DIVISION OF ENVIRONMENTAL MANAGEMENT
ASHEVILLE REGIONAL OFFICE
AIR QUALITY SECTION

May 16, 1990

MEMORANDUM

TO: Mike Aldridge

THROUGH: Jerry Hoyle

FROM: Steve Maynard

SUBJECT: Source Test Report
Thompson Contractors, Inc.
Asphalt Plant
Rutherfordton, North Carolina
Rutherford County

Enclosed for your review are the results of a Method 5 and Method 9 source test performed by Pace Laboratories on the exhaust of a new drum mix asphalt plant which is subject to the requirements of NSPS, Subpart I. The start up date of the plant as reported to us by the company was March 12, 1990. The test was performed on April 18, 1990, which complies with the requirements of 60.8. From the test results, it also appears that the plant was operating in compliance with 60.92. Due to other commitments, I was not able to observe this test.

SM:ar

Enclosure

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INCORPORATED
THE ASSURANCE OF QUALITY

May 2, 1990

Mr. Allen Thompson
Thompson Contractors, Inc.
P.O. Box 1268
Rutherfordton, N.C. 28139

RE: PACE Project No. 600426.524

Dear Mr. Thompson:

Please find enclosed four copies of the Source Sampling Report for the Astec asphalt plant located in Rutherfordton, N.C. Compliance testing for particulate and visual emissions were conducted April 19, 1990. I am pleased to advise you that the plant was in compliance with the permit limitations for particulate and visual emissions as outlined by the North Carolina Department of Environment, Health and Natural Resources.

PACE, Inc. appreciates this opportunity to serve Thompson Contractors, Inc. If you have any questions concerning this report, do not hesitate to contact me.

Sincerely,

Richard B. McCain III

Richard B. McCain, III
Air Sampling Manager

RBM/tb

Enclosures

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SOURCE SAMPLING REPORT

FOR

THOMPSON CONTRACTORS, INC.

Asphalt Plant

Baghouse Stack

Rutherfordton, North Carolina

Performed by:
PACE, INC.
Charlotte, North Carolina

Richard B. McCain, III
Manager
Air Sampling Department
April 1990

Reviewed by:
PACE, INC.
Charlotte, North Carolina

Paul R. Jenkins, Jr.
Director
Sampling & Analytical Services
April 1990

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INTRODUCTION

Source sampling was performed on an Astec asphalt plant at Thompson Contractors, Inc., Rutherfordton, North Carolina on April 18, 1990. The purpose of the sampling was to determine compliance with the particulate permit limitation of 0.04 grains per dry standard cubic foot and the opacity limitation of 20% as required by the State of North Carolina. Three one-hour sampling runs were made at the sampling locations shown on Figure 1.

The measurements of stack gas flow rate and pollutant concentrations were made according to U.S. Environmental Protection Agency and the North Carolina Department of Environment, Health, and Natural Resources (DEHNR) recommendations. Representatives from N.C. DEHNR were invited to observe the test.

The following sections of the report detail the summary of results, the process and its operation, the location of the sampling points and the sampling and analytical procedures used.

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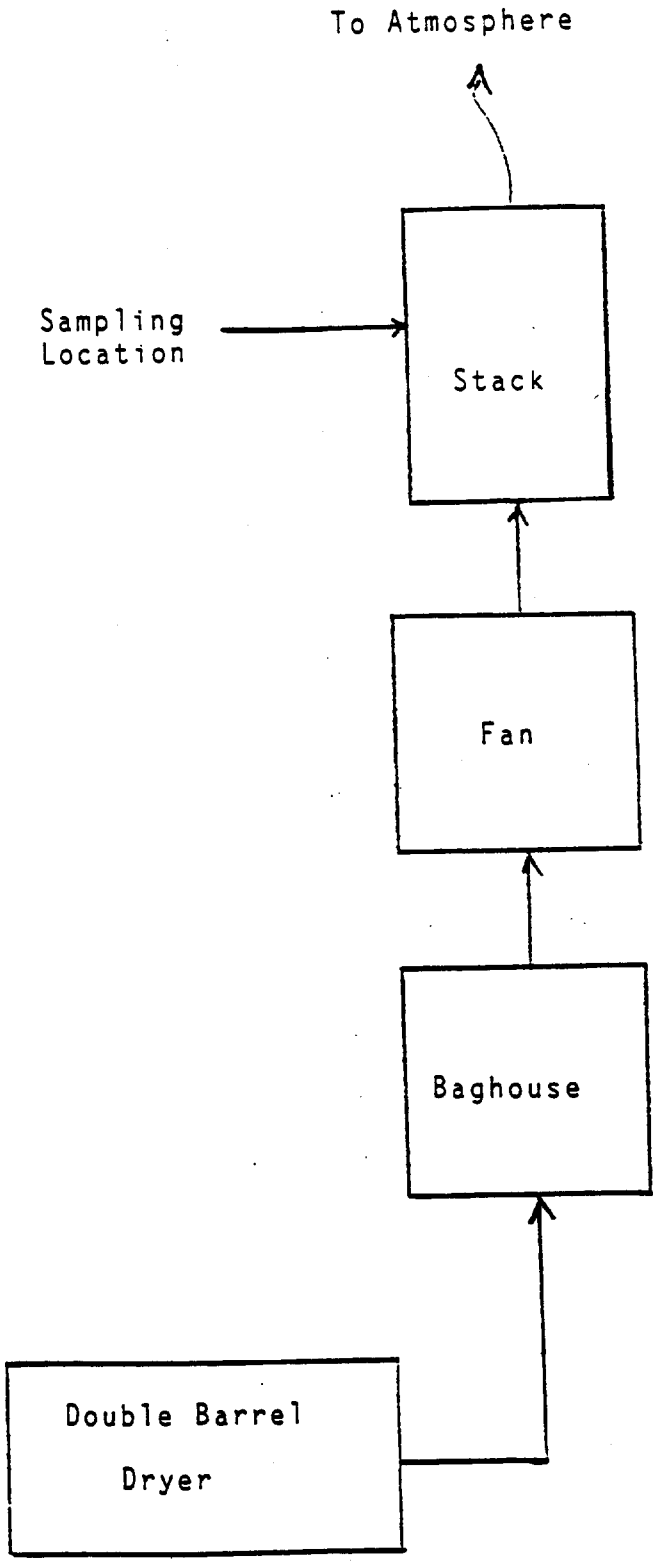

FLOW DIAGRAM

Figure 1

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SUMMARY OF RESULTS

Table 1 presents the summary of results from the particulate sampling. The mean particulate concentration was 0.0072 grains per dry standard cubic foot and the mean particulate emission rate was 0.694 pounds per hour. The average process weight was approximately 177 tons per hour.

Three one-hour visual emission observations were made on the baghouse stack. Opacity is determined as the average of 24 consecutive observations recorded at 15 second intervals. Thirty sets of 24 consecutive readings (six minute) are contained in each Method 9 test. There were no exceedances of the six minute average limit of 20% opacity at the baghouse stack. See Appendix D for visual emission field data and summary sheets.

Based on the results of the particulate and visual emission sampling, the Thompson Contractors, Inc., Rutherfordton, North Carolina asphalt plant was in compliance with the permit limitations as set forth by the State of North Carolina.

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TABLE 1

SUMMARY OF RESULTS, PARTICULATE SAMPLING

Run Number	1	2	3
Date	04/18/90	04/18/90	04/18/90
% Isokinetic	102.52	102.72	102.46
Volume of Gas Sampled, SCF * Dry	45.771	48.106	49.721
Stack Gas Flow Rate, SCFM * Dry	10810.4	11339.4	11749.6
Stack Gas Flow Rate, ACFM	18463.0	19338.2	20365.9
Particulate:			
Catch, mgrams	34.0	14.6	18.2
Concentration, grains/ SCF * Dry	0.0114	0.0047	0.0056
Emission Rate, lbs/hr	1.060	0.454	0.568

*68°F, 29.92 in. Hg
**Nozzle, probe, filter

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PROCESS DESCRIPTION AND OPERATION

The Thompson Contractors, Inc. asphalt plant in Rutherfordton, North Carolina is an Astec drum-type batch plant. It produces hot mix asphalt made from river sand, granite screenings and aggregates. The materials are dried in a double barrel dryer. The fuel was No. 2 fuel oil. The material mix was conveyed to a storage silo. Air was introduced at the burner and passed through the dryer, baghouse, fan and stack to the atmosphere.

During sampling the plant produced I-2 grade asphalt mix. Sampling was coordinated with plant personnel and production averaged approximately 177 tons per hour.

