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

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

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

MEMORANDUM

DATE:

TO: County file: MARION
Facility: C.B. Asphalt, Inc. / 1983 CMI drum-mix plant
Location: Huntington, MO

FROM: Doug Elley

SUBJECT: COMPLIANCE TEST RESULTS Test Date: 5-5-93

Testing firm: AirSource Technologies

Test team leader: Tim Titus / Doug Ostrander
Source tested: Permit #0690-014
1983 CMI drum-mix asphalt plant
Pollutants tested for:
Opacity, Particulate

	% Iso	ft^3 samp.	lb/hr	ppm	gr/dscf	gr/dscf corr.	Allowed	Opac%
Run #1	106.9	40.1	.86		.006			0
Run #2	108.1	40.2	.87		.006			0
Run #3	105.1	38.7	1.01		.008			0
Averages					.007		.04 gr/dscf	0%

Rated production/operation capacity: 295 ton/hr

Production/operation rate during test: 250 ton/hr

Fuel used: #2 Diesel Rate: Analysis:

Combustion Efficiency $= CE = \frac{CO_2}{CO_2 + CO} \times 100 = ____ \times 100 = ____$

Control device: Baghouse
Secondary chamber volume (measured): _____

Retention time: Run #1_____ Run #2_____ Run #3_____
Av.= _____ seconds

Pressure drop(s): 4-5 in. H_2O
Scrubber supply line water psi: _____

cd mo / 55 — 92

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METHOD 5 - PARTICULATE EMISSIONS

DE 6-25-93

PLANT NAME: C.B. Asphalt
UNIT TESTED: 1983 CMI drum-mix asphalt
RUN NUMBER: 2
DATE TESTED: 5-5-93

NO. OF POINTS	25	PERCENT OXYGEN	13.0
TIME PER POINT	2.50	PERCENT CARBON DIOXIDE	3.0
LEAK RATE	0.0020	PERCENT CARBON MONOXIDE	0.0
Y (METER CORR FACT)	1.053	Cp (PITOT COEFF)	0.840
As (STACK AREA)	6.03	Dn (NOZZLE DIAM)	0.204
Pbar (BAR PRESS)	29.40	Vinitial	551.843
Mn (WT PARTICULATE)	16.8000	Vfinal	591.580
Vc	367.6		
Wsg	0.0		

POINT NUMBER	STATIC PRESSURE (Ps)	STACK TEMP (Ts)	VELOCITY PRESSURE (delta Ps)	ORIFICE PRESS DIFF (delta H)	DRY GAS METER TEMP INLET (Tmi)	OUTLET (Tmo)
1	0.24	308.0	2.60	2.20	80.0	80.0
2	0.24	317.0	2.30	1.90	81.0	80.0
3	0.24	320.0	1.90	1.50	81.0	80.0
4	0.24	321.0	1.20	1.00	81.0	80.0
5	0.24	319.0	0.95	0.78	83.0	81.0
6	0.24	312.0	2.20	1.80	81.0	79.0
7	0.24	320.0	2.00	1.60	82.0	80.0
8	0.24	315.0	1.80	1.50	82.0	80.0
9	0.24	317.0	1.30	1.10	83.0	81.0
10	0.24	319.0	0.89	0.73	83.0	81.0
11	0.24	317.0	2.00	1.60	81.0	80.0
12	0.24	317.0	1.90	1.60	82.0	81.0
13	0.24	315.0	1.30	1.10	83.0	81.0
14	0.24	312.0	1.40	1.20	84.0	82.0
15	0.24	312.0	1.30	1.10	84.0	82.0
16	0.24	316.0	1.70	1.40	81.0	80.0
17	0.24	316.0	1.90	1.60	380.0	82.0
18	0.24	308.0	2.00	1.70	84.0	82.0
19	0.24	306.0	1.40	1.20	85.0	82.0
20	0.24	304.0	1.10	0.90	84.0	81.0
21	0.24	304.0	1.90	1.60	84.0	82.0
22	0.24	312.0	2.10	1.80	84.0	82.0
23	0.24	314.0	1.90	1.60	85.0	83.0
24	0.24	315.0	1.50	1.30	85.0	82.0
25	0.24	316.0	1.60	1.30	85.0	82.0
AVG	0.24	314.1	1.29	1.40	94.7	81.0

STACK VELOCITY	93.60 (ft/sec)
STANDARD VOLUME SAMPLED	39.75 (SCF)
AVERAGE DRY GAS METER TEMP	87.9 (°F)
PERCENT MOISTURE	30.33 (%)
STANDARD STACK FLOW RATE	15823.00 (DSCFM)
ISOKINETIC SAMPLING RATE	106.72 (%)
PARTICULATE EMISSION RATE	0.885 (lb/hr)
PARTICULATE EMISSION RATE	0.0065 (gr/dscf)

SOURCE EMISSIONS REPORT
for
C.B. ASPHALT, INC.
Asphalt Facility
Huntington, Missouri
Permit No. 0690-014

prepared by
AirSource Technologies

11635 W. 83rd Terrace
Lenexa, Kansas 66214

AirSource Project No. 411834

PREFACE

This report was prepared by AirSource Technologies in response to a test that was conducted at the C.B. Asphalt, Inc. in Huntington, Missouri on May 5, 1993. Any questions concerning this report should be directed to Mr. Tim Titus, Assistant Environmental Scientist, or to Mr. George Cobb, General Manager.

AirSource Technologies

Tim Titus CAD

Tim Titus
Assistant Environmental Scientist

Approved by:

George R. Cobb
General Manager

Date: May 24, 1993

SECTION 1

INTRODUCTION

A compliance stack test was conducted by AirSource Technologies on the C.B Asphalt, Inc., asphalt plant in Huntington, Missouri, on May 5, 1993. The tests were conducted in regards to permit No. 0690-014. The AirSource Technologies personnel who conducted the test were: Mr. Tim Titus, Assistant Environmental Scientist, and Mr. Doug Ostrander, Electrical Engineer/Continuous Emission Monitoring Analyst. The opacity tests were conducted by Mr. Rodney Bratcher of AirSource Technologies.

The results of the test were used to evaluate the process' performance with regards to the particulate concentration and opacity.

The observer for the test was Ms. Ruth Wallace, Environmental Specialist, Missouri Air Pollution Control Program.

The appendices contain the following:

Appendix A:	Example Calculations
Appendix B:	Laboratory and Analysis Forms
Appendix C:	Computer Data
Appendix D:	Particulate Field Data Forms
Appendix E:	Pretest Calibrations
Appendix F:	Posttest Calibrations
Appendix G:	Opacity Data Sheets
Appendix H:	Plant Operation Data

SECTION 2

SUMMARY OF RESULTS

The results of the particulate concentration for the facility are: 0.0063, 0.0064, and 0.0076 gr/dscf for Runs 1-3, respectively. The allowable particulate concentration is 0.04 gr/dscf.

The opacity averages for Runs 1-3 were all 0%, which is within the 20% limit.

The sampling, particulate, and opacity results are shown in Table 1.

Table 1
SUMMARY OF SAMPLING AND PARTICULATE RESULTS

Parameters	Units	Run 1	Run 2	Run 3	Av.
Dates		5/05/93	5/05/93	5/05/93	
Particulate Emissions*					
Uncorrected	gr/dscf	0.0063	0.0064	0.0076	.0068
Corrected to 7% O_2	gr/dscf	0.0106	0.0113	0.0136	
Corrected to 12%CO_2	gr/dscf	0.0150	0.0161	0.0174	
Uncorrected	lb/hr	0.86	0.87	1.01	
Opacity	%	0	0	0	0 %
Isokinetics	%	106.9	108.1	105.1	
Stack Flow Rate					
Actual	acfm	33,786	33,703	33,433	
Standard Conditions	dscfm	15,946	15,795	15,647	
Sampling Results					
Avg. Stack Temp.	°F	322	314	316	
Avg. Delta P	in/H_2O	1.748	1.686	1.771	
Avg. Delta H	in/H_2O	1.42	1.42	1.45	
Avg. Meter Temp.	°F	76	82	87	
Oxygen, Orsat	%	12.7	13.0	13.2	
Carbon Dioxide, Orsat	%	5.0	4.8	5.2	
Static Pressure	in/H_2O	0.24	0.24	0.24	
Moisture Collected	mls	346.6	367.6	352.5	
Percent Water	%	28.9	30.1	30.0	
Sampling Time	min	62.5	62.5	62.5	
Sample Volume	dscf	40.114	40.189	38.692	
Particulate Weight	g	0.0163	0.0168	0.0190	

* All values based on probe and filter rinse particulate weights.

Table 2
SUMMARY OF RESULTS PROCESS OPERATION

	Units	Conditions
Manufacturer's rated production capacity	tons/hr	295
Historical maximum asphalt production rate	tons/hr	290
Historical minimum asphalt production rate	tons/hr	175
Nominal asphalt production rate during test	tons/hr	250 *
Baghouse temperature	°F	330 to 350
Baghouse pressure differential	in. H_2O	4 - 5 *
Mix temperature	°F	275 - 300
Dryer fuel		#2 Diesel
Raw Materials Data:		
Limestone	%	81.0
Sand	%	14.3
Moisture	%	-
Asphalt	%	4.7

Cold Feed

Size	% Passing
1 - 1 1/2"	100
1"	100
1/2"	97.6
3/8"	
Mesh #4	67.9
Mesh #8	44.5
Mesh #16	
Mesh #30	23.8
Mesh #100	
Mesh #200	7.8

SECTION 3

PROCESS OPERATION

The asphalt plant is a 1983 drum-mix type CMI portable asphalt plant equipped with a baghouse. The condition for each of the test runs were the same.

Table 2 summarizes the results of the process operations.

