PARTICULATE EMISSION TEST

KLUG BROTHERS, INCORPORATED

MOUNDSVILLE, WEST VIRGINIA

by

TraDet Laboratories, Inc.

P. O. Box 2019

Wheeling, West Virginia 26003

(304) 547-9094

September 1987

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PROCESS DESCRIPTION

The facility tested is an Asphalt Drum Mixers, Inc. (ADM) asphalt plant owned and operated by Klug Brothers, Inc., Moundsville, West Virginia. The facility is located on State Route 2 immediately south of Moundsville. The unit is an ADM Model 6026 designed to produce 100 TPH of hot asphalt mix at 5% product moisture. The typical production process includes heating a mixture of 40% sand, 60% gravel, and AC-20 asphalt bitum in a No. 2 Fuel Oil fired rotary kiln. The product mix is conveyed from the discharge end of the rotary kiln to a 38 ton capacity bin which also serves as the truck loadout facility.

The emissions from the operation consists of combustion by-products and any fine particulate (sand/gravel) that has become entrained in the heated air stream. Combustion air for the No. 2 Fuel Oil is added at the feed end of the rotary kiln by means of a 20 horsepower blower. The air/fuel mixture is fed through a Hauck Shape A Flame Jet Burner and ignited inside the rotary kiln. A 50 horsepower induced draft fan removes combustion gases by pulling them through a venturi scrubber and a horizontal, tangentially fed circular mist eliminator. The scrubber consists of a series of nozzles ahead of the venturi plate and utilizes 40 gpm of water at 30 psi. A portion of the scrubber water is diverted and directed into the bottom of the mist eliminator

and is used as push water to prevent solids buildup. The water exits the system through the bottom of the mist eliminator and is discharged through appropriate treatment facilities. Scrubber feed water is supplied from the public water distribution system. The saturated gas stream exits the system through the induced draft fan and the 60-inch diameter circular stack.

PROCESS OPERATION

The facility is designed to process 100 TPH of asphalt product. Due to limitations of the product conveyor the facility can only produce 90 TPH, with this quantity being marginal due to spillage from the product conveyor. Normal operating rate is in the range of 75 TPH. During the three particulate emission tests the facility was operated at an average of 82.3 TPH. This operation rate was a balance between overloading the product conveyor and removal of the material from the storage bin for final transportation. The final product temperature was maintained in the range of 250 to 280 ^{o}F.

REGULATIONS

The emissions from the Klug Brother, Inc. asphalt drum mix plant are required to meet New Source Performance standards as specified in 40 CFR, Part 60.90 through 60.92, Subpart I - Standards of Performance for Hot Mix Asphalt

Facilities. The standard specifies that the particulate emission rate from the facility shall not exceed 0.04 gr./DSCF as determined by Method 5.

PROCEDURE

PARTICULATE SAMPLING

PRINCIPLE - Particulates were sampled isokinetically according to Federal Test Methods 1, 2, 3, 4, and 5 as given in the Federal Register, Vol. 36, No. 247 of December 23, 1971, and as amended in the Federal Register, Vol. 40, No. 60, of July 1, 1984, and Vol. 40, No. 60 of December 27, 1985. The weight of the particulate was determined gravimetrically after the removal of uncombined water. The molecular weight of the stack gas was determined by FYRITE analysis and the percent moisture by the condensation method. Particulate grain loading was then calculated using filter and probe catch weights.

EQUIPMENT - The equipment utilized included a Research Appliance Company, Model 2343, stacksampler train with a combination heated stainless steel probe and S-type pitot tubes, and the associated glassware. The equipment utilized is shown schematically in Figure 1.

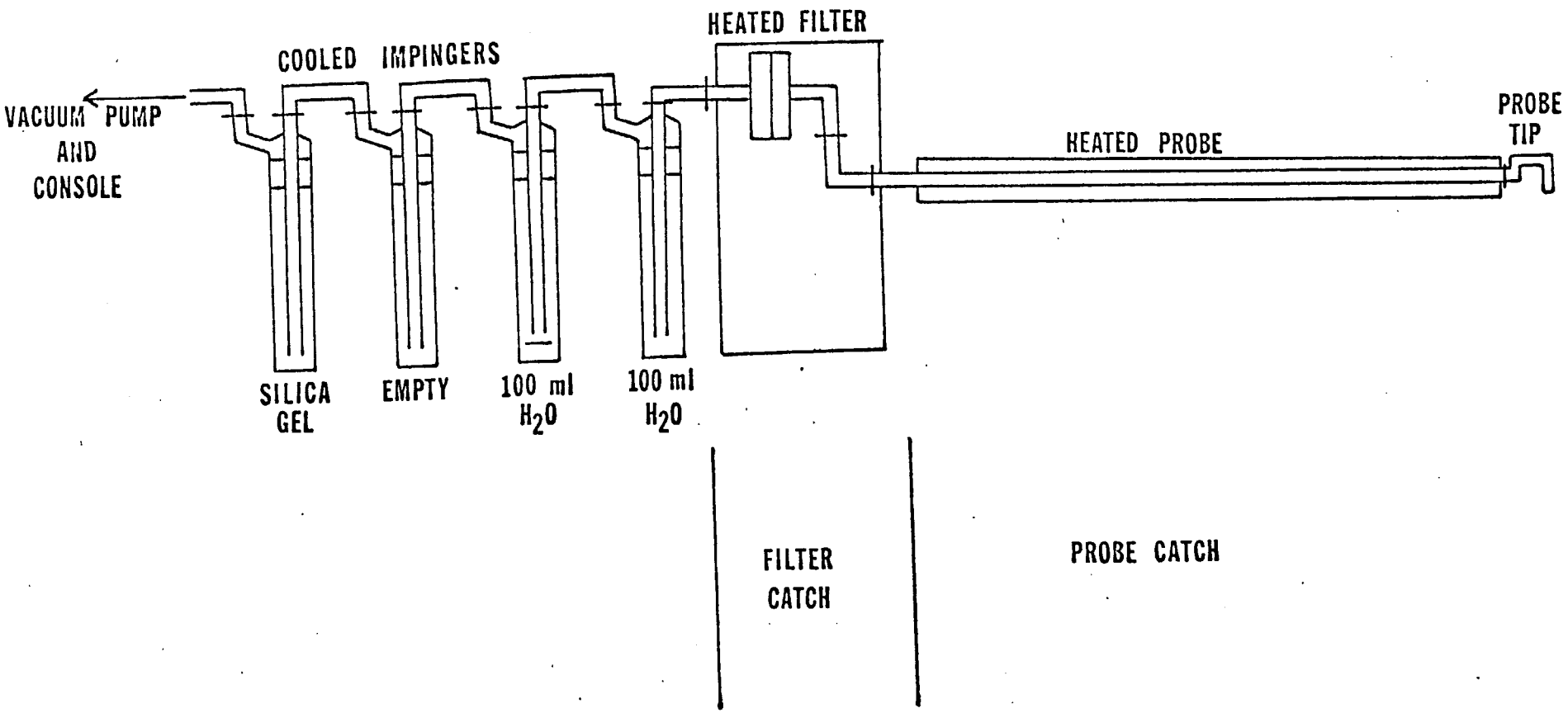


Figure 1. Schematic diagram of EPA Method V isokinetic sampling train for particulates.

PROCEDURE - After allowing 10 to 15 minutes for stabilization of the asphalt dryer mix plant after start-up, the stack was sampled at each of 24 traverse points, 12 points taken from each traverse diameter as shown in Figure 2. The stack schematic showing the location of the sampling ports and the upstream and downstream disturbances are presented in Figure 3. The total sampling time for Run 2 was 78 minutes. Total sampling time for Runs 3 and 4 was 84 minutes each. The sampling rate for all three tests met the 0.53 DSCF/minute criteria.

SAMPLING MEDIA - The major portion of the particulate was collected on a 4-inch dessicated and pre-weighed glass fibre filter contained in a glass filter holder, with a sintered glass frit, and enclosed in a heated compartment to prevent moisture condensation from plugging the filter during sampling. Some particulate was also deposited in the probe and on other sample exposed surfaces prior to the filter. These were cleaned after each test by rinsing with acetone and brushing.

The impinger train, for concurrent moisture collection, consisted of four impingers connected in series with glass ball joint fittings. The first, third, and fourth were of the straight bubbler type (modified Greenburg-Smith) and the second was of the standard Greenburg-Smith type. For the combined particulate and moisture determinations, the first

FIGURE 2. TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Klug Brothers, Inc.
DATE
SAMPLING LOCATION Asphalt Mix Plant
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A)
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B)
STACK I.D., (DISTANCE A - DISTANCE B) 60 inches
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR Whitt