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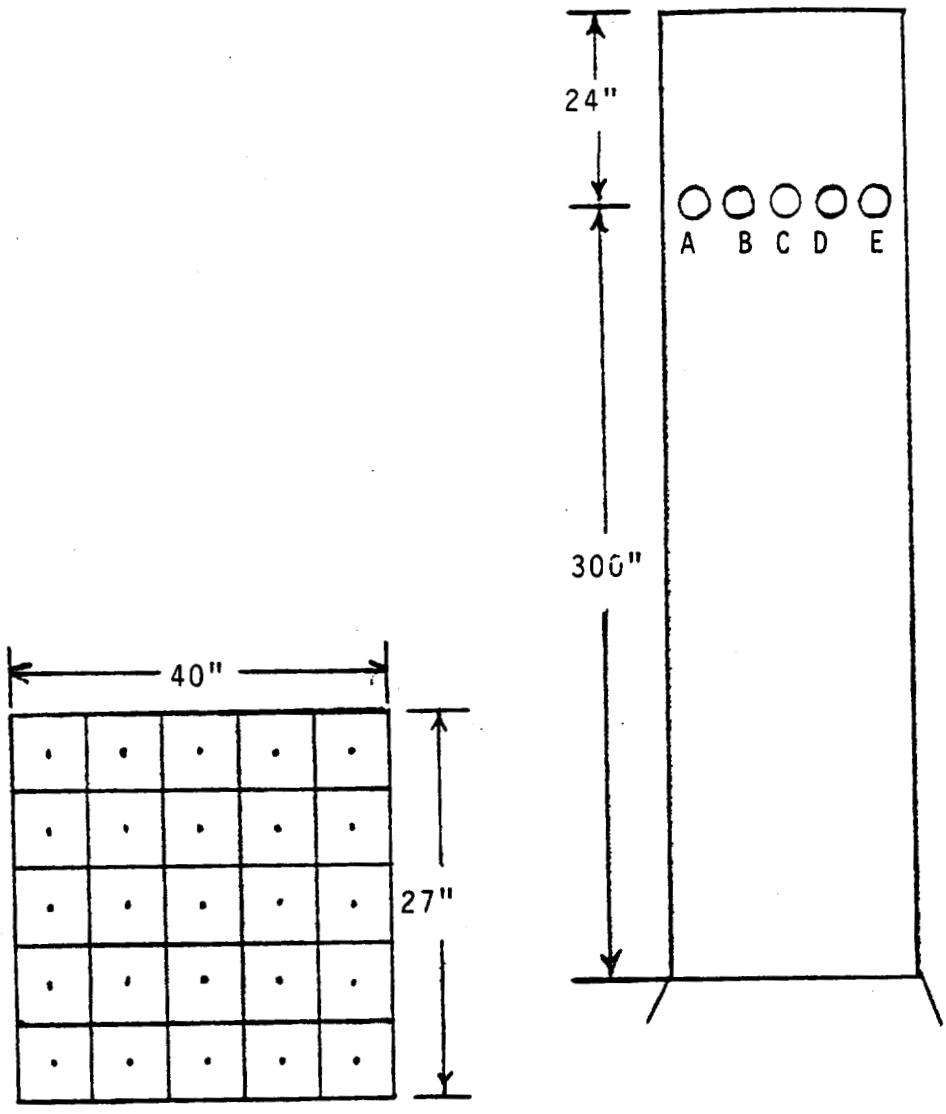
LOCATION OF SAMPLING POINTS

The dimensions of the stack and the location of the sampling points are shown in Figure 2. The stack cross section was divided into 25 equal areas, a 5 port by 5 point matrix. The ports were labeled A, B, C, D and E. Each point was sampled for a period of 2.5 minutes per point which yielded a total test time of 62.5 minutes per run. The number of sampling points was determined by the distance from the last disturbance in the gas flow as outlined in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 1.



SAMPLING PORT AND POINT LOCATIONS

FIGURE 2

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SAMPLING AND ANALYTICAL PROCEDURES

All sampling and analytical procedures used were those recommended by the U.S. Environmental Protection Agency and the N.C. DEHNR. Complete details are found in Appendix F which is a copy of the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1 through 5, and Method 9 (July 1, 1988 edition).

Sample point locations and velocity measurements were made by Methods 1 and 2. Gas composition was determined by Fyrite and Method 3 on continuous bag samples. Method 5 was used for the particulate determination. Method 9 was used for the visual emission determinations.

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APPENDICES

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APPENDIX A

SUMMARY OF RESULTS

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Summary of Method 5 Particulate Results

Thompson Contractors Inc. Rutherfordton N.C. Baghouse Stack

Run Number		1	2	3
Date		4/19/90	4/19/90	4/19/90
DN	Sample nozzle dia., in.	0.302	0.302	0.302
TT	Net time of test	62.5	62.5	62.5
PB	Barometric pressure, in. Hg.	29.58	29.58	29.58
PM	Average orifice pressure drop, in. H2O	1.930	2.149	2.304
VM	Volume of dry gas sampled, cu. ft. at meter conditions	46.66	49.76	51.44
TM	Average gas meter temp. in degrees F.	74.48	82.62	82.92
VMSTD	Volume of dry gas sampled at standard conditions*, SCF	45.771	48.106	49.721
VW	Total water collected in impingers + silica gel, ML.	328.6	333.0	339.3
VMV	Volume of water vapor at standard conditions*, SCF	15.474	15.681	15.978
PMV	Percent moisture by volume	25.266	24.584	24.320
MD	Mole fraction dry gas	0.7473	0.7542	0.7568
PCO2	Percent CO2 by volume, dry	6.47	6.27	5.80
PO2	Percent O2 by volume, dry	11.33	11.63	12.40
PCO	Percent CO by volume, dry	0.00	0.00	0.00
PN2	Percent N2 by volume, dry	82.20	82.10	81.80
MWD	Molecular weight-dry stack gas	29.488	29.468	29.424
MW	Molecular weight-stack gas	26.586	26.649	26.646
CP	Pitot tube coefficient	0.84	0.84	0.84
DPS	Average velocity head of stack gas, inches water	0.6183	0.6459	0.6735
TS	Average stack temperature, F	203.28	208.36	221.68

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PSI	Static pressure of stack gas, inches Hg.	-0.121	-0.121	-0.121
PS	Stack pressure, absolute	29.459	29.459	29.459
VS	Average stack velocity, FPM	2451.7	2567.9	2704.4
AS	Stack area, inches sqrd.	1080.0	1080.0	1080.0
QS	Stack flow rate, dry, standard conditions, DSCFM	10810.4	11339.4	11749.6
QSW	Stack flow rate, wet, standard conditions, WSCFM	14465.1	15035.6	15525.3
QA	Actual stack flow rate, ACFM	18463.0	19338.2	20365.9
PERI	Percent isokinetic	102.52	102.72	102.46
FMF	Particulate, Mg., front	34.00	14.60	18.20
CAN	Particulate, GR/DSCF front	0.0114	0.0047	0.0056
CAM	Particulate, GR/WSCF front	0.0153	0.0062	0.0074
CAT	Particulate, GR/ACF front	0.0067	0.0027	0.0033
CAW	Particulate, LB/HR front	1.060	0.454	0.568
FNP	Net sampling points	25	25	25
RW	Process weight, tons	161.0	179.0	190.0

*68 Degrees F. 29.92 Inches Hg.

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Method 5 Particulate Calculations Test Number 1

Thompson Contractors Inc. Rutherfordton N.C. Baghouse Stack

Volume of Dry Gas Sampled at Standard Conditions

$$VMSTD = \frac{17.64 * VM * (PB + PM / 13.6)}{TM + 460} = 45.771$$

Volume of Water Vapor at Standard Conditions

$$VMV = 0.04709 * VW = 15.474$$

Percent Moisture in Stack Gas

$$PMV = \frac{100 * VMV}{VMSTD + VMV} = 25.266$$

Mole Fraction of Dry Gas

$$MD = \frac{100 - PMV}{100} = 0.7473$$

Average Molecular Weight of Dry Stack Gas

$$MWD = 0.44 * PCO2 + 0.32 * PO2 + 0.28 * (PN2+PCO) = 29.488$$

Molecular Weight of Stack Gas

$$MW = MWD * MD + 18 * (1-MD) = 26.586$$

Stack Gas Velocity at Stack Conditions

$$VS = 5129.4 * CP * DPS * SQRT(TS + 460)/(PS * MW) = 2451.7$$

Stack Gas Volumetric Flow at Standard Conditions, Dry

$$QS = \frac{0.123 * VS * AS * PS * MD}{TS + 460} = 10810.4$$

Stack Gas Volumetric Flow at Stack Conditions

$$QA = \frac{QS * (TS + 460)}{17.64 * PS * MD} = 18463.0$$

Percent Isokinetic

$$PERI = \frac{1039 * (TS + 460) * VMSTD}{VS * TT * PS * MD * DN * DN} = 102.52$$

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Particulate Loading -- Probe, Cyclone, Filter
(At Standard Conditions)
CAN = 0.0154 * FMF / VMSTD = 0.0114

Particulate Loading -- Probe, Cyclone, Filter
(At Stack Conditions)

$$CAT = \frac{17.64 * CAN * PS * MD}{TS + 460} = 0.0067$$

Particulate Lb/Hr -- Probe, Cyclone, Filter
(At Standard Conditions)
CAW = 0.00857 * CAN * QS = 1.060

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APPENDIX B

FIELD DATA SHEETS

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

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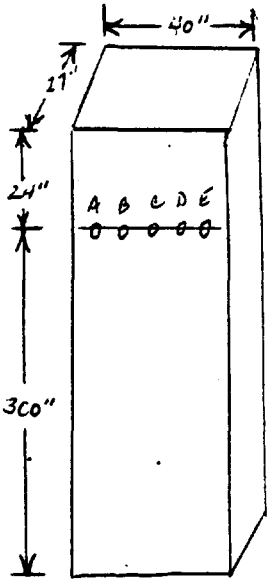


Plant Thompson Contractors, Rutherfordton, N.C.