SECTION 4

SAMPLING AND ANALYTICAL PROCEDURES

Particulates

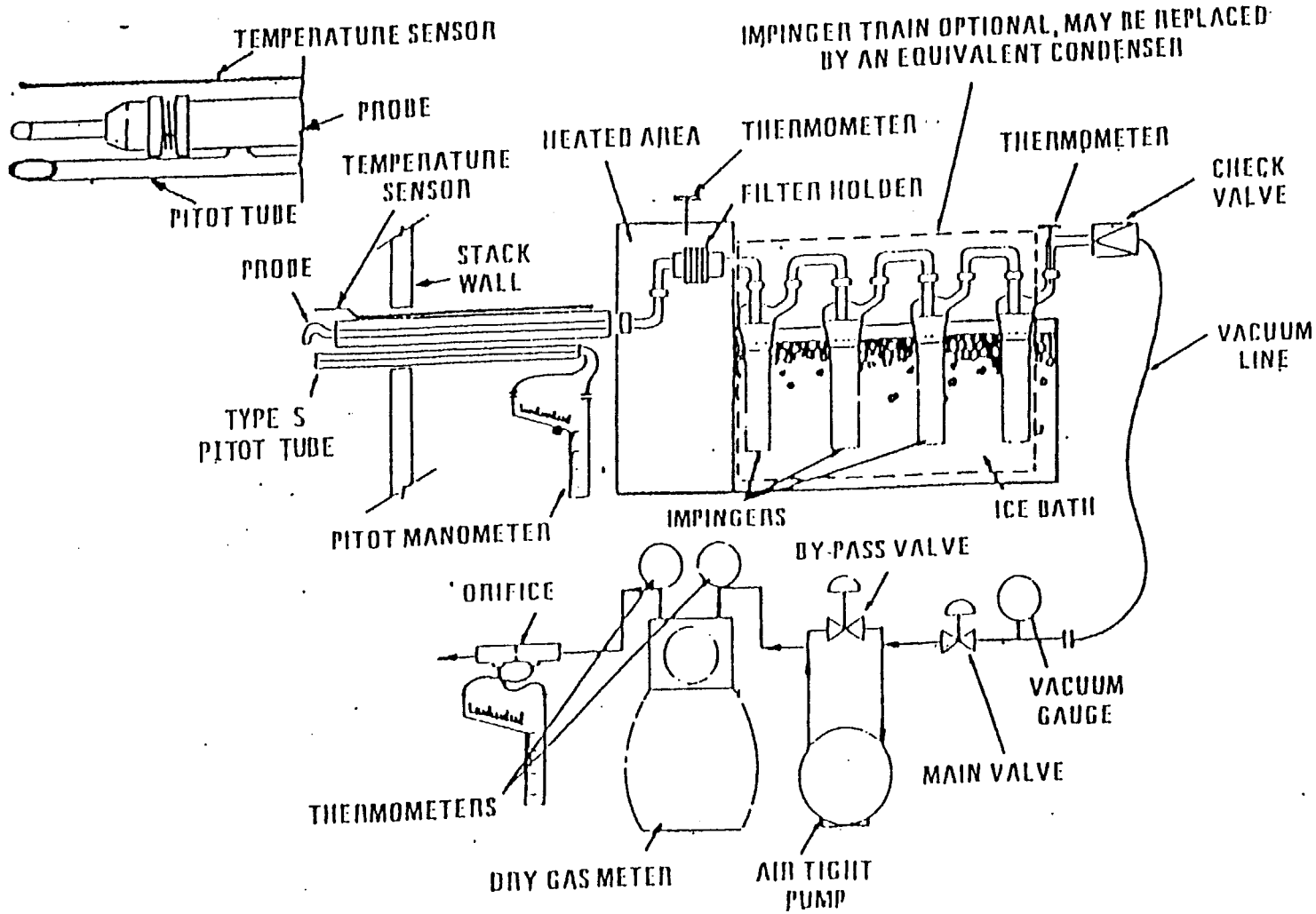
EPA Methods 1-4 were used for the determination of traverse point locations, velocities and flows of stack gas, oxygen, carbon dioxide, and moisture. The particulate sampling and recovery of the samples were done according to EPA Method 5 recovery procedures. The filters and beakers were desiccated for 24 hours and weighed to a constant weight.

Figure 1 shows a schematic of the sampling train, which includes a water-cooled probe.

Figure 2 shows a schematic of the stack and traverse locations.

Opacity

EPA Method 9 was used for determining opacity.

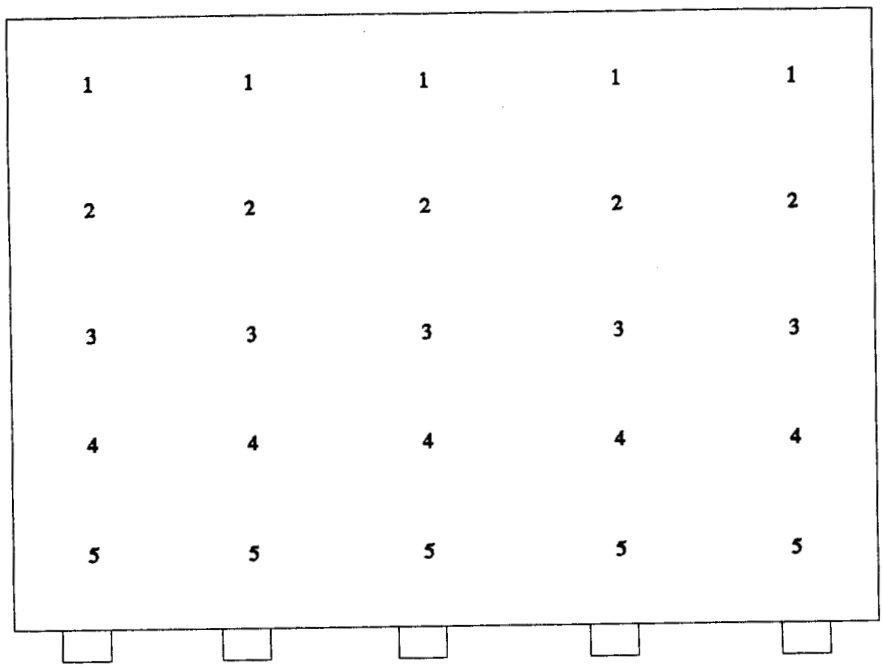


Schematic of Method 5 sampling train.

Figure 1

Stack dimensions = 31" x 28"

Ports are located 0.9 equivalent diameters upstream
and 2.6 equivalent diameters downstream from any disturbances.



Traverse Point Locations

1. 3.1"
2. 9.3"
3. 15.5"
4. 21.7"
5. 27.9"

Figure 2

APPENDIX A

EXAMPLE CALCULATIONS

NOMENCLATURE

Equation No.	Symbol	Description	Units
1	Vi	Initial meter reading	dcf
	Vf	Final meter reading	dcf
	Vm	Volume meter, actual	dcf
2	Pb	Barometric pressure	in. Hg
	ΔH_{avg}	Average orfice pressure drop	in. H_2O
	Tm_{avg}	Average meter temperature	°F
	Vm_{std}	Volume meter, standard conditions	dscf
3	Vlc	Total moisture collected	grams
	Vw_{std}	Volume of water vapor collected, standard conditions	ft^3
	% H_2O	Percent moisture by volume	-
4	Mf	Mole fraction of dry gas	-
5	% CO_2	Percent carbon dioxide by volume, dry	-
	% O_2	Percent oxygen by volume, dry	-
	% CO	Percent carbon monoxide by volume, dry	-
	% N_2	Percent nitrogen by volume, dry	-
6	Md	Molecular weight, dry stack gas	lb/lb-mole
7	Ms	Molecular weight, stack gas	lb/lb-mole
8	Θi	Sampling time interval	minutes
	Dn	Diameter of nozzle	inches
	ΔPs	Velocity head of S pitot	in. H_2O
	Ts	Temperature of stack gas	°F
	Vm_i	Volume of meter per sampling interval	ft^3
9	Ps	Stack pressure, absolute	in. Hg
	Pg	Stack gas pressure	in. H_20
10	ΔPs_{avg}	Average velocity head of S pitot	in. H_2O
	Ts_{avg}	Average temperature of stack gas	°F
	Vs	Average stack gas velocity	fpm
11	Θ	Total time of test	minutes
	% I	Percent isokinetic	-
12	ID	Inside diameter of stack	inches
	As	Area of stack	in^2
13	Qs	Stack flow rate, dry standard conditions	dscfm
14	m_n	Total particulate matter collected	mg
	Cs_{std}	Concentration of particulate collected, dry basis, standard conditions	gr/dscf
15	Cs_{std}	Concentration of particulate collected, actual conditions	gr/acf
16	Ep	Particulate emission rate	lb/hr

Example Calculations
Run 1

1) $Vm = (550.884 - 511.617) = 41.348\ dcf$

2) $$Vm_{std} = \frac{(17.64)(41.348) \left(29.4 + \frac{1.42}{13.6} \right)}{76+460} = 40.114\ dscf$$

3) $Vwc_{std} = 0.0471 \quad (346.6) = 16.325\ ftSUP3$

$$\%H_2O = \frac{(100) (16.325)}{(40.114 + 16.325)} = 28.9\%$$

4) $$Mf = \frac{(100 - 28.9)}{100} = 0.711$$

5) $\%N_2 = 100 - (5.0 + 12.7 + 0) = 82.3\%$

6) $Md = (5.0 \ x\ 0.44) + (12.7 \ x\ 0.32)(82.3 \ x\ 0.28) = 29.31\ lb/lb\text{-}mole$

7) $Ms = (29.31 \ x\ 0.711) + 18(1 - 0.711) = 26.04\ lb/lb\text{-}mole$

8) N / A

9) $$P_s = 29.40 + \frac{0.24}{13.6} = 29.42\ inches\ Hg$$

10) $$Vs = (5128.8)\sqrt{1.748}\left(\sqrt{\frac{322 + 460}{29.42 \ x\ 26.04}}\right) \times .84 = 5{,}605\ fpm$$

11) $$\%I = \frac{1039\ (322 + 460)(40.114)}{5{,}605\ (62.5)(29.42)(0.711)(0.0416)^2} = 106.9\%$$

12) $As = 31 \times 28 = 868\ \epsilon^2$

13) $Q_s = \dfrac{0.122\ (\ 5{,}605\ )\ (\ 868\ )\ (\ 0.711\ )\ (\ 29.42\ )}{322\ +\ 460} = 15{,}946\ dscfm$

14) $Cs_{(std)} = 0.0154\ (0.0163/40.114) = 0.0063\ gr/dscf$

15) $Cs_{(act)} = \dfrac{17.64\ (0.0063)(29.42)(0.711)}{322\ +\ 460} = 0.0030$

16) $E_p = 0.00857\ (0.0063)(15{,}946) = 0.86\ lb/hr$

PARTICULATE CALCULATION EQUATIONS

1. $V_m = V_f - V_i$

2. $$V_{m(std)} = \frac{17.64\ (V_m)\ Y \left(P_b + \frac{\Delta H_{avg}}{13.6}\right)}{T_{m(avg)} + 460}$$