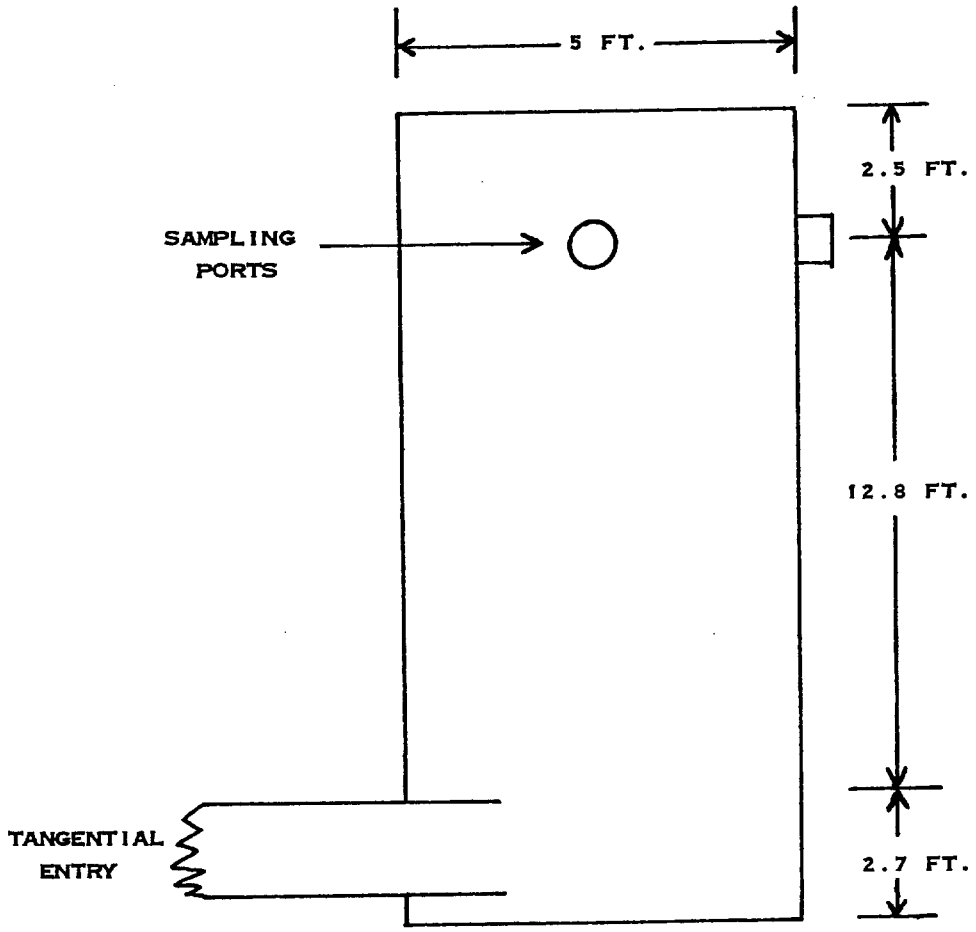
SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.021	60"	1.26"		
2	0.067	60"	4.02"		
3	0.118	60"	7.08"		
4	0.177	60"	10.62"		
5	0.250	60"	15.00"		
6	0.356	60"	21.36"		
7	0.644	60"	38.64"		
8	0.750	60"	45.00"		
9	0.823	60"	49.38"		
10	0.882	60"	52.92"		
11	0.933	60"	55.98"		
12	0.979	60"	58.74"		

FIGURE 3. STACK SCHEMATIC

KLUG BROTHERS, INCORPORATED

MOUNDSVILLE, WEST VIRGINIA



two impingers contained 100-ml. of deionized water each, the third was empty, and the fourth contained between 200 and 300-grams of pre-weighed silica gel. After the test the volume of the condensate was measured and the percent moisture of the gas stream calculated.

The dry molecular weight of the stack gas was determined by FYRITE analysis for CO_2 and O_2 (CO and N_2 by difference) on a series of grab samples during each run.

SAMPLE ANALYSIS - Each sample filter and any loose particulate matter from the filter container was heated at 103 °C for two hours, cooled in a dessicator, and then weighed to the nearest 0.1 mg. on a analytical balance. The filters were then dessicated for another 24-hours and re-weighed. This was repeated until successive weighings agreed within 0.5-mg. or until a weight increase was noted. A control filter (extra pre-weighed filter taken through the same handling, dessication, and weighing as the sample filters) was used to determine a net change in weight, which was then applied as a blank to the sample filter weights.

The acetone washings from the probe and glassware forward of the filter were transferred to a previously dessicated and tared beaker, and evaporated to near dryness in a hood at room temperature and pressure. The nearly dry weighings were then placed in a laboratory drying oven at

103 - 105 °C for two hours to drive off residual water, then cooled in a dessicator and weighed. The oven drying, dessicator cooling cycle was repeated until successive weights agreed with 0.5-mg. or until a weight increase was noted. A acetone blank, from the same lot of acetone used for the probe washings was carried through the above evaporation and drying procedure along with the samples, and the net weight change found in the blank was applied as a correction to the particulate weight obtained from the samples.

RESULTS AND DISCUSSION

The particulate emission tests were conducted on September 3 and 4, 1987. Runs 2 and 3 being conducted on September 3, and Run 4 being conducted on September 4, 1987.

The results of the particulate emission tests are summarized in Table 1. The three determinations had an average particulate emission concentration of 0.0262 grs./DSCF compared to the emission standard of 0.04 grs./DSCF. The average total particulate emission rate was 1.16 lb./hr.

Process monitoring conducted during the three emission tests is summarized in Table 2. Dry aggregate feedrate was held fairly consistent during each of the three tests averaging 82.3 tons per hour. AC-20 asphalt bitum feedrate

ABLE 1. Stack Gas Particulate Sampling Summary

mpling Data	Symbol	RUN 2	RUN 3	RUN 4
Volume of Dry Gas Sampled at Standard Conditions,[a] DSCF[b]	$V_{m,std}$	41.351	53.334	51.155
@ Percent Isokinetic	%I	105.7	108.5	104.2
ack Gas Composition and Flow				
Molecular Weight of Stack Gas, Dry Basis	MW_d	29.516	29.780	29.740
Molecular Weight of Stack Gas, Wet Basis	MW	25.969	25.585	25.828
Mole Fraction of Dry Gas	M_d	0.692	0.644	0.667
Percent Moisture in Stack Gas, by Volume	%M	30.8	35.6	33.3
Average Stack Gas Temperature, °F	T_s	163.0	167.0	165.9
Stack Gas Velocity at Stack Conditions, fpm	V_a	404.1	510.0	490.0
Stack Gas Volumetric Flow Rate at Stack Conditions, ACFM[c]	Q_a	7934.4	10,013.8	9622.1
Dry Stack Gas Volumetric Flow Rate at Standard Conditions, DSCFM[d]	Q_s	4608.0	5376.8	5307.6
otal Particulate Emissions				
Concentration of Particulates in Stack Gas, gr./DSCF	C_s'	0.0232	0.0290	0.0265
Total Particulate Emission Rate, lb/hr.	P_{tr}	0.92	1.34	1.22

[a]Standard Conditions are 70°F and 29.92 in. Hg. [b]Dry Standard Cubic Feet. [c]Actual Cubic Feet per Minute (stack conditions). [d]Dry Standard Cubic Feet per Minute.

ABLE 2.

PROCESS MONITORING SUMMARY

ASPHALT PLANT

KLUG BROTHERS, INCORPORATED

MOUNDSVILLE, WEST VIRIGNIA

	Feed Bin Motor Speed %			Aggregate Instantaneous	AC-20 Instantaneous	Aggregate Totalizer	Fuel Feedrate	Exhaust Set Point	Exhaust Temperature
	1	2	3	TPH	TPH	TPH	%	°F	°F
Run 2 Average	50.1	42	59.5	84.8	4.6	87.4	29.8	226	227
Run 3 Average	54	--	32	78.6	5.1	74.8	30.4	226	225.2
Run 4 Average	48	--	48	83.5	4.4	85.6	28.7	228.4	235.5

averaged 4.7 tons per hour. The fuel feedrate averaged 29.6% with an average exhaust temperature of 229 ^{o}F. The circular chart recording the asphalt product temperature plus the process monitoring data is presented in the appendix.

The pressure drop across the scrubber was not continuously monitored during the test. A magna-helic installed within the mist eliminator showed a consistent negative 14 to 15 inch water column during the three tests. The manufacture representative indicated that the static pressure before the scrubber remains fairly consistent at negative one-half inch water column.

The scrubber water analysis is presented in Table 3. Samples of the scrubber influent and effluent were composited during each test run and analyzed for pH and total suspended solids. The pH levels remained fairly constant during each of the three runs. The total suspended solids analysis showed that the scrubber was removing an average of 183 lbs./hr. of solids based on a 40 gallon per minute flowrate.

Cyclonic flow determinations were conducted at the facility to document the presence or absence of cyclonic flow patterns as a result of a tangential entry into the discharge stack. The preliminary (pre-test) determinations

TABLE 3. SCRUBBER WATER ANALYSIS

KLUG BROTHERS, INCORPORATED

MOUNDSVILLE, WEST VIRGINIA

		PH	Total Suspended Solids	
		S.U.	mg/1.	lbs./hr.*
Run 2	Feed	7.41	14.1	
	Discharge	7.31	10,400	
	Difference		10,386	208
Run 3	Feed	7.14	5.3	
	Discharge	7.30	7,360	
	Difference		7,355	147
Run 4	Feed	7.27	<1.0	
	Discharge	7.27	9,740	
	Difference		9,740	195

* Based on a scrubber water influent rate of 40 gpm

indicated cyclonic flow patterns that were unacceptable. The cyclonic flow was reduced by placing a baffle arrangement in the bottom of the stack.

The cyclonic flow determinations were conducted in accordance with the methodology as outlined in Part 60, Appendix A, Method 1, Section 2.4. During the preliminary cyclonic flow determinations and prior to the final installation of the baffles, the average rotation angle was 28.9 degrees. At that time modifications were made to the baffle assembly which resulted in an acceptable average rotation angle of 11.3 degrees. This determination was made with only the induced draft fan and scrubber sprays operating. Due to timing constraints the plant was not producing asphalt. A final cyclonic flow determination was completed at the time of the particulate emission test with the plant operating under load. The average rotational angle was then determined to be 0 degrees, which is an acceptable flow pattern for the particulate emission test.