Date April 19, 1990

Sampling location Baghouse Stack

Inside of far wall to outside of nipple (I) 27"

Inside of near wall to outside of nipple (nipple length) (I) 3.5"

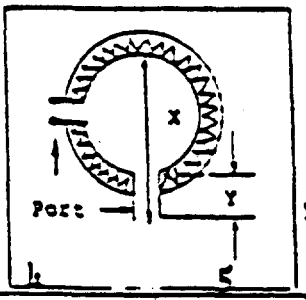
Stack I.D. (I-I) 27" x 40"

Nearest upstream disturbance 0.75 dd

Nearest downstream disturbance 9.38 dd

Calculated by RBM

Eq Diam. 32.2"
Area Stack 1080 in²
5 x 5 matrix



SCHEMATIC OF SAMPLING LOCATION

1	2	3			
TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	NIPPLE LENGTH	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.1	27	2.7	3.5	6.2
2	0.3	27	8.1	3.5	11.6
3	0.5	27	13.5	3.5	17.0
4	0.7	27	18.9	3.5	22.4
5	0.9	27	24.3	3.5	27.8

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METHOD 2 GAS VELOCITY AND CYCLONIC FLOW DETERMINATION

Plant and City Thompson Contractors, Inc. Run Date 04/19/90

Sampling Location Baghouse Stack Clock Time 0900

Run Number 1 Operator RBM/DL Amb. Temp., °F 45

Bar. Press., in. Hg 29.58 Static Press., in. H_2O -1.65

Stack Press., in. Hg 29.459 Static Press., in. Hg -0.121

Stack Dimension, in. - Diam. or side 1 27" side 2 40"

Pitot Tube (C_p) 0.84 Pitot Tube Leak Check <0.1 @ 4.1 in. H_2O

Field data — No Cyclonic Flow in Rect. Duct

Traverse point number	Position, in.	Velocity head (Δp_s), in. H_2O		Stack temp., °F		Cyclonic flow determination: Δp_s at 0° reference		Cyclonic flow determination: Angle (α) which yields a null Δp	
		A	B	A	B				
1	6.2	0.48	0.50	204	205				
2	11.6	0.49	0.53	204	206				
3	17.0	0.46	0.56	204	206				
4	22.4	0.44	0.51	202	205				
5	27.8	0.39	0.42	201	205				
		C	D	C	D				
1	6.2	0.45	0.49	207	206				
2	11.6	0.52	0.49	207	207				
3	17.0	0.45	0.54	207	208				
4	22.4	0.40	0.51	207	206				
5	27.8	0.39	0.41	204	205				
		E		E					
1	6.2	0.23		204					
2	11.6	0.24		204					
3	17.0	0.25		205					
4	22.4	0.26		205					
5	27.8	0.21		205					
								Average angle (α)[a]	

[a] Average of (α) must be < 10 degrees to be acceptable.

NOMAGRAPH DATA

1965

$\Delta H_@$ 1.84 T_m 85 %M 25% P_s/P_m 0.999 C 0.70 D_b 206

$\overline{\Delta p}$ 0.42 T_s 205 DN_c 0.285 DN_a 0.302 Ref. Δp 0.375 W_b 151/55

0.302

0.302

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METHOD 5 PARTICULATE FIELD DATA

Plant Thompson Contractors Rutherfordton N.C.
Run No. 1
Location Baghouse Stack
Date 04/19/90
Operator RBM
Sample Box No. 1
Meter Box No. 1965
Filter No. 34
Probe No.
Pitot Tube Cp 0.84

Very Important — Fill In All Blanks
Leak Checks: Beg. @ 15" 0.011
End @ 8" 0.007
Pitot Tube: Pretest @ 4.2 "H2O
Posttest @ 3.9 "H2O
Static Pressure: -1.65 "H2O
Start: 0959 @ 1225
Finish: 1331
Observer — Agency N.C. DEHNR

Bar. Press. "Hg 29.58
Meter Box ΔH@ 1.84 Y = 1.00
Assumed Tm, °F 85
Dry Bulb, °F 206
Wet Bulb, °F 151
Db - Wb, °F 55
Assumed Moisture % 25%
Ps/Pm 0.999
C Factor 0.70

Ambient Temp., °F 50
Heater Box Setting, °F 250
Probe Tip Dia., in. 0.362
Probe Length 4' glass lined
Probe Heater Setting 85%
Average Δp 0.420 Δp 0.375
Average ΔH 2.09 ΔH Rel
Process Weight
Steam Load NA
Steam Pressure NA

Point	Clock Time	Dry Gas Meter, Cu. Ft.	Pitot Manometer (Δp) in H2O	Orifice Manometer (ΔH) in H2O Desired	Orifice Manometer (ΔH) in H2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum in Hg Gauge	Box Temp °F	Impinger Temp °F	Stack Temp °F	% CO2	% O2
A 1	0	510.10	0.57	2.85	2.85	60	60	7.0	260	50	189		
2	2½	512.47	0.42	2.09	2.09	64	62	6.0	260	46	205		
3	5	514.42	0.42	2.09	2.09	68	63	6.0	260	45	204		
4	7½	516.31	0.39	1.95	1.95	72	64	6.0	260	46	204		
5	10	518.18	0.31	1.55	1.55	75	65	5.5	265	52	197		
B 1	12½/0	519.88	0.48	2.40	2.40	75	64	6.5	260	54	205		
2	2½	522.00	0.52	2.58	2.58	78	65	7.0	260	55	206		
3	5	524.07	0.46	2.25	2.25	81	66	6.5	260	56	207		
4	7½	526.09	0.42	2.09	2.09	84	67	6.5	265	56	206		
5	10	528.01	0.30	1.49	1.49	86	68	5.5	270	57	205		
C 1	12½/0	529.64	0.52	2.58	2.58	83	68	7.0	260	55	202		
2	2½	531.77	0.54	2.65	2.65	84	68	7.0	260	55	206		
3	5	533.94	0.50	2.49	2.49	86	68	7.0	260	56	206		
4	7½	536.10	0.39	1.95	1.95	86	69	6.0	265	57	204		
5	10	537.98	0.28	1.40	1.40	86	70	5.5	265	58	201		
D 1	12½/0	539.61	0.40	1.98	1.98	83	70	6.5	260	55	202		
2	2½	541.56	0.42	2.09	2.09	86	71	7.0	255	56	206		
3	5	543.47	0.41	2.03	2.03	86	71	7.0	250	56	207		
4	7½	545.41	0.33	1.68	1.68	87	71	6.5	250	57	205		
5	10	547.22	0.26	1.28	1.28	88	72	5.5	250	58	202		
E 1	12½/0	548.78	0.26	1.28	1.28	86	72	5.5	245	56	200		
2	2½	550.35	0.31	1.55	1.55	86	72	6.0	250	57	203		
3	5	552.03	0.28	1.40	1.40	85	72	5.8	250	58	204		
4	7½	553.65	0.26	1.28	1.28	84	71	5.5	250	59	204		
5	10	555.21	0.26	1.28	1.28	84	72	5.5	250	59	202		
	12½	556.76											

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METHOD 5 PARTICULATE FIELD DATA

Plant Thompson Contractors, Rutherfordton N.C.
Run No. 2
Location Baghouse stack
Date 11/19/90
Operator RBM
Sample Box No. 2
Meter Box No. 1965
Filter No. 35
Probe No. 2
Pitot Tube Cp 0.84

Very Important — Fill In All Blanks
Leak Checks: Beg. @ 15" 0.008
End @ 8" 0.006
Pitot Tube: Pretest @ 4.1 "H2O
Post Test @ 3.7 "H2O
Static Pressure: -1.65 "H2O
Start: 1337
Finish: 1446
Observer — Agency —

Bar. Press. "Hg 29.58
Meter Box ΔH@ 1.84 Y = 1.00
Assumed Tm, °F 85
Dry Bulb, °F 206
Wet Bulb, °F 151
Db - Wb, °F 55
Assumed Moisture % 25%
Ps/Pm 0.999
C Factor 0.70

Ambient Temp., °F 64
Heater Box Setting, °F 250
Probe Tip Dia., in. 0.302
Probe Length 4' glass lined
Probe Heater Setting 85%
Average Δp 0.42 Δp 0.315
Average ΔH 2.09 ΔH Rel
Process Weight —
Steam Load NA
Steam Pressure NA

