 221.5 = 10.426$$

3. Moisture content in stack gas.

$$B_{ws} = \frac{V_{wc\ std}}{V_{m_{std}} + V_{wc_{std}}} = B_{ws} = \frac{10.426}{51.093 + 10.426} = .169$$

4. Dry molecular weight of stack gas.

$$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%O_2) + 0.280\ (\%\ N_2 + \%\ CO) =$$

$$M_d = 0.440\ (5.0) + 0.320\ (14.2) + 0.280\ (80.8) = 29.37$$

5. Molecular weight of stack gas

$$M_s = M_d\ (1-B_{ws}) + 18\ B_{ws} =$$

$$M_s = 29.37\ (1-.169) + 18(.169) = 27.45$$

6. Stack velocity at stack conditions, fps

$$V_s = 85.49 \times C_p \times \sqrt{\Delta p\ avg.} \times \sqrt{\frac{T_s}{P_s\ M_s}} =$$

$$V_s = 85.49 \times .84 \times (.848) \times \sqrt{\frac{712}{28.95 \times 27.45}} = 57.64$$

7. Stack gas volumetric flow rate at stack conditions, cfh

$$Q_s = 3600 \times V_s \times A_s$$

$$Q_s = 60 \times 57.64 \times 12.57 = 43{,}472 \text{ ACFM}$$

8. Dry stack gas volumetric flow rate at standard conditions, cfh.

$$Q_{s_{std}} = 17.65\ Q_s \frac{P_s}{T_s} (1-B_{ws}) = \text{SCFM} \times 60 = \text{SCFH}$$

$$Q_{std} = 17.65 \times 43{,}472 \times \frac{28.95}{712} \times (1-.165) = 26{,}050 \times 60 = 1{,}563{,}000$$

9. Concentration in g/scf

$$C'_s = 0.001 \text{ g/mg} \frac{M_n}{V_{m_{std}}} = 0.001 \times \frac{40.1}{51.093} = 0.00078$$

$$0.00078 \times 15.43 = 0.012 \text{ gr/dscf}$$

10. Particulate mass emission rate, lbs/hr.

$$\text{pmr} = \frac{C_s \times Q_{s_{std}}}{454} = \frac{0.00078 \times 1{,}563{,}000}{454} = 2.7 \text{ lb/hr}$$

11. Isokinetic variation

$$I = \frac{100\ T_s \left[0.002669\ V_{1_c} + \frac{V_m}{T_m}\ Y \left(P_{bar} + \frac{H}{13.6} \right) \right]}{60\ \theta\ V_s\ P_s\ A_n} =$$

$$I = \frac{100\ (712)\ [0.002669(221.5) + \frac{57.120}{570}\ (.995)\ (28.9 + \frac{1.8}{13.6})]}{60 \times 72 \times 57.64 \times 28.95 \times .000327} = 105.3$$

Formula,

$A = 0.76E^{0.42}$, where:
A = Allowable emissions in pounds per hour
E = Emission index = F x W pounds per hour
E = Process factor in pounds per unit, and
W = Production or charging rate in units per hour
F = 6 lbs/ton
W = Tons/hr

Test No.1

$A = 0.76\ (6 \times 287.9)^{0.42} = 17.4$ lbs/hr

Test No. 2

$A = 0.76\ (6 \times 297.2)^{0.42} = 17.6$ lbs/hr

Test No. 3

$A = 0.76\ (6 \times 241.0)^{0.42} = 16.1$ lbs/hr

B. SAMPLING METHODOLOGY & EQUIPMENT CALIBRATION

SAMPLE AND VELOCITY TRAVERSES FOR STATIONARY SOURCES
EPA METHOD 1

The following method was used in this test program. Sampling procedures follow those described in EPA Method 1 of the Federal Register*.

SELECTION OF THE MEASUREMENT SITE

The velocity measurement were taken at (**) stack (or duct) diameters downstream and (**) diameters upstream from any flow disturbances.

CHOOSING THE NUMBER OF TRAVERSE POINTS (non-Cyclonic flow)

Particulate Traverse Sampling

At least twelve (12) traverse points were sampled for circular (or rectangular) stack diameters greater than .61 meters. At least eight (8) traverse points were sampled for circular stacks and nine (9) points for rectangular stacks for equivalent diameters for .30 to .61 meters. For other stack diameters, Figure 1-1 was referred to.

Non-Particulate Traverse Sampling

The above procedure was used except that Figure 1-2 is substituted for Figure 1-1.

CROSS SECTIONAL TRAVERSE POINT LOCATIONS

The traverse points were located on two (2) perpendicular diameters. For particulate traverse samples, on of the above diameters was positioned in the plane containing the greatest concentration variation.

Circular Stacks

EPA Method 1, Figure 1-3 and Table 1-2 was referred to.

Rectangular Stacks

Using Figure 1-4 and Table 1-1 a rectangular grid, sectioned into as many equal areas as there are traverse points, was constructed. A sample was taken at the center of each elemental area in the grid.

No traverse points were located within 2.5 centimeters of the stack wall for stack diameters greater than .61 meters. For stack diameters equal to or less than .61 meters, no traverse points were located within 1.3 centimeters. For both of the above cases, where the sample nozzle inside diameter was greater than the adjusted distances, the larger distance was used.

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*Federal Register, CFR 40, Part 60, July 1, 1989
** Check sampling location schematic included.

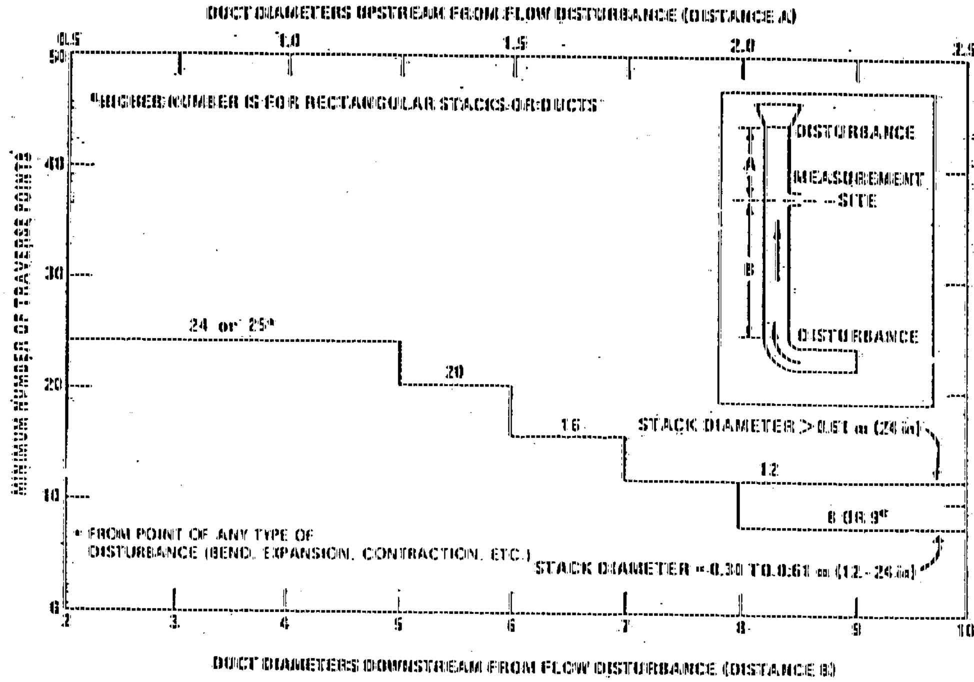


Figure 1-2. Minimum number of traverse points for particulate traverses.

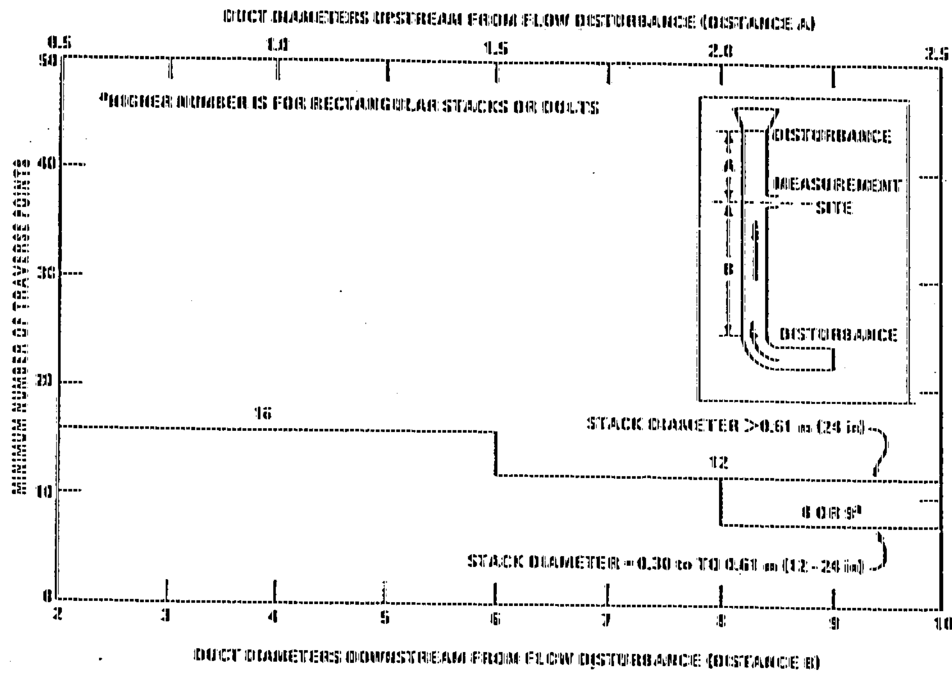


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[Percent of stack diameter from inside wall to traverse point]

Traverse point number on a diameter	Number of traverse points on a diameter—											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.0	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

TRAVERSE POINT	DISTANCE, % of diameter
1	4.4
2	14.6
3	29.6
4	70.4
5	85.4
6	95.6

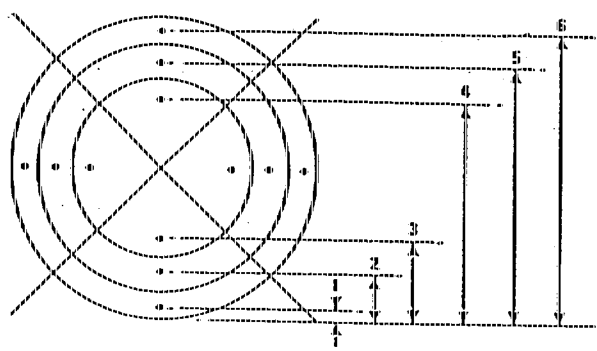


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

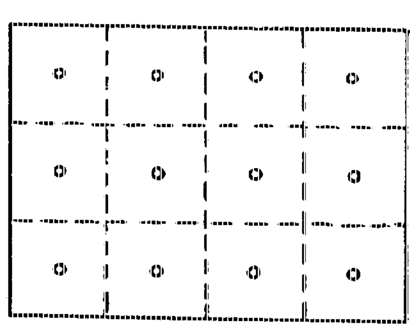


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

Verification of the Absence of Cyclonic Flow through Stacks

For any stack where there existed a possibility of cyclonic flow, a test for the presence of cyclonic flow was performed using a manometer and Type S pitot tube.

The manometer was leveled and zeroed before the pitot tube was connected to the probe and positioned at each traverse point. The pitot tube was rotated (if necessary) until a null reading was obtained. All rotation angles were assigned absolute values. When no rotation was necessary, a value of 0 degrees was assigned. The values were summed, and the resultant angle called alpha ( ). Twenty (20 degrees was the limit of acceptability of the measurement locations for the average value of alpha with a Standard Deviation of ten (10) degrees or less.

A minimum of 24 traverse points for circular ducts and 42 points for rectangular ducts were used in the determination of gas flow angles. When the absence of cyclonic gas flow was verified, these same points were used to obtain velocity measurements.

EPA METHOD 2

DETERMINE OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE
EPA METHOD 2

The average velocity in a stack (or duct) was determined from the gas' density and average velocity head with a Type S pitot tube and stack gas flow was quantified.

SAMPLING APPARATUS

The apparatus consisted of the following equipment:

Pitot Tube - Type S pitot tube that meet all geometry standards was used to monitor stack gas velocity.

Draft Gauge - An inclined manometer made by Dwyer with readability of 0.01 inches H_2O in the 0-1 inch range was used.

Temperature Gauge - Included a thermocouple and digital readout capable of measuring temperatures to within 1.5% of the minimum stack temperatures.

Barometer - A barometer capable of measuring atmospheric pressure to within 2.5 mm Hg.

Gas Density Determination Equipment - Fyrite analyzer.

SAMPLING PROCEDURE

The apparatus was set up as illustrated in Figure 1.

The pretest leak-check was conducted for both the impact and static openings of the Pitot tube.