3. $V_{wc(std)} = 0.0471(V_{lc})$

$$\%\ H_2O = \frac{100(V_{wc(std)})}{V_{m(std)} + V_{wc(std)}}$$

4. $$M_f = \frac{100 - \%H_2O}{100}$$

5. $\%\ N_2 = 100 - (\%CO_2 + \%O_2 + \%CO)$

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

7. $M_s = (M_d \times M_f) + 18(1 - M_f)$

8. $$V_{mi} = \frac{5.168(T_m + 460)(C_p)(\theta_i)(M_f)(D_n^2)}{\sqrt{P_b}} \times \sqrt{\frac{\Delta P_s}{T_S + 460}}$$

9. $$P_s = P_b + \frac{P_g}{13.6}$$

10. $$V_s = 5128.8 \times C_P \times \left(\sqrt{\Delta P_{s(avg)}}\right) \times \sqrt{\frac{T_{s(avg)} + 460}{P_s \times M_s}}$$

11. $$\%\ I = \frac{1039(T_{s(avg)} + 460)(V_{m(std)})}{V_s(\theta)(P_s)(M_f)(D_n^2)}$$

12. $A_s = \pi \left(\frac{ID}{2}\right)^2$

13. $Q_s = \frac{0.122(V_s)(A_s)(M_f)(P_s)}{T_{s(avg)} + 460}$

14. $C_{s(std)} = 0.0154\left(\frac{M_n}{V_{m(std)}}\right)$

15. $C_{s(act)} = \frac{17.64(C_{s(std)})(P_s)(M_f)}{T_{s(avg)} + 460}$

16. $E_p = 0.00857(C_{S(std)})(Q_s)$

APPENDIX B

LABORATORY AND ANALYSIS FORMS

INITIAL FILTER WEIGHING

Analyst:	
Filter Type and Size:	Weight Unit: grams

Filter Treatment:

_____Desiccate 24 hours/6 hours between weighings
_____Oven Treated
_____Other

Balance Check:				
Weight Value(g)	65	65		
Initial Check(g)	64.9996	64.9992		
Final Check(g)	64.9994	64.9991		
Date:	4-7-93	4-7-93		
Time (24 hr):	1000	08 2030		
Filter No.	Weigh No. ____	Weigh No.____	Weigh No.____	Average
93-42	62.2903	62.2898		62.2901
93-43	60.3538	60.3539		60.3539
93-44	63.2073	63.2074		63.2074
93-46	66.0916	66.0918		66.0917
93-47	65.4526	65.4526		65.4526
93-48	60.6930	60.6925		60.6928

INITIAL FILTER WEIGHING

Analyst: TT	
Filter Type and Size: 3" glass	Weight Unit: grams

Filter Treatment:

x Desiccate 24 hours/6 hours between weighings
____ Oven Treated
____ Other

Balance Check:				
Weight Value(g)	~~17.0~~ 65.0	65		
Initial Check(g)	~~17.0000~~ 64.9994	64.9994	64.9995	
Final Check(g)	64.9994	64.9994	64.9993	
Date:	4/05/93	4-5-93	4-6-93	
Time (24 hr):	8:30	1900	1500	
Filter No.	Weigh No. 1	Weigh No. 2	Weigh No. 3	Average
93-42	62.2955	62.3021	62.2997	→
93-43	60.3546	60.3597	60.3564	→
93-44	63.2102	63.2096	63.2106	→
93-45	66.8246	66.8275	66.8273	66.8274
93-46	66.0916	66.0967	66.0932	→
93-47	65.4523	65.4746	65.4667	→
93-48	60.6954	60.72154	60.6977	→

INITIAL FILTER WEIGHING

Analyst: BWood	
Filter Type and Size: 85 mm Glass	**Weight Unit:** grams

Filter Treatment:

✓ Desiccate 24 hours/6 hours between weighings
____ Oven Treated
____ Other

Balance Check:				
Weight Value(g)	40	40		
Initial Check(g)	39.9995	39.9996		
Final Check(g)	39.9995	39.9994		
Date:	4-23-93	4-23-90		
Time (24 hr):	0800	1400		
Filter No.	**Weigh No.** 1	**Weigh No.** 2	**Weigh No.** ____	**Average**
93-62	BW ~~31.4009~~ 33.3814	33.3812		33.3813
93-63	BW ~~29.6225~~ 33.8299	33.8297		33.8298
93-64	36.9140	36.9140		36.9140
93-65	29.0340	29.0338		29.0339
93-66	32.7507	32.7507		32.7507
93-67	31.4009	31.4011		31.4010
93-68	29.6225	29.6230		29.6228
93-69	33.9947	33.9948		33.9948
93-70	31.6523	31.6524		31.6524
93-71	31.5256	31.5257		31.5257
93-72	32.2492	32.2493		32.2493
93-73	34.8694	34.8695		34.8695
93-74	36.1644	36.1646		36.1645
93-75	33.3489	33.3490		33.3490
93-76	32.8403	32.8403		32.8403

Initial ~~FINAL~~ BEAKER WEIGHING

Project No.:	Analyst:
Beaker Size: 130 ml	Weight Unit: grams

Beaker Treatment:
_____Desiccate 24 hours/6 hours between weighings
_____Other

Balance Check:					
Weight Value(g)	70.0	70.0	70.?		
Initial Check(g)	69.9998	70.0001	70.0004		
Final Check(g)	69.9999	69.9998	70.0005		
Date:	5/06/93	5/7/93	5-9-93		
Time (24 hr):	20:20	905	15:54		
Beaker No.	Weigh No. 1	Weigh No. 2	Weigh No.____	Average	ml.
* 93-76	66.8738	66.8736		66.8737	
X 93-77	67.0095	67.0105	67.0101		
93-78	65.9387	65.9395	65.9393		
x 93-79	67.6063	67.6074	67.6070		
93-80	67.9963	67.9974			
93-81	66.0227	66.0239	66.0235		
x 93-82	69.1407	69.1420	69.1417	69.1419	
93-83	63.8675	63.8685			
93-84	75.8950	75.8962	~~75.8959~~ 75.8961		
x 93-85	67.3543	67.3556	67.3552		
x 93-86	68.1701	68.1716	68.1712	68.1714	
x 93-87	74.9298	74.9304	74.9308	74.9306	
97-88	63.2906	63.2913			
93-89	67.6509	67.6518			
93-90	65.8581	65.8591			

FILTER WEIGHING

Analyst: 411834	
Filter Type and Size:	**Weight Unit:** grams

Filter Treatment:
X Desiccate 24 hours/6 hours between weighings
____ Oven Treated
____ Other

Balance Check:				
Weight Value(g)	35.0	35.0	35.0	
Initial Check(g)	34.9998	35.0003	35.0002	
Final Check(g)	34.9997	35.0002	35.0002	
Date:	5-10-93	5/10/93	5/11/93	
Time (24 hr):	8:00	14:30	06:30	
Filter No.	**Weigh No.** 1	**Weigh No.** 2	**Weigh No.** 3	**Average**
93-46	66.0983	66.0987		66.0985
93-63	33.8412	33.8413		33.8413
93-64	36.9142	36.9150	36.9149	36.9150
93-65	29.0449	29.0453		29.0451

FINAL BEAKER WEIGHING

Project No.: 411834	Analyst: TT
Beaker Size: 150 ml	Weight Unit: grams

Beaker Treatment:
x Desiccate 24 hours/6 hours between weighings
____Other

Balance Check:					
Weight Value(g)	70.0	70.0			
Initial Check(g)	70.0004	70.0005			
Final Check(g)	70.0002	70.0005			
Date:	5/11/93	5/11/93			
Time (24 hr):	06:30	12:30			
Beaker No.	Weigh No. 1	Weigh No. 2	Weigh No.____	Average	ml.
93-76	66.8744	66.8748		66.8746	100
93-82	69.1517	69.1520		69.1519	75
93-86	68.1794	68.1790		68.1792	75
93-87	74.9351	74.9356		74.9354	75

APPENDIX C

COMPUTER DATA

FILE NAME - CBASHPALT.R1
RUN # - C.B. ASPHALT HUNTINGTON PLANT RUN 1
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:37:09

Initial Meter Volume (Cubic Feet)=	511.617
Final Meter Volume (Cubic Feet)=	550.884
Meter Factor=	1.053
Final Leak Rate (cu ft/min)=	0.004
Net Meter Volume (Cubic Feet)=	41.348
Gas Volume (Dry Standard Cubic Feet)=	40.114
Barometric Pressure (in Hg)=	29.40
Static Pressure (Inches H20)=	0.24
Percent Oxygen=	12.7
Percent Carbon Dioxide=	5.0
Moisture Collected (ml)=	346.6
Percent Water=	28.9
Average Meter Temperature (F)=	76
Average Delta H (in H20)=	1.42
Average Delta P (in H20)=	1.748
Average Stack Temperature (F)=	322
Dry Molecular Weight=	29.31
Wet Molecular Weight=	26.04
Average Square Root of Delta P (in H20)=	1.2878
% Isokinetic=	106.9
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	62.5
Nozzle Diameter (Inches)=	0.204
Stack Axis #1 (Inches)=	31.0
Stack Axis #2 (Inches)=	28.0
Rectangular Stack	
Stack Area (Square Feet)=	6.03
Stack Velocity (Actual, Feet/min)=	5,605
Flow Rate (Actual, Cubic ft/min)=	33,786
Flow rate (Standard, Wet, Cubic ft/min)=	22,435
Flow Rate (Standard, Dry, Cubic ft/min)=	15,946

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0163		
Particulate Loading, Dry Std. (gr/scf)=	0.0063	0.0106	0.0150
Particulate Loading, Actual (gr/cu ft)=	0.0030		
Emission Rate (lb/hr)=	0.86		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - CBASHPALT.R1
RUN # - C.B. ASPHALT HUNTINGTON PLANT RUN 1
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:37:09