Point	Clock Time	Dry Gas Meter, Cu. Ft.	Pitot Manometer (Δp) in H2O	Orifice Manometer (ΔH) in H2O Desired	Orifice Manometer (ΔH) in H2O Actual	Dry Gas Temp °F Inlet	Dry Gas Temp °F Outlet	Pump Vacuum in Hg Gauge	Box Temp. °F	Impinger Temp. °F	Stack Temp °F	% CO2	% O2
A 1	0	557.00	0.57	2.85	2.85	74	72	7.0	230	60	201		
2	2.5	559.28	0.54	2.65	2.65	78	72	6.5	235	56	204		
3	5	561.48	0.49	2.45	2.45	83	72	6.5	235	54	208		
4	7.5	563.66	0.46	2.25	2.25	84	73	6.5	235	53	207		
5	10	565.73	0.33	1.68	1.68	86	73	6.0	240	53	207		
B 1	12.5/0	567.63	0.58	2.89	2.89	84	72	7.5	240	55	204		
2	2.5	569.96	0.64	3.20	3.20	89	72	8.0	250	55	210		
3	5	572.24	.64	3.20	3.20	90	74	8.1	250	55	210		
4	7.5	574.92	.55	2.80	2.80	92	74	8.2	250	55	210		
5	10	577.08	.48	2.45	2.45	99	78	6.8	250	55	207		
C 1	12.5/0	579.35	.55	2.80	2.80	92	78	6.9	248	55	209		
2	2.5	581.55	.57	2.90	2.90	92	78	7.0	248	55	209		
3	5	583.85	.54	2.70	2.70	92	78	6.9	250	55	209		
4	7.5	586.18	.42	2.15	2.15	92	78	5.8	250	55	209		
5	10	588.15	.25	1.77	1.22	94	78	4.0	250	55	210		
D 1	12.5/0	589.66	.42	2.05	2.05	90	78	5.0	250	55	210		
2	2.5	591.83	.42	2.05	2.05	90	78	5.0	250	55	210		
3	5	593.62	.44	2.20	2.20	90	78	5.5	250	55	208		
4	7.5	595.64	.31	1.55	1.55	92	78	4.5	250	57	208		
5	10	597.40	.18	.86	.86	90	78	2.2	250	57	208		
E 1	12.5/0	598.75	.28	1.40	1.40	94	76	4.0	252	56	212		
2	2.5	600.36	.28	1.40	1.40	94	76	4.0	252	56	212		
3	5	602.01	0.30	1.52	1.52	92	76	4.5	250	57	210		
4	7.5	603.60	0.30	1.52	1.52	92	77	4.5	250	57	209		
5	10	605.31	0.19	0.98	0.98	92	77	4.0	250	58	208		
	12.5	606.76											

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METHOD 5 PARTICULATE FIELD DATA

Plant: Thompson Contractors, Inc. Rutherfordton, N.C.
Run No.: 3
Location: Baghouse Stack
Date: 8/19/90
Operator: Kem/DL
Sample Box No.: 3
Meter Box No.: 1965
Filter No.: 36
Probe No.: 3
Pilot Tube Cp: 0.84

Very Important — Fill In All Blanks
Leak Checks: Beg. @ 15" 0.003
End @ 7" 0.002
Pilot Tube: Pretest @ 4.1 "H2O
Posttest @ 3.9 "H2O
Static Pressure: -1.65 "H2O
Start: 1455
Finish: 1606
Observer: — Agency: —

Bar. Press. "Hg: 29.58
Meter Box ΔH@: 1.84 Y = 1.00
Assumed Tm, °F: 85
Dry Bulb, °F: 206
Wet Bulb, °F: 151
Db - Wb, °F: 55
Assumed Moisture %: 25%
Ps/Pm: 0.949
C Factor: 0.70

Ambient Temp., °F: 68
Heater Box Setting, °F: 250
Probe Tip Dia., in.: 0.302
Probe Length: 4' 3/4" lined
Probe Heater Setting: 85%
Average Δp: 0.42 Δp Rel: 0.375
Average ΔH: 2.09 ΔH
Process Weight:
Steam Load: NA
Steam Pressure: NA

Point	Clock Time	Dry Gas Meter, Cu. Ft.	Pitot Manometer (Δp) in H_2O	Orifice Manometer (ΔH) in H_2O Desired	Orifice Manometer (ΔH) in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum in Hg Gauge	Box Temp. °F	Impinger Temp °F	Stack Temp °F	% CO_2	% O_2
A 1	0	607.28	.52	2.60	2.60	79	75	5.0	248	55	220		
2	2.5	609.38	.54	2.70	2.70	81	78	5.5	248	55	220		
3	5	611.55	.52	2.60	2.60	86	78	5.5	248	55	220		
4	7.5	613.68	.71	3.55	3.55	90	78	7.0	250	55	220		
5	10	616.18	.50	2.60	2.60	96	78	5.70	252	55	220		
B 1	12.5/0	618.46	0.58	2.89	2.89	86	77	5.7	255	57	221		
2	2.5	620.78	0.58	2.89	2.89	87	77	5.7	255	57	222		
3	5	623.10	0.55	2.80	2.80	90	78	5.7	260	58	221		
4	7.5	625.39	0.42	2.09	2.09	93	78	5.0	260	58	219		
5	10	627.51	0.38	1.89	1.89	94	78	4.5	265	58	215		
C 1	12.5/0	629.40	.61	3.05	3.05	89	78	6.0	265	56	216		
2	2.5	631.96	0.57	2.85	2.85	92	78	5.7	265	57	219		
3	5	634.25	0.54	2.70	2.70	94	78	5.8	265	57	217		
4	7.5	636.58	0.52	2.60	2.60	97	79	5.1	262	57	220		
5	10	638.66	0.37	1.65	1.65	98	80	4.1	260	58	219		
D 1	12.5/0	640.65	0.40	2.00	2.00	82	80	4.5	261	58	224		
2	2.5	642.55	0.41	2.05	2.05	92	80	4.8	262	58	220		
3	5	644.52	0.41	2.05	2.05	92	80	4.8	262	59	223		
4	7.5	646.10	0.36	1.75	1.75	93	81	4.2	263	59	226		
5	10	648.33	0.26	1.28	1.28	91	80	3.8	265	59	226		
E 1	12.5/0	649.97	0.28	1.40	1.40	90	80	4.0	265	59	224		
2	2.5	651.68	0.33	1.65	1.65	91	80	4.5	265	60	229		
3	5	653.80	0.39	1.95	1.95	92	81	5.0	265	60	230		
4	7.5	655.73	0.39	1.95	1.95	91	81	4.0	265	60	228		
5	10	656.88	0.41	2.05	2.05	92	81	5.0	266	61	230		
	12.5	658.72											

PEDCO Laboratories, Inc.

METHOD 3 - ORSAT AND DRY MOLECULAR WEIGHT DETERMINATION

Plant Thompson Contractors Inc. Rutherfordton NC Sample Location Baghouse STACK

Sample Type - Continuous ✓ Pump Leakfree @ 10" ? ✓

Oxygen Check 20.9% ± 0.1% ✓ Fuel Type NG

Orsat Leak Check @ 4 min.: Pipet Levels - Leakfree ? ✓

Buret 14.6 - 14.6 = <0.2 ml ? ✓

Run No. 1 Sample Date 4/19/90 Ambient Temp. °F 72

Sampling Time (24 - hr clock) 1225 - 1331 Analysis By RBM

Gas \ Run	1 Actual	1 Net	2 Actual	2 Net	3 Actual	3 Net	Avg. %	Mult.	Molecular Wt. Dry lb/lb mole
CO_2	6.4	6.4	6.5	6.5	6.5	6.5	6.47	.44	2.8468
O_2	17.8	11.4	17.8	11.3	17.8	11.3	11.33	.32	3.6256
CO	17.8	0.0	17.8	0.0	17.8	0.0	0.0	.28	0.0000
N_2	100	82.2	100	82.2	100	82.2	82.2	.28	23.0160
								Total	29.4884

$F_o = \frac{20.9 - \%O_2}{\%CO_2} = NA$

Run No. 2 Sample Date 4/19/90 Ambient Temp. °F 72

Sampling Time (24 - hr clock) 1337 - 1446 Analysis By RBM

Gas \ Run	1 Actual	1 Net	2 Actual	2 Net	3 Actual	3 Net	Avg. %	Mult.	Molecular Wt. Dry lb/lb mole
CO_2	6.3	6.3	6.2	6.2	6.3	6.3	6.27	.44	2.7588
O_2	17.9	11.6	17.9	11.7	17.9	11.6	11.63	.32	3.7216
CO	17.9	0.0	17.9	0.0	17.9	0.0	0.0	.28	0.0000
N_2	100	82.1	100	82.1	100	82.1	82.1	.28	22.988
								Total	29.4684

$F_o = \frac{20.9 - \%O_2}{\%CO_2} = NA$

Run No. 3 Sample Date 4/19/90 Ambient Temp. °F 74

Sampling Time (24 - hr clock) 1455 - 1606 Analysis By RBM

Gas \ Run	1 Actual	1 Net	2 Actual	2 Net	3 Actual	3 Net	Avg. %	Mult.	Molecular Wt. Dry lb/lb mole
CO_2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	.44	2.5520
O_2	18.2	12.4	18.2	12.4	18.2	12.4	12.4	.32	3.9680
CO	18.2	0.0	18.2	0.0	18.2	0.0	0.0	.28	0.0000
N_2	100	81.8	100	81.8	100	81.8	81.8	.28	22.9040
								Total	29.4240