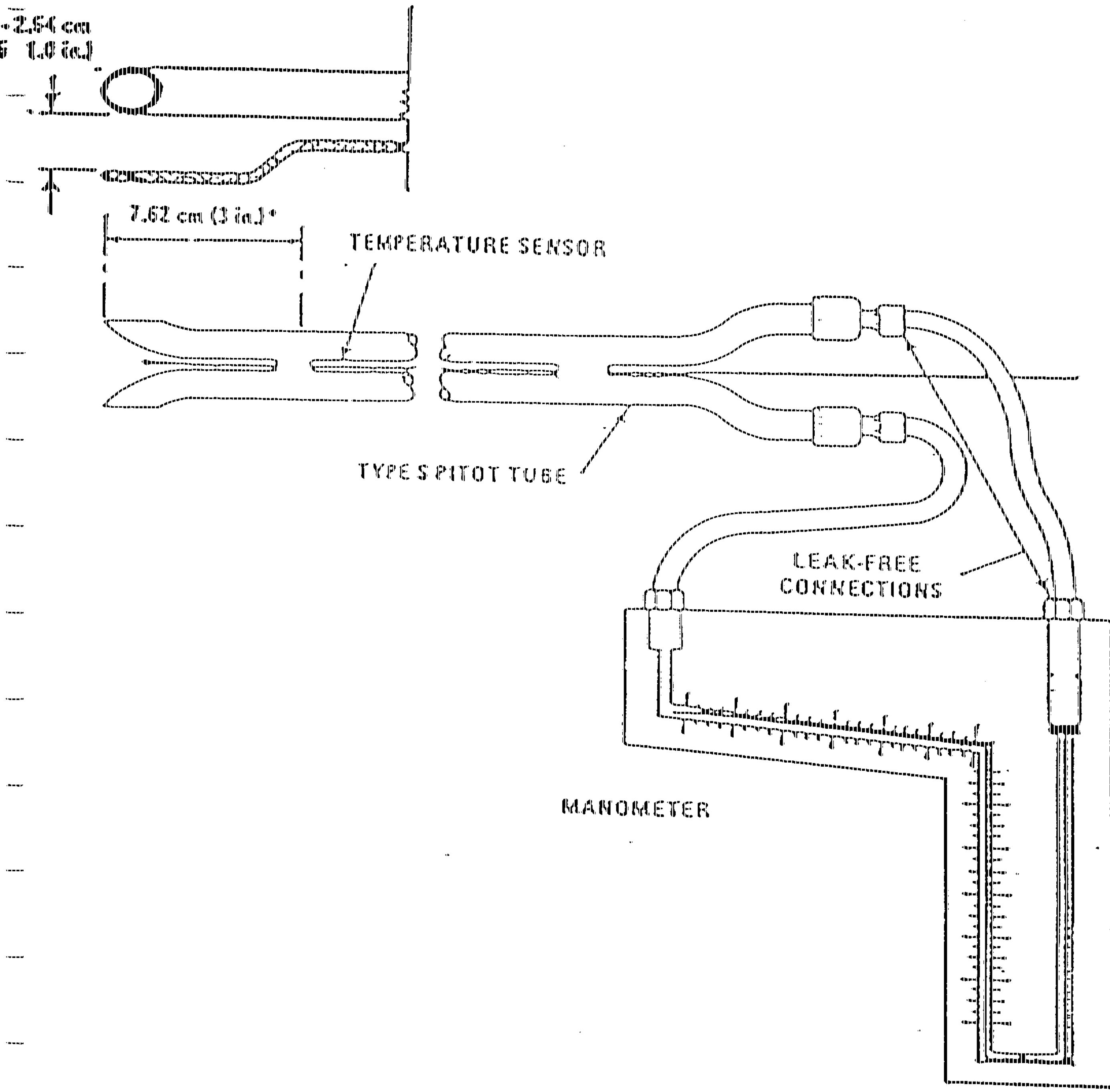
After adjusting the manometer level and zero, the velocity head and temperature were measured for each traverse point and recorded on the data sheet.

In addition, the static pressure in the stack was measured and the atmospheric pressure recorded.

The stack gas dry molecular weight was determined using EPA Method 3.

The moisture content was obtained using either EPA Method 4 or EPA Method 5.

The cross sectional area of the stack (or duct) at the sampling location was measured and recorded.



EPA Method 2

Flow Measurement System

EPA METHOD 3

GAS ANALYSIS FOR CARBON DIOXIDE, OXYGEN, EXCESS AIR & DRY

GAS ANALYSIS FOR CARBON DIOXIDE, OXYGEN, EXCESS AIR AND DRY MOLECULAR WEIGHT

EPA METHOD 3

The following method was used in this test program. Sampling procedures followed those described in EPA Method 3 of the Federal Register*.

SAMPLING APPARATUS

The gas analysis sampling train used in these tests at the exit stack meet the design specifications established by the Federal EPA and was assembled by Comprehensive Safety Compliance, Inc. (CSC) personnel.

The apparatus consisted of the following:

INTEGRATE SAMPLING: APPARATUS

PROBE - A stainless steel probe equipped with an in-stack or out-stack glass wool filter to remove particulate matter.

PUMP - A leak-free, diaphragm-type pump to transport sample gas to the flexible bag.

CONDENSER - A water-cooled condenser to remove excess moisture.

VALVE - A needle valve to adjust the sample flow rate.

SURGE TANK - A surge tank installed between the pump and rate meter to eliminate the pulsation effect of the diaphragm pump on the rate meter.

RATE METER - A rotameter capable of measuring flow rates to within ± 2% of a flow range of 500 to 1000 cubic centimeters per minute.

ORSAT ANALYZER - This combustible gas analyzer was used to determine dry molecular weight (DMW) for O_2, CO_2 and CO.

*Federal Register, CFR 40, Part 60, July 1, 1989

INTEGRATED SAMPLING

The sample train was set up as shown in Figure No. 1.

For single point sampling the sample point location was at the center of the cross-section or at least 1 meter away from the stack wall. The analyzer leak test was performed, and the flexible bag as well as the sample train was also leak tested.

For multi-point sampling at least eight traverse points were sampled in circular stacks with diameters less than .61 meters (9 points for rectangular stacks of .61 meter equivalent diameter). At least twelve points were sampled for all other cases.

Traverse point location was performed; with respect to EPA Method 1. All points were traversed and sampled for an equal length of time.

After positioning the probe and purging the sample line, the sample bag was connected to the train.

The sample was taken at a constant rate. The run was simultaneous will the lasted the total duration of the pollutant emission rate determination.

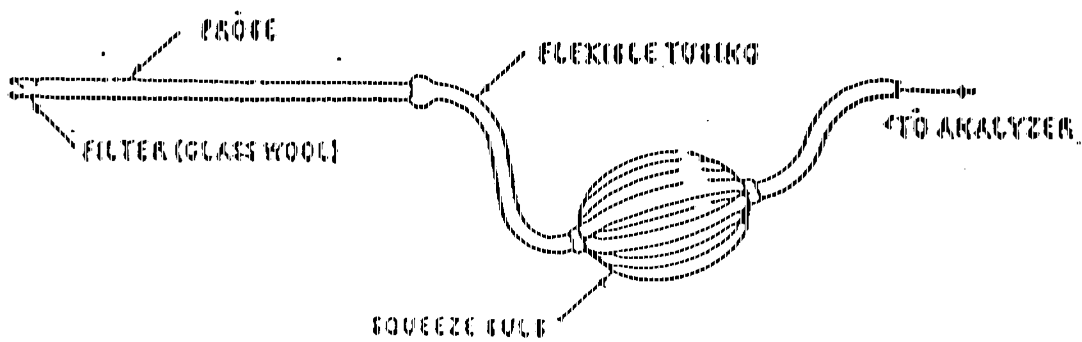
One flue gas sample was taken for each pollutant emission rate determination. Within eight hours the samples were analyzed for % CO_2 and O_2. The % N_2 and CO were determined and the dry molecular weight was calculated.

SAMPLE ANALYSIS

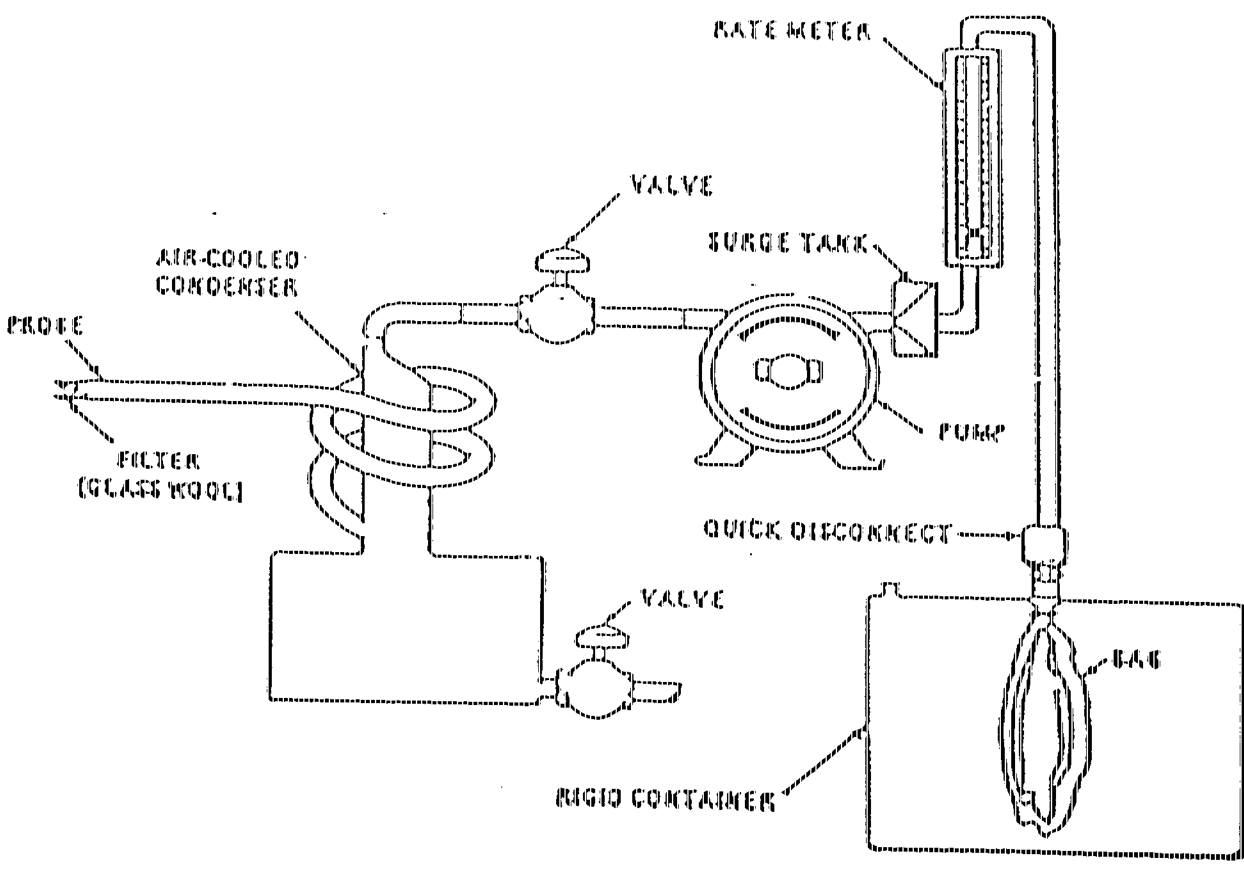
After a sample was drawn into a combustible gas analyzer, it was immediately analyzed for percent CO_2 and O_2. The percentage of the gas that is N_2 and Co was determined by subtracting the sum of the percents CO_2 and O_2 from 100 percent.

During sample analysis for a given gas, consecutive passes through the analyzer absorbing solutions were made until two consecutive readings were obtained. All values were averaged and recorded to the nearest 0.1%.

The analyzer was leak-tested before and after the analyses was performed.



Grab-sampling train.



EPA Method 3

Gas Composition Sampling Train

CO_2 ANALYSIS

The results of three analyses differ by no more than:

a) .3% volume when the CO_2 was greater than 4% of the total gas volume.

b) .2% volume when CO_2 was less than or equal to 4% of the total gas volume.

O_2 ANALYSIS

The analytical procedure was repeated until the results of three analyses differ by no more than:

a) .3% volume when O_2 was less than or equal to 15% of total gas volume.

b) .2% by volume when O_2 was greater than or equal to 15% of total gas volume.

CO AND N_2 ANALYSIS

For percent CO and N_2, the analytical procedure was repeated until three analyses differ by no more than .3%.

DETERMINATION OF THE DRY MOLECULAR WEIGHT

The DMW of each sample was determined using the following formula:

$$DMW = 0.440\ (\%\ CO_2) + .322\ (\%\ O_2) + .280\ (\%\ N_2 + \%\ CO)$$

EMISSION RATE CORRECTION FACTOR OR EXCESS AIR DETERMINATION

An EPA approved combustible gas analyzer was used to determine the excess air content in the stack emissions.