Initial Meter Volume (Cubic Meters)=	14.487
Final Meter Volume (Cubic Meters)=	15.599
Meter Factor=	1.053
Final Leak Rate (cu m/min)=	0.0001
Net Meter Volume (Cubic Meters)=	1.171
Gas Volume (Dry Standard Cubic Meters)=	1.136
Barometric Pressure (mm Hg)=	747
Static Pressure (mm H20)=	6
Percent Oxygen=	12.7
Percent Carbon Dioxide=	5.0
Moisture Collected (ml)=	346.6
Percent Water=	28.9
Average Meter Temperature (C)=	25
Average Delta H (mm H20)=	36.0
Average Delta P (mm H20)=	44.4
Average Stack Temperature (C)=	161
Dry Molecular Weight=	29.31
Wet Molecular Weight=	26.04
Average Square Root of Delta P (mm H20)=	6.4902
% Isokinetic=	106.9
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	62.5
Nozzle Diameter (mm)=	5.18
Stack Axis #1 (Meters)=	0.787
Stack Axis #2 (Meters)=	0.711
Rectangular Stack	
Stack Area (Square Meters)=	0.560
Stack Velocity (Actual, m/min)=	1,708
Flow rate (Actual, Cubic m/min)=	957
Flow rate (Standard, Wet, Cubic m/min)=	635
Flow rate (Standard, Dry, Cubic m/min)=	452

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0163		
Particulate Loading, Dry Std. (mg/cu m)=	14.4	24.2	34.4
Particulate Loading, Actual (mg/cu m)=	6.8		
Emission Rate (kg/hr)=	0.39		

No Back Half Analysis

FILE NAME - CBASHPALT.R1
RUN # - C.B. ASPHALT HUNTINGTON PLANT RUN 1
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:37:10

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	2.700	2.20	310	70	69
2	2.700	2.20	311	73	71
3	1.900	1.50	316	72	71
4	1.100	0.90	316	73	71
5	0.580	0.47	314	73	71
6	2.200	1.80	314	74	72
7	2.800	2.30	314	75	73
8	2.000	1.60	320	81	76
9	1.100	0.90	326	83	78
10	0.680	0.55	323	77	74
11	2.300	1.90	327	82	79
12	2.200	1.80	324	78	83
13	1.800	1.40	322	78	75
14	1.300	1.10	316	78	75
15	0.700	0.56	321	78	75
16	2.400	1.90	322	78	76
17	2.300	1.90	327	79	72
18	1.700	1.40	332	80	77
19	1.100	0.88	332	80	77
20	0.720	0.57	333	81	77
21	2.900	2.30	331	79	77
22	2.400	1.90	331	80	77
23	2.200	1.80	325	80	78
24	1.100	0.89	320	80	78
25	0.820	0.67	318	81	78

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	33.8413	33.8298	0.0000	0.0115

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	74.9354	74.9306	75.0	0.0048
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

FILE NAME - CBASPHALT.R2
RUN # - C.B. ASPHALT HUNTINGTON RUN 2
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:37:53

Initial Meter Volume (Cubic Feet)=	551.843
Final Meter Volume (Cubic Feet)=	591.580
Meter Factor=	1.053
Final Leak Rate (cu ft/min)=	0.002
Net Meter Volume (Cubic Feet)=	41.843
Gas Volume (Dry Standard Cubic Feet)=	40.189
Barometric Pressure (in Hg)=	29.40
Static Pressure (Inches H20)=	0.24
Percent Oxygen=	13.0
Percent Carbon Dioxide=	4.8
Percent Water=	30.1
Average Meter Temperature (F)=	82
Average Delta H (in H20)=	1.42
Average Delta P (in H20)=	1.686
Average Stack Temperature (F)=	314
Dry Molecular Weight=	29.29
Wet Molecular Weight=	25.89
Average Square Root of Delta P (in H20)=	1.2872
% Isokinetic=	108.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	62.5
Nozzle Diameter (Inches)=	0.204
Stack Axis #1 (Inches)=	31.0
Stack Axis #2 (Inches)=	28.0
Rectangular Stack	
Stack Area (Square Feet)=	6.03
Stack Velocity (Actual, Feet/min)=	5,591
Flow Rate (Actual, Cubic ft/min)=	33,703
Flow rate (Standard, Wet, Cubic ft/min)=	22,599
Flow Rate (Standard, Dry, Cubic ft/min)=	15,795

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0168		
Particulate Loading, Dry Std. (gr/scf)=	0.0064	0.0113	0.0161
Particulate Loading, Actual (gr/cu ft)=	0.0030		
Emission Rate (lb/hr)=	0.87		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - CBASPHALT.R2
RUN # - C.B. ASPHALT HUNTINGTON RUN 2
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:37:53

Initial Meter Volume (Cubic Meters)=	15.626
Final Meter Volume (Cubic Meters)=	16.751
Meter Factor=	1.053
Final Leak Rate (cu m/min)=	0.0001
Net Meter Volume (Cubic Meters)=	1.185
Gas Volume (Dry Standard Cubic Meters)=	1.138
Barometric Pressure (mm Hg)=	747
Static Pressure (mm H20)=	6
Percent Oxygen=	13.0
Percent Carbon Dioxide=	4.8
Percent Water=	30.1
Average Meter Temperature (C)=	28
Average Delta H (mm H20)=	36.2
Average Delta P (mm H20)=	42.8
Average Stack Temperature (C)=	157
Dry Molecular Weight=	29.29
Wet Molecular Weight=	25.89
Average Square Root of Delta P (mm H20)=	6.4874
% Isokinetic=	108.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	62.5
Nozzle Diameter (mm)=	5.18
Stack Axis #1 (Meters)=	0.787
Stack Axis #2 (Meters)=	0.711
Rectangular Stack	
Stack Area (Square Meters)=	0.560
Stack Velocity (Actual, m/min)=	1,704
Flow rate (Actual, Cubic m/min)=	954
Flow rate (Standard, Wet, Cubic m/min)=	640
Flow rate (Standard, Dry, Cubic m/min)=	447

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0168		
Particulate Loading, Dry Std. (mg/cu m)=	14.8	25.8	36.9
Particulate Loading, Actual (mg/cu m)=	6.9		
Emission Rate (kg/hr)=	0.40		

No Back Half Analysis

FILE NAME - CBASPHALT.R2
RUN # - C.B. ASPHALT HUNTINGTON RUN 2
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:37:54

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	2.600	2.20	308	80	80
2	2.300	1.90	317	81	80
3	1.900	1.50	320	81	80
4	1.200	~~1.50~~ 1.0	~~320~~ 321	81	80
5	0.950	0.78	319	83	81
6	2.200	1.80	312	81	79
7	2.000	1.60	320	82	80
8	1.800	1.50	315	82	80
9	1.300	1.10	317	83	81
10	0.890	0.73	319	83	81
11	2.000	1.60	317	81	80
12	1.900	1.60	317	82	81
13	1.300	1.10	315	83	81
14	1.400	1.20	312	84	82
15	1.300	1.10	312	84	82
16	1.700	1.40	316	81	80
17	1.900	1.60	316	80	82
18	2.000	1.70	314	84	82
19	1.400	1.20	315	85	82
20	1.100	0.90	316	84	81
21	1.900	1.60	316	84	82
22	2.100	1.80	308	84	82
23	1.900	1.60	306	85	83
24	1.500	1.30	304	85	82
25	1.600	1.30	304	85	82

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	66.0985	66.0917	0.0000	0.0068

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	69.1519	69.1419	75.0	0.0100
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

FILE NAME - CBASPHALT.R3 PROG.=VER 06/27/89
RUN # - C.B. ASPHALT HUNTINGTON RUN 3 05-29-1993 13:38:37
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

Initial Meter Volume (Cubic Feet)=	592.204
Final Meter Volume (Cubic Feet)=	630.823
Meter Factor=	1.053
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	40.666
Gas Volume (Dry Standard Cubic Feet)=	38.692
Barometric Pressure (in Hg)=	29.40
Static Pressure (Inches H20)=	0.24
Percent Oxygen=	13.2
Percent Carbon Dioxide=	5.2
Percent Water=	30.0
Average Meter Temperature (F)=	87
Average Delta H (in H20)=	1.45
Average Delta P (in H20)=	1.771
Average Stack Temperature (F)=	316
Dry Molecular Weight=	29.36
Wet Molecular Weight=	25.95
Average Square Root of Delta P (in H20)=	1.2766
% Isokinetic=	105.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	62.5
Nozzle Diameter (Inches)=	0.204
Stack Axis #1 (Inches)=	31.0
Stack Axis #2 (Inches)=	28.0
Rectangular Stack	
Stack Area (Square Feet)=	6.03
Stack Velocity (Actual, Feet/min)=	5,546
Flow Rate (Actual, Cubic ft/min)=	33,433
Flow rate (Standard, Wet, Cubic ft/min)=	22,352
Flow Rate (Standard, Dry, Cubic ft/min)=	15,647

Particulate Loading - Front Half

Particulate Weight (g)=	0.0190	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0076	0.0136	0.0174
Particulate Loading, Actual (gr/cu ft)=	0.0035		
Emission Rate (lb/hr)=	1.01		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - CBASPHALT.R3
RUN # - C.B. ASPHALT HUNTINGTON RUN 3
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:38:38

Initial Meter Volume (Cubic Meters)=	16.769
Final Meter Volume (Cubic Meters)=	17.862
Meter Factor=	1.053
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.151
Gas Volume (Dry Standard Cubic Meters)=	1.096
Barometric Pressure (mm Hg)=	747
Static Pressure (mm H20)=	6
Percent Oxygen=	13.2
Percent Carbon Dioxide=	5.2
Percent Water=	30.0
Average Meter Temperature (C)=	31
Average Delta H (mm H20)=	36.8
Average Delta P (mm H20)=	45.0
Average Stack Temperature (C)=	158
Dry Molecular Weight=	29.36
Wet Molecular Weight=	25.95
Average Square Root of Delta P (mm H20)=	6.4337
% Isokinetic=	105.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	62.5
Nozzle Diameter (mm)=	5.18
Stack Axis #1 (Meters)=	0.787
Stack Axis #2 (Meters)=	0.711
Rectangular Stack	
Stack Area (Square Meters)=	0.560
Stack Velocity (Actual, m/min)=	1,691
Flow rate (Actual, Cubic m/min)=	947
Flow rate (Standard, Wet, Cubic m/min)=	633
Flow rate (Standard, Dry, Cubic m/min)=	443

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0190		
Particulate Loading, Dry Std. (mg/cu m)=	17.3	31.1	40.0
Particulate Loading, Actual (mg/cu m)=	8.1		
Emission Rate (kg/hr)=	0.46		