APPENDIX I

CALIBRATIONS

f 3

Staksamplr Calibration

ate 7 July 1987

Console No. 51340

arometric Pressure, P_b = 28.86 in. Hg

Dry Gas Meter No. 3017861

perator(s) KLEMM

Orfice anometer Setting	Volume						Temperature				Elapsed Time
	Wet Test Meter			Dry Gas Meter			Wet Test	Dry Gas Meter			
	Start	Stop	Volume	Start	Stop	Volume	Meter	Inlet	Outlet	Average	
ΔH			V_w			V_d	T_w	+4.4	+4.7	T_d	θ
in. H_2O	ft^3	ft^3	ft^3	ft^3	ft^3	ft^3	°F	°F	°F	°F	min.
0.5 (5)	018.375	023.121	4.746	632.002	637.006	5.004	60°	100, 102, 106 } 107.0	76, 98, 80 } 82.4	94.9	12:01.75 12.029
1.0 (5)	024.060	028.758	4.698	638.001	643.003	5.002	60	106, 111, 114 } 115.0	80, 82, 84 } 86.7	100.9	8:39.61 8.660
2.0 (10)	029.717	039.158	9.441	644.004	654.106	10.102	60	114, 123, 124 }	84, 87, 90 }	108.2	12:31.39 12.52
4.0 (10)	040.000	049.325	9.325	655.005	665.007	10.002	60	122, 130, 133 }	90, 93, 94 }	114.9	8:53.29 8.99
6.0 (10)	050.251	059.583	9.332	666.006	676.044	10.038	60	130, 134, 135 }	95, 96, 98 }	119.2	7:21.90 7.37
8.0 (10)	060.577	069.886	9.309	677.110	687.134	10.024	60	132, 136, 138 }	99, 100, 101 }	122.1	6:23.94 6.40

2 of 2

Staksamplr Calibration Calculations

7/7/87

ΔH	$P_b + \frac{\Delta H}{13.6}$	$T_w + 460$	$T_d + 460$	γ $\frac{V_w P_b (T_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(T_w + 460)}$	H@ $\frac{0.0317 \Delta H}{P_b (T_d + 460)} \left[\frac{(T_w + 460)\,\theta}{V_w}\right]^2$
0.5	28.90	520	554.9	1.018	1.719
1.0	28.93	520	560.9	1.010	1.800
2.0	29.01	520	568.2	1.016	1.839
4.0	29.15	520	574.9	1.020	1.877
6.0	29.30	520	579.2	1.020	1.916
8.0	29.45	520	582.1	1.019	1.929

CONSOLE CALIBRATION WORKSHEET

Date: 7 July 1987

Operator: R.B.Klemm Jr. Barometer: 28.86

Console # S-1340 Dry Gas Meter # 3017861 (T=60'F)

dH (in W.C.)	V(w) (ft^3)	V(d) (ft^3)	T(i) ('F)	T(o) ('F)	T(d) ('R)	Time (min)	Pb+dH (in Hg)	Gamma	H@
0.5	18.375	632.002	100.0	76.0					
	23.121	637.006	102.0	78.0					
	4.746	5.004	106.0	80.0	554.9	12.03	28.90	1.011	1.719
1.0	24.060	638.001	106.0	80.0					
	28.758	643.003	111.0	82.0					
	4.698	5.002	114.0	84.0	560.7	8.66	28.93	1.010	1.800
2.0	29.717	644.004	114.0	84.0					
	39.158	654.106	123.0	87.0					
	9.441	10.102	124.0	90.0	568.2	12.52	29.01	1.016	1.839
4.0	40.000	655.005	122.0	90.0					
	49.325	665.007	130.0	93.0					
	9.325	10.002	133.0	94.0	574.9	8.89	29.15	1.020	1.877
6.0	50.251	666.006	130.0	95.0					
	59.583	676.044	134.0	96.0					
	9.332	10.038	135.0	98.0	579.2	7.37	29.30	1.020	1.916
8.0	60.577	677.110	132.0	98.0					
	69.886	687.134	136.0	100.0					
	9.309	10.024	138.0	101.0	582.1	6.40	29.45	1.019	1.929

Staksamplr Calibration

14 Sept 1987

Console No. S-1340

ometric Pressure, P_b = 28.83 in. Hg

Dry Gas Meter No. 3017861

ator(s) KLEMM

After Klug Bros. Asphalt Emmissions Testing.

1100 - 1400

ice ometer ting	Volume						Temperature				Elapsed Time
	Wet Test Meter			Dry Gas Meter			Wet Test	Dry Gas Meter			
	Start	Stop	Volume	Start	Stop	Volume	Meter	Inlet	Outlet	Average	
H			V_w			V_d	T_w	+4.65°	+2.90°	T_d	θ
H_2O	ft^3	ft^3	ft^3	ft^3	ft^3	ft^3	°F	°F	°F	°F	min.
.5 s	087.953	092.640	4.687	894.200	899.201	5.001	60°F	99 102 108	81 82 83	96.3	11:54.62
.0 s	098.070	102.720	4.650	905.001	910.002	5.001	60°F	112 119 130	88 90 91	107.1	8:36.46
.0 10	103.179	112.429	9.250	910.503	920.505	10.002	60°F	120 128 132	92 95 98	114.6	12:14.72
.0 10	113.364	122.589	9.225	921.505	931.506	10.001	60°F	132 139 144	98 100 102	122.9	8:51.38
.0 10	123.510	132.758	9.248	932.509	942.515	10.006	60°F	142 146 150	102 104 106	128.8	7:18.69
.0 10	135.076	144.324	9.248	945.008	955.012	10.004	60°F	146 147 149	108 108 108	131.4	6:23.05

Leak check: @ t:0 → 086.752 ft^3

Pretest: @ t:1 min → 086.752 ft^3

Vac = 13 in Hg.

Staksamplr Calibration Calculations

14 Sept 1987

ΔH	$P_b + \frac{\Delta H}{13.6}$	$T_w + 460$	$T_d + 460$	γ $\frac{V_w P_b (T_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(T_w + 460)}$	H@ $\frac{0.0317 \Delta H}{P_b (T_d + 460)} \left[\frac{(T_w + 460) \theta}{V_w}\right]^2$
0.5	28.87	520	556.3	1.001	1.726
1.0	28.90	520	567.1	1.011	1.796
2.0	28.98	520	574.6	1.017	1.814
4.0	29.12	520	582.9	1.024	1.880
6.0	29.27	520	588.8	1.031	1.894
8.0	29.42	520	591.4	1.030	1.917

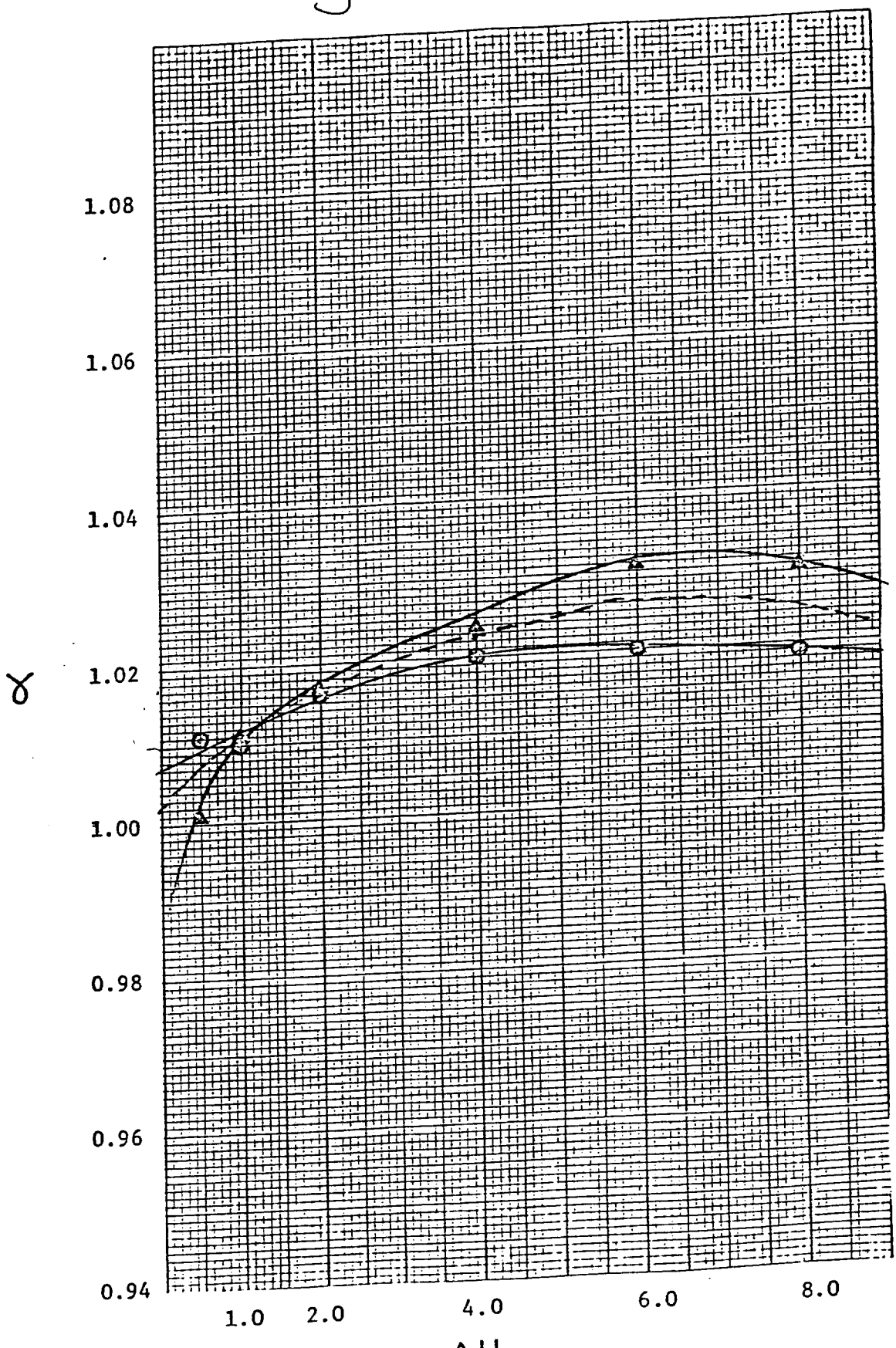
CONSOLE CALIBRATION WORKSHEET
Date: 14 September 1987
Operator: R.B.Klemm Jr.
Console # S-1340

Barometer: 28.83
Dry Gas Meter # 3017861 (T=60'F)

dH (in W.C.)	V(w) (ft^3)	V(d) (ft^3)	T(i) ('F)	T(o) ('F)	T(d) ('R)	Time (min)	Pb+dH (in Hg)	Gamma	H@
0.5	87.953	894.200	99.0	81.0					
	92.640	899.201	102.0	82.0					
	4.687	5.001	108.0	83.0	556.3	11.91	28.87	1.001	1.726
1.0	98.070	905.001	112.0	88.0					
	102.720	910.002	119.0	90.0					
	4.650	5.001	120.0	91.0	567.1	8.61	28.90	1.011	1.796
2.0	103.179	910.503	120.0	92.0					
	112.429	920.505	128.0	95.0					
	9.250	10.002	132.0	98.0	574.6	12.25	28.98	1.017	1.814
4.0	113.364	921.505	132.0	98.0					
	122.589	931.506	139.0	100.0					
	9.225	10.001	144.0	102.0	582.9	8.86	29.12	1.024	1.880
6.0	123.510	932.509	142.0	102.0					
	132.758	942.515	146.0	104.0					
	9.248	10.006	150.0	106.0	588.8	7.31	29.27	1.031	1.894
8.0	135.076	945.008	146.0	108.0					
	144.324	955.012	147.0	108.0					
	9.248	10.004	149.0	108.0	591.4	6.38	29.42	1.030	1.917

CONSOLE CALIBRATION

Klug Bros. Asphalt.