For single point and grab samples, the values obtained for % O_2, CO and N_2 were substituted in the following equation to determine the % excess air:

$$\%\ EA = \frac{\%\ O_2 - .5\%\ CO}{.264\%\ N_2 - (\%\ O_2 - .5\%\ CO)}\ X\ 100\%$$

The fuel factor, F, calculated as follows:

$$F = \frac{20.9 - \%O_2}{\%CO_2}$$

*20.9 = The percent of O_2 by volume in ambient air.

SAMPLING PROCEDURE

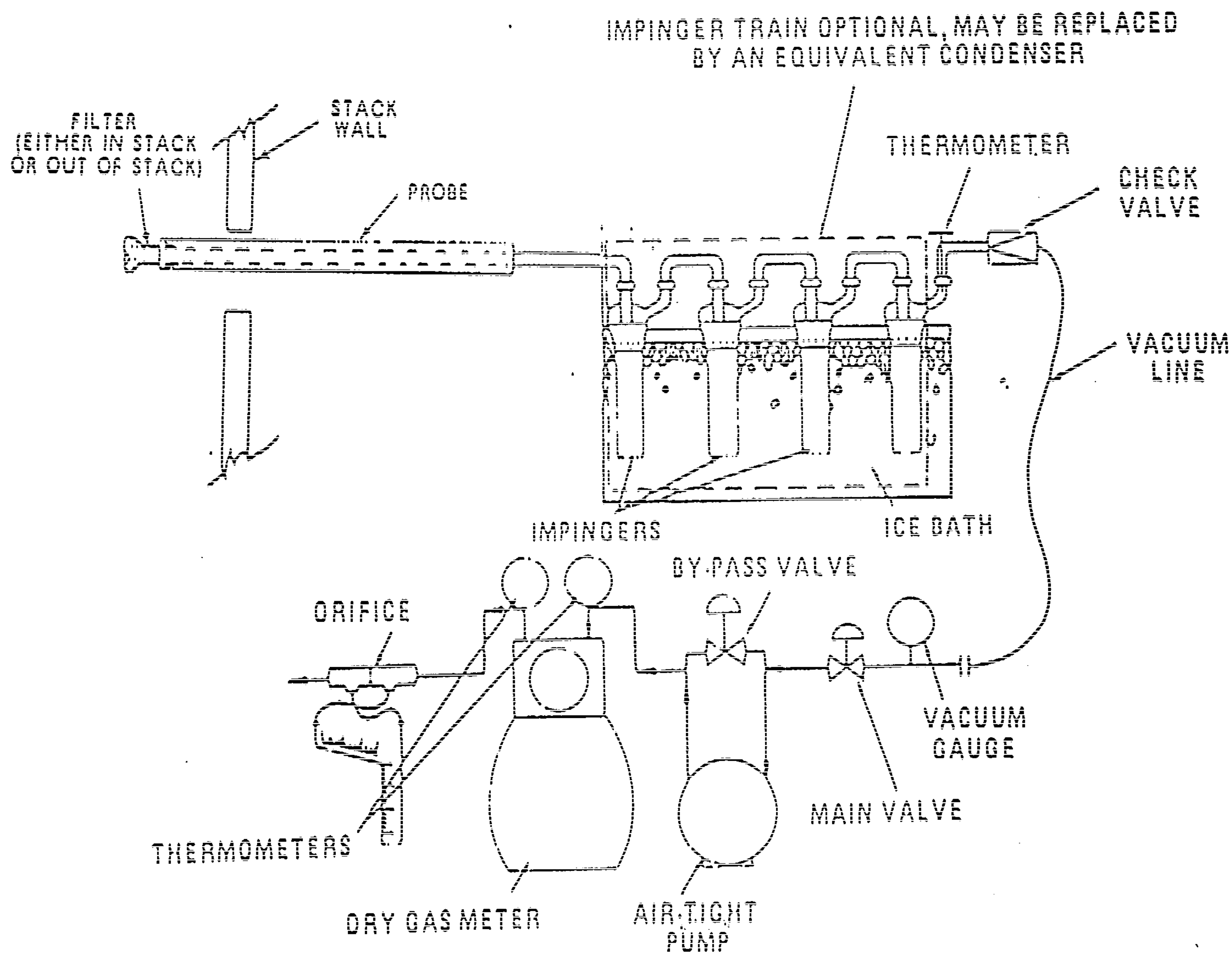
After selecting the sampling site and the minimum number of traverse points, the stack pressure and temperature was measured according to the procedures described in the Federal Register*.

Approximately 200 grams of silica gel were weighed in a sealed impinger prior to each test. One-hundred m:l of distilled water was placed in each of the first two impingers; the third impinger was initially empty; and the impinger containing the silica gel was placed next in series. The train was set up with the probe as shown in Figure A-1. The sampling train was leak-checked at the sampling site prior to each test run by plugging the inlet to the nozzle and pulling a 15 inch Hg vacuum, and at the conclusion of the test by plugging the inlet to the nozzle and pulling a vacuum equal to the highest vacuum reached during the test run.

Crushed ice was placed around the impingers to keep the temperature of the gases leaving the last impinger at 68 F or less.

During sampling, stack gas and sampling train data were recorded at each sampling point and when significant changes in stack flow conditions occur. All sampling data were recorded on the Field Data Sheet.

*Federal Register, CFR 40, Part 60, July 1, 1989



Moisture sampling train-reference method.

SAMPLE RECOVERY PROCEDURE

The sampling train was moved carefully from the test site to the cleanup area. Sample fractions were recovered as follows:

1. The volume of water from the first three impingers was measured and recorded on the Recovery Data Sheet.

2. The silica gel from the fourth impinger was weighed and the gain recorded on the Sample Recovery Data Sheet with other pertinent data.

EPA METHOD 5

DETERMINATION OF PARTICULATE EMISSIONS

DETERMINATION OF PARTICULATE EMISSIONS
EPA METHOD 5

The following method was used in this test program. Sampling procedures followed those described in Method 5 of the Federal Register*.

SAMPLING APPARATUS

The particulate sampling train used in these tests at the exit stack met design specifications established by the Federal EPA and was assembled by Comprehensive Safety Compliance, Inc. (CSC) personnel. It consisted of:

Nozzle - Stainless steel (316) with sharp, tapered leading edge and accurately measured round opening.

Probe - Glass lined with a heating system capable of maintaining a minimum gas temperature of 250 F at the exit end during sampling.

Filter Holder - Pyrex glass with heating system capable of maintaining a filter temperature of approximately 250 F.

Draft Gauge - An inclined manometer made by Dwyer with readability of 0.01 inches H_2O in the 0-1 inch range was used.

Impingers - Four impingers connected in series with glass ball joints. The first, third and fourth impingers were of the Greensburg-Smith design, modified by replacing the tip with a 1/2 inch I.D. glass tube extending to 1/2 inch from the bottom of the flask.

Metering System - Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 5 , calibrated dry gas meter, and related equipment, to maintain an isokinetic sampling rate and to determine sample volume. The dry gas meter is made by Rockwell and the fiber vane pump is made by Gast.

Barometer - Aneroid type to measure atmospheric pressures to $\pm$0.1 inch Hg.

*Federal Register, CFR 40, Part 60, July 1, 1989

SAMPLING PROCEDURE

After selecting the sampling site and the minimum number of traverse points, the sack pressure, temperature, moisture and range of velocity head were measured according to the procedures described in the Federal Register*.

Approximately 200 grams of silica gel was weighed in a sealed impinger prior to each test. Glass fiber filters** (4 inch diameter) were desiccated for at least 24 hours, dried at 105 C for 2 hours and weighed to the nearest 0.1 mg on an analytical balance. One hundred ml of distilled water was placed in each of the first two impingers; the third impinger was initially empty; and the impinger containing the silica gel was placed next in series. The train was set up with the probe as shown in Figure A-1. The sampling train was leak-checked at the sampling site prior to each test run by plugging the inlet to the nozzle and pulling 15 inch Hg vacuum, and at the conclusion of the test by plugging the inlet to the nozzle and pulling a vacuum equal to the highest vacuum reached during the test run.

The pitot tube and line were leak-checked at the test site prior to an following the initial velocity traverse. The check was made by blowing into the impact opening of the pitot tube* until 3 or more inches of water were recorded on the manometer and then capping the impact opening and holding it for 15 seconds to assure it was leak free. The static pressure side of the pitot tube was leak checked using the same procedure, except suction was used to obtain the 3 inch H_2O manometer reading. Crushed ice was placed around the impingers to keep the temperature of the gases leaving the last impinger at 68 F or less.

During sampling, stack gas and sampling train data were recorded at each sampling point and when significant changes in stack flow conditions occurred. Isokinetic sampling rates were set throughout the sampling period with the said of a nomograph or calculator. All sampling were recorded on the Particulate Field Data Sheet.

* Federal Register, CFR 40, Part 60, July 1, 1989
**934 AH type

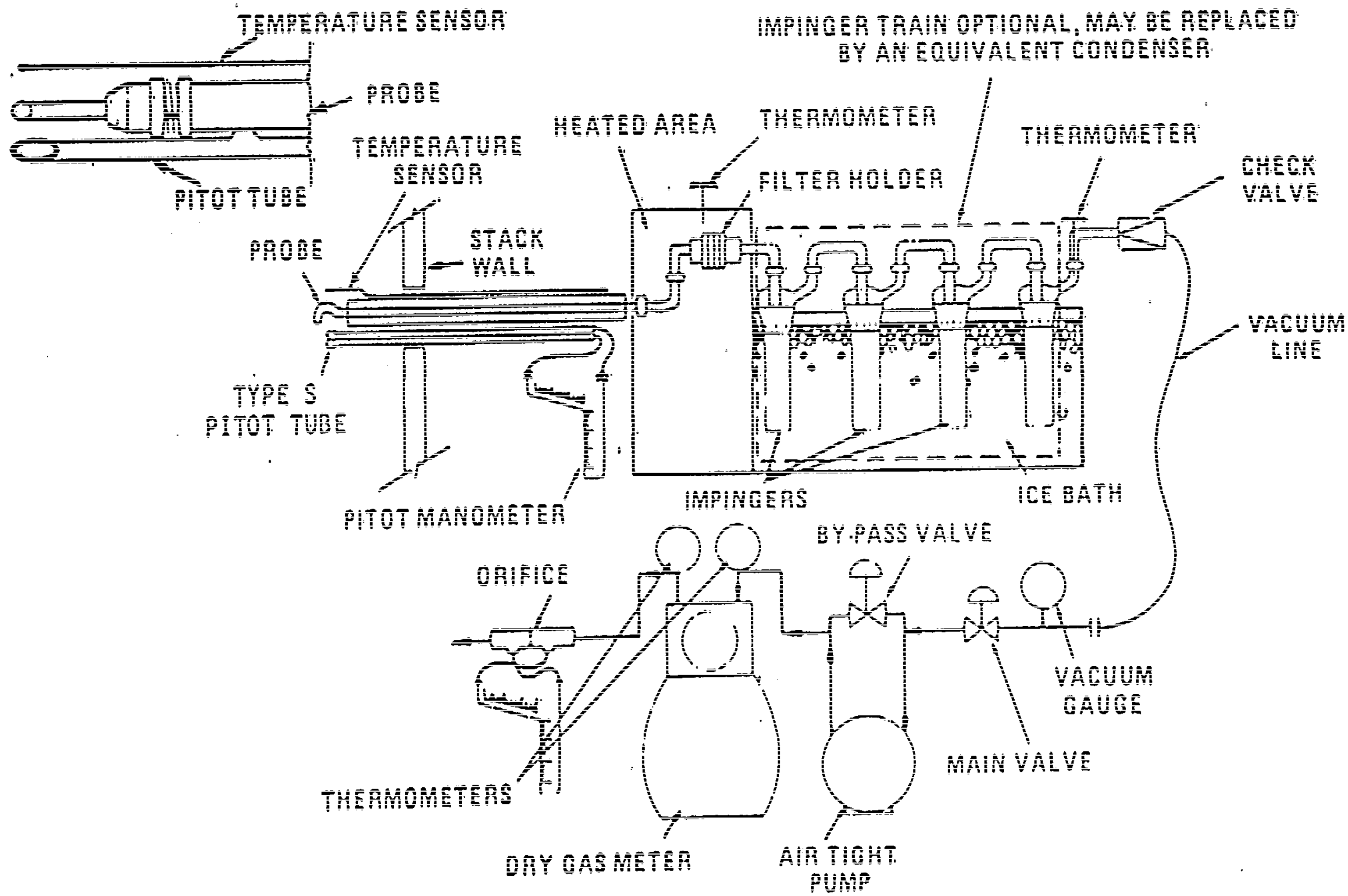


Figure 1. Schematic of Method 5 sampling train.