Fuel type	F_o range
Coal:	
Anthracite and lignite	1.016-1.130
Bituminous	1.083-1.230
Wood	1.000-1.120
Wood bark	1.003-1.130

$F_o = \frac{20.9 - \%O_2}{\%CO_2} = NA$

pace laboratories, inc

METHOD 5 SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Thompson Contractors Inc. Recovered By VQB / RBM
Sample Location Baghouse Stack Recovery Date 4-19-90

Run Number	1	2	3
Sample Date	4/19/90	4/19/90	4/19/90
Sample Box Number	1	2	3
Probe Number	1	2	3
Filter Number	34	35	36

MOISTURE RECOVERY

Impingers Cont. Number	1-1	1-2	1-3
Description of Water	Clear	Clear	Clear
Liquid Level Marked	✓	✓	✓
Final Volume (wt.), ml	500	506	512
Initial Volume (wt.), ml	200	200	200
Net Volume (wt.), ml (g)	300	306	312
Silica Gel Cont. Number	1-1	1-2	1-3
Silica Gel % Spent	95%	95%	90%
Final Weight, g	2286	2270	2273
Initial Weight, g	2000	2000	2000.0
Net Weight, g	28.6	27.0	27.3
Total Moisture, g	328.6	333.0	339.3

PARTICULATE RECOVERY

Filter Cont. Number	1-1	1-2	1-3
Particulate Description	Yellow	Yellow	Yellow
Filter Cont. Sealed	✓	✓	✓
Final Weight, mg	508.3 .5	510.9 .6	511.1 .1
Final Weight Audit, mg	508.7	510.7	511.0
Initial Weight, mg	502.39 .3	505.6 .6	503.8 .8
Initial Weight Audit, mg	502.2	505.5	503.9
Filter Catch, mg	6.2	5.2	7.3
Probe Rinse Cont. Number	1-1	1-2	1-3
Liquid Level Marked	✓	✓	✓
Final Weight, mg	105,341.4 .5	105,767.2 .2	103,828.2 .2
Final Weight Audit, mg	105,341.6	105,767.1	103,828.2
Initial Weight, mg	105,313.6 .7	105,752.6 .6	103,817.3 7.3
Initial Weight Audit, mg	105313.8	105,752.9	103,817.2
Less Acetone Blank, mg	-0-	-0-	-0-
Acetone Rinse Catch, mg	27.8	9.4	10.9
Total Particulate, mg	34.0	14.6	18.2

Acetone Blank Number	A
Final Weight, mg	106,459.0
Final Weight Audit, mg	106,458.6
Initial Weight, mg	106,458.9 .4
Initial Weight Audit, mg	106,458.6
Acetone Residue, mg	-0-
Acetone Volume, ml	150
Concentration, mg/mg	$<1.8 \times 10^{-5}$

LABORATORY CUSTODY

Received By: RBM
Date Received: 4/19/90
Stored & Locked: ✓
Remarks: NONE

pace. laboratories, inc.

APPENDIX C

PROCESS DATA

Run 1	161 tons
Run 2	179 tons
Run 3	190 tons

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APPENDIX D

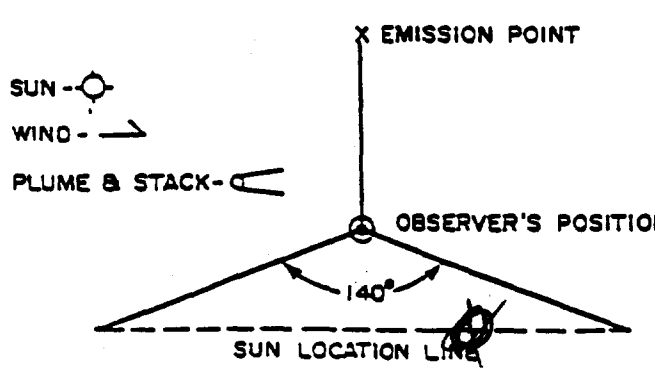
VISUAL EMISSION DATA

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME	Thompson Contractors Inc
ADDRESS	Miller Road
CITY	Rutherfordton
STATE	NC
ZIP	28139
PHONE	(704) 286-1521
SOURCE I.D. NUMBER	
PROCESS EQUIPMENT	Aztec Asphalt plant
OPERATING MODE	
CONTROL EQUIPMENT	baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT	square stack from baghouse
HEIGHT ABOVE GROUND LEVEL	30-35'
HEIGHT REL. TO OBSERVER	25'-30'
DISTANCE FROM OBSERVER	100-125'
DIRECTION FROM OBSERVER	north east west
DESCRIBE EMISSIONS	steam
EMISSION COLOR	white
PLUME TYPE: CONT. ☐ FUGITIVE ☐ INTER. ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☑	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑	
POINT IN PLUME AT WHICH OPACITY WAS DETERMINED	beyond the steam
DESCRIBE BACKGROUND	sky
BACKGROUND COLOR	blue
SKY CONDITIONS	scattered
WIND SPEED	3-5
WIND DIRECTION	S, W
AMBIENT TEMP START	60 STOP 64
WET BULB TEMP.	48
RH %	40

SOURCE LAYOUT SKETCH

DRAW NORTH ARROW



OBSERVATION DATE	START TIME	STOP TIME
4/19/90	~~#49~~ 1224	1324

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3	0	0	0	0	33	0	5	0	0
4	0	0	0	0	34	0	0	0	0
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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	5	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	0
NUMBER OF READINGS ABOVE WERE	
RANGE OF OPACITY READINGS MINIMUM	0
MAXIMUM	5
OBSERVER'S NAME (PRINT)	D. Quentin Best
OBSERVER'S SIGNATURE	D. Quentin Best
DATE	4/19/90
ORGANIZATION	PACE Inc.
CERTIFIED BY	ETA
DATE	
VERIFIED BY	
DATE	

COMMENTS:

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SIGNATURE

TITLE DATE

VISIBLE EMISSION OBSERVATION FORM

OBSERVATION DATE	START TIME	STOP TIME
4/19/90	1334	1434

SOURCE NAME: Thompson Contractors Inc

ADDRESS: Miller Road

CITY: Rutherford | STATE: NC | ZIP: 28139

PHONE: (704) 286-1521 | SOURCE I.D. NUMBER:

PROCESS EQUIPMENT: asphault | OPERATING MODE:

CONTROL EQUIPMENT: baghouse | OPERATING MODE:

DESCRIBE EMISSION POINT: Stack out of baghouse

HEIGHT ABOVE GROUND LEVEL: 30-35' | HEIGHT REL. TO OBSERVER: 20'-25'

DISTANCE FROM OBSERVER: 100-125' | DIRECTION FROM OBSERVER: North West

DESCRIBE EMISSIONS: Steam

EMISSION COLOR: white | PLUME TYPE: CONT. ☐ FUGITIVE ☐ INTER. ☐

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

POINT IN PLUME AT WHICH OPACITY WAS DETERMINED: above Steam

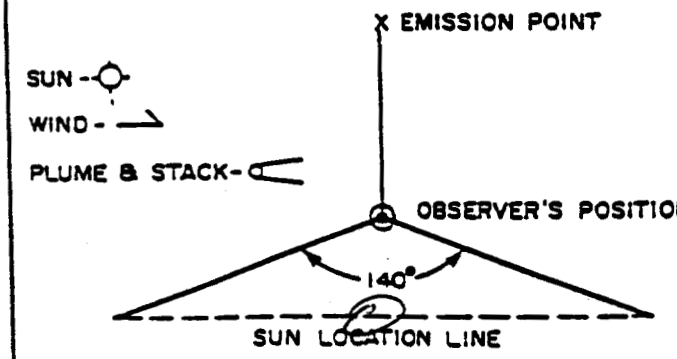
DESCRIBE BACKGROUND: SKY

BACKGROUND COLOR: blue | SKY CONDITIONS: Clear

WIND SPEED: 3-5 | WIND DIRECTION: West

AMBIENT TEMP. START 64 STOP 64 | WET BULB TEMP. 57 | RH % 39

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



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

AVERAGE OPACITY FOR HIGHEST PERIOD | NUMBER OF READINGS ABOVE WERE

RANGE OF OPACITY READINGS: MINIMUM 0 | MAXIMUM 5

OBSERVER'S NAME (PRINT): W. Quentin Best

COMMENTS:

OBSERVER'S SIGNATURE: W. Quentin Best | DATE: 4/19/90

ORGANIZATION: PACE Labs

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SIGNATURE | TITLE | DATE

CERTIFIED BY: ETA | DATE: March 21 /9

VERIFIED BY | DATE

VISIBLE EMISSION OBSERVATION FORM

OBSERVATION DATE ~~4/13/90~~ 4/14/90	START TIME 1450	STOP TIME 1550

SOURCE NAME: Thompson Contractors, Inc.