S-Type Pitot Tube Calibration Data

Date 9/2/87 Calibrated by White / Coleman

S-Type Pitot Tube Identification SS / 5 ft Probe C_p = R = 0.760

Calibration Setup: Normal - Pitot Leads Down

Reverse - Pitot Leads Up

$$C_p = 0.99 \sqrt{\frac{\Delta P_{STD}}{\Delta P_{S\text{-}Type}}}$$

Test No.	Pitot Tube Readings (in. H_2O)				
	Standard	S-Type			
		Normal	C_p	Reversed	C_p
1	0.26	0.43	0.770	0.43	0.770
2	0.26	0.43	0.770	0.45	0.753
3	0.27	0.43	0.784	0.46	0.758
Average			0.775	Average	0.760

APPENDIX II

PARTICULATE ANALYTICAL DATA

Klug Bros. Inc
Moundsville, W.V.

Concentration of Particulate Matter in Stack, grs./DSCF

$$C_s' = 0.0154 \frac{M_p}{V_{m,std}}$$

Where M_p = Milligrams of particulate collected

RUN 2

$$C'_s = 0.0154 \left(\frac{62.4}{41.351}\right)$$

$$C'_s = 0.0232 \text{ grs./DSCF}$$

RUN 3

$$C'_s = 0.0154 \left(\frac{100.4}{53.334}\right)$$

$$C'_s = 0.0290 \text{ grs./DSCF}$$

RUN 4

$$C'_s = 0.0154 \left(\frac{88.0}{51.155}\right)$$

$$C'_s = 0.0265 \text{ grs./DSCF}$$

Klug Bros. Inc.
Moundsville, W.V.

Total Particulate Emission Rate, lb./hr:

$$P_{tr} = 0.008571(C_s')(Q_s)$$

Run 2

$$P_{TR} = 0.008571\,(0.0232)(4608)$$

$$P_{TR} = 0.92 \text{ lb/hr}$$

Run 3

$$P_{TR} = 0.008571\,(0.0290)(5377)$$

$$P_{TR} = 1.34 \text{ lb/hr}$$

Run 4

$$P_{TR} = 0.008571\,(0.0265)(5370)$$

$$P_{TR} = 1.22 \text{ lb/hr}$$

Average P_{TR} = 1.16 lb/hr

TRADET LABORATORIES

930 Kinnear Road, Columbus, Ohio Phone: 614-299-9229
Mailing Address: P.O. Box 12069, Columbus, Ohio 43212

Wheeling-Ohio County Airport, Wheeling, W.Va. 26003 Phone: 304-277-4350

PARTICULATE ANALYTICAL DATA

Plant Klug Bros, Inc. Run 2

Location Moundsville, W.V. Date 9/3/87

MOISTURE:

Impinger	1	2	4
Final Volume	364 ml	212 ml	298.4 - 52.5
Initial Volume	100 ml	100 ml	286.1 - 52.5
Net Volume	264 ml	112 ml	12.3

Total Weight of Water Collected 388.3 grams

PARTICULATES:	Filter	Probe Wash	Wet Catch
Designation Number	171	127 ml	—
Final Weight (1)	0.7993	73.8471	
Final Weight (2)	0.7983	73.8470	
Final Weight (3)	0.7982	73.8470	
Final Weight (4)	0.7983		
Initial Weight (1)	0.7461	73.8368	
Initial Weight (2)	0.7460		
Net Weight	0.0522 ✓	0.0102	
Blank Correction	Negligible ✓	Negligible	
Corrected Net Weight	0.0522	0.0102 ✓	

Total Weight Without Wet Catch 0.0624 ✓ grams

Total Weight With Wet Catch _____ grams

TRADET LABORATORIES

930 Kinnear Road, Columbus, Ohio Phone: 614–299-9229
Mailing Address: P.O. Box 12069, Columbus, Ohio 43212

Wheeling-Ohio County Airport, Wheeling, W.Va. 26003 Phone: 304–277-4350

PARTICULATE ANALYTICAL DATA

Plant Klug Bros. Inc. Run 3

Location Moundsville, W.V Date 9/3/87

MOISTURE:

Impinger	1	2	4
Final Volume	378 ml	412 ml	278.3 - 52.5
Initial Volume	100 ml	100 ml	246.0 - 52.5
Net Volume	278 ml	312 ml	32.3

Total Weight of Water Collected 622.3 grams

PARTICULATES:	Filter	Probe Wash	Wet Catch
Designation Number	173	261 ml	—
Final Weight (1)	0.8351	76.6647	
Final Weight (2)	0.8346	(76.6646)	
Final Weight (3)	(0.8343)		
Final Weight (4)	0.8347		
Initial Weight (1)	0.7522	(76.6463)	
Initial Weight (2)	(0.7522)		
Net Weight	0.0821 ✓	0.0183 ✓	
Blank Correction	negligible	negligible	
Corrected Net Weight	0.0821	0.0183	

Total Weight Without Wet Catch 0.1004 ✓ grams

Total Weight With Wet Catch _____ grams

TRADET LABORATORIES

930 Kinnear Road, Columbus, Ohio
Mailing Address: P.O. Box 12069, Columbus, Ohio 43212
Phone: 614-299-9229

Wheeling-Ohio County Airport, Wheeling, W.Va. 26003 Phone: 304-277-4350

PARTICULATE ANALYTICAL DATA

Plant Klug Bros., Inc. Run 4

Location Moundsville, W.V Date 9/4/87

MOISTURE:

Impinger	1	2	4
Final Volume	398 ml	316 ml	428.7-52.5 g
Initial Volume	100 ml	100 ml	455.9-105.0
Net Volume	298 ml	216 ml	25.3 g

Total Weight of Water Collected 539.3 grams

PARTICULATES:	Filter	Probe Wash	Wet Catch
Designation Number	174	388 ml	—
Final Weight (1)	0.8240	80.7878	
Final Weight (2)	0.8234	80.7875	
Final Weight (3)	0.8240		
Final Weight (4)	0.8241		
Initial Weight (1)	0.7513	80.7716	
Initial Weight (2)	0.7513		
Net Weight	0.0721 ✓	0.0159 ✓	
Blank Correction	negligible	negligible	
Corrected Net Weight	0.0721	0.0159	

Total Weight Without Wet Catch 0.0880 ✓ grams

Total Weight With Wet Catch _____ grams

TRADET LABORATORIES

930 Kinnear Road, Columbus, Ohio Phone: 614-299-9229
Mailing Address: P.O. Box 12069, Columbus, Ohio 43212

Wheeling-Ohio County Airport, Wheeling, W.Va. 26003 Phone: 304-277-4350

PARTICULATE ANALYTICAL DATA

Plant King Bros. Inc Run Blanks

Location TraDet, Inc Date 9/3/87

MOISTURE:

Impinger	1	2	4
Final Volume			
Initial Volume			
Net Volume			

Total Weight of Water Collected _____ grams

PARTICULATES:	Filter	Probe Wash	Wet Catch
Designation Number	175	100 ml	—
Final Weight (1)	0.7532	72.2560	
Final Weight (2)	0.7528	72.2563	
Final Weight (3)	0.7529	72.2567	
Final Weight (4)	0.7529		
Initial Weight (1)	0.7529	72.2559	
Initial Weight (2)	0.7529		
Net Weight	0.0001	0.0001	
Blank Correction	negligible	negligible	
Corrected Net Weight	—	—	

Total Weight Without Wet Catch _____ grams

Total Weight With Wet Catch _____ grams

Stack Sampling Data Input

RUN 2

```
PARTICULATE
STACK SAMPLING

SAMPLING DATA

RUN NO?
          2.000
BAR.PRESS,IN.HG?
         29.520
STACK DIAM,IN?
         60.000
NOZZLE DIAM,IN?
          0.625
RUN TIME,MIN?
         78.000
CORR.DRY GAS VOL
         44.199
AVG DELTA H?
          1.000
AVG.STACK TEMP?
         163.000
AVG METER TEMP?
         100.200
AVG.SQRT.DELTA P
          0.115
PITOT COEFF.?
          0.760
STACK STAT.PRESS
         29.520
TOT.IMPING.WT.GM
        103.300
%CARBON DIOXIDE?
          7.900
% OXYGEN?
          6.700
```

RUN 3

```
PARTICULATE
STACK SAMPLING

SAMPLING DATA

RUN NO?
          3.000
BAR.PRESS,IN.HG?
         29.520
STACK DIAM,IN?
         60.000
NOZZLE DIAM,IN?
          0.625
RUN TIME,MIN?
         84.000
CORR.DRY GAS VOL
         57.956
AVG DELTA H?
          1.430
AVG.STACK TEMP?
        167.000
AVG.METER TEMP?
        110.300
AVG.SQRT.DELTA P
          0.144
PITOT COEFF.?
          0.760
STACK STAT.PRESS
         29.524
TOT.IMPING.WT.GM
        [illegible]
%CARBON DIOXIDE?
          [illegible]
% OXYGEN?
          [illegible]
```

RUN 4

```
PARTICULATE
STACK SAMPLING

SAMPLING DATA

RUN NO?
          4.000
BAR.PRESS,IN.HG?
         29.580
STACK DIAM,IN?
         60.000
NOZZLE DIAM,IN?
          0.625
RUN TIME,MIN?
         84.000
CORR.DRY GAS VOL
         52.762
AVG DELTA H?
          1.28[illegible]
AVG.STACK TEMP?
        165.900
AVG.METER TEMP?
         82.100
AVG.SQRT.DELTA P
          0.139
PITOT COEFF.?
          0.760
STACK STAT.PRESS
         29.520
TOT.IMPING.WT.GM
         [illegible]
%CARBON DIOXIDE?
          9.000
% OXYGEN?
          [illegible]
```

Stack Sampling Calculated Data

RUN 2

V(M) STD.,DSCF=
41.351

V(W) GAS,SCF=
18.405

%MOISTURE=30.801
%

M(D)= 0.692

MW(D)= 29.516

MW= 25.969

V(A),FPM=404.097

%I= 105.705%

Q(A),ACFM=
7934.426

Q(S),DSCFM=
4608.000

P(S),LBS./CU.FT=
0.056

RUN 3

V(M) STD.,DSCF=
53.334

V(W) GAS,SCF=
29.497

%MOISTURE=35.611
%

M(D)= 0.644

MW(D)= 29.780

MW= 25.585

V(A),FPM=509.996

%I= 108.497%

Q(A),ACFM=
10013.745

Q(S),DSCFM=
5376.797

P(S),LBS./CU.FT=
0.055

RUN 4

V(M) STD.,DSCF=
51.155

V(W) GAS,SCF=
25.563

%MOISTURE=33.321
%

M(D)= 0.667

MW(D)= 29.743

MW= 25.828

V(A),FPM=490.048

%I= 104.185%

Q(A),ACFM=
9622.062

Q(S),DSCFM=
5370.573

P(S),LBS./CU.FT=
0.056

APPENDIX III

VELOCITY DATA

PRELIMINARY VELOCITY TRAVERSE

Plant Klug Bros, Inc.