SAMPLE RECOVERY PROCEDURE

The sampling train was moved carefully from the test site to the cleanup area. Samples of the acetone and distilled water used in the sample recovery were taken for use as blanks. The volume of water from the first three impingers was measured. Sample fractions were recovered as follows:

Container No. 1 - The filter was removed from its holder and placed in a petri dish and sealed.

Container No. 2 - Loose particulate and H_2O washings from all sample-exposure surface prior to the filter were placed in a sample container, sealed and labelled. Particulate was removed from the probe with the aid of a brush and H_2O rinsing. The liquid level was marked after the container was sealed.

Container No. 3 - Loose particulate and acetone washings from all sample-exposure surface prior to the filter were placed in a sample container, sealed and labeled. Particulate was removed from the probe with the aid of a brush and acetone rinsing. The liquid level was marked after the container was sealed.

Container No. 4 - A minimum of 200 ml of acetone was taken for the blank analysis. The blank was obtained and treated in a similar manner as the acetone washing.

Container No. 5 - Distilled water in the impinger section of the sampling train was measured and placed in a sample container. The impingers and connecting glassware were rinsed with distilled H_2O and this rinse was added to the container for shipment to the laboratory.

Container No. 6 - The impinger section of the sampling train of the connecting glassware was rinsed with acetone and this rinse was put in a container for shipment to the laboratory.

Container No. 7 - A minimum of 200 ml of distilled water was taken for the blank analysis. The blank was obtained and treated in a similar manner as the water rinse.

The silica gel from the fourth impinger was weighed and the gain recorded on the Sample Recovery Data Sheet with other pertinent data.

ANALYTICAL PROCEDURES

The following procedures were used and follow the methods described in the DER Source Testing Manual*.

Container No. 1 - The filter and any loosed particulate matter from this sample container were placed into a tared glass weighing dish, baked at 105 C for 2 hours, desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 2 - The H_2O washings were transferred to a tared beaker and evaporated to dryness at 105 C temperature and pressure, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 3 - the acetone washings were transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 4 - The acetone blank was transferred to a tared breaker and evaporated to dryness at ambient temperature and pressure. The blank was then desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 5 - The contents of this container were filtered through 0.8-.22 micron tared filters to remove insoluble particulate. The filters and filtrates in tared breakers were evaporated to dryness at 105 C, then desiccated to a constant weight and weighed on an analytical balance to the nearest 0.1 mg.

Container No. 6 - The acetone was transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure. The sample was then desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 7 - The distilled water blank was transferred to a tared beaker and evaporated to dryness at 105 C. The blank was desiccated to a constant weight and weighed on analytical balance to the nearest 0.1 mg.

The term "constant weight" means a difference of no more than 0.5 mg or 1% of total weight less tare weight, whichever is greater between two consecutive readings, with no less than 6 hours of desiccation between weighings.

EPA Method 9

Visual Determination of the

Opacity of Emissions from Stationary Sources

Determination of Opacity of Emissions from
Stationary Sources

EPA Method 9

The following method was used in this test program. Observation procedures follow those described in EPA Method 9 of the Federal Register *.

Observation Procedures

The opacity of emissions from stationary sources was determined visually by a qualified observer. The qualified observer stood at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140 sector to his back. Consistent with maintaining the above requirement, the observer made his observations from a position such that his line of vision was approximately perpendicular to the plume direction, and approximately perpendicular to the longer axis of the outlet. The observer recorded the name of the plant, emissions location, type facility, observer's name and affiliation, a sketch of the observer's position relative to the source, and the date on a field data sheet (Figure 1). The time, estimated distance to the emission location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), and plume background were recorded on a field data sheet at the time opacity readings were taken.

Opacity observations were made at the point of greatest opacity in the portion of the plume where condensed water vapor was not present. The observer did no look continuously at the plume, but momentarily at 15-seconds intervals.

SOURCE NAME

ADDRESS

CITY | STATE | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT | OPERATING MODE

CONTROL EQUIPMENT | OPERATING MODE

DESCRIBE EMISSION POINT
START STOP

HEIGHT ABOVE GROUND LEVEL
START STOP

HEIGHT RELATIVE TO OBSERVER
START STOP

DISTANCE FROM OBSERVER
START STOP

DIRECTION FROM OBSERVER
START STOP

DESCRIBE EMISSIONS
START STOP

EMISSION COLOR
START STOP

PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT:
NO ☐ YES ☐

IF WATER DROPLET PLUME
ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START STOP

DESCRIBE BACKGROUND
START STOP

BACKGROUND COLOR
START STOP

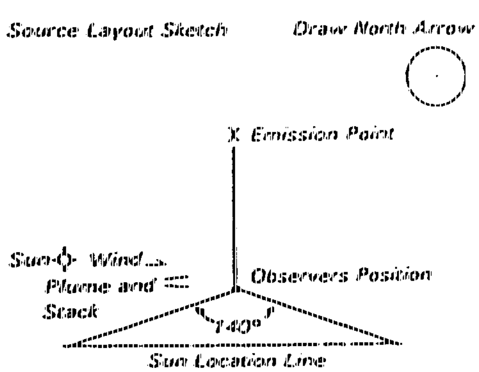
SKY CONDITIONS
START STOP

WIND SPEED
START STOP

WIND DIRECTION
START STOP

AMBIENT TEMP.
START STOP

WET BULB TEMP. | RH, percent



COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE

TITLE | DATE

OBSERVATION DATE | START TIME | STOP TIME

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1					31				
2					32				
3					33				
4					34				
5					35				
6					36				
7					37				
8					38				
9					39				
10					40				
11					41				
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20					50				
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22					52				
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24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

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

RANGE OF OPACITY READINGS
MINIMUM MAXIMUM

OBSERVER'S NAME (PRINT)

OBSERVER'S SIGNATURE | DATE

ORGANIZATION

CERTIFIED BY | DATE

VERIFIED BY | DATE

If condensed water vapor was present within the plume as it emerged from the emission outlet, opacity observations were made beyond the point in the plume at which condensed water vapor was no longer visible. The observer recorded the approximate distance from the emission outlet to the point in the plume at which the observations were made.

If water vapor in the plume condensed and became visible at a distinct distance from the emission outlet, the opacity of emissions were evaluated at the emission outlet prior to the condensation of water vapor and the formation of the steam plume.

Opacity observations were recorded to the nearest 5 percent at 15-second intervals on an observational record sheet (Figure 1). A minimum of 24 observations were recorded. Each momentary observation recorded was deemed to represent the average opacity of emissions for a 15-second period.

Opacity was determined as an average of 24 consecutive observations recorded at 15-second intervals. The observations recorded on the record sheet were divided into sets of 24 consecutive observations. A set was composed of any 24 consecutive observations. For each set of 24 observations, the average was calculated by summing the opacity of the 24 observations and dividing this sum by 24.

To receive certification as a qualified observer, a candidate was tested and demonstrated the ability to assign opacity readings in 5 percent increments to 25 different black plumes and 25 different white plumes, with an error not to exceed 15 percent opacity on any one reading and an average error not exceed 7.5 percent opacity in each category.

The certification is valid for a period of 6 months, at which time the qualification procedure must be repeated by any observer in order to retain certification. The certification test consists of showing the candidate a complete run of 50 plumes-25 black plumes and 25 white plumes-generated by a smoke generator. Plumes within each set of 25 black and 25 white runs were presented in random order. The candidate assigned an opacity value to each plume and recorded his observation on a suitable form. At the completion of each run of 50 readings, the score of the candidate was determined. If a candidate failed to qualify, the complete run of 50 readings was repeated in any retest. The smoke test was administered as part of a smoke school and was preceded by training of familiarization runs of the smoke generator during which candidates were shown black and white plumes of known opacity.

METER BOX CALIBRATION DATA AND CALCULATION FORM

Date 8/6/90 Meter box number 443

Barometric pressure, P_b = 28.9 in. Hg Calibrated by [signature]

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	Temperatures: Wet test meter (t_w), °F	Dry gas meter: Inlet (t_{d_i}), °F	Dry gas meter: Outlet (t_{d_o}), °F	Dry gas meter: Avg[a] (t_d), °F	Time (Θ), min	Y_i	$\Delta H@_i$, in. H_2O
0.5	5	920.900 926.150	72 °F	108 120	79 83	97	12.10	.996	
1.0	5	926.260 931.560	73 °F	122 103	88 91	101	8.14	.990	
1.5	10	935.000 945.327	73 °F	133 105	92 79	102	13.00	1.017	
2.0	10	945.442 956.395	73 °F	111 115	80 89	97	8.30	.994	
3.0	10	956.939 967.498	73 °F	111 140	85 90	106	10.00	.998	
4.0	10	968.026 978.629	73 °F	112 140	86 90	107	8.39	.993	
							Avg	.998	

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t_w + 460)}$	$\Delta H@_i = \frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \Theta}{V_w}\right]^2$
0.5	0.0368	5(28.9) (557) / 5.25(28.94)(532) = .996	
1.0	0.0737	5(28.9) (561) / 5.30 (28.97)(533) = .990	
1.5	0.110	10(28.9) (562) / 10.327(29.01) (533) 1.017	
2.0	0.147	10 (28.9) (557) / 10.953 (29.05)(533) = .994	
3.0	0.221	10(28.9) (566) / 10.559(29.12) (533) .998	
4.0	0.294	10(28.9) (567) / 10.603(29.19) (533) .993	

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

Darren E. Miller 9-16-90

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Test numbers ________ Date 9-10-90 Meter box number 443 Plant ________

Barometric pressure, P_b = 29.40 in. Hg Dry gas meter number 806 Pretest Y .995

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	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
2"	10	10.667	72	113/136	86/96	108	12.52	2"	.996	10 (29.4) 568 / 10.667 (29.4 + 2/13.6) 532
2"	10	10.704	72	116/138	89/93	109	12.54	2"	.994	10 (29.4) 569 / 10.704 (29.4 + 2/13.6) 532
2"	10	10.757	72	124/139	90/94	112	12.56	2"	.994	10 (29.4) 572 / 10.757 (29.4 + 2/13.6) (532)
									Y = .995	

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

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.

PITOT TUBE INSPECTION DATA SHEET

Pitot Tube Identification Number: #7 Date: 2/22/90

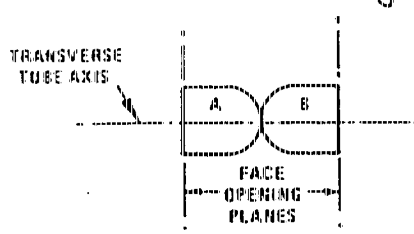
1. What is the external diameter of the tubing in inches? 3/8"

2. Are the face opening planes perpendicular to the transverse axis as in Figure A (end view)? yes

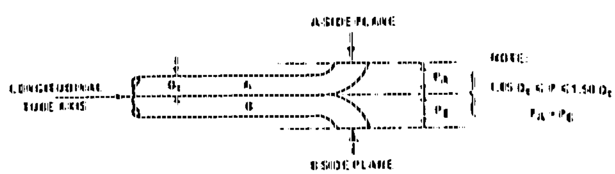
3. Are the face opening planes parallel to the longitudinal axis as in Figure B (top view)? yes

4. Are both legs of equal length and center lines coincident, when viewed from both sides as in Figure (C)? yes

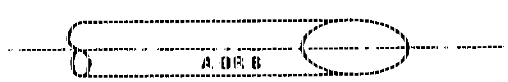
5. Does the tube meet all the geometric specifications to be assigned a .84 coefficient? yes



(a)



(b)



(c)

CALIBRATED BY: Steve Kennedy

NOZZLE CALIBRATION DATA FORM

Date 8/23/90 Calibrated by R. Campbell

Nozzle identification number	D_1, (in.)	D_2, (in.)	D_3, (in.)	ΔD, (in.)	D_{avg}
#3	.245	.245	.245	0.0	.245

where:

$D_{1,2,3,}$ = Three different nozzles diameters, in.; each diameter measure within 0.001 in.

ΔD = Maximum difference between any two diameters, in., $\Delta D \leq 0.004$ in.

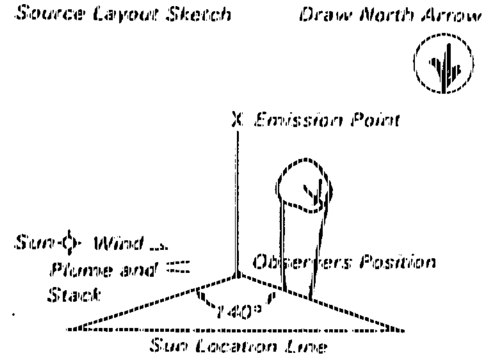
D_{avg} = Average of D_1, D_2, and D_3.