ADDRESS:

CITY: Rutherford | STATE: NC | ZIP: 28139

PHONE: (704) 286-7521 | SOURCE I.D. NUMBER:

PROCESS EQUIPMENT: Asphalt plant | OPERATING MODE:

CONTROL EQUIPMENT: Baghouse | OPERATING MODE:

DESCRIBE EMISSION POINT: Square stack from baghouse

HEIGHT ABOVE GROUND LEVEL: 30-35' | HEIGHT REL. TO OBSERVER: 25-30'

DISTANCE FROM OBSERVER: 75-100' | DIRECTION FROM OBSERVER: North east

DESCRIBE EMISSIONS: Steam

EMISSION COLOR: White/clear | PLUME TYPE: CONT. ☐ FUGITIVE ☐ INTER. ☐

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

POINT IN PLUME AT WHICH OPACITY WAS DETERMINED: above Steam

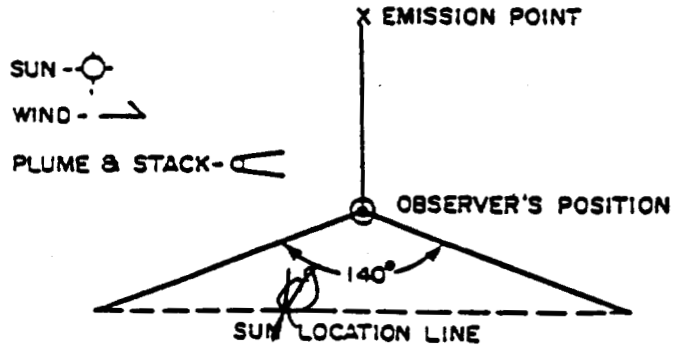
DESCRIBE BACKGROUND: Sky

BACKGROUND COLOR: blue | SKY CONDITIONS: scattered

WIND SPEED: 3-5 | WIND DIRECTION: West

AMBIENT TEMP START 65 STOP 66 | WET BULB TEMP: 50 | RH %: 41

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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2	0	0	0	0	32	0	0	0	0
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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
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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
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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	58	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 0 | NUMBER OF READINGS ABC WERE:

RANGE OF OPACITY READINGS MINIMUM: 0 MAXIMUM: 0

OBSERVER'S NAME (PRINT): William Quentin Best

COMMENTS:

OBSERVER'S SIGNATURE: W. Quentin Best | DATE: 4/14/90

ORGANIZATION: PACE Inc.

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SIGNATURE

TITLE | DATE

CERTIFIED BY: ETA | DATE: 3/21/90

VERIFIED BY | DATE

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R1 PG1

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
1	0		
2	0		
3	0		
4	0		
5	0		
6	0		
7	0		
8	0		
9	0		
10	0		
11	0		
12	0		
13	0		
14	0		
15	0		
16	0		
17	0		
18	0		
19	0		
20	0		
21	0		
22	0		
23	0		
24	0	0	0.0
25	0	0	0.0
26	0	0	0.0
27	0	0	0.0
28	0	0	0.0
29	0	0	0.0
30	0	0	0.0
31	0	0	0.0
32	0	0	0.0
33	0	0	0.0
34	0	0	0.0
35	0	0	0.0
36	0	0	0.0
37	0	0	0.0
38	0	0	0.0
39	0	0	0.0
40	0	0	0.0
41	0	0	0.0
42	0	0	0.0
43	0	0	0.0
44	0	0	0.0
45	0	0	0.0
46	0	0	0.0
47	0	0	0.0
48	0	0	0.0
49	0	0	0.0
50	0	0	0.0
51	0	0	0.0
52	0	0	0.0
53	0	0	0.0
54	0	0	0.0
55	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R1 PG2

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
56	0	0	0.0
57	0	0	0.0
58	0	0	0.0
59	0	0	0.0
60	0	0	0.0
61	0	0	0.0
62	0	0	0.0
63	0	0	0.0
64	0	0	0.0
65	0	0	0.0
66	0	0	0.0
67	0	0	0.0
68	0	0	0.0
69	0	0	0.0
70	0	0	0.0
71	0	0	0.0
72	0	0	0.0
73	0	0	0.0
74	0	0	0.0
75	0	0	0.0
76	0	0	0.0
77	0	0	0.0
78	0	0	0.0
79	0	0	0.0
80	0	0	0.0
81	0	0	0.0
82	0	0	0.0
83	0	0	0.0
84	0	0	0.0
85	0	0	0.0
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88	0	0	0.0
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90	0	0	0.0
91	0	0	0.0
92	0	0	0.0
93	0	0	0.0
94	0	0	0.0
95	0	0	0.0
96	0	0	0.0
97	0	0	0.0
98	0	0	0.0
99	0	0	0.0
100	0	0	0.0
101	0	0	0.0
102	0	0	0.0
103	0	0	0.0
104	0	0	0.0
105	0	0	0.0
106	0	0	0.0
107	0	0	0.0
108	0	0	0.0
109	0	0	0.0
110	0	0	0.0
111	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R1 PG3

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
112	0	0	0.0
113	0	0	0.0
114	0	0	0.0
115	0	0	0.0
116	0	0	0.0
117	0	0	0.0
118	0	0	0.0
119	0	0	0.0
120	0	0	0.0
121	0	0	0.0
122	0	0	0.0
123	0	0	0.0
124	0	0	0.0
125	0	0	0.0
126	0	0	0.0
127	0	0	0.0
128	5	5	0.2
129	0	5	0.2
130	0	5	0.2
131	0	5	0.2
132	0	5	0.2
133	0	5	0.2
134	0	5	0.2
135	0	5	0.2
136	0	5	0.2
137	0	5	0.2
138	0	5	0.2
139	0	5	0.2
140	0	5	0.2
141	0	5	0.2
142	0	5	0.2
143	0	5	0.2
144	0	5	0.2
145	0	5	0.2
146	0	5	0.2
147	0	5	0.2
148	0	5	0.2
149	0	5	0.2
150	0	5	0.2
151	0	0	0.0
152	0	0	0.0
153	0	0	0.0
154	0	0	0.0
155	0	0	0.0
156	0	0	0.0
157	0	0	0.0
158	0	0	0.0
159	0	0	0.0
160	0	0	0.0
161	0	0	0.0
162	0	0	0.0
163	0	0	0.0
164	0	0	0.0
165	0	0	0.0
166	0	0	0.0
167	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R1 PG4

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
168	0	0	0.0
169	0	0	0.0
170	0	0	0.0
171	0	0	0.0
172	0	0	0.0
173	0	0	0.0
174	0	0	0.0
175	0	0	0.0
176	0	0	0.0
177	0	0	0.0
178	0	0	0.0
179	0	0	0.0
180	0	0	0.0
181	0	0	0.0
182	0	0	0.0
183	0	0	0.0
184	0	0	0.0
185	0	0	0.0
186	0	0	0.0
187	0	0	0.0
188	0	0	0.0
189	0	0	0.0
190	0	0	0.0
191	0	0	0.0
192	0	0	0.0
193	0	0	0.0
194	0	0	0.0
195	0	0	0.0
196	0	0	0.0
197	0	0	0.0
198	0	0	0.0
199	0	0	0.0
200	0	0	0.0
201	0	0	0.0
202	0	0	0.0
203	0	0	0.0
204	0	0	0.0
205	0	0	0.0
206	0	0	0.0
207	0	0	0.0
208	0	0	0.0
209	5	5	0.2
210	0	5	0.2
211	0	5	0.2
212	0	5	0.2
213	0	5	0.2
214	0	5	0.2
215	0	5	0.2
216	0	5	0.2
217	0	5	0.2
218	0	5	0.2
219	0	5	0.2
220	0	5	0.2
221	0	5	0.2
222	0	5	0.2
223	0	5	0.2

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R1 PG5

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
224	0	5	0.2
225	0	5	0.2
226	0	5	0.2
227	0	5	0.2
228	0	5	0.2
229	0	5	0.2
230	0	5	0.2
231	0	5	0.2
232	0	5	0.2
233	0	0	0.0
234	0	0	0.0
235	0	0	0.0
236	0	0	0.0
237	0	0	0.0
238	0	0	0.0
239	0	0	0.0
240	0	0	0.0
			=========
			0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R2 PG1

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
1	0		
2	0		
3	0		
4	0		
5	0		
6	0		
7	0		
8	0		
9	0		
10	0		
11	5		
12	0		
13	0		
14	0		
15	0		
16	0		
17	0		
18	0		
19	0		
20	0		
21	0		
22	0		
23	0		
24	0	5	0.2
25	0	5	0.2
26	0	5	0.2
27	0	5	0.2
28	0	5	0.2
29	0	5	0.2
30	0	5	0.2
31	0	5	0.2
32	0	5	0.2
33	0	5	0.2
34	0	5	0.2
35	0	0	0.0
36	0	0	0.0
37	0	0	0.0
38	0	0	0.0
39	0	0	0.0
40	0	0	0.0
41	0	0	0.0
42	0	0	0.0
43	0	0	0.0
44	0	0	0.0
45	0	0	0.0
46	0	0	0.0
47	0	0	0.0
48	0	0	0.0
49	0	0	0.0
50	0	0	0.0
51	0	0	0.0
52	0	0	0.0
53	0	0	0.0
54	0	0	0.0
55	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R2 PG2