No Back Half Analysis

FILE NAME - CBASPHALT.R3
RUN # - C.B. ASPHALT HUNTINGTON RUN 3
LOCATION - HUNTINGTON
DATE - 5-5-93
PROJECT # - 411834

PROG.=VER 06/27/89
05-29-1993 13:38:38

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	3.200	2.60	315	85	85
2	2.800	2.30	321	85	85
3	1.600	1.30	323	88	85
4	0.990	0.80	323	85	85
5	0.660	0.54	317	86	86
6	3.200	2.60	314	87	88
7	2.300	1.90	319	88	88
8	1.500	1.20	319	89	87
9	0.730	0.60	318	90	87
10	0.650	0.54	316	90	87
11	3.500	2.90	316	85	85
12	2.600	2.10	315	85	85
13	1.600	1.30	313	86	86
14	0.780	0.64	315	86	86
15	0.510	0.42	313	87	86
16	3.200	2.60	313	87	86
17	2.400	2.00	314	88	86
18	1.400	1.10	314	88	86
19	0.790	0.66	313	89	86
20	0.610	0.51	315	88	86
21	3.000	2.50	316	89	87
22	2.300	1.90	318	91	87
23	1.800	1.40	318	91	87
24	1.300	1.10	317	91	87
25	0.850	0.70	317	91	88

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	29.0451	29.0339	0.0000	0.0112

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	68.1792	68.1714	75.0	0.0078
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

APPENDIX D

PARTICULATE FIELD DATA FORMS

PRELIMINARY VELOCITY TRAVERSE

PROJECT NO. 411 834

PLANT C.B. Asphalt

DATE 5/05/93

LOCATION Huntington

STACK I.D. 28"x34"

BAROMETER PRESSURE IN. Hg 29.4

SITE TO BARO. ELEVATION (ft.) 15

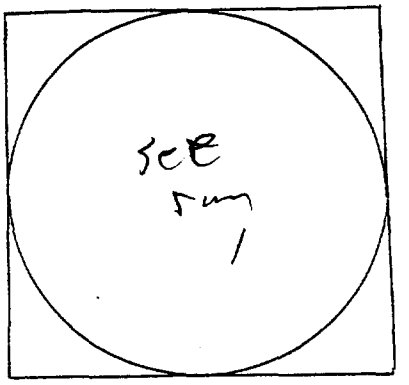
CORRECTED BARO. PRESSURE —

TEMPERATURE METER NO. 3

THERMOCOUPLE I.D. NO. 3-1

PITOT (Cp) .84

OPERATORS TT/DO



STACK GAUGE PRESSURE (In. H_2O) +.24

FINAL PITOT LEAK CK. AT ≥3" H_2O P/F

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD ΔP, IN. H_2O	STACK TEMP. °F	CYCLONIC FLOW DETERMINATION		TRAVERSE POINT NUMBER	VELOCITY HEAD ΔP, IN. H_2O	STACK TEMP. °F	CYCLONIC FLOW DETERMINATION	
			ΔP, AT 0° REFERENCE	ANGLE (±) WHICH YIELDS A NULL ΔP				ΔP, AT 0° REFERENCE	ANGLE (±) WHICH YIELDS A NULL ΔP
A1	2.4	325	~~.10~~ .05	1	4	1.0	327	.12	2
2	2.2	325	.11	1	5	.70	328	.09	1
3	2.0	326	.06	1	D1	2.4	326	.35	5
4	1.6	325	0	0	2	2.4	326	.32	5
5	.69	325	.05	1	3	2.2	325	.11	2
B1	2.5	327	.05	1	4	1.1	325	.13	2
2	2.2	325	.10	1	5	.63	325	.08	1
3	1.6	327	.05	1	E1	2.7	326	.38	5
4	1.0	327	.05	1	2	2.7	325	0	0
5	.71	327	0	0	3	2.1	323	.23	3
C1	2.4 ~~.42~~	325	.42	5	4	1.1	325	0	0
2	2.4	325	.15	2	5	.65	326	.10	2
3	2.2	326	.33	5					

Comments:

static +.24

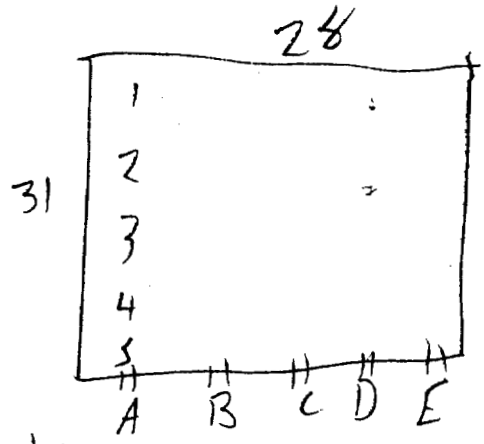
Reviewed by: _____ Date: _____

AIRSOURCE TECHNOLOGIES

11635 W 83RD TERRACE
Lenexa, Kansas 66215
(913) 492-1613
FAX: (913) 492-1012

PROJECT NO. 411834
PROJECT LEADER TT
RUN NO. 1
CONSOLE OPERATOR TT
DATE 5/05/93
LAB PERSON TT
SAMPLE TYPE post
SUPPORT PERSONNEL: DO
PLANT C.B. Asphalt
SAMPLING LOCATION Huntington

METER NO. 3
ASSUMED MOISTURE ~~15~~ 30 %
UMBILICAL CORD I.D. NO. —
METER CORRECTION FACTOR 1.053
UMBILICAL/SAMPLER HOOKUP 1
METER ΔH @ 2.054
OVEN BOX NO. 1
BAROMETRIC PRESSURE 29.4 in Hg
PROBE NO. 3-1
STATIC PRESSURE .24 in H_2O
PROBE LENGTH & TYPE 3 glass
RECORD DATA EVERY 2.5 MIN
PITOT NO. 3-1
PITO COEFFICIENT .84
THERMOCOUPLE I.D. NO. 3-1
NOZZLE DIAMETER ~~.177~~ .204 in
NOZZLE NO. ~~.177~~ Q-13
STACK AXIS #1 31
NOZZLE TYPE SS/Q10
STACK AXIS #2 28 rectangular



SCHEMATIC OF TRAVERSE POINT LAYOUT

SAMPLE TRAIN LEAK CHECKS	INITIAL	FINAL
TIME (24 HRS.)	9:15	11:05
VACUUM, in. Hg	≥15	15"
CFM	0.0	.004
PITOT LEAK CHECK ≥3" H_2O	ok	ok

INITIAL METER VOLUME	511.617
FINAL METER VOLUME	550.484

ORSAT/FYRITE

TRIAL	PERCENT CO_2	PERCENT CO_2 + O_2	PERCENT O_2
1	5	17.5	12.5
2	5	18	13
3	5	17.5	12.5
AVG	5	—	12.7

RECOVERY DATA

	FINAL	INITIAL	DIFFERENCE
IMP. 1	347	100	247
IMP. 2	176	100	76
IMP. 3	10	0	10
IMP. 4	682.3	668.7	13.6
TOTAL:			346.6

FILTER NO.: 93-63

COMMENTS:

28.9% moist. break 93-87 beakes blank 93-76

Run No. 1 Project No. 411834 Location Huntington Date 5/05/93 Operator TT Page 1 of 1

Traverse Point Number	Sample Time (min)	Clock Time (24-hr)	Dry Gas Meter ft³ Initial 511.617 Desired	Dry Gas Meter ft³ Actual	Velocity Head Δp in. H_2O	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Stack Temp. °F	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	Pump VAC. in. Hg	Probe Temp. °F	Filter Temp. °F	Impinger Temp. °F	
		940													
A 1	2.5		~~512.36~~	—	2.7	2.18	2.2	310	70	69	11	253	254	61	1.64
2	5.0				2.7	2.19	2.2	311	73	71	11	254	253	57	1.64
3					1.9	1.5	1.5	316	72	71	9	254	253	52	1.37
4	10.0	9:50			1.1	0.88	.9	316	73	71	5	254	253	51	1.04
5	12.5			519.715	.58	.47	.47	314	73	71	2	253	255	51	.74
B 1	2.5	10:00			2.2	1.78	1.8	314	74	72	8	255	245	58	1.48
2	5.0				2.8	2.27	2.3	314	75	73	13	254	246	51	1.67
3					2.0	1.62	1.6	320	81	76	7	250	247	51	1.41
4	10				1.1	.89	.9	326	83	78	4	250	247	52	1.04
5	12.5				.68	0.54	.55	323	77	74	3	260	255	52	.82
C 1		10:14			2.3	1.86	1.9	327	82	79	10	258	251	57	1.51
2	5				2.2	1.78	1.8	324	78	83	10	254	253	55	1.48
3					1.8	1.44	1.4	322	78	75	8	253	250	53	1.34
4	10				1.3	1.05	1.1	316	78	75	6	252	250	53	1.11
5	12.5			535.022	.70	.56	.56	321	78	75	3	250	251	52	.83
D 1		1030			2.4	1.93	1.9	322	78	76	11	263	253	57	1.54
2	5				2.3	1.85	1.9	327	79	77	11	265	253	56	1.51
3					1.7	1.36	1.4	332	80	77	7	265	250	56	1.30
4	10				1.1	.88	.88	332	80	77	5	263	249	55	1.04
5	12.5				.72	~~.72~~ .57	.57	333	81	77	4	260	250	53	.84
E 1		10:46			2.9	2.31	2.3	331	79	77	12	265	256	58	1.70
2	5				2.4	1.92	1.9	331	80	77	11	270	251	59	1.54
3	7				2.2	1.78	1.8	325	80	78	10	238	252	54	1.48
4	10				1.1	.89	.89	320	80	78	5	238	260	58	1.04
5	12.5			550.884	~~.87~~	.67	.67	318	81	78	4	230	252	57	.90
					.82		1.415	321.8		74.9					1.28 ASRDP

AIRSOURCE TECHNOLOGIES

11635 W 83RD TERRACE
Lenexa, Kansas 66215
(913) 492-1613
FAX: (913) 492-1012

PROJECT NO. 411834
RUN NO. 2
DATE 5/05/93
SAMPLE TYPE Pos.
PLANT C.B. Asphalt
SAMPLING LOCATION Huntington

PROJECT LEADER TT
CONSOLE OPERATOR TT
LAB PERSON TT
SUPPORT PERSONNEL: DO

METER NO. 3
UMBILICAL CORD I.D. NO. –
UMBILICAL/SAMPLER HOOKUP 4
OVEN BOX NO. 1
PROBE NO. 3-1
PROBE LENGTH & TYPE 3' glass
PITOT NO. 3-1
THERMOCOUPLE I.D. NO. 3-1
NOZZLE NO. D-13
NOZZLE TYPE SS/D/O

ASSUMED MOISTURE 30 %
METER CORRECTION FACTOR 1.053
METER ΔH @ 2.054
BAROMETRIC PRESSURE 29.4 in Hg
STATIC PRESSURE -.24 in H_2O
RECORD DATA EVERY 2.5 MIN
PITO COEFFICIENT .84
NOZZLE DIAMETER .204 in
STACK AXIS #1 31
STACK AXIS #2 28 rectang.