C. FIELD DATA SHEETS

Visible Emission Observation Form

SOURCE NAME	Commercial Stone
ADDRESS	SpringField Pike
CITY	
STATE	PA
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	BAGhouse
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT	START STOP
HEIGHT ABOVE GROUND LEVEL	START 35' STOP 35'
HEIGHT RELATIVE TO OBSERVER	START 35' STOP 35'
DISTANCE FROM OBSERVER	START 60' STOP 60'
DIRECTION FROM OBSERVER	START S STOP
DESCRIBE EMISSIONS	START STOP
EMISSION COLOR	START STOP
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☑ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START STOP
DESCRIBE BACKGROUND	START Blue SKY STOP
BACKGROUND COLOR	START Blue STOP
SKY CONDITIONS	START Clear STOP
WIND SPEED	START 0-2mph STOP
WIND DIRECTION	START SE STOP
AMBIENT TEMP	START 68°F STOP
WET BULB TEMP	
RH, percent	

Source Layout Sketch   Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8/24/90	8:15	9:40

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	
NUMBER OF READINGS ABOVE % WERE	
RANGE OF OPACITY READINGS	MINIMUM MAXIMUM
OBSERVER'S NAME (PRINT)	Kevin Kennedy
OBSERVER'S SIGNATURE	Kevin Kennedy
DATE	8/24/90
ORGANIZATION	CSC Inc.
CERTIFIED BY	ETA
DATE	March 1990
VERIFIED BY	
DATE	

COMMENTS TEST-1

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE

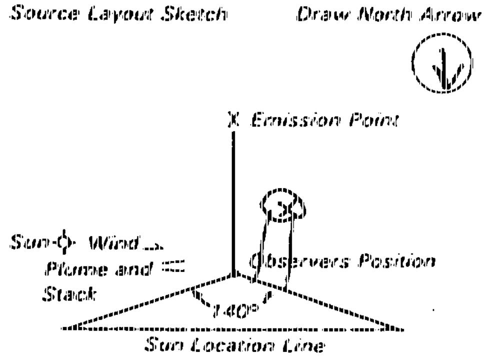
DATE

Visible Emission Observation Form

SOURCE NAME	Commercial Stone
ADDRESS	Spring Field Pike
CITY	
STATE	PA
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	Normal
DESCRIBE EMISSION POINT	START / STOP
HEIGHT ABOVE GROUND LEVEL	START 35' STOP 35'
HEIGHT RELATIVE TO OBSERVER	START 35' STOP 35'
DISTANCE FROM OBSERVER	START 60' STOP 60'
DIRECTION FROM OBSERVER	START S STOP
DESCRIBE EMISSIONS	START / STOP
EMISSION COLOR	START / STOP
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☑ YES ☐	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START / STOP
DESCRIBE BACKGROUND	START Blue SKY STOP
BACKGROUND COLOR	START Blue STOP
SKY CONDITIONS	START Clear STOP
WIND SPEED	START 0-2 mph STOP
WIND DIRECTION	START SE STOP
AMBIENT TEMP.	START / STOP
WET BULB TEMP.	
RH, percent	

Source Layout Sketch

Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8/24/90	9:15	9:40

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

AVERAGE OPACITY FOR HIGHEST PERIOD

NUMBER OF READINGS ABOVE % WERE

RANGE OF OPACITY READINGS MINIMUM MAXIMUM

OBSERVER'S NAME (PRINT) Kevin Kennedy

OBSERVER'S SIGNATURE Kevin Kennedy DATE 8/24/90

ORGANIZATION CSC INC.

CERTIFIED BY EPA DATE March 1990

VERIFIED BY DATE

COMMENTS TEST-1

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

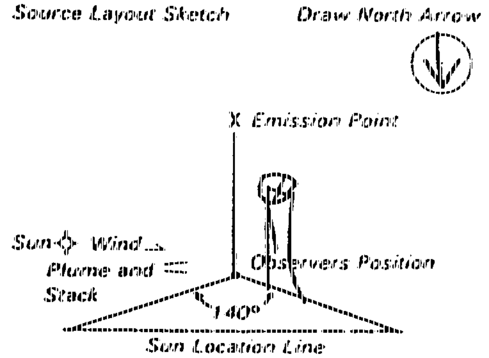
SIGNATURE

TITLE DATE

Visible Emission Observation Form

SOURCE NAME	Commercial Stone
ADDRESS	Springfield Pike
CITY	
STATE	PA
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	Normal
DESCRIBE EMISSION POINT	START / STOP
HEIGHT ABOVE GROUND LEVEL	START 35' STOP 35'
HEIGHT RELATIVE TO OBSERVER	START 35 STOP
DISTANCE FROM OBSERVER	START 60' STOP
DIRECTION FROM OBSERVER	START SW STOP
DESCRIBE EMISSIONS	START / STOP
EMISSION COLOR	START STOP
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☒ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START STOP
DESCRIBE BACKGROUND	START Blue Sky STOP
BACKGROUND COLOR	START Blue STOP
SKY CONDITIONS	START Overcast STOP
WIND SPEED	START 0 mph STOP
WIND DIRECTION	START SE STOP
AMBIENT TEMP.	START 70°F STOP
WET BULB TEMP.	
RH, percent	

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	8/29/90
START TIME	10:13
STOP TIME	11:50

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
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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	
NUMBER OF READINGS ABOVE % WERE	
RANGE OF OPACITY READINGS	MINIMUM / MAXIMUM
OBSERVER'S NAME (PRINT)	Kevin Kennedy
OBSERVER'S SIGNATURE	Kevin Kennedy
DATE	8/29/90
ORGANIZATION	CSC Inc.
CERTIFIED BY	ETA
DATE	March 1990
VERIFIED BY	
DATE	

COMMENTS: TEST-2

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE

DATE

Visible Emission Observation Form

SOURCE NAME: Commercial Stone

ADDRESS: Springfield Pike

CITY | STATE: PA | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT | OPERATING MODE

CONTROL EQUIPMENT: Baghouse | OPERATING MODE: NORMAL

DESCRIBE EMISSION POINT
START STOP

HEIGHT ABOVE GROUND LEVEL START STOP | HEIGHT RELATIVE TO OBSERVER START STOP

DISTANCE FROM OBSERVER START STOP | DIRECTION FROM OBSERVER START STOP

DESCRIBE EMISSIONS
START STOP

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

WATER DROPLETS PRESENT NO ☑ YES ☐ | IF WATER DROPLET PLUME ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START STOP

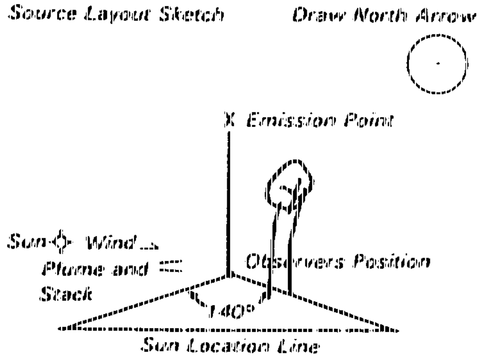
DESCRIBE BACKGROUND
START Blue sky STOP

BACKGROUND COLOR START Blue STOP | SKY CONDITIONS START Clear STOP

WIND SPEED START 0-3 mph STOP | WIND DIRECTION START SE STOP

AMBIENT TEMP. START 70 F STOP | WET BULB TEMP. | RH, percent

Source Layout Sketch Draw North Arrow



COMMENTS: TEST a

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE

TITLE | DATE

OBSERVATION DATE: 8/24/90 | START TIME: 10:18 | STOP TIME: 11:50

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

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

RANGE OF OPACITY READINGS
MINIMUM MAXIMUM

OBSERVER'S NAME (PRINT): Kevin N Kennedy

OBSERVER'S SIGNATURE: Kevin Kennedy | DATE: 8/24/90

ORGANIZATION: ESC Inc.

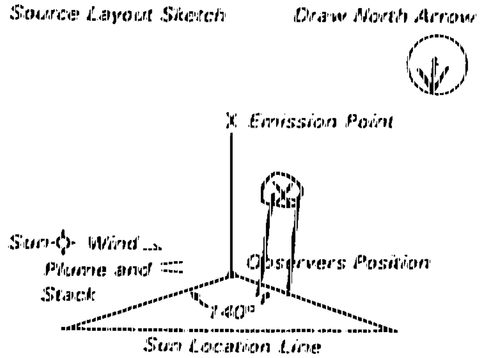
CERTIFIED BY: ETA | DATE: March 1990

VERIFIED BY | DATE

Visible Emission Observation Form

SOURCE NAME	Common Stove
ADDRESS	Springfield Pike
CITY	Connellsville
STATE	PA
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	Normal
DESCRIBE EMISSION POINT	START STOP
HEIGHT ABOVE GROUND LEVEL	START 35' STOP 35'
HEIGHT RELATIVE TO OBSERVER	START 35' STOP 35'
DISTANCE FROM OBSERVER	START 60 STOP
DIRECTION FROM OBSERVER	START S STOP
DESCRIBE EMISSIONS	START STOP
EMISSION COLOR	START STOP
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☑ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START STOP
DESCRIBE BACKGROUND	START Blue Sky STOP
BACKGROUND COLOR	START Blue STOP
SKY CONDITIONS	START Clear STOP
WIND SPEED	START 0-2 mph STOP
WIND DIRECTION	START SE STOP
AMBIENT TEMP	START 70 F STOP
WET BULB TEMP	
RH, percent	

Source Layout Sketch   Draw North Arrow



COMMENTS: TEST-3

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE   DATE

OBSERVATION DATE: 8/24/98   START TIME: 12:20   STOP TIME:

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

AVERAGE OPACITY FOR HIGHEST PERIOD	
NUMBER OF READINGS ABOVE % WERE	
RANGE OF OPACITY READINGS	MINIMUM MAXIMUM
OBSERVER'S NAME (PRINT)	Kevin Kennedy
OBSERVER'S SIGNATURE	Kevin Kennedy
DATE	8/24/98
ORGANIZATION	CSC Inc.
CERTIFIED BY	ETA
DATE	March 1998
VERIFIED BY	
DATE	

Visible Emission Observation Form

SOURCE NAME: Comm. Stone

ADDRESS: Springfield Pike

CITY: | STATE: PA | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: | OPERATING MODE:

CONTROL EQUIPMENT: BAG house | OPERATING MODE: Normal

DESCRIBE EMISSION POINT
START STOP

HEIGHT ABOVE GROUND LEVEL: START 35' STOP 35' | HEIGHT RELATIVE TO OBSERVER: START 35' STOP 35'

DISTANCE FROM OBSERVER: START 60 STOP 60 | DIRECTION FROM OBSERVER: START S STOP

DESCRIBE EMISSIONS
START STOP

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

WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

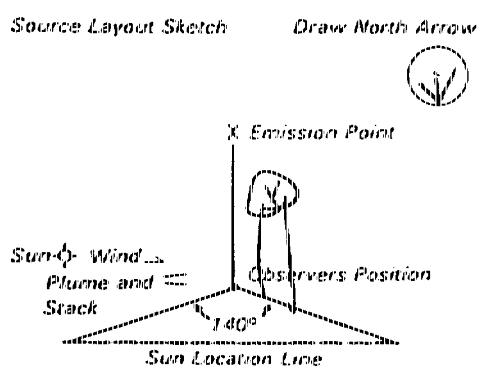
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START STOP

DESCRIBE BACKGROUND: START Blue sky STOP

BACKGROUND COLOR: START Blue STOP | SKY CONDITIONS: START Clear STOP

WIND SPEED: START 0-2 mph STOP | WIND DIRECTION: START SE STOP

AMBIENT TEMP: START 70 F STOP | WET BULB TEMP: | RH, percent:



OBSERVATION DATE: 8/24/90 | START TIME: 12:00 | STOP TIME:

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
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13					43				
14					44				
15					45				
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18					48				
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21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

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

RANGE OF OPACITY READINGS: MINIMUM MAXIMUM

OBSERVER'S NAME (PRINT): Kevin Kennedy

OBSERVER'S SIGNATURE: Kevin Kennedy | DATE: 8/24/90

ORGANIZATION: CSC Inc.

COMMENTS: TEST-3

CERTIFIED BY: ETA | DATE: Aug 1990

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SIGNATURE

TITLE | DATE

VERIFIED BY | DATE

PLANT Lem Tilon

LOCATION Springfield Asphalt

OPERATOR R.K. Campbell

DATE 8/24/90

RUN NO. SA-1

SAMPLE BOX NO.