Date 7/24/87

Location Asphalt Plant - Moundsville, W.V.

Stack I.D. 5 feet

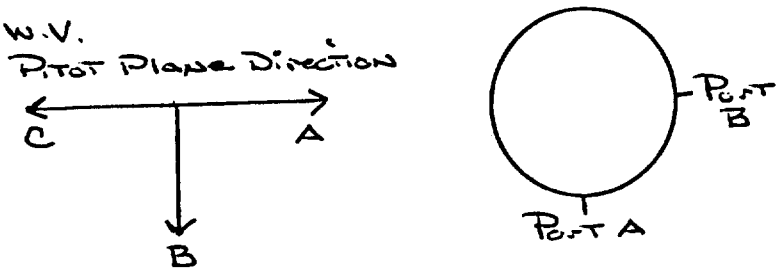
Barometric Pressure, in Hg —

Stack Gauge Pressure, in. H_2O —

Operators WHITE / H. V. AUD

Pitot Coefficient (Cp)

Run Number



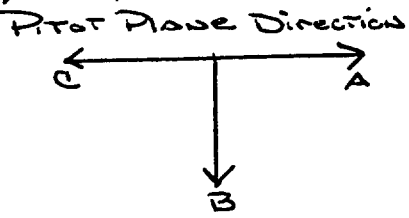
Schematic of Traverse Point Layout

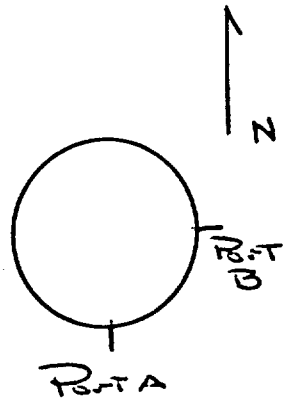
Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
1 A	Port A		27°
B			
C			0°
2 A			26°
B			
C			6°
3 A			30°
B			
C			0°
4 A			32°
B			
C			0°
5 A			32°
B			
C			0°
6 A			15°
B			
C			0°
Average			

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
7 A			0°
B			
C			15°
8 A			0°
B			
C			26°
9 A			0°
B			
C			31°
10 A			0°
B			
C			27°
11 A			0°
B			
C			21°
12 A			0°
B			
C			20°
Average			25.2°

PRELIMINARY VELOCITY TRAVERSE

Plant Klug Bros, Inc.
Date 7/24/87
Location Asphalt Plant - Moundsville, W.V.
Stack I.D. 5 Feet
Barometric Pressure, in Hg -
Stack Gauge Pressure, in. H_2O -
Operators WH.FP / H.V.AUK
Pitot Coefficient (Cp)
Run Number





Schematic of Traverse Point Layout

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
1 A	Port B		75°
B			
C			0°
2 A			45°
B			
C			0°
3 A			45°
B			
C			0°
4 A			42°
B			
C			0°
5 A			0°
B			
C			0°
6 A			0°
B			
C			0°
Average			

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
7 A			0°
B			
C			15°
8 A			0°
B			
C			29°
9 A			0°
B			
C			29°
10 A			0°
B			
C			35°
11 A			0°
B			
C			32°
12 A			0°
B			
C			46°
Average			32.75°

PRELIMINARY VELOCITY TRAVERSE

Plant Klug Bros., Inc

Date 8/5/87

Location Asphalt Plant - Moundsville, W.V.

Stack I.D. 5 feet

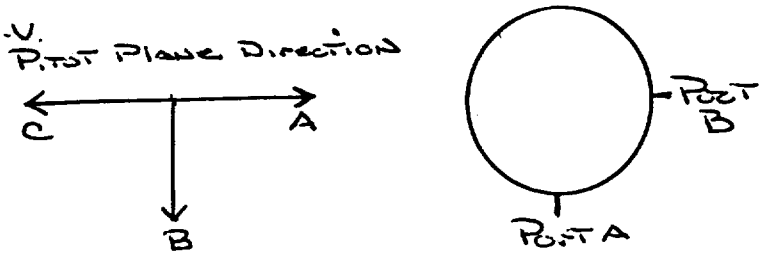
Barometric Pressure, in Hg —

Stack Gauge Pressure, in. H_2O —

Operators J. Smith / K. [illegible]

Pitot Coefficient (Cp)

Run Number



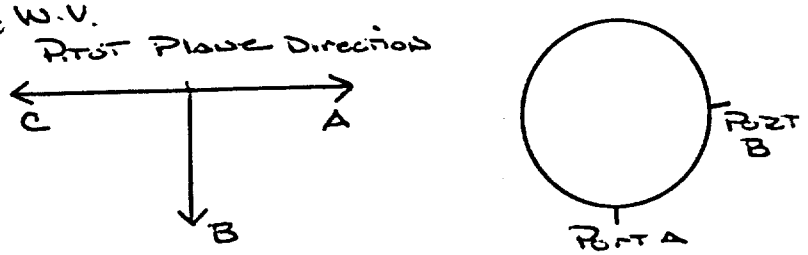
Schematic of Traverse Point Layout

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	~~$\sqrt{\Delta Ps}$~~ Rotation Angle
A	Port A	0.01	15°
B		0.01	
C		0.0	0°
A		0.01	20°
B		0.01	
C		0.0	0°
A		0.0	0°
B		0.01	
C		0.0	0°
4 A		0.0	0°
B		0.01	
C		0.0	0°
5 A		0.0	0°
B		0.015	
C		0.0	0°
6 A		0.0	0°
B		0.02	
C		0.0	0°
Average			

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	~~$\sqrt{\Delta Ps}$~~ Rotation Angle
7 A		0.0	0°
B		0.03	
C		0.0	0°
8 A		0.0	0°
B		0.03	
C		0.01	2.5°
9 A		0.0	0°
B		0.03	
C		0.0	0°
10 A		0.0	0°
B		0.03	
C		0.02	10°
11 A		0.0	0°
B		0.045	
C		0.03	15°
12 A		0.0	0°
B		0.06	
C		0.05	27.5
Average			7.5°

PRELIMINARY VELOCITY TRAVERSE

Plant King Brass, Inc.
Date 8/5/87
Location Asphalt Plant - Moundsville, W.V.
Stack I.D. 5 Feet
Barometric Pressure, in Hg —
Stack Gauge Pressure, in. H_2O —
Operators White / Klemm
Pitot Coefficient (Cp)
Run Number



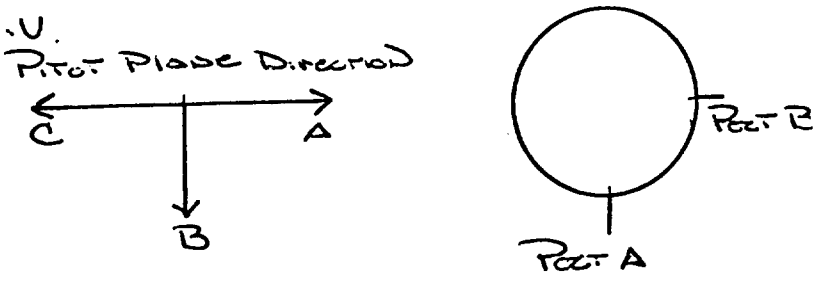
Schematic of Traverse Point Layout

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
1 A	Port B	0.05	37.5°
B		0.065	
C		0.0	0°
2 A		0.03	35°
B		0.05	
C		0.0	0°
3 A		0.03	27.5°
B		0.05	
C		0.0	0°
4 A		0.025	27.5°
B		0.04	
C		0.0	0°
5 A		0.02	20°
B		0.035	
C		0.0	0°
6 A		0.0	0°
B		0.02	
C		0.0	0°
Average			

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
7 A		0.0	0°
B		0.04	
C		0.01	2.5°
8 A		0.0	0°
B		0.04	
C		0.01	2.5°
9 A		0.0	0°
B		0.04	
C		0.02	10°
10 A		0.0	0°
B		0.045	
C		0.025	7.5°
11 A		0.0	0°
B		0.025	
C		0.01	2.0°
12 A		0.0	0°
B		0.04	
C		0.03	10°
Average			15.2°

PRELIMINARY VELOCITY TRAVERSE

Plant Klug Bros. Inc.
Date 9/4/87
Location Asphalt - Moundsville, W.V.
Stack I.D. 5 Feet
Barometric Pressure, in Hg —
Stack Gauge Pressure, in. H_2O —
Operators White/Coleman
Pitot Coefficient (Cp)
Run Number



Schematic of Traverse Point Layout

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	~~$\sqrt{\Delta Ps}$~~ Rotated Angle
A	Port A	0.0	0°
B			
C		0.0	0°
3 A		0.0	0°
B			
C		0.0	0°
A		0.0	0°
B			
C		0.0	0°
4 A		0.0	0°
B			
C		0.0	0°
5 A		0.0	0°
B			
C		0.0	0°
6 A		0.0	0°
B			
C		0.0	0°
Average			

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	~~$\sqrt{\Delta Ps}$~~ Rotated Angle
7 A		0.0	0°
B			
C		0.0	0°
8 A		0.0	0°
B			
C		0.0	0°
9 A		0.0	0°
B			
C		0.0	0°
10 A		0.0	0°
B			
C		0.0	0°
11 A		0.0	0°
B			
C		0.0	0°
12 A		0.0	0°
B			
C		0.0	0°
Average			0°

PRELIMINARY VELOCITY TRAVERSE

Plant Klug Bros, Inc.