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
56	0	0	0.0
57	0	0	0.0
58	0	0	0.0
59	0	0	0.0
60	0	0	0.0
61	0	0	0.0
62	0	0	0.0
63	0	0	0.0
64	0	0	0.0
65	0	0	0.0
66	0	0	0.0
67	0	0	0.0
68	0	0	0.0
69	0	0	0.0
70	0	0	0.0
71	0	0	0.0
72	0	0	0.0
73	0	0	0.0
74	0	0	0.0
75	0	0	0.0
76	0	0	0.0
77	0	0	0.0
78	0	0	0.0
79	0	0	0.0
80	0	0	0.0
81	0	0	0.0
82	0	0	0.0
83	0	0	0.0
84	0	0	0.0
85	0	0	0.0
86	0	0	0.0
87	0	0	0.0
88	0	0	0.0
89	0	0	0.0
90	0	0	0.0
91	0	0	0.0
92	0	0	0.0
93	0	0	0.0
94	0	0	0.0
95	0	0	0.0
96	0	0	0.0
97	0	0	0.0
98	0	0	0.0
99	0	0	0.0
100	0	0	0.0
101	0	0	0.0
102	0	0	0.0
103	0	0	0.0
104	0	0	0.0
105	0	0	0.0
106	0	0	0.0
107	0	0	0.0
108	0	0	0.0
109	0	0	0.0
110	0	0	0.0
111	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R2 PG3

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
112	0	0	0.0
113	0	0	0.0
114	0	0	0.0
115	0	0	0.0
116	0	0	0.0
117	0	0	0.0
118	0	0	0.0
119	0	0	0.0
120	0	0	0.0
121	0	0	0.0
122	0	0	0.0
123	0	0	0.0
124	0	0	0.0
125	0	0	0.0
126	0	0	0.0
127	0	0	0.0
128	0	0	0.0
129	0	0	0.0
130	0	0	0.0
131	0	0	0.0
132	0	0	0.0
133	0	0	0.0
134	0	0	0.0
135	5	5	0.2
136	0	5	0.2
137	0	5	0.2
138	0	5	0.2
139	0	5	0.2
140	0	5	0.2
141	0	5	0.2
142	0	5	0.2
143	0	5	0.2
144	0	5	0.2
145	0	5	0.2
146	0	5	0.2
147	0	5	0.2
148	0	5	0.2
149	0	5	0.2
150	0	5	0.2
151	0	5	0.2
152	0	5	0.2
153	0	5	0.2
154	0	5	0.2
155	0	5	0.2
156	0	5	0.2
157	0	5	0.2
158	0	5	0.2
159	0	0	0.0
160	0	0	0.0
161	0	0	0.0
162	0	0	0.0
163	0	0	0.0
164	0	0	0.0
165	0	0	0.0
166	0	0	0.0
167	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R2 PG4

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
168	0	0	0.0
169	0	0	0.0
170	0	0	0.0
171	0	0	0.0
172	0	0	0.0
173	0	0	0.0
174	0	0	0.0
175	0	0	0.0
176	0	0	0.0
177	0	0	0.0
178	0	0	0.0
179	0	0	0.0
180	0	0	0.0
181	0	0	0.0
182	0	0	0.0
183	0	0	0.0
184	0	0	0.0
185	0	0	0.0
186	0	0	0.0
187	0	0	0.0
188	0	0	0.0
189	0	0	0.0
190	0	0	0.0
191	0	0	0.0
192	0	0	0.0
193	0	0	0.0
194	0	0	0.0
195	0	0	0.0
196	0	0	0.0
197	0	0	0.0
198	0	0	0.0
199	0	0	0.0
200	0	0	0.0
201	0	0	0.0
202	0	0	0.0
203	0	0	0.0
204	0	0	0.0
205	0	0	0.0
206	0	0	0.0
207	0	0	0.0
208	0	0	0.0
209	0	0	0.0
210	0	0	0.0
211	0	0	0.0
212	0	0	0.0
213	0	0	0.0
214	0	0	0.0
215	0	0	0.0
216	0	0	0.0
217	0	0	0.0
218	0	0	0.0
219	0	0	0.0
220	0	0	0.0
221	0	0	0.0
222	0	0	0.0
223	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R2 PG5

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
224	0	0	0.0
225	0	0	0.0
226	0	0	0.0
227	0	0	0.0
228	0	0	0.0
229	0	0	0.0
230	0	0	0.0
231	0	0	0.0
232	0	0	0.0
233	0	0	0.0
234	0	0	0.0
235	0	0	0.0
236	0	0	0.0
237	0	0	0.0
238	0	0	0.0
239	0	0	0.0
240	0	0	0.0
			=========
			0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R3 PG1

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
1	0		
2	0		
3	0		
4	0		
5	0		
6	0		
7	0		
8	0		
9	0		
10	0		
11	0		
12	0		
13	0		
14	0		
15	0		
16	0		
17	0		
18	0		
19	0		
20	0		
21	0		
22	0		
23	0		
24	0	0	0.0
25	0	0	0.0
26	0	0	0.0
27	0	0	0.0
28	0	0	0.0
29	0	0	0.0
30	0	0	0.0
31	0	0	0.0
32	0	0	0.0
33	0	0	0.0
34	0	0	0.0
35	0	0	0.0
36	0	0	0.0
37	0	0	0.0
38	0	0	0.0
39	0	0	0.0
40	0	0	0.0
41	0	0	0.0
42	0	0	0.0
43	0	0	0.0
44	0	0	0.0
45	0	0	0.0
46	0	0	0.0
47	0	0	0.0
48	0	0	0.0
49	0	0	0.0
50	0	0	0.0
51	0	0	0.0
52	0	0	0.0
53	0	0	0.0
54	0	0	0.0
55	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R3 PG2

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
56	0	0	0.0
57	0	0	0.0
58	0	0	0.0
59	0	0	0.0
60	0	0	0.0
61	0	0	0.0
62	0	0	0.0
63	0	0	0.0
64	0	0	0.0
65	0	0	0.0
66	0	0	0.0
67	0	0	0.0
68	0	0	0.0
69	0	0	0.0
70	0	0	0.0
71	0	0	0.0
72	0	0	0.0
73	0	0	0.0
74	0	0	0.0
75	0	0	0.0
76	0	0	0.0
77	0	0	0.0
78	0	0	0.0
79	0	0	0.0
80	0	0	0.0
81	0	0	0.0
82	0	0	0.0
83	0	0	0.0
84	0	0	0.0
85	0	0	0.0
86	0	0	0.0
87	0	0	0.0
88	0	0	0.0
89	0	0	0.0
90	0	0	0.0
91	0	0	0.0
92	0	0	0.0
93	0	0	0.0
94	0	0	0.0
95	0	0	0.0
96	0	0	0.0
97	0	0	0.0
98	0	0	0.0
99	0	0	0.0
100	0	0	0.0
101	0	0	0.0
102	0	0	0.0
103	0	0	0.0
104	0	0	0.0
105	0	0	0.0
106	0	0	0.0
107	0	0	0.0
108	0	0	0.0
109	0	0	0.0
110	0	0	0.0
111	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R3 PG3

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
112	0	0	0.0
113	0	0	0.0
114	0	0	0.0
115	0	0	0.0
116	0	0	0.0
117	0	0	0.0
118	0	0	0.0
119	0	0	0.0
120	0	0	0.0
121	0	0	0.0
122	0	0	0.0
123	0	0	0.0
124	0	0	0.0
125	0	0	0.0
126	0	0	0.0
127	0	0	0.0
128	0	0	0.0
129	0	0	0.0
130	0	0	0.0
131	0	0	0.0
132	0	0	0.0
133	0	0	0.0
134	0	0	0.0
135	0	0	0.0
136	0	0	0.0
137	0	0	0.0
138	0	0	0.0
139	0	0	0.0
140	0	0	0.0
141	0	0	0.0
142	0	0	0.0
143	0	0	0.0
144	0	0	0.0
145	0	0	0.0
146	0	0	0.0
147	0	0	0.0
148	0	0	0.0
149	0	0	0.0
150	0	0	0.0
151	0	0	0.0
152	0	0	0.0
153	0	0	0.0
154	0	0	0.0
155	0	0	0.0
156	0	0	0.0
157	0	0	0.0
158	0	0	0.0
159	0	0	0.0
160	0	0	0.0
161	0	0	0.0
162	0	0	0.0
163	0	0	0.0
164	0	0	0.0
165	0	0	0.0
166	0	0	0.0
167	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R3 PG4