See run 1

SCHEMATIC OF TRAVERSE POINT LAYOUT

SAMPLE TRAIN LEAK CHECKS	INITIAL	FINAL
TIME (24 HRS.)	1125	1257
VACUUM, in. Hg	≥15	11"
CFM	.003	.002
PITOT LEAK CHECK ≥3" H_2O	pass	pass

INITIAL METER VOLUME	551.843
FINAL METER VOLUME	591.560

ORSAT/FYRITE

TRIAL	PERCENT CO_2	PERCENT CO_2 + O_2	PERCENT O_2
1	4.5	17.5	13.0
2	5	18.0	13.0
3	5	18.0	13.0
AVG	4.8	–	13.0

RECOVERY DATA

	FINAL	INITIAL	DIFFERENCE
IMP. 1	393	100	293
IMP. 2	157	100	57
IMP. 3	5	0	5
IMP. 4	720.0	707.4	12.6
TOTAL:			(367.6)

FILTER NO.: 93-46

COMMENTS:

bench 93.92
30.09 % moisture

O_2 13% CO_2 3%

Run No. 2 Project No. 411834 Location Huntington Date 5/05/93 Operator [illegible] Page 1 of 1

Traverse Point Number	Sample Time (min)	Clock Time (24-hr)	Dry Gas Meter ft³ Initial 551.843 Desired	Dry Gas Meter ft³ Actual	Velocity Head Δp in. H₂O	Orifice ΔH in. H₂O Desired	Orifice ΔH in. H₂O Actual	Stack Temp. °F	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	Pump VAC. in. Hg	Probe Temp. °F	Filter Temp. °F	Impinger Temp. °F	
A1		1135			2.6	2.15	2.2	308	80	80	10	265	250	60	
2	5				2.3	1.88	1.9	317	81	80	10	266	254	55	
3					1.9	1.54	1.5	320	81	80	9	235	260	52	
4	10				1.2	.97	1.0	321	81	80	6	236	248	52	
5	12.5			—	.95	.78	.78	319	83	81	5	233	264	55	
B1		1155			2.2	1.81	1.8	312	81	79	9	265	246	58	
2	5				2.0	1.63	1.6	320	82	80	8	264	250	54	
3					1.8	1.47	1.5	315	82	80	7	252	252	54	
4	10				1.3	1.06	1.1	317	83	81	6	233	248	56	
5	12.5			568.042	.89	.73	.73	319	83	81	4	245	247	55	
C1		—	1213		2.0	1.64	1.6	317	81	80	8	266	253	63	
2	5				1.9	1.56	1.6	317	82	81	8	250	255	60	
3					1.3	1.07	1.1	315	83	81	6	242	256	58	
4	10				1.4	1.16	1.2	312	84	82	6	250	254	58	
5	12.5				1.3	1.08	1.1	312	84	82	6	248	250	58	
D1					1.7	1.39	1.4	316	81	80	6	270	255	61	
2	5				1.9	1.56	1.6	316	83	82	8	272	259	61	
3					2.0	1.63	1.7	314	84	82	8	265	250	61	
4	10				1.4	1.15	1.2	315	85	82	7	247	251	61	
5	12.5			583.465	1.1	.90	90	316	84	81	5	240	259	61	
E1		1244			1.9	1.56	1.6	316	84	82	8	257	266	64	
2	5				2.1	1.75	1.8	308	84	82	8	258	255	62	
3					1.9	1.59	1.6	306	85	83	8	242	259	62	
4	10				1.5	1.25	1.3	304	85	82	7	228	257	64	
5	12.5			591.580	1.6	1.33	1.3	304	85	82	7	233	250	64	

AIRSOURCE TECHNOLOGIES

11635 W 83RD TERRACE
Lenexa, Kansas 66215
(913) 492-1613
FAX: (913) 492-1012

PROJECT NO. 411834
RUN NO. 3
DATE 5/05/93
SAMPLE TYPE part.
PLANT C.B. Asphalt
SAMPLING LOCATION Huntington

PROJECT LEADER TT
CONSOLE OPERATOR TT
LAB PERSON TT
SUPPORT PERSONNEL: DO

METER NO. 1
UMBILICAL CORD I.D. NO. –
UMBILICAL/SAMPLER HOOKUP 4
OVEN BOX NO. 1
PROBE NO. 3-1
PROBE LENGTH & TYPE 3' glass
PITOT NO. 3-1
THERMOCOUPLE I.D. NO. 3-1
NOZZLE NO. Q13
NOZZLE TYPE SS/Q

ASSUMED MOISTURE 30 %
METER CORRECTION FACTOR 1.053
METER ΔH @ 2.054
BAROMETRIC PRESSURE 29.4 in Hg
STATIC PRESSURE -.24 in H_2O
RECORD DATA EVERY 2.5 MIN
PITO COEFFICIENT .84
NOZZLE DIAMETER .204 in
STACK AXIS #1 31
STACK AXIS #2 28 Rect.

see run 1

SCHEMATIC OF TRAVERSE POINT LAYOUT

SAMPLE TRAIN LEAK CHECKS	INITIAL	FINAL
TIME (24 HRS.)	1605	1830
VACUUM, in. Hg	≥15	18"
CFM	.001	.001
PITOT LEAK CHECK ≥3" H_2O	pass	pass

INITIAL METER VOLUME	592.704
FINAL METER VOLUME	630.823

ORSAT/FYRITE

TRIAL	PERCENT CO_2	PERCENT CO_2 + O_2	PERCENT O_2
1	5	18	13
2	5.5	18.5	13
3	5	18.5	13.5
AVG	5.2	+	13.2

RECOVERY DATA

	FINAL	INITIAL	DIFFERENCE
IMP. 1	400	100	300
IMP. 2	133	100	33
IMP. 3	6	0	6
IMP. 4	707.8	694.2	13.5
TOTAL:			(352.5)

COMMENTS:

FILTER NO.: 93-65

beaker 93-86
filter blank 93-64

Delay ~~14:30 to 16:30~~

Run No. 3 Project No. 411834 Location Hunt. Date 8/03/93 Operator TT Page 1 of 7

Traverse Point Number	Sample Time (min)	Clock Time (24-hr)	Dry Gas Meter ft³ Initial 592.204 Desired	Dry Gas Meter ft³ Actual	Velocity Head Δp in. H_2O	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Stack Temp. °F	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	Pump VAC. in. Hg	Probe Temp. °F	Filter Temp. °F	Impinger Temp. °F	
A1		~~1647~~			3.2	2.64	2.6	315	85	85	14	273	254	63	
2	5	1647			2.8	2.29	2.3	321	85	85	12	268	256	60	
3					1.6	1.31	1.3	323	86	85	7	262	256	54	
4	10	1652			.99	.81	.80	323	85	85	5	238	260	55	
5				600.206	.66	.54	.54	317	86	86	3	237	259	59	
B1					3.2	2.65	2.6	314	87	86	13	250	259	59	
2	5				2.3	~~2.59~~	1.9	319	88	86	12	253	258	60	
3					1.5	1.24	~~1.25~~ 1.2	319	89	87	6	238	256	61	
4	10				.73	.60	.60	318	90	87	3	233	258	63	
5					.65	.54	.54	316	90	87	3	234	258	65	
C1					3.5	2.89	2.9	316	85	85	15	256	251	64	
2	5	1750		~~1750~~	2.6	2.14	2.1	315	85	85	12	247	260	61	
3					1.6	1.33	1.3	313	86	86	7	241	257	64	
4	10	1755		~~1755~~	.78	.64	.64	315	88	86	4	238	257	64	
5				615.366	.51	.42	.42	313	87	86	3	237	256	65	
D1					3.2	2.66	2.6	313	87	86	15	267	261	67	
2	5	1808			2.4	1.99	2.0	314	88	86	12	264	259	65	
3					1.4	1.16	1.1	314	88	86	6	244	258	67	
4	10	1813			.79	.66	.66	313	89	86	5	238	255	66	
5					.61	.51	.51	315	88	86	3	240	258	66	
E1					3.0	2.48	2.5	316	89	87	15	263	258	68	
2	5	1820			2.3	1.91	1.9	318	91	87	11	257	256	64	
3					1.8	1.49	1.4	318	91	87	8	237	259	63	
4	10	1825			1.3	1.08	1.1	317	91	87	6	234	254	66	
5				630.823	.85	.71	.70	317	91	88	4	252	256	67	

delay 17:15 to

AIRSOURCE TECHNOLOGIES

11635 W 83RD TERRACE
Lenexa, Kansas 66215
(913) 492-1613
FAX: (913) 492-1012

PROJECT NO. 411834

RUN NO. moisture

DATE 5/05/93

SAMPLE TYPE moisture

PLANT C.B. Asphalt

SAMPLING LOCATION Huntington

PROJECT LEADER TT

CONSOLE OPERATOR TT

LAB PERSON TT

SUPPORT PERSONNEL DO

METER NO. 3

UMBILICAL CORD I.D. NO. —

UMBILICAL/SAMPLER HOOKUP 4

OVEN BOX NO. —

PROBE NO. —

PROBE LENGTH & TYPE —

PITOT NO. —

THERMOCOUPLE I.D. NO. —

NOZZLE NO. —

NOZZLE TYPE ~~SS / G / O~~

ASSUMED MOISTURE — %

METER CORRECTION FACTOR 1.053

METER ΔH @ 2.054

BAROMETRIC PRESSURE 29.4 in Hg

STATIC PRESSURE +.24 in H_2O

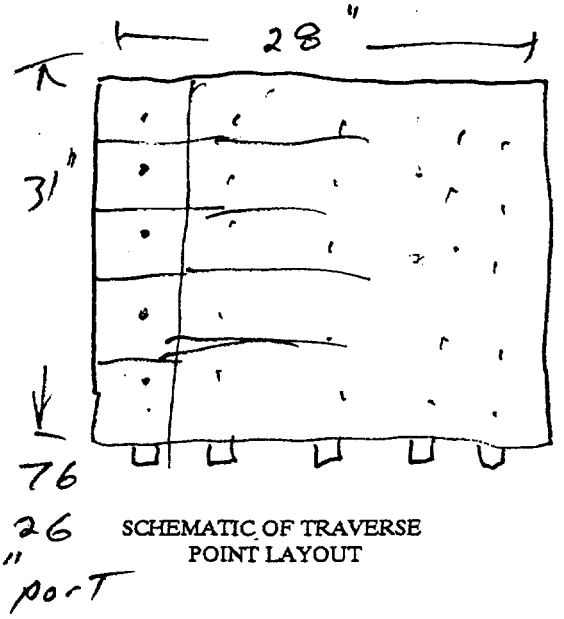
RECORD DATA EVERY 5 MIN

PITO COEFFICIENT —

NOZZLE DIAMETER — in

STACK AXIS #1 31

STACK AXIS #2 28



SCHEMATIC OF TRAVERSE POINT LAYOUT

SAMPLE TRAIN LEAK CHECKS	INITIAL	FINAL
TIME (24 HRS.)	8:00	8:35
VACUUM, in. Hg	≥15	8"
CFM	0.00	0.00
PITOT LEAK CHECK ≥3" H_2O	—	—