Date 9/4/87

Location Asphalt Plant - Moundsville, W.V.

Stack I.D. 5 feet

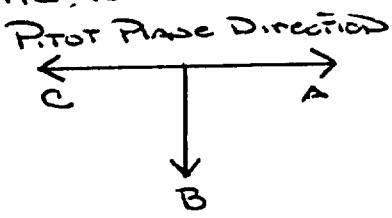
Barometric Pressure, in Hg -

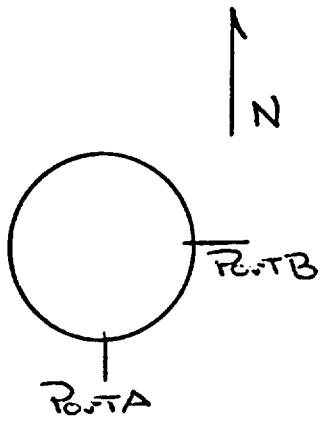
Stack Gauge Pressure, in. H_2O -

Operators White / Coleman

Pitot Coefficient (Cp)

Run Number





Schematic of Traverse Point Layout

Traverse Point Number	~~Stack Temperature (To), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
1 A	Port B	0.0	0°
B			
C		0.0	0°
2 A		0.0	0°
B			
C		0.0	0°
3 A		0.0	0°
B			
C		0.0	0°
4 A		0.0	0°
B			
C		0.0	0°
5 A		0.0	0°
B			
C		0.0	0°
6 A		0.0	0°
B			
C		0.0	0°
Average			

Traverse Point Number	~~Stack Temperature (Ts), °F~~	Velocity Head (ΔPs), in H_2O	$\sqrt{\Delta Ps}$ Rotation Angle
7 A		0.0	0°
B			
C		0.0	0°
8 A		0.0	0°
B			
C		0.0	0°
9 A		0.0	0°
B			
C		0.0	0°
10 A		0.0	0°
B			
C		0.0	0°
11 A		0.0	0°
B			
C		0.0	0°
12 A		0.0	0°
B			
C		0.0	0°
Average			0°

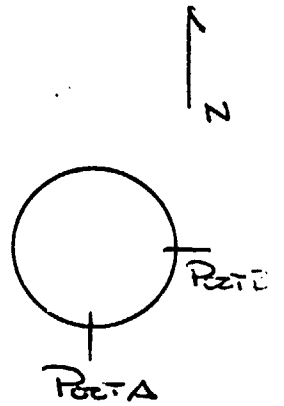
APPENDIX IV

FIELD DATA

FIELD DATA

PLANT Kloo Bros. Inc
DATE 9/3787
SAMPLING LOCATION Asphalt Plant, Moundsville, W.V.
SAMPLE TYPE Particulate
RUN NUMBER TWO(2)
OPERATOR Whitt
AMBIENT TEMPERATURE 65°F
BAROMETRIC PRESSURE 29.52
STATIC PRESSURE, (P_s) —
FILTER NUMBER (s) 171

PROBE LENGTH AND TYPE 5FT S/S
NOZZLE I.D. 3/8" = 0.625 inches
ASSUMED MOISTURE, % 29
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
C FACTOR Cp (Rev) 0.760
PROBE HEATER SETTING 80-90%
HEATER BOX SETTING 200-250
REFERENCE Δp K: 71



SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER (PORT B)	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F		$\sqrt{\Delta P_s}$	
B-1	0 1127.5	722.718	0.015	1.09	1.09	152.2	81	82	4.0	0.1225	—
2	3 1130.5	724.6	0.017	1.21	1.21	157.4	84	82	4.0	0.1304	—
3	6 1133.5	726.4	0.02	1.45	1.45	158.1	90	82	4.5	0.1414	66
4	9 1136.5	728.4	0.018	1.30	1.30	158.3	95	83	4.5	0.1342	60
5	12 1139.5	730.3	0.019	1.39	1.39	157.6	100	84	4.5	0.1378	58
6	15 1142.5	732.3	0.019	1.39	1.39	159.0	103	84	4.5	0.1378	60
7	18 1145.5	734.2	0.015	1.09	1.09	157.5	105	86	4.0	0.1225	60
8	21 1148.5	736.0	0.015	1.09	1.09	167.5	106	86	4.0	0.1225	60
9	24 1151.5	737.8	0.013	0.94	0.94	169.0	107	86	4.0	0.1140	60
10	27 1154.5	739.5	0.015	1.09	1.09	168.9	110	89	4.0	0.1225	60
11	30 1157.5	740.2	0.012	0.87	0.87	169.6	111	90	4.0	0.1095	60
12	33 1160.5	742.6	0.015	1.09	1.09	168.1	112	92	4.0	0.1225	60
STOP	36 1163.5	744.792									
		V_m = 22.024			1.17	161.9	100.3	85.5		0.1265	
											59.8
						164.6	104.9	88.4			

COMMENTS: Pre Leak Check @ 8" Hg for 60 sec.
START - 722.713
STOP - 722.718 FT3

EPA (Dur) 235

FIEL _ .TA

PLANT King Bros. Inc.
DATE 9/3/87
SAMPLING LOCATION Asphalt Plant Moundsville, W.V.
SAMPLE TYPE Particulate
RUN NUMBER TWO (2)
OPERATOR WJW.TT
AMBIENT TEMPERATURE 65°F
BAROMETRIC PRESSURE 29.52
STATIC PRESSURE, (P_s) —
FILTER NUMBER (s) 171

PROBE LENGTH AND TYPE 5Ft S/S
NOZZLE I.D. 3/8" = 0.625 inches
ASSUMED MOISTURE, % 29
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
C FACTOR Cp(Rev) 0.760
PROBE HEATER SETTING 80-90%
HEATER BOX SETTING 200-250
REFERENCE ~~Δp~~ K_s = 71

N

PORT B

PORT A

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER PORT A	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F $\sqrt{\Delta H}$	IMPINGER TEMPERATURE, °F
A-1	0 1412	744.742	0.015	1.05	1.05	151.1	88	90	4.0	0.1225	60
2	3.5 1415.5	747.0	0.02	1.42	1.42	153.4	94	90	4.5	0.1414	60
3	7.0 1419	749.4	0.025	1.75	1.75	158.1	102	90	5.5	0.1581	59
4	10.5 1422.5	752.0	0.022	1.51	1.51	158.1	106	91	4.0	0.1483	58
5	14.0 1426	754.4	0.015	1.05	1.05	158.3	110	92	4.0	0.1225	59
6	17.5 1429.5	756.5	0.01	0.71	0.71	157.8	110	94	3.0	0.1000	59
7	21.0 1433	758.2	0.005	0.36	0.36	158.7	110	94	3.0	0.0707	59
8	24.5 1436.5	759.6	0.005	0.36	0.36	160.7	110	96	3.0	0.0707	59
9	28.0 1440	760.8	0.005	0.36	0.36	159.3	110	97	3.0	0.0707	59
10	31.5 1443.5	762.1	0.005	0.36	0.36	159.8	110	98	3.0	0.0707	59
11	35.0 1447	763.3	0.005	0.36	0.36	164.5	110	99	3.0	0.0707	59
12	38.5 1450.5	764.5	0.009	0.64	0.64	164.6	112	100	3.0	0.0949	59
STOP	42.0 1454	766.437									
		ΔV_M = 21.695			0.83	158.7	106	94.2		0.1034	59.1
						corr 161.4	corr 110.7	corr 97.1			
		V_M = 43.718			1.00	163.0	107.8 / 100.2	92.7		0.1150	59.4

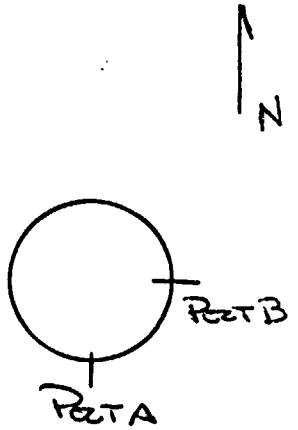
COMMENTS: Post Leak Check
START 766.454
STOP 766.457
0.003 FT3 @ 5.5 in Hg for 60 sec.

EPA (Dur) 235
4 72

FIELD DATA

PLANT Kiva Bros. Inc
DATE 9/3/87
SAMPLING LOCATION Asphalt Plant Moundsville, W.V.
SAMPLE TYPE Particulate
RUN NUMBER Three (3)
OPERATOR Whitt
AMBIENT TEMPERATURE 70°F
BAROMETRIC PRESSURE 29.52
STATIC PRESSURE, (P_s) -
FILTER NUMBER (s) 173

PROBE LENGTH AND TYPE 5Ft S/S
NOZZLE I.D. 5/8" = 0.625 inches
ASSUMED MOISTURE, % 29
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
C FACTOR Cp(Rev) 0.760
PROBE HEATER SETTING 80-90%
HEATER BOX SETTING 200-250
REFERENCE Δp K=71



SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER Port A	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F $\sqrt{\Delta P_s}$	IMPINGER TEMPERATURE, °F
A-1	0	1603	766.533	0.019	1.39	1.39	157.8	91	94	5.0	0.1378	53
2	3.5	1606.5	769.0	0.025	1.79	1.79	161.3	99	94	5.0	0.1581	54
3	7.0	1610	771.5	0.025	1.79	1.79	161.3	107	94	6.0	0.1581	65
4	10.5	1613.5	774.1	0.025	1.79	1.79	162.2	114	96	6.0	0.1581	65
5	14.0	1617	776.7	0.025	1.79	1.79	161.6	120	98	6.0	0.1581	62
6	17.5	1620.5	779.4	0.02	1.41	1.41	162.7	121	99	5.5	0.1414	60
7	21.0	1624	781.7	0.015	1.05	1.05	162.7	121	99	4.5	0.1224	60
8	24.5	1627.5	783.8	0.015	1.05	1.05	166.5	121	100	4.5	0.1224	62
9	28.0	1631	785.8	0.015	1.05	1.05	166.7	120	102	4.5	0.1224	62
10	31.5	1634.5	787.8	0.02	1.41	1.41	167.5	120	104	5.0	0.1414	67
11	35.0	1638	790.2	0.021	1.50	1.50	—	124	104	5.0	0.1449	62
12	38.5	1641.5	792.6	0.021	1.50	1.50	—	125	104	5.5	0.1449	62
STOP	42.0		795.011									
			V_M = 28.478 ✓			1.96 ✓	163.0	115.2 ✓	99.0 ✓		0.1425 ✓	60.8 ✓
							corr. 165.7	corr. 119.8 ✓	101.9 ✓			

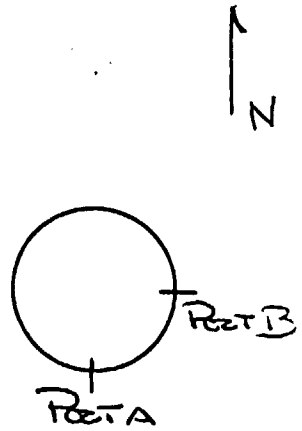
COMMENTS: Pre-Leak Check
START 766.520 @6" Hg for 60 sec.
STOP 766.533

EPA (Dur) 235

FIELD DATA

PLANT Klug Bros, Inc
DATE 9/3/87
SAMPLING LOCATION Asphalt Plant, Moundsville, W.V.
SAMPLE TYPE Particulate
RUN NUMBER Three (3)
OPERATOR Hiatt
AMBIENT TEMPERATURE 70°F
BAROMETRIC PRESSURE 29.52
STATIC PRESSURE, (P_s) —
FILTER NUMBER (s) 173

PROBE LENGTH AND TYPE 5Ft S/S
NOZZLE I.D. 5/8" = 0.625 inches
ASSUMED MOISTURE, % 29
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
C FACTOR Cp (Rev.) 0.760
PROBE HEATER SETTING 80-90%
HEATER BOX SETTING 200-250
REFERENCE Δp K = 71



SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER Port B	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F $\sqrt{\Delta P_s}$	IMPINGER TEMPERATURE, °F
B-1	0	1745	795.172	0.01	0.72	0.72	162.1	93	94	4.0	0.1000	60
2	3.5	1748.5	797.0	0.02	1.41	1.41	161.2	98	95	5.0	0.1414	60
3	7.0	1752	799.2	0.025	1.75	1.75	164.0	105	95	6.0	0.1581	60
4	10.5	1755.5	801.8	0.025	1.75	1.75	165.2	112	96	6.0	0.1581	60
5	14.0	1759	804.3	0.025	1.75	1.75	166.3	117	96	6.0	0.1581	58
6	17.5	1762.5	806.9	0.025	1.75	1.75	164.2	118	96	6.5	0.1581	56
7	21.0	1766	—	0.02	1.41	1.41	166.3	120	97	6.0	0.1414	56
8	24.5	1769.5	811.8	0.015	1.05	1.05	166.5	120	98	6.0	0.1225	58
9	28.0	1773	—	0.02	1.41	1.41	167.7	120	99	6.0	0.1414	58
10	31.5	1776.5	816.1	0.02	1.41	1.41	168.3	123	100	6.0	0.1414	60
11	35.0	1780	818.6	0.025	1.79	1.79	167.4	124	100	6.5	0.1581	60
12	38.5	1783.5	821.1	0.025	1.79	1.79	168.2	126	100	6.5	0.1581	61
	42.0	1787	823.699									
			V_M = 28.527			1.50	165.6	114.7	97.2		0.1947	58.9
							6022-168.3	6022-119.4	6022-100.1			
			V_M = 57.1666			1.48	167.0	119.6 / 110.3	101.0		0.1936	59.8

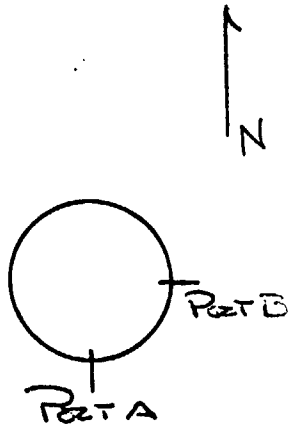
COMMENTS: Post Leak Check @ 7" Hg for 60sec.
START 823.719
STOP 823.727

EPA (Dur) 235

FIELD DATA

PLANT King Bros., Inc.
DATE 9/4/07
SAMPLING LOCATION Asphalt Plant Moundsville WV
SAMPLE TYPE Particulate
RUN NUMBER Four (4)
OPERATOR Wm. TT
AMBIENT TEMPERATURE 65°F
BAROMETRIC PRESSURE 29.58
STATIC PRESSURE, (P_s) —
FILTER NUMBER (s) 174

PROBE LENGTH AND TYPE 5FT S/S
NOZZLE I.D. 5/8" = 0.625 inches
ASSUMED MOISTURE, % 30
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
C FACTOR Cp 0.760
PROBE HEATER SETTING 85%
HEATER BOX SETTING 250
REFERENCE ~~Δp~~ K: 65



SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER Port B	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F $\sqrt{\Delta P_s}$	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
B-1	0 0845.5	823.754	0.015	0.98	0.98	119.2	54	52	3.0	0.1225	55
2	3.5 0849	825.8	0.03	1.95	1.95	157.8	64	54	5.0	0.1732	52
3	7.0 0852.5	828.4	0.02	1.30	1.30	159.5	69	54	4.0	0.1414	49
4	10.5 0856	830.6	0.015	0.98	0.98	161.1	74	56	3.5	0.1225	50
5	14.0 0859.5	832.5	0.015	0.98	0.98	160.9	77	56	3.5	0.1225	50
6	17.5 0903	834.5	0.015	0.98	0.98	160.3	81	58	3.5	0.1225	50
7	21.0 0906.5	836.4	0.015	0.98	0.98	161.2	84	60	3.5	0.1225	52
8	24.5 0910	838.3	0.015	0.98	0.98	162.7	89	64	3.5	0.1225	52
9	28.0 0913.5	840.3	0.015	0.98	0.98	162.6	90	64	3.5	0.1225	53
10	31.5 0917	842.1	0.02	1.30	1.30	161.4	93	66	4.0	0.1414	54
11	35.0 0920.5	844.3	0.02	1.30	1.30	162.5	95	68	4.0	0.1414	54
12	38.5 0924	846.5	0.02	1.30	1.30	165.0	97	68	4.0	0.1414	56
STOP	42.0 0927.5	848.763									
		V_m = 25.009 ft^3		1.17	1.17	161.4	80.6	60.0		0.1330	52.2
						Corr. 164.1	Corr. 85.2	Corr. 62.9			

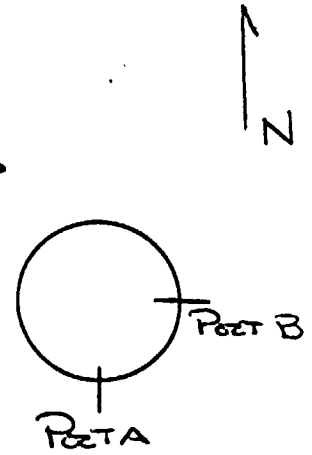
COMMENTS: Pre Leak Check @ 7" Hg for 60 sec.
START 823.745
STOP 823.754

EPA (Draft) 225

FIELD DATA

PLANT Kiva Bros. Inc.
DATE 9/4/87
SAMPLING LOCATION Asphalt Plant - Moundsville, W.V.
SAMPLE TYPE Particulate
RUN NUMBER Four (4)
OPERATOR V.D.H.
AMBIENT TEMPERATURE 65°F
BAROMETRIC PRESSURE 29.58
STATIC PRESSURE, (P_s) —
FILTER NUMBER (s) 174

PROBE LENGTH AND TYPE 5Ft S/S
NOZZLE I.D. 5/8" = 0.625 inches
ASSUMED MOISTURE, % 36
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
C FACTOR Cp (Rev) 0.760
PROBE HEATER SETTING 85%
HEATER BOX SETTING 250
REFERENCE ~~Δp~~ V_s = 65



SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER (Port A)	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F		$\sqrt{\Delta P_s}$	
A - 1	0	0955	848.763	0.02	1.30	1.30	134.1	72	69	4.0	0.1414	65
2	3.5	0958.5	850.9	0.035	2.25	2.25	162.6	80	70	5.0	0.1871	53
3	7.0	0102	853.7	0.035	2.25	2.25	161.9	91	71	5.5	0.1871	56
4	10.5	1005.5	856.5	0.03	1.91	1.91	162.7	96	72	5.0	0.1732	50
5	14.0	1009.0	859.2	0.03	1.91	1.91	164.1	100	74	5.0	0.1732	52
6	17.5	1012.5	861.9	0.02	1.30	1.30	163.8	102	75	4.5	0.1414	55
7	21.0	1016	864.2	0.015	0.98	0.98	162.8	104	76	4.0	0.1225	58
8	24.5	1019.5	866.2	0.015	0.98	0.98	168.0	103	78	4.0	0.1225	58
9	28.0	1023	868.1	0.015	0.98	0.98	167.1	103	80	4.0	0.1225	58
10	31.5	1026.5	870.1	0.015	0.98	0.98	165.8	103	80	4.0	0.1225	58
11	35.0	1030	872.0	0.015	0.98	0.98	167.4	103	81	4.0	0.1225	58
12	38.5	1033.5	873.9	0.015	0.98	0.98	168.7	104	82	4.0	0.1225	58
STOP	42.0	1037	875.871									
			V_m = 27.108			1.40	165.0 / 167.7 corr	96.8 / 101.4 corr	75.7 / 78.6 corr		0.1448	56.1
			V_m = 52.117			1.28	165.9	93.3	70.8		0.1389	54.2
								82.1				