METER BOX NO. #443

METER ΔH@

C FACTOR KF= 2.31

PITOT TUBE COEFFICIENT, C_p .84

SCHEMATIC OF STACK CROSS SECTION

Location

Stack dimen. 40"

AMBIENT TEMPERATURE 75

BAROMETRIC PRESSURE 28.9

ASSUMED MOISTURE, % 18%

PROBE LENGTH, (ft) 6'

NOZZLE IDENTIFICATION NO. #3

AVERAGE CALIBRATED NOZZLE DIAMETER, (in.) .245

PROBE HEATER SETTING 250

LEAK RATE, (cfm) 0.01 cfm @ 10"

PROBE LINER MATERIAL Glass

STATIC PRESSURE, (in. Hg) +.75

FILTER NO. 1000 22

TRAVERSE POINT NUMBER	TIME	SAMPLING TIME (θ), min.	VACUUM (in. Hg)	STACK TEMPERATURE (T_S) (°F)	VELOCITY HEAD (ΔP_S), (in. H_2O)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (in. H_2O)	GAS SAMPLE VOLUME (ft^3)	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (°F)	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (°F)	FILTER HOLDER TEMPERATURE, (°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, (°F)
	8:15	0					833.467				
A-1		3	3.5	245	.65	1.5	835.930	75	76	259	51
2		6	3.5	268	.64	1.5	838.891	104	74	260	51
3		9	3.5	268	.65	1.5	841.849	110	78	257	51
4		12	3.5	265	.68	1.6	844.999	112	79	262	51
5		15	3.0	267	.64	1.4	847.482	114	82	264	51
6		18	3.0	268	.60	1.3	850.325	112	82	263	50
7		21	3.0	268	.57	1.25	852.325	113	83	265	50
8		24	3.0	266	.50	1.1	854.120	113	84	266	51
9		27	3.0	278	.50	1.1	856.040	114	83	261	51
10		30	3.0	289	.45	1.0	857.900	114	84	262	51
11		33	3.0	290	.45	1.0	859.810	113	83	264	51
12		36	3.0	290	.45	1.0	861.389	115	85	259	51
B-1	9:00	39	4.5	279	1.0	2.2	864.310	82	83	260	53
2		42	4.5	280	.95	2.1	867.090	121	87	260	53
3		45	4.5	276	.98	2.2	870.105	128	87	263	54
4		48	4.5	280	.90	2.0	872.675	127	86	258	54
5		51	4.0	267	.80	1.8	875.680	123	89	260	54
6		54	4.0	258	.80	1.8	877.445	123	75	264	54
TOTAL								Avg.	Avg.		
AVERAGE				274	.801	1.4	55.603	Avg. 99			

IMPINGER WATER

Final 278 ml

Init. 200 ml

Cond. 178 ml

DESICCANT

Final 229.6 gms

Init. 211.1 gms

Gain 18.5 gms

ORSAT ANALYSES

Time				
CO_2	6.0	5.8	6.0	5.9
O_2	13.0	13.2	13.0	13.1
CO				

LOCATION A ...

OPERATOR K. Campbell

DATE 8/24/90

RUN NO. SA-1

SAMPLE BOX NO.

METER BOX NO. #443

METER ΔH@

C FACTOR

PITOT TUBE COEFFICIENT, C_p .84

SCHEMATIC OF STACK CROSS SECTION

Location

Stack dimen. 48"

AMBIENT TEMPERATURE

BAROMETRIC PRESSURE 28"

ASSUMED MOISTURE, %

PROBE LENGTH, (ft)

NOZZLE IDENTIFICATION NO. #3

AVERAGE CALIBRATED NOZZLE DIAMETER, (in.) .245

PROBE HEATER SETTING

LEAK RATE, (cfm) 0.01 cfm at 10"

PROBE LINER MATERIAL Glass

STATIC PRESSURE, (in. Hg) +.75

FILTER NO. 100022

TRAVERSE POINT NUMBER	TIME	SAMPLING TIME (θ), min.	VACUUM (in. Hg)	STACK TEMPERATURE (T_S) (°F)	VELOCITY HEAD (ΔP_S), (in.) H_2O	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (in. H_2O)	GAS SAMPLE VOLUME (ft³)	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (°F)	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (°F)	FILTER HOLDER TEMPERATURE, (°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, (°F)
8-7		57	3.0	271	.75	1.7	879.860	123	90	263	54
8		60	3.0	274	.60	1.3	881.850	122	90	263	54
9		63	3.0	276	.55	1.2	883.750	120	90	264	55
10		66	3.0	281	.55	1.2	885.600	118	90	260	55
11		69	3.0	286	.50	1.1	887.340	119	90	261	54
12	9:36	72	3.0	287	.50	1.1	889.670	119	90	263	55
TOTAL								Avg.	Avg.		
AVERAGE								Avg.			

C-071

IMPINGER WATER

Final 372 ml

Init. 200 ml

Cond. 172 ml

DESICCANT

Final ______ gms

Init. ______ gms

Gain ______ gms

ORSAT ANALYSES

Time			
CO_2			
O_2			
CO			

236
136
372

PLANT Co. – Sf–
LOCATION Asphalt Plant
OPERATOR R. Campbell
DATE 8/24/90
RUN NO. SA-2
SAMPLE BOX NO.
METER BOX NO. #443
METER ΔH@
C FACTOR
PITOT TUBE COEFFICIENT, C_p .84

SCHEMATIC OF STACK CROSS SECTION
Location
Stack dimen. 48"

AMBIENT TEMPERATURE — INITIAL / FINAL
BAROMETRIC PRESSURE 28.9
ASSUMED MOISTURE, %
PROBE LENGTH, (ft)
NOZZLE IDENTIFICATION NO. #3
AVERAGE CALIBRATED NOZZLE DIAMETER, (in.) .245
PROBE HEATER SETTING 250
LEAK RATE, (cfm)
PROBE LINER MATERIAL Glass
STATIC PRESSURE, (in. Hg) +.75
FILTER NO.

TRAVERSE POINT NUMBER	TIME	SAMPLING TIME (θ), min.	VACUUM (in. Hg)	STACK TEMPERATURE (T_S) (°F)	VELOCITY HEAD (ΔP_S), (in. H_2O)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (in. H_2O)	GAS SAMPLE VOLUME (ft^3)	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (°F)	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (°F)	FILTER HOLDER TEMPERATURE, (°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, (°F)
	10:20	0					889.465				
B-1		3	2.0	274	1.1	2.4	892.410	84	84	245	48
2		6	2.5	273	1.0	2.2	895.150	105	85	247	48
3		9	3.0	263	1.1	2.4	898.030	108	86	252	48
4		12	3.5	256	.95	2.1	900.580	111	84	259	48
5		15	4.0	255	.90	2.0	903.080	115	84	260	48
6		18	4.0	253	.80	1.8	905.465	115	85	265	48
7		21	4.0	254	.75	1.7	907.615	116	86	267	48
8		24	4.0	252	.70	1.6	909.710	114	87	268	49
9		27	3.5	252	.60	1.3	911.630	118	87	265	49
10		30	3.5	253	.60	1.3	913.550	119	88	268	49
11		33	3.5	260	.60	1.3	915.440	118	88	267	50
12	316F	36	3.5	269	.55	1.2	917.370	120	90	270	50
A-1	11:07	39	4.0	272	.70	1.5	919.810	118	92	265	51
2		42	4.0	281	.65	1.45	922.300	120	91	266	51
3		45	4.0	265	.65	1.45	924.960	121	91	268	51
4		48	4.0	272	.65	1.45	927.180	121	94	268	52
5		51	4.0	275	.75	1.6	930.170	121	93	265	53
6		54	5.0	281	.60	1.6	932.370	118	92	271	54
TOTAL								Avg.	Avg.		
AVERAGE				276	.837	1.6	56.245	Avg. 104			

IMPINGER WATER
Final 385 ml
Init. 200 ml
Cond. 185 ml

DESICCANT
Final 249 gms
Init. 230.1 gms
Gain 18.9 gms

ORSAT ANALYSES

Time			
CO_2	5.4	5.4	5.4
O_2	14.0	14.0	14.0
CO			

LOCATION Al ... Al
OPERATOR E. Campbell
DATE 8/24/90
RUN NO. SA-2
SAMPLE BOX NO.
METER BOX NO. #443
METER ΔH@
C FACTOR
PITOT TUBE COEFFICIENT, C_p .84

SCHEMATIC OF STACK CROSS SECTION
Location
Stack dimen.

AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
ASSUMED MOISTURE, %
PROBE LENGTH, (ft)
NOZZLE IDENTIFICATION NO. #3
AVERAGE CALIBRATED NOZZLE DIAMETER, (in.) .245
PROBE HEATER SETTING
LEAK RATE, (cfm)
PROBE LINER MATERIAL Glass
STATIC PRESSURE, (in. Hg) +.75
FILTER NO. 1000 20

TRAVERSE POINT NUMBER	TIME	SAMPLING TIME (θ), min.	VACUUM (in. Hg)	STACK TEMPERATURE (T_S) (°F)	VELOCITY HEAD (ΔP_S), (in. H_2O)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (in. H_2O)	GAS SAMPLE VOLUME (ft^3)	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (°F)	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (°F)	FILTER HOLDER TEMPERATURE, (°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, (°F)
A-7		57	4	308	.60	1.4	934.699	130	.94	272	55
8		66	4	310	.68	1.4	936.930	128	98	274	57
9		63	4	313	.55	1.3	939.300	128	95	268	56
10		66	4	311	.55	1.3	941.364	129	95	268	57
11		67	4	309	.55	1.3	943.580	130	95	271	58
12	11:45	72	4	309	.55	1.3	945.710	128	95	272	59
TOTAL								Avg.	Avg.		
AVERAGE								Avg.			

IMPINGER WATER
Final 385 ml
Init. 206 ml
Cond. 185 ml

DESICCANT
Final 249 gms
Init. 230.1 gms
Gain 18.9 gms

ORSAT ANALYSES

Time			
CO_2	5.4	5.4	5.1
O_2	14.0	14.0	14.0
CO			

PLANT [illegible]
LOCATION Asphalt Plant
OPERATOR R. Campbell
DATE 8/21/90
RUN NO. SA-3
SAMPLE BOX NO.
METER BOX NO. #443
METER ΔHg
C FACTOR KF
PITOT TUBE COEFFICIENT, C_p

SCHEMATIC OF STACK CROSS SECTION
Location
Stack dimen.

AMBIENT TEMPERATURE
BAROMETRIC PRESSURE 28.9
ASSUMED MOISTURE, %
PROBE LENGTH, (ft)
NOZZLE IDENTIFICATION NO. #3
AVERAGE CALIBRATED NOZZLE DIAMETER, (in.) .245
PROBE HEATER SETTING 250
LEAK RATE, (cfm) 0.00 cfm at 8"
PROBE LINER MATERIAL Glass
STATIC PRESSURE, (in. Hg) +.75
FILTER NO. 100036

TRAVERSE POINT NUMBER	TIME	SAMPLING TIME (θ), min.	VACUUM (in. Hg)	STACK TEMPERATURE (T_S) (°F)	VELOCITY HEAD (ΔP_S), (in. H_2O)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (in. H_2O)	GAS SAMPLE VOLUME (ft^3)	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (°F)	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (°F)	FILTER HOLDER TEMPERATURE, (°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, (°F)
	12:20	0					948.365				
A-1		3	4.0	249	.70	1.7	951.030	112	94	249	42
2		6	4.0	245	.65	1.6	953.140	121	92	250	42
3		9	3.5	247	.65	1.6	955.470	121	93	249	42
4		12	3.5	249	.64	1.5	957.690	124	92	252	43
5		15	3.5	264	.60	1.4	959.880	127	92	256	43
6		18	3.5	271	.58	1.4	962.035	123	91	257	44
7		21	3.5	273	.56	1.3	964.180	124	93	262	44
8		24	3.5	258	.55	1.3	966.250	123	93	260	45
9		27	3.5	265	.50	1.2	968.110	122	93	259	45
10		30	3.5	249	.50	1.2	970.155	123	94	260	47
11		33	3.5	267	.50	1.2	970.300	124	94	261	47
12	stop	36	3.5	264	.46	1.1	974.210	124	93	264	48
B-1	11:03	39	5.0	249	1.2	2.8	977.340	126	93	270	48
2		42	5.0	234	1.2	2.8	980.520	133	94	268	47
3		45	5.0	241	1.1	2.6	983.610	132	95	268	47
4		48	5.0	255	1.1	2.6	986.610	133	95	271	47
5		51	5.0	253	1.0	2.4	989.320	132	95	268	47
6		54	5.0	255	.90	2.2	991.960	132	96	270	47
TOTAL											
AVERAGE				252	.848	1.8	57.120	Avg.	Avg. 110		

IMPINGER WATER
Final 375 ml
Init. 200 ml
Cond. 175 ml

DESICCANT
Final 245.9 gms
Init. 219.4 gms
Gain 26.5 gms

ORSAT ANALYSES

Time			
CO_2	5.0	5.0	5.0
O_2	14.2	14.2	14.2
CO			

PLANT [illegible]
LOCATION Asphalt Plant
OPERATOR R. Campbell
DATE 8/24/90
RUN NO. SA-3
SAMPLE BOX NO.
METER BOX NO. #443
METER ΔHα
C FACTOR
PITOT TUBE COEFFICIENT, C_p .84

SCHEMATIC OF STACK CROSS SECTION
Location
Stack dimen. 48"

AMBIENT TEMPERATURE
BAROMETRIC PRESSURE 28.9
ASSUMED MOISTURE, %
PROBE LENGTH, (ft)
NOZZLE IDENTIFICATION NO. #3
AVERAGE CALIBRATED NOZZLE DIAMETER, (in.) .245
PROBE HEATER SETTING
LEAK RATE, (cfm) 0.00 cfm at 8" Hg
PROBE LINER MATERIAL
STATIC PRESSURE, (in. Hg) +.75
FILTER NO.