INITIAL METER VOLUME	489.607
FINAL METER VOLUME	511.315

ORSAT/FYRITE

TRIAL	PERCENT CO_2	PERCENT CO_2 + O_2	PERCENT O_2
1			
2			
3			
AVG			

RECOVERY DATA

	FINAL	INITIAL	DIFFERENCE
IMP. 1	252	100	152
IMP. 2	157	100	57
IMP. 3	5	0	5
IMP. 4	758.5	740.6	12.9
TOTAL:			226.9

FILTER NO.:

COMMENTS:

~~69~~% moist.

32.6

APPENDIX E

PRETEST CALIBRATIONS

BAROMETER CALIBRATION SHEET

Date 4-13-93

Barometer Number #1

Ambient Temperature

Calibrator Rigdon

Barometer Reading 28.85

Reference Barometer Reading 28.90

Difference .05

Tolerance: Difference $\leq$ 0.1 inch

CONSOLE WORKSHEET

NAME Rigdon K FACTOR .5312 PROJECT # _____

DATE 4-13-93 TRAIN ID #13 PREVIOUS Y FACTOR 1.076

ORIFICE # 1 PYROMETER # _____

	RUN NUMBER 1	RUN NUMBER 2
DGM FINAL READING	375.605	379.30
INITIAL READING	372.30	376.00
INLET & OUTLET TEMPERATURES		
INITIAL	80 / 79	81 / 77
FINAL	81 / 77	83 / 78
TIME Sec	300	300
ORIFICE RDG. ^E	1.50	1.50
BAR. PRESSURE	28.90	28.90
ROOM TEMP.	82 / 82	82 / 82
PUMP VACUUM Hg"	17"	17"

Y 1.053

Alt 2.054

BRACKETING WORKSHEET

NAME Rigdon K.FACTOR 1. .4335 2. .605

PROJECT # _____ DATE 4-13-93 TRAIN I.D. #3

ORIFICE # 1. 10 2. 7

DGM	1	2
Final Reading	383.54	388.55
Initial reading	380.80	384.50
Difference		

INLET & OUTLET TEMP.		
Initial	83/78	84/79
Final	83/78	84/79
Avg. Temp.		

Time	300	300
Orifice rdg. ^H	1.00	2.25
Bar. Pressure	28.90	28.90
Room Temp.	78/78	78/78
Pump Vacuum	16"	15"

DRY GAS METER THERMOCOUPLE CALIBRATION SHEET

Date 4-13-93 Thermocouple Number #3

Ambient Temp. _____ F Barometric Pressure 28.90 in. Hg

Calibrator Rigdon Reference: mercury-in-glass ASTM

Other _____

Thermocouple	Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Inlet				
	Ambient Air	78°	79°	
	Hot Water Bath	136°	134°	
Outlet				
	Ambient Air	78°	78°	
	Hot Water Bath	136°	137°	

[a] Reference Temperature — Thermocouple Temperature = ± 5.4°F

TYPE S PITOT TUBE
CALIBRATION

PITOT # 3-1

Calibrator: Bigelon	Project no.:
Date: 4/19/93	Probe no.: 3-1

Pitot Tube Assembly Level? (Y) / N

Pitot Tube Openings Damaged? Y (N) (If yes explain below)

α^1 1 ° (<10°) β^1 0 ° (<5°)

α^2 1 ° (<10°) β^2 1 ° (<5°)

Y = 1 O = 1 A = .940 in.

Z = A sin Y .016 in. (<1/8 in.)

W = A sin O .016 in. (<1/32 in.)

P^{α} .470 in. P^{β} .470 in.

DT = .385 in.

Calibration Required? Y / N (If yes explain below)

Comments:

STACK THERMOCOUPLE CALIBRATION SHEET

Date 4/19/92 Thermocouple Number 3-1

Ambient Temp. _____ F Barometric Pressure 28.50 in. Hg

Calibrator Rigola Reference: mercury-in-glass Astn

Other _____

Reference Point Number[a]	Source[b] (Specify)	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[c] %
1	Ambient	72°	72°	
2	Tube oven	118°	119°	

[a] Every 50°F for each reference point

[b] Type of calibration system used

[c] $\left[\dfrac{(\text{ref temp, °F} + 460) - (\text{test thermom temp, °F} + 460)}{\text{ref temp, °F} + 460}\right] 100 \leq 1.5\%.$

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 4/19/93 Thermocouple Number 1

Ambient Temp. _____ F Barometric Pressure 28.60 in. Hg

Calibrator Rigolon Reference: mercury-in-glass 28.60

Other _____

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	72°	71°	
Ice Bath	33°	34°	

[a] Reference Temperature — Thermocouple Temperature = ± 2°F

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 4/19/93 Thermocouple Number 4

Ambient Temp. _____ F Barometric Pressure 28.60 in. Hg

Calibrator Rigalon Reference: mercury-in-glass 28.60

Other _____

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	72°	71°	
Ice Bath	33°	33°	

[a] Reference Temperature — Thermocouple Temperature = ± 2°F

Oven THERMOCOUPLE CALIBRATION SHEET

Date 4/13/93 Thermocouple Number 1

Ambient Temp. _____ °F Barometric Pressure 28.90 in. Hg

Calibrator Bigdon Reference: mercury-in-glass Astm

Other _____

Reference Point Number[a]	Source[b] (Specify)	Reference Thermometer Temperature °F	Thermocouple Potentiometer Temperature °F	Temperature Difference[c] %
	Ambient	76°	75°	
	Oven Heater	245°	248°	

a Every 50°F for each reference point

b Type of calibration system used

c $\left[\frac{(\text{ref temp, °F} + 460) - (\text{test thermom temp, °F} + 460)}{\text{ref temp, °F} + 460}\right] 100 \leq 1.5\%.$

APPENDIX F

POSTTEST CALIBRATIONS

BAROMETER CALIBRATION SHEET

Date	5/7/93
Barometer Number	#1
Ambient Temperature	72°
Calibrator	Rigdon

Barometer Reading	28.84
Reference Barometer Reading	28.90
Difference	.06

Acceptance Criteria: Difference ≤ 0.1 inch

DRY GAS METER THERMOCOUPLE CALIBRATION SHEET

Date 5/7/93 Thermocouple Number #3

Ambient Temp. _____ F Barometric Pressure 28.90 in. Hg

Calibrator Bigdon Reference: mercury-in-glass Astm

Other _____

Thermocouple	Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Inlet	Ambient Air	75°	75°	
	Hot Water Bath	134	135	
Outlet	Ambient Air	75	76°	
	Hot Water Bath	134	136°	

[a] Reference Temperature — Thermocouple Temperature = ± 5.4°F

GRC 6/11/90

ORFICE BRACKETING

Project	962002	Bracket Orfices:	
Date	DEC 18 92	Orifice No. 1	4.
Operator	RIGDON	Orifice N0.1 K factor	.
Orfice Number	3	Orifice No. 2	7.
Orfice Y factor	1.027	Orifice N0.2 K factor	.

	Orfice #1	Orfice #2
Final DGM Volume	642.850	647.575
Inital DGM Volume	640.800	643.500
Net DGM Volume (Vm)	2.050	4.075

In/Out DGM Temp.		
Inlet		
initial	74.0	75.0
final	75.0	75.0
Outlet		
initial	72.0	73.0
final	73.0	73.0
Avg. DGM Temp	73.5	74.0
Time, sec.	300.0	300.0
Orifice DH, in. H2O	.55	2.25
Baro. Press., in. Hg	28.90	28.90
Room temp., Deg. F		
initial	76.0	76.0
final	76.0	76.0
Avg. Room Temp.	76.0	76.0
Pump Vacuum, in. Hg	16	18

Vcr (std)	1.997	3.998
Vm (std)	1.962	3.913
Y Factor (brackets)	1.018	1.022

+/- 2% criteria		
Percent of Y	.89	.51
	PASS	PASS

BRACKETING WORKSHEET

NAME Rigdon K.FACTOR 1. 3199 2. 6405

PROJECT # _____ DATE 5/7/93 TRAIN I.D. #3

ORIFICE # 1. 4 2. 7

DGM	1	2
Final Reading	642.85	647.575
Initial reading	640.80	643.50
Difference		

INLET & OUTLET TEMP.		
Initial	74 / 72	75 / 73
Final	75 / 73	75 / 73
Avg. Temp.		
Time	300	300
Orifice rdg. ^H	.56	2.25
Bar. Pressure	28.90	28.90
Room Temp.	76 / 76	76 / 76
Pump Vacuum	16"	18

CONSOLE CALIBRATION

Project	411317	Orifice number	2
Date	may 7 93	Orifice K factor	.5312
Operator	RIGDON	Previous Y factor	1.053
Console Number	3		