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
168	0	0	0.0
169	0	0	0.0
170	0	0	0.0
171	0	0	0.0
172	0	0	0.0
173	0	0	0.0
174	0	0	0.0
175	0	0	0.0
176	0	0	0.0
177	0	0	0.0
178	0	0	0.0
179	0	0	0.0
180	0	0	0.0
181	0	0	0.0
182	0	0	0.0
183	0	0	0.0
184	0	0	0.0
185	0	0	0.0
186	0	0	0.0
187	0	0	0.0
188	0	0	0.0
189	0	0	0.0
190	0	0	0.0
191	0	0	0.0
192	0	0	0.0
193	0	0	0.0
194	0	0	0.0
195	0	0	0.0
196	0	0	0.0
197	0	0	0.0
198	0	0	0.0
199	0	0	0.0
200	0	0	0.0
201	0	0	0.0
202	0	0	0.0
203	0	0	0.0
204	0	0	0.0
205	0	0	0.0
206	0	0	0.0
207	0	0	0.0
208	0	0	0.0
209	0	0	0.0
210	0	0	0.0
211	0	0	0.0
212	0	0	0.0
213	0	0	0.0
214	0	0	0.0
215	0	0	0.0
216	0	0	0.0
217	0	0	0.0
218	0	0	0.0
219	0	0	0.0
220	0	0	0.0
221	0	0	0.0
222	0	0	0.0
223	0	0	0.0

THOMPSON CONTRACTERS INC. VE BAGHOUSE 4/19/90 R3 PG5

READING #	OPACITY	TOTAL OPACITY	6-MIN AVG
224	0	0	0.0
225	0	0	0.0
226	0	0	0.0
227	0	0	0.0
228	0	0	0.0
229	0	0	0.0
230	0	0	0.0
231	0	0	0.0
232	0	0	0.0
233	0	0	0.0
234	0	0	0.0
235	0	0	0.0
236	0	0	0.0
237	0	0	0.0
238	0	0	0.0
239	0	0	0.0
240	0	0	0.0
			=========
			0.0

pace. laboratories, inc.

APPENDIX E

TEST PARTICIPANTS

Richard B. McCain, III	Air Sampling Manager PACE, Inc.
W. Quentin Best	Visual Emission Evaluator PACE, Inc.
Dirk Lovelace	Air Technician PACE, Inc.

pace. laboratories, inc.

APPENDIX F

SAMPLING AND ANALYTICAL PROCEDURES

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APPENDIX G

CALIBRATION DATA

pace laboratories, inc.

CALIBRATION INFORMATION

NOZZLES

Each new set of nozzles purchased by Pace are first machined and calibrated before being put into field use. Thereafter, whenever it becomes apparent that a nozzle has been damaged, it is again machined and recalibrated. A set of three is matched to within 0.002 inches (Difference between high and low readings). Nozzles are checked prior to each source test.

PITOT TUBES

All pitot tubes used by Pace whether separate or attached to a sampling probe were made by Pace personnel. Prior to being put into field use, they are calibrated. In general, if a type "S" pitot tube is constructed properly, and not positioned too closely to the probe nozzle or any other obstruction, it will have a Cp of 0.83 - 0.87. As long as the pitot tube is not damaged its calibration should not change. All Pace pitot tubes are made to have a Cp of 0.84. If a pitot tube does not initially have a Cp of 0.84, it is altered until a reading of 0.84 is obtained. Pitot tubes are checked before each source test and receive a complete calibration once a year.

DRY GAS METER AND ORIFICE METER

Complete meter box calibrations are performed annually. One point calibrations at the average orifice meter and maximum vacuum readings encountered during the compliance test are performed after each source test. If the dry gas meter calibration factor differs from 1.00 by more than +\- 0.02 then the dry gas meter is repaired and given an annual calibration.

THERMOMETERS, FYRITES, ORSAT AND ORSAT BAGS

Each new thermometer, pyrometer and thermocouple purchased or manufactured by Pace is checked and calibrated before being put into field use. After each source test each temperature sensing device used on the test receives a one point calibration check according to U.S. EPA guidelines.

Fyrites, orsat and orsat bags are checked before and after each source test. If they do not function according to U.S. EPA protocol that piece of equipment is either repaired or replaced.

LABORATORY EQUIPMENT

Pace has a written quality assurance document that covers calibration and maintenance of laboratory equipment. This includes calibration of the analytical balance against Class S weights, and service contracts to maintain traceability to N.B.S. Calibration of thermometers, barometers, stopwatches and wet test meters are traceable to N.B.S. A copy of our quality assurance document may be obtained by written request.

pace laboratories, inc.

METHOD 5 PRETEST - POSTEST CALIBRATION CHECKS

Plant Thompson Contractors, Rutherfordton N.C. Calibrated by KBM
Meter box number 1965 Date 04/18/90 + 4/20/90

Dry Gas Meter
Pretest meter calibration factor, Y = 1.00 (within ± 2%)
Postest meter calibration factor, Y = 1.015 (within ± 5% of pretest)
Recalibration required? Circle one: yes or (no) If yes new Y = —
Lower cal. factor, Y = — for calculations (pretest or postest)

Dry Gas Meter Thermometers
Was a pretest temperature correction used? Circle one: yes or (no) If yes temperature correction — (within ± 5.4°F over range)
Postest comparison with mercury-in-glass thermometer? (within ±10.8°F at ambient temperature) Recalibration required? Circle one: yes or (no)
Recalibration temperature correction? — (within ±5.4°F over range
If yes, no correction necessary for calculations if meter thermometer temperature is higher; if calibration temperature is higher, add correction to average meter temperature for calculations

Stack Temperature Sensor
Was a pretest temperature correction used? Circle one: yes or (no) If yes temperature correction — °F (within ±1.5% in °R over range)
Average stack temperature of compliance test, 671 °R
Temperature of ref. thermometer for recalibration #1 660 #2 660 °R
(within ± 10% of the average stack temperature)
Temperature of stack thermometer for recalibration #1 652 #2 657 °R
Diff. between ref. and stack thermometer temps. #1 8 #2 3 °R
Do the ref. and stack values agree within ±1.5%? Circle one: (yes) or no
If yes, no correction is necessary for calculations
If no, calculations must be done twice—once with the recorded values and once with the average stack temperature corrected to correspond to the reference temperature differential; both final result values must be reported since there is no way to determine which is correct

Barometer
Was the pretest field barometer reading correct? Circle one: (yes) or no
Postest comparison? 0.014 in. Hg (±0.1 in. Hg) Recalibration required? Circle one: yes or (no) If yes, no correction necessary for calculations when the field barometer has a lower reading; if the mercury-in-glass reading is lower, subtract the difference from the field data readings for the calculations.

	Pretest	Postest
Hg in glass	29.672	29.264
Field	29.66	29.25
Difference	0.012	0.014

Nozzle
Was the nozzle calibrated to the nearest .001 in.? Circle one: (yes) or no

Nozzle #1:	0.302	0.302	0.303	0.303	0.302	: Average 0.302
Nozzle #2:	0.303	0.302	0.303	0.302	0.301	: Average 0.302
Nozzle #3:	0.302	0.302	0.302	0.301	0.302	: Average 0.302

Impinger Thermometer
Was a pretest temperature correction used? Circle one: yes or (no) If yes temperature correction — (within ±5.4°F over range)

POSTEST DRY GAS METER CALIBRATION DATA FORM (English Units)

Test Number 1 Date 4/20/90 Meter Box No. 1965 Plant Thompson Contractors Rutherford TON NC

Barometric Pressure, P_b = 29.369 in. Hg Dry Gas Meter No. 1965 Pretest Y 1.00

Orifice manometer setting, inches H_2O ΔH	Gas Volume: Wet test meter, ft³ V_w	Gas Volume: Dry gas meter, ft³ V_d	Temperature: Wet test meter, °F t_w	Temperature: Dry Gas Meter: Inlet °F t_{d_i}	Temperature: Dry Gas Meter: Outlet °F t_{d_o}	Temperature: Dry Gas Meter: Average °F t_d	Time min. θ	Vacuum setting in. Hg	Y_i	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t_w + 460)}$
2.13	10	10.40	71.2	117	88	102.5	12:91	8.0	1.013	$\frac{10(29.369)(102.5+460)}{10.40(29.369+\frac{2.13}{13.6})(71.2+460)}$
2.13	10	10.43	71.2	120	92	106	12:94	8.0	1.016	$\frac{10(29.369)(106+460)}{10.43(29.369+\frac{2.13}{13.6})(71.2+460)}$
2.13	10	10.46	71.2	121.5	95	108.25	12:95	8.0	1.017	$\frac{10(29.369)(108.25+460)}{10.46(29.369+\frac{2.13}{13.6})(71.2+460)}$
									1.015	

V_w = Gas volume passing through the wet test meter, ft.³

V_d = Gas volume passing throught the dry gas meter, ft.³

t_w = Temperature of the gas in the wet test meter, °F

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F

ΔH = Pressure differential across orifice, in. H_2O

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y

P_b = Barometric pressure, in. Hg

θ = Time of calibration run, min.

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PRETEST - POSTEST THERMOMETER CALIBRATION

Client Thompson Contractors Date 04/18/90 + 4/20/90

Location Rutherfordton, N.C. Ref. Thermometer #5

Thermometer	Pretest		Postest	