TRAVERSE POINT NUMBER	TIME	SAMPLING TIME (θ), min.	VACUUM (in. Hg)	STACK TEMPERATURE (T_s) (°F)	VELOCITY HEAD (ΔP_s), (in. H_2O)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (in. H_2O)	GAS SAMPLE VOLUME (ft^3)	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (°F)	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (°F)	FILTER HOLDER TEMPERATURE, (°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, (°F)
B-7		57	4.0	258	.80	1.90	994.340	131	97	271	48
8		60	4.0	257	.75	1.80	996.660	130	97	272	48
9		63	4.0	250	.70	1.70	999.010	131	98	269	49
10		66	4.0	239	.76	1.76	1001.270	129	97	265	48
11		69	4.0	230	.65	1.6	1003.410	129	98	271	49
12	1:39	72	4.0	228	.65	1.6	1005.485	130	98	269	49
TOTAL								Avg.	Avg.		
AVERAGE								Avg.			

C-077

IMPINGER WATER
Final 395 ml
Init. 200 ml
Cond. 195 ml

DESICCANT
Final 245.9 gms
Init. 219.4 gms
Gain 26.5 gms

ORSAT ANALYSES

Time			
CO_2	5.0	5.0	5.0
O_2	14.2	14.2	14.2
CO			

D. PROCESS DATA

Material Produced between 8:11 - 9:36

Product ID		Tons
04	ST Binder 90-21	286.02
17	ID3 Wearing 90-10	109.86
02	ID2 Wearing 90-5	12.94

408.82 Total tons

AVG 287.90 tons Per Hour

Material Produced between 10:20 - 11:48

Product ID		Tons
04	ST Binder 90-21	265.14
17	ID3 Wearing 90-10	131.87
02	ID2 Wearing 90-5	39.92

436.93 total tons

AVG 297.23 tons Per Hour

Material Produced between 12:20 - 1:38

Product ID		Tons
04	ST Binder 90-21	131.99
17	ID3 Wearing 90-10	109.90
02	ID2 Wearing 90-5	49.49
05	BCBC 90-24	21.99

313.37 total tons

AVG 241.05 tons Per Hour

(10)

Raw Aggregate Blends (Cold Feed)

Product ID

04 ST Binder 90-21 Fine Agg 32.8%
Course Agg 67.2%

17 ID3 Wearing 90-10 Fine Agg 53.4%
Course Agg 46.6%

02 ID2 Wearing 90-5 Fine Agg 59.7%
Course Agg 40.3%

05 BCBC 90-24 Fine Agg 32.8%
Course Agg 67.2%

Fine AGG Gradation

sieve	
* 200	7.9%
100	15.8%
50	26.7%
30	37.6%
16	49.7%
8	71.3%
4	99.7%
3/8	100.%

* Note: In General we will Pick up another 2% #200 mesh material off of the Course aggregate.

Ticket Reference Report

REPORT DATE: 08/24/90

DATE: 08/24/90 TIME: 17:57 PLANT ID: 2 PAGE: 3

Ticket	Rec. Code	Time	Date	Tran. Code	Truck Id	Cust Id	Job Id	Pdt Id	Product Name	Tons
3284	A	1423	082490	0	DC65	0400480	25512	05	BCBC 90-22	21.93
003285	A	1428	082490	0	DC60	0400480	25512	05	BCBC 90-22	22.01
003286	A	1435	082490	0	MT106	0408700	27329	04	ST.BIND 90-21	22.00
3287	A	1441	082490	0	64	0408700	27329	04	ST.BIND 90-21	22.01
3288	A	1444	082490	0	OWN1	0400001	23634	02	ST.ID-2W 90-5	9.00
003289	A	1446	082490	0	OWN1	0400001	23632	01	M TOP	4.00
3290	A	1452	082490	0	GW1	0408700	27329	04	ST.BIND 90-21	22.01
3291	A	1457	082490	0	RI109	0400480	25512	05	BCBC 90-22	22.01
003292	A	1502	082490	0	V2	0408700	27329	04	ST.BIND 90-21	21.94
3293	A	1507	082490	0	MT112	0408700	27329	04	ST.BIND 90-21	22.01
3294	A	1513	082490	0	MT115	0408700	27329	04	ST.BIND 90-21	22.01
003295	A	1518	082490	0	MT114	0408700	27329	04	ST.BIND 90-21	21.98
003296	A	1523	082490	0	A17	0408700	27329	04	ST.BIND 90-21	22.02
3297	A	1528	082490	0	RI6	0400480	25512	05	BCBC 90-22	21.98
3298	A	1533	082490	0	A19	0408700	27329	04	ST.BIND 90-21	22.01
003299	A	1538	082490	0	V3	0408700	27329	04	ST.BIND 90-21	22.00
3300	A	1546	082490	0	A18	0408700	27329	04	ST.BIND 90-21	22.01
3301	A	1605	082490	0	DC65	0400480	25512	05	BCBC 90-22	22.01
003302	A	1610	082490	0	DC60	0400480	25512	05	BCBC 90-22	22.00
3303	A	1644	082490	0	RI109	0400480	25512	05	BCBC 90-22	21.99
3304	A	1656	082490	0	RI6	0400480	25512	05	BCBC 90-22	22.00
									Report Total	2616.80

Ticket Reference Report

REPORT DATE: 08/24/90

DATE: 08/24/90 TIME: 17:56 PLANT ID: 2

Ticket	Rec. Code	Time	Date	Tran. Code	Truck Id	Cust Id	Job Id	Pdt Id	Product Name	Tons
003231	A	0953	082490	0	A18	0408700	27329	04	ST.BIND 90-21	21.96
003232	A	0958	082490	0	MT116	0400480	27592	04	ST.BIND 90-21	21.99
003233	A	1001	082490	0	OWN1	0405905	23811	02	ST.ID-2W 90=5	7.99
003234	A	1009	082490	0	A17	0403945	24191	02	ST.ID-2W 90=5	22.01
003235	A	1014	082490	0	V5	0408700	27329	04	ST.BIND 90-21	21.99
003236	A	1020	082490	0	DC60	0400480	27592	04	ST.BIND 90-21	22.00
003237	A	1025	082490	0	MT101	0403505	27743	17	ID3-W 90-10	21.99
003238	A	1029	082490	0	MT106	0403505	27743	17	ID3-W 90-10	21.97
003239	A	1033	082490	0	MT105	0403505	27743	17	ID3-W 90-10	21.92
003240	A	1038	082490	0	MT108	0403505	27743	17	ID3-W 90-10	22.01
003241	A	1043	082490	0	MT107	0403505	27743	17	ID3-W 90-10	22.01
03242	A	1047	082490	0	MT104	0403505	27743	17	ID3-W 90-10	22.01
003243	A	1052	082490	0	OWN1	0400001	23634	02	ST.ID-2W 90=5	8.98
003244	A	1057	082490	0	R3	0403945	24191	02	ST.ID-2W 90=5	21.99
03245	A	1101	082490	0	MT119	0400480	27592	04	ST.BIND 90-21	22.01
03246	A	1106	082490	0	616	0408700	27329	04	ST.BIND 90-21	23.01
003247	A	1110	082490	0	MT120	0400480	27592	04	ST.BIND 90-21	21.99
03248	A	1114	082490	0	RI109	0400480	27592	04	ST.BIND 90-21	22.02
03249	A	1119	082490	0	V2	0408700	27329	04	ST.BIND 90-21	22.03
003250	A	1123	082490	0	RI6	0400480	27592	04	ST.BIND 90-21	22.02
003251	A	1127	082490	0	64	0408700	27329	04	ST.BIND 90-21	21.97
03252	A	1131	082490	0	DC65	0400480	27592	04	ST.BIND 90-21	22.04
003253	A	1134	082490	0	OWN1	0400001	23634	02	ST.ID-2W 90=5	8.95
003254	A	1139	082490	0	MT112	0408700	27329	04	ST.BIND 90-21	22.00
03255	A	1143	082490	0	MT115	0408700	27329	04	ST.BIND 90-21	22.05
03256	A	1148	082490	0	MT114	0408700	[illegible]	04	ST.BIND 90-21	22.00
003257	A	1152	082490	0	6W1	0408700	27329	04	ST.BIND 90-21	22.00
03258	A	1158	082490	0	MT110	0400480	27592	04	ST.BIND 90-21	21.99
03259	A	1202	082490	0	MT116	0400480	27592	04	ST.BIND 90-21	22.00
003260	A	1207	082490	0	DC60	0400480	27592	04	ST.BIND 90-21	22.00
003261	A	1211	082490	0	MT119	0400480	27592	04	ST.BIND 90-21	22.01
03262	A	1216	082490	0	MT120	0400480	27592	04	ST.BIND 90-21	22.00
003263	A	1220	082490	0	MT109	0403505	27743	17	ID3-W 90-10	21.97
003264	A	1225	082490	0	MT111	0403505	27743	17	ID3-W 90-10	21.98
3265	A	1230	082490	0	V3	0408700	27329	04	ST.BIND 90-21	22.01
3266	A	1235	082490	0	A19	0408700	27329	04	ST.BIND 90-21	22.00
003267	A	1239	082490	0	RI109	0400480	27592	04	ST.BIND 90-21	22.01
3268	A	1243	082490	0	OWN1	0405905	23811	02	ST.ID-2W 90=5	3.50
3269	A	1248	082490	0	OWN1	0400300	24147	02	ST.ID-2W 90=5	15.00
003270	A	1255	082490	0	MT118	0403505	27743	17	ID3-W 90-10	22.00
003271	A	1301	082490	0	MT117	0403505	27743	17	ID3-W 90-10	21.94
3272	A	1307	082490	0	MT102	0403505	27743	17	ID3-W 90-10	22.01
003273	A	1312	082490	0	RI6	0400480	27592	04	ST.BIND 90-21	22.00
003274	A	1316	082490	0	A18	0408700	27329	04	ST.BIND 90-21	22.01
3275	A	1321	082490	0	V5	0408700	27329	04	ST.BIND 90-21	21.96
3276	A	1326	082490	0	MT110	0403945	23766	05	BCBC 90-24	21.99
003277	A	1335	082490	0	MT116	0403945	24191	02	ST.ID-2W 90=5	21.99
3278	A	1338	082490	0	OWN1	0400001	23634	02	ST.ID-2W 90=5	9.00
3279	A	1346	082490	0	MT101	0403505	27743	17	ID3-W 90-10	22.01
003280	A	1351	082490	0	MT103	0403505	27743	17	ID3-W 90-10	21.99
003281	A	1357	082490	0	MT119	0408700	27329	04	ST.BIND 90-21	21.98
3282	A	1405	082490	0	MT120	0400300	24147	02	ST.ID-2W 90=5	21.99
003283	A	1411	082490	0	616	0408700	27329	04	ST.BIND 90-21	23.00