	Run 1	Run 2
Final DGM Volume	636.350	639.855
Inital DGM Volume	633.000	636.500
Net DGM Volume (Vm)	3.350	3.355
In/Out DGM Temp.		
Inlet Deg. F		
initial	72.0	72.0
final	72.0	72.0
Outlet Deg. F		
initial	71.0	71.0
final	71.0	71.0
Avg. DGM Temp Deg. F	71.5	71.5
Time, sec.	300.0	300.0
Orifice DH, in. H2O	1.55	1.55
Baro. Press., in. Hg	28.90	28.90
Room temp., Deg. F		
initial	76.0	76.0
final	76.0	76.0
Avg.Room Temp.	76.0	76.0
Pump Vacuum, in. Hg	16	16
Vcr (std)	3.315	3.315
Vm (std)	3.226	3.231
Y Factor	1.028	1.026
Delta H@	2.047	2.041
Average Y	1.027	
Average Delta H@	2.044	

+/- 2% criteria	
Percent of Avg Y	.07
	PASS
+/- 5% criteria	
Percent of final Y	2.53
	PASS

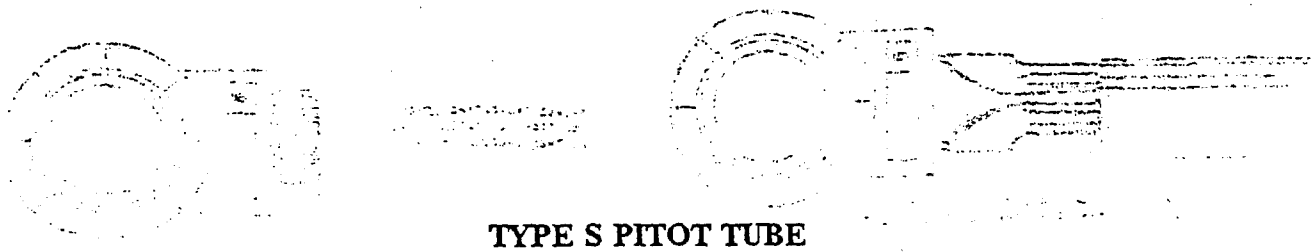
CONSOLE WORKSHEET

NAME Rigdoc K FACTOR .5312 PROJECT # _____

DATE 5/7/93 TRAIN ID #3 PREVIOUS Y FACTOR 1.053

ORIFICE # 2 PYROMETER # _____

	RUN NUMBER 1	RUN NUMBER 2
DGM FINAL READING	636.35	639.855
INITIAL READING	633.00	636.56
INLET & OUTLET TEMPERATURES		
INITIAL	72 / 71	72 / 71
FINAL	72 / 71	72 / 71
TIME Sec	300	300
ORIFICE RDG. ^E	1.55	1.55
BAR. PRESSURE	28.90	28.90
ROOM TEMP.	76 / 76	76 / 76
PUMP VACUUM Eg"	16	16



TYPE S PITOT TUBE CALIBRATION

PITOT # 3-1

Calibrator: Riedler	Project no.:
Date: 5-7-93	Probe no.: 3-1

Pitot Tube Assembly Level? (Y) / N

Pitot Tube Openings Damaged? Y / (N) (If yes explain below)

α^1 1 ° (<10°) β^1 0 ° (<5°)

α^2 1 ° (<10°) β^2 1 ° (<5°)

Y = 1 O = 1 A = .940 in.

Z = A sin Y .016 in. (<1/8 in.)

W = A sin O .016 in. (<1/32 in.)

P^{-} .470 in. P^{+} .470 in.

DT = .385 in.

Calibration Required? Y / (N) (If yes explain below)

Comments:

STACK THERMOCOUPLE CALIBRATION SHEET

Date 5-7-93 Thermocouple Number 3-1

Ambient Temp. _____ °F Barometric Pressure 28.90 in. Hg

Calibrator Rigdon Reference: mercury-in-glass Atm

Other _____

Reference Point Number[a]	Source[b] (Specify)	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[c] %
1	Ambient	72°	71°	-1°
2	Tube oven	300°	294°	-6°

a Every 50°F for each reference point

b Type of calibration system used

c $\left[\frac{(\text{ref temp, °F} + 460) - (\text{test thermom temp, °F} + 460)}{\text{ref temp, °F} + 460}\right] 100 \leq 1.5\%.$

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 6-7-93 Thermocouple Number 1

Ambient Temp. _____ F Barometric Pressure 28.90 in. Hg

Calibrator Rigdon Reference: mercury-in-glass Astm

Other _____

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	72°	72°	
Ice Bath	34°	34°	

[a] Reference Temperature — Thermocouple Temperature = ± 2°F

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 5-7-93 Thermocouple Number 4

Ambient Temp. _____ F Barometric Pressure 28.90 in. Hg

Calibrator Rigdon Reference: mercury-in-glass ASTM

Other _____

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	72°	72°	
Ice Bath	34°	33°	

[a] Reference Temperature — Thermocouple Temperature = ± 2°F

Oven THERMOCOUPLE CALIBRATION SHEET

Date 5-2/9.3 Thermocouple Number #1

Ambient Temp. _____ °F Barometric Pressure 28.90 in. Hg

Calibrator Rigdon Reference: mercury-in-glass Astn

Other _____

Reference Point Number[a]	Source[b] (Specify)	Reference Thermometer Temperature °F	Thermocouple Potentiometer Temperature °F	Temperature Difference[c] %
1	Ambient	72°	74°	+2°
2	Tube oven	246	249°	+3°

a Every 50°F for each reference point

b Type of calibration system used

c $\left[\dfrac{(\text{ref temp, °F} + 460) - (\text{test thermom temp, °F} + 460)}{\text{ref temp, °F} + 460}\right] 100 \leq 1.5\%.$

APPENDIX G

OPACITY DATA SHEETS

RUN # 1

AIRSOURCE TECHNOLOGIES

Phone: (913) 492-1613
Fax: (913) 492-1012

C.B. Asphalt (HUNTINGTON PLANT)

PLANT NAME: CENTRAL STONE COMPANY

ADDRESS: P.O. BOX 430
HANNIBAL MO 63401

DATE: 5/5/93

TIME OF OBSERVATION

BEGIN: 9:30 AM

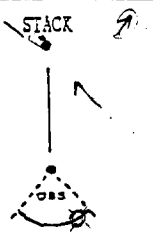
END: 10:30 AM

SOURCE IDENTIFICATION: ASPHALT PLANT

REGULATION(S):

FUEL BURNED: OIL NATURAL GAS

OBSERVATION POINT/POSITION OF SUN



LOCATE SUN ON ARC

DISTANCE FROM STACK: 100'

DIRECTION FROM STACK: SE

STACK HEIGHT: 25'

SKY CONDITION: CLEAR

WIND SPEED: 0-5

WIND DIRECTION: WEST

TEMPERATURE: 70°

COLOR OF PLUME: WHITE

CODES: [X] Yes [ ] No

COMMENTS:

OPACITY READINGS

RANGE: 0 TO: 5 AVERAGE: 0

SIGNATURE OF OBSERVER: [illegible]

	0	15	30	45	XX	0	15	30	45
0	0	0	0	0	30	0	0	0	0
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	5	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	5	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	5	-
28	0	0	0	0	58	0	0	0	-
29	0	0	0	0	59	0	0	0	-

RUN #2

AIRSOURCE TECHNOLOGIES

Phone: (913) 492-1613
Fax: (913) 492-1012

PLANT NAME: C.B. ASPHALT (HUNTINGTON PLANT)

ADDRESS: CENTRAL STONE COMPANY
P.O. BOX 430
HANNIBAL MO 63401

DATE: 4-5-93

TIME OF OBSERVATION

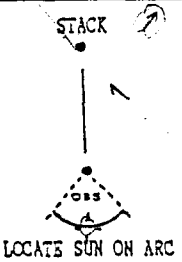
BEGIN: 11:34 END: 12:34

SOURCE IDENTIFICATION: AS1

REGULATION(S):

FUEL BURNED: OIL / NATURAL GAS

OBSERVATION POINT/POSITION OF SUN



DISTANCE FROM STACK: 100'

DIRECTION FROM STACK: S

STACK HEIGHT: 25'

SKY CONDITION: CLEAR / PARTLY CLOUDY

WIND SPEED: 0-5 mph

WIND DIRECTION: W

TEMPERATURE: 93°

COLOR OF PLUME: WHITE

COORS: X Yes ( ) No

COMMENTS:

OPACITY READINGS

RANGE: 0 TO: 0 AVERAGE: 0

SIGNATURE OF OBSERVER:

	0	15	30	45	XX	0	15	30	45
0	0	0	0	0	30	0	0	0	0
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	-
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	-
27	0	0	0	0	57	0	0	-	-
28	0	0	0	0	58	0	-	-	-
29	0	0	0	0	59	0	-	-	

512-3150

Run #

AIRSOURCE TECHNOLOGIES

Phone: (913) 492-1613
Fax: (913) 492-1012

PLANT NAME: C.B. ASPHALT

ADDRESS: P.O. BOX 430 (HUNTINGTON PLANT) HANNIBAL MO 63401

DATE: 5/05/93

TIME OF OBSERVATION

BEGIN: 4:42 / STOP 5:20

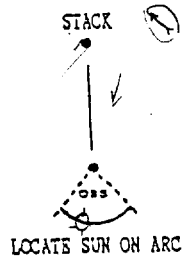
END: 5:45 / STOP 6:07

SOURCE IDENTIFICATION: ASPHALT PLANT

REGULATION(S):

FUEL BURNED: OIL NATURAL GAS

OBSERVATION POINT/POSITION OF SUN



DISTANCE FROM STACK: 100'

DIRECTION FROM STACK: W

STACK HEIGHT: 73'

SKY CONDITION: PARTLY CLOUDY

WIND SPEED: 0-5

WIND DIRECTION:

TEMPERATURE: 88°

COLOR OF PLUME: WHITE

COORS: [X] Yes [ ] No

COMMENTS:

OPACITY READINGS

RANGE: 0 TO: 0 AVERAGE: 0

SIGNATURE OF OBSERVER: Rodney Bristol

	0	15	30	45	XX	0	15	30	45
0	0	0	0	0	30	0	0	0	0
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	
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

APPENDIX H

PLANT OPERATION DATA

From C.B. Asphalt
For Tim Titus

Bag House Drill 4 to 5
Mix Temp 300° to 275°
Bag House Temp 330° to 350°
Ton per hour 225 to 250
AC Temp 300°