COMMENTS: Post Leak Check @ 6" Hg for 60sec
START 875.890
STOP 875.893

- 9/3/8

N 2A

Process Monitoring

Klug Brothers, Inc

	Motor Speed % Feed Bin 1	Feed Bin 2	Feed Bin 3	Aggre-gate TPH	AC-20 TPH	Aggre-gate Totalizer Tons	Fuel Feed Rate %	Exhaust Set-Point °F	Exhaust Temp. °F	
30	49%	N/A	49%	87	4.4	8.5	34	225	228	
.35	49%	N/A	49%	87	4.5	13	32	226	223	
40	49%	N/A	49	87%	4.5	24.5	30	226	229	
45	49%	N/A	49%	87	4.5	32.4	30	226	229	
.50	49%	N/A	49%	87	4.5	36.4	29	226	228	Bad 1
'.55	49%	N/A	49%	87	4.5	43	31	226	224	
1:06	49%	N/A	49%	88.1	4.6	47.7	31	226	223	
1:05	49%	N/A	49%	87.1	4.6	55.9	31	226	223	
1:10	49%		49%	87	4.5	62.5	31	226	227	
Avg	49%	N/A	49%	87.1	4.5		31	226	226	

T- 9/18/

ON 2B

Klug Brothers, Inc

e	Motor Speed % Feed Bin 1	Feed Bin 2	Feed Bin 3	Aggregate TPH	AC-20 TPH	Aggregate Totalizer Tons	Fuel Feed Rate %	Exhaust Set-Point °F	Exhaust Temp. °F	
15	50%	N/D	50%	84	~~6.5~~ 4.4	6.5	30	226	230	
20	50%	N/D	50%	84	4.4	15.3	26	226	230	
25	50%	N/D	50%	84	4.4	25.	32	226	221	
30	50%	N/D	50%	84	4.4	31	33	226	223	
.35	50%	N/D	50%	84	4.4	37	32	226	227	
.40	50%	N/D	50%	84	4.4	45	29	226	235	
.45	50%	N/D	50%	84	4.4	50	26	226	230	
50	~~50~~ 54%	~~N/D~~ 42%	~~50%~~ N/D	79	5.0	61.5	27	226	228	
50	54	42%	N/D	79	5.1	66	26	226	230	wearing
.55	54	42%	N/D	79	5.1	69	26	226	230	
erage	51.2	42	50	82.5	4.6		28.7	226	228	

T - 9/2/87

N 3A

Process Monitor

Klug Brothers, Inc

3 Not used Warning

e	Motor Speed % Feed Bin 1	Feed Bin 2	Aggre-gate TPH	AC-20 TPH	Aggre-gate Totalizer Tons	Fuel Feed Rate %	Exhaust Set-Point °F	Exhaust Temp. °F	
05	54	42	78.5	5.1	8.3	31	226	221	
0	54	42	79	5.1	12	30	226	230	
5	54	42	78	5.1	18	31	226	232	
20	54	42	80	5.1	27	28	226	229	
25	54	42	78	5.1	33.9	28	226	229	
30	54	42	79	5.1	39	28	226	228	
35	54	42	79	5.2	46	28	226	229	
40	54	42	79	5.2	53	27	226	230	
45	54	42	79	5.1	62	28	226	226	
50	54	42	79	5.1	65.5	26	226	225	
erage	54	42	78.8	5.1		28.5	226	228	

T- 9/3/87

ON 3B

Process Monitoring

Klug Brothers, Inc

#3 Not Used - Wearing

e	Motor Speed % Feed Bin 1	Motor Speed % Feed Bin 2	Aggre-gate TPH	AC-20 TPH	Aggre-gate Totalizer Tons	Fuel Feed Rate %	Exhaust Set-Point °F	Exhaust Temp. °F
45	54	22	78	5.1	[illegible]	29	226	222
0	54	22	78	5.1	9.7	28	226	223
5	54	22	78	5.1	17.1	33	226	222
0	54	22	78	5.1	24	33	226	224
5	54	22	78	5.1	33	33	224	223
0	54	22	79	5.1	42	33	224	223
5	54	22	79	5.1	47	33	224	222
20	54	22	79	5.1	52.4	34	224	222
25	54	22	79	5.1	58.3	34	224	222
30	54	22	79	5.1	64	33	224	222
.35	54	22	79	5.1	68	33	224	223

T- 9/18/1

N 41

Process [illegible]

Klug Brothers, Inc

#2 Not used

e	Motor Speed % Feed Bin 1	Feed Bin #3	Aggre-gate TPH	AC-20 TPH	Aggre-gate Totalizer Tons	Fuel Feed Rate %	Exhaust Set-Point °F	Exhaust Temp. °F	
50	48	48	81	4.3	16	33	230	225	
55	48	48	81	4.3	26	29	230	233	
00	48	48	82	4.3	38	28	230	235	
05	48	48	82	4.3	44.3	28	230	238	
10	48	48	82	4.4	50	27	230	239	
15	48	48	83	4.4	59	27	230	235	
20	48	48	83	4.4	66	26	228	238	
25	48	48	84	4.4	72	26	225	234	
30	48	48	84	4.4	82.1	26	228	232	
35									
	48	48	82.4	4.4		27.7	229.3	234.3	

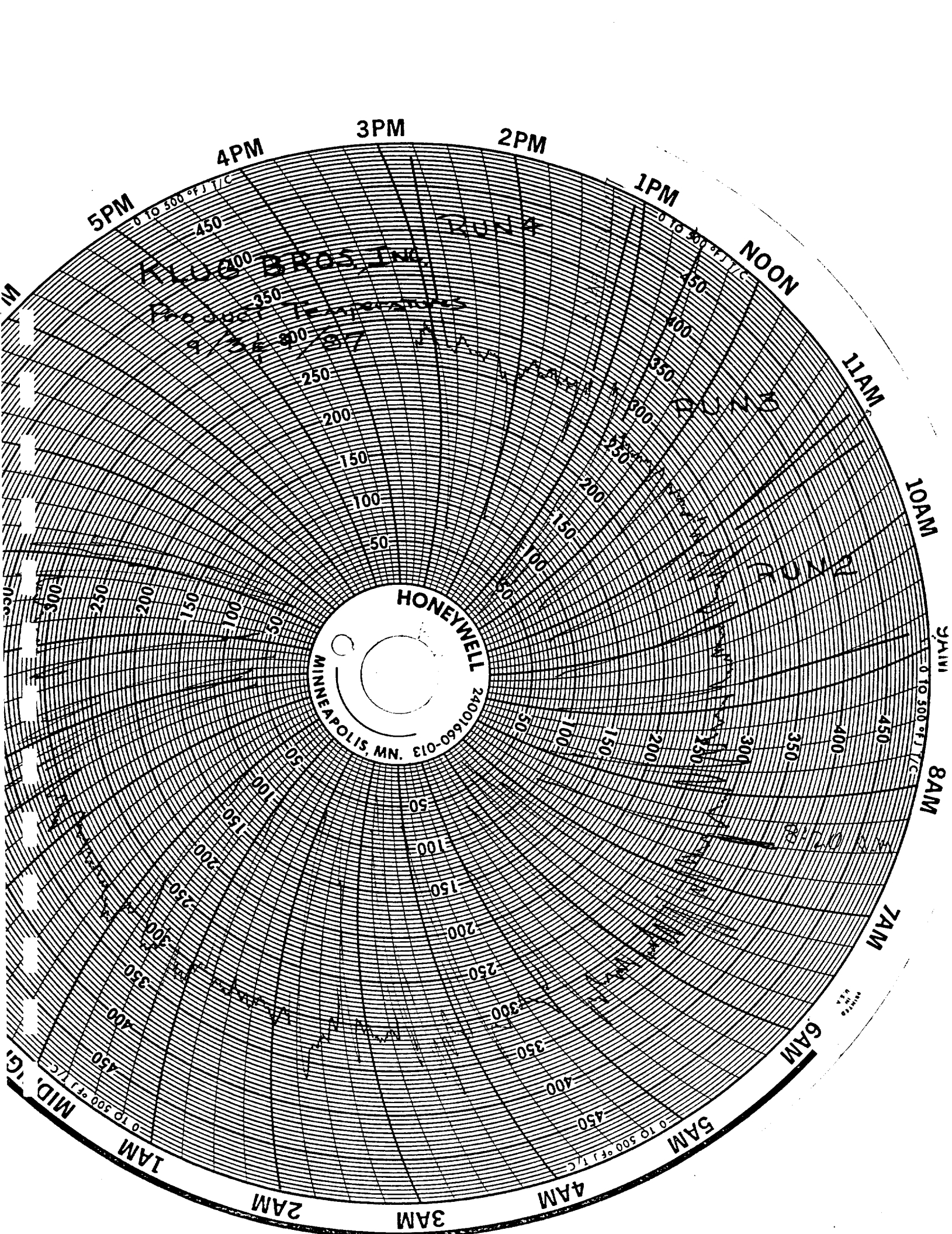
T- 9/18/1

ON 48

Process Monitoring

King Brothers, Inc

e	Motor Speed % Feed Bin 1	Feed Bin 2	Aggre-gate TPH	AC-20 TPH	Aggre-gate Totalizer Tons	Fuel Feed Rate %	Exhaust Set-Point °F	Exhaust Temp. °F	
:00	46	48	84	4.4	6.3	32	228	234	
:05	48	48	84	4.4	17.3	30	228	231	
:10	48	48	84	4.4	25~~8.4~~	30	228	237	
:15	46	46	84	4.4	32	30	228	236	
:20	46	46	85	4.4	38	30	228	236	
:25	48	48	85	4.4	45.1	30	228	235	
:30	48	48	85	4.4	52	30	228	240	
:35	48	48	85	4.4	60	29	226	242	
:40	48	48	85	4.4	67	28	226	238	
:45	48	46	85	4.4	68.7	28	226	238	
	48	48	84.6	4.4		29.7	227.4	236.7	


KLUG BROS. INC.
Product Temperatures
9/3 & 9/7
RUN 4
RUN 8
RUN 12
RUN 16
HONEYWELL
MINNEAPOLIS, MN.
24001660-013
12 AM
1AM
2AM
3AM
4AM
5AM
6AM
7AM
8AM
9AM
10AM
11AM
NOON
1PM
2PM
3PM
4PM
5PM
MID. TO
0 TO 500 °F J T/C