Ticket Reference Report

REPORT DATE: 08/24/90

DATE: 08/24/90 TIME: 17:56 PLANT ID: 2 PAGE: 2

Ticket	Rec. Code	Time	Date	Tran. Code	Truck Id	Cust Id	Job Id	Pdt Id	Product Name	Tons
03231	A	0953	082490	0	A18	0408700	27329	04	ST.BIND 90-21	21.96
03232	A	0958	082490	0	MT116	0400480	27592	04	ST.BIND 90-21	21.99
003233	A	1001	082490	0	DWN1	0405905	23811	02	ST.ID-2W 90=5	7.99
003234	A	1009	082490	0	A17	0403945	24191	02	ST.ID-2W 90=5	22.01
03235	A	1014	082490	0	V5	0408700	27329	04	ST.BIND 90-21	21.99
03236	A	1020	082490	0	DC60	0400480	27592	04	ST.BIND 90-21	22.00
003237	A	1025	082490	0	MT101	0403505	27743	17	ID3-W 90-10	21.95
03238	A	1029	082490	0	MT106	0403505	27743	17	ID3-W 90-10	21.97
03239	A	1033	082490	0	MT105	0403505	27743	17	ID3-W 90-10	21.92
003240	A	1038	082490	0	MT108	0403505	27743	17	ID3-W 90-10	22.01
03241	A	1043	082490	0	MT107	0403505	27743	17	ID3-W 90-10	22.01
03242	A	1047	082490	0	MT104	0403505	27743	17	ID3-W 90-10	22.01
003243	A	1052	082490	0	DWN1	0400001	23634	02	ST.ID-2W 90=5	8.98
003244	A	1057	082490	0	R3	0403945	24191	02	ST.ID-2W 90=5	21.99
3245	A	1101	082490	0	MT119	0400480	27592	04	ST.BIND 90-21	22.01
3246	A	1106	082490	0	616	0408700	27329	04	ST.BIND 90-21	23.01
003247	A	1110	082490	0	MT120	0400480	27592	04	ST.BIND 90-21	21.99
3248	A	1114	082490	0	RI109	0400480	27592	04	ST.BIND 90-21	22.02
3249	A	1119	082490	0	V2	0408700	27329	04	ST.BIND 90-21	22.03
003250	A	1123	082490	0	RI6	0400480	27592	04	ST.BIND 90-21	22.02
3251	A	1127	082490	0	64	0408700	27329	04	ST.BIND 90-21	21.97
3252	A	1131	082490	0	DC65	0400480	27592	04	ST.BIND 90-21	22.04
003253	A	1136	082490	0	DWN1	0400001	23634	02	ST.ID-2W 90=5	8.95
003254	A	1139	082490	0	MT112	0408700	27329	04	ST.BIND 90-21	22.00
3255	A	1143	082490	0	MT115	0408700	27329	04	ST.BIND 90-21	22.05
3256	A	1148	082490	0	MT114	0408700	27329	04	ST.BIND 90-21	22.00
003257	A	1152	082490	0	GW1	0408700	27329	04	ST.BIND 90-21	22.00
3258	A	1158	082490	0	MT110	0400480	27592	04	ST.BIND 90-21	21.99
3259	A	1202	082490	0	MT116	0400480	27592	04	ST.BIND 90-21	22.00
003260	A	1207	082490	0	DC60	0400480	27592	04	ST.BIND 90-21	22.00
3261	A	1211	082490	0	MT119	0400480	27592	04	ST.BIND 90-21	22.01
3262	A	1216	082490	0	MT120	0400480	27592	04	ST.BIND 90-21	22.00
003263	A	1220	082490	0	MT109	0403505	27743	17	ID3-W 90-10	21.97
003264	A	1225	082490	0	MT111	0403505	27743	17	ID3-W 90-10	21.93
265	A	1230	082490	0	V3	0408700	27329	04	ST.BIND 90-21	22.01
266	A	1235	082490	0	A19	0408700	27329	04	ST.BIND 90-21	22.00
003267	A	1239	082490	0	RI109	0400480	27592	04	ST.BIND 90-21	22.01
268	A	1243	082490	0	DWN1	0405905	23811	02	ST.ID-2W 90=5	3.50
269	A	1248	082490	0	DWN1	0400300	24147	02	ST.ID-2W 90=5	15.00
003270	A	1255	082490	0	MT118	0403505	27743	17	ID3-W 90-10	22.00
271	A	1301	082490	0	MT117	0403505	27743	17	ID3-W 90-10	21.94
272	A	1307	082490	0	MT102	0403505	27743	17	ID3-W 90-10	22.01
003273	A	1312	082490	0	RI6	0400480	27592	04	ST.BIND 90-21	22.00
003274	A	1316	082490	0	A18	0408700	27329	04	ST.BIND 90-21	22.01
275	A	1321	082490	0	V5	0408700	27329	04	ST.BIND 90-21	21.96
276	A	1326	082490	0	MT110	0403945	23766	05	BCBC 90-24	21.99
003277	A	1335	082490	0	MT116	0403945	24191	02	ST.ID-2W 90=5	21.99
278	A	1338	082490	0	DWN1	0400001	23634	02	ST.ID-2W 90=5	9.00
279	A	1346	082490	0	MT101	0403505	27743	17	ID3-W 90-10	22.01
003280	A	1351	082490	0	MT103	0403505	27743	17	ID3-W 90-10	21.99
281	A	1357	082490	0	MT119	0408700	27329	04	ST.BIND 90-21	21.98
282	A	1405	082490	0	MT120	0400300	24147	02	ST.ID-2W 90=5	21.99
003283	A	1411	082490	0	616	0408700	27329	04	ST.BIND 90-21	23.00

Ticket Reference Report

REPORT DATE: 08/24/90

DATE: 08/24/90 TIME: 17:56 PLANT ID: 2 PAGE: 1

Ticket	Rec. Code	Time	Date	Tran. Code	Truck Id	Cust Id	Job Id	Pdt Id	Product Name	Tons
003178	A	0539	082490	0	MT102	0403505	27743	17	ID3-W 90-10	21.98
003179	A	0545	082490	0	MT103	0403505	27743	17	ID3-W 90-10	22.04
003180	A	0549	082490	0	MT101	0403505	27743	17	ID3-W 90-10	22.07
003181	A	0601	082490	0	RI58	0400205	27788	02	STID2-W 90-3	21.98
003182	A	0610	082490	0	MT106	0403505	27743	17	ID3-W 90-10	22.04
003183	A	0616	082490	0	V3	0408700	27329	04	ST.BIND 90-21	21.96
003184	A	0621	082490	0	V5	0408700	27329	04	ST.BIND 90-21	21.97
003185	A	0625	082490	0	A19	0408700	27329	04	ST.BIND 90-21	22.01
003186	A	0629	082490	0	A18	0408700	27329	04	ST.BIND 90-21	22.01
003187	A	0633	082490	0	V2	0408700	27329	04	ST.BIND 90-21	22.02
003188	A	0638	082490	0	MT105	0403505	27743	17	ID3-W 90-10	21.94
003189	A	0642	082490	0	MT108	0403505	27743	17	ID3-W 90-10	21.94
003190	A	0646	082490	0	MT107	0403505	27743	17	ID3-W 90-10	21.98
003191	A	0650	082490	0	MT104	0403505	27743	17	ID3-W 90-10	21.94
003192	A	0657	082490	0	G16	0408700	27329	04	ST.BIND 90-21	23.06
003193	A	0701	082490	0	B4	0408700	27329	04	ST.BIND 90-21	22.03
003194	A	0713	082490	0	RI29	0400205	27788	02	ST.ID-2W 90=5	22.00
003195	A	0717	082490	0	R16	0400480	27592	04	ST.BIND 90-21	22.00
003196	A	0721	082490	0	MT112	0408700	27329	04	ST.BIND 90-21	21.95
003197	A	0725	082490	0	MT115	0408700	27329	04	ST.BIND 90-21	21.96
003198	A	0730	082490	0	MT114	0408700	27329	04	ST.BIND 90-21	22.04
003199	A	0734	082490	0	MT110	0400480	27592	04	ST.BIND 90-21	21.90
003200	A	0740	082490	0	GW1	0408700	27329	04	ST.BIND 90-21	22.04
003201	A	0744	082490	0	MT116	0400480	27592	04	ST.BIND 90-21	22.01
003202	A	0748	082490	0	DC60	0400480	27592	04	ST.BIND 90-21	21.99
003203	A	0752	082490	0	DC65	0400480	27592	04	ST.BIND 90-21	22.01
003204	A	0758	082490	0	OWN1	0400001	23634	02	ST.ID-2W 90=5	9.01
003205	A	0800	082490	0	OWN1	0400001	23634	02	ST.ID-2W 90=5	9.04
003206	A	0802	082490	0	OWN1	0400001	23634	02	ST.ID-2W 90=5	9.01
003207	A	0806	082490	0	MT119	0400480	27592	04	ST.BIND 90-21	21.97
003208	A	0811	082490	0	MT120	0400480	27592	04	ST.BIND 90-21	22.01
003209	A	0816	082490	0	RI109	0400480	27592	04	ST.BIND 90-21	22.00
003210	A	0820	082490	0	MT109	0403505	27743	17	ID3-W 90-10	21.92
003211	A	0825	082490	0	MT111	0403505	27743	17	ID3-W 90-10	22.00
003212	A	0829	082490	0	MT118	0403505	27743	17	ID3-W 90-10	21.98
003213	A	0833	082490	0	MT117	0403505	27743	17	ID3-W 90-10	21.98
003214	A	0838	082490	0	R16	0400480	27592	04	ST.BIND 90-21	22.03
003215	A	0843	082490	0	MT110	0400480	27592	04	ST.BIND 90-21	22.02
003216	A	0847	082490	0	DC65	0400480	27592	04	ST.BIND 90-21	22.01
003217	A	0851	082490	0	MT116	0400480	27592	04	ST.BIND 90-21	21.98
003218	A	0856	082490	0	DC60	0400480	27592	04	ST.BIND 90-21	21.98
003219	A	0900	082490	0	MT119	0400480	27592	04	ST.BIND 90-21	22.01
003220	A	0905	082490	0	MT120	0400480	27592	04	ST.BIND 90-21	22.00
003221	A	0911	082490	0	MT102	0403505	27743	17	ID3-W 90-10	21.98
003222	A	0914	082490	0	OWN1	0403175	24183	02	ST.ID-2W 90=5	6.98
003223	A	0915	082490	0	OWN1	0403175	24183	02	ST.ID-2W 90=5	5.96
003224	A	0922	082490	0	RI109	0400480	27592	04	ST.BIND 90-21	21.99
003225	A	0926	082490	0	V3	0408700	27329	04	ST.BIND 90-21	22.02
003226	A	0930	082490	0	R16	0400480	27592	04	ST.BIND 90-21	21.95
003227	A	0936	082490	0	A19	0408700	27329	04	ST.BIND 90-21	22.02
003228	A	0940	082490	0	DC65	0400480	27592	04	ST.BIND 90-21	22.04
[illegible]	A	0944	082490	0	MT103	0403505	27743	17	ID3-W 90-10	21.91

Highest Tons Per Hour 30

5

MATERIAL USAGE PRINT

Raw Material

Agg Name		
AGG4	1334.625	Tons
AGG1	0725.790	Tons
M.F.	0049.305	Tons
AGG2	0318.950	Tons
AGG3	0061.195	Tons
	0000.000	Tons
	0000.000	Tons
Agg Total	02489.865	Tons
Asp Name		
ASP1	0126.986	Tons
	0000.000	Tons
Asp Total	00126.986	Tons
Grand Total	02616.851	Tons

Print

Product Totals

Prod Id	Prod Name		
17	ID3-W 90-10	0593.47	Tons
02	ST.ID-2W 90=5	0234.38	Tons
04	ST.BIND 90-21	1587.03	Tons
05	BCBC 90-22	0197.92	Tons
01	M TOP	0004.00	Tons
		0000.00	Tons
		0000.00	Tons
		0000.00	Tons
		0000.00	Tons
		0000.00	Tons
		0000.00	Tons
		0000.00	Tons
		0000.00	Tons
		0000.00	Tons
-----	Remaining	0000.00	Tons
	Grand Total	02616.80	Tons

Fri Aug 24/90 17:39:23 Libra Systems

Notes: Highest tons Per Hour 308 during test #1 8:11 - 9:11

FABRIC FILTER DATA SHEET — PARAMETERS OF DESIGN AND OPERATION AFFECTING PERFORMANCE

Facility: Springfield Pike Asphalt Plant Boiler No. ____

Monitor Name: Asphalt plant Baghouse Test No.: 1-3

Design Efficiency: ____ Test Date: 8/24/90

Recording Interval: Sampling Time (minutes)	Recording Interval: Clock Time (24 hr. clock)	Pressure Drop Across Baghouse (in. H_2O)	Pressure Drop Across Compartment (in. H_2O): 1	2	3	4	5
8:10AM		2.0"					
8:25AM		2.0"					
8:40AM		2.1"					
8:55AM		2.0"					
9:10AM		2.0"					
9:25AM		2.1"					
9:40AM		2.0"					
10:20AM		2.0"					
10:35AM		2.0"					
10:50AM		2.0"					
11:05AM		2.0"					
11:20AM		2.1"					
11:35AM		2.1"					
11:50AM		2.1"					
12:20pm		2.0"					
12:35pm		2.0"					
12:50pm		2.0"					
1:00pm		2.0"					
1:15pm		2.1"					
1:30pm		2.0"					
1:45pm		2.1"					
	Representative						
	Design						

E. LABORATORY DATA

ANALYTICAL DATA

Test No.	SA-1	SA-2	SA-3
Test Date	8/24/90	8/24/90	8/24/90
Filter No.	100022	100020	100036
Filter Tare, mg	623.5	626.6	616.5
Filter Final, mg	629.3	633.5	621.4
Filter Net, mg	5.8	6.9 ✓	4.9
Probe Acetone, mg	14.3	14.9 ✓	14.7
Probe Water	1.1	0.7 ✓	3.2
Impinger Sol., mg	18.3	19.3	9.0
Impinger Insol., mg	10.0	10.3 ✓	10.5
Impinger Acetone, mg	2.2	2.1	40.1
Acetone Blank mg*	0.2		
Water Blank mg*	0.4		
Total particulate, mg	33.4	34.9	40.1

*Data not corrected for blank values.

Analyst Kevin Kennedy

Reviewer [illegible]

F. V. E. CERTIFICATION

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Kevin Kennedy

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

Thomas Hose
President

225654
Certificate Number

Willis [illegible]
Vice President

Pittsburgh
Location

David Savage
Program Manager

March 21, 1990
Date of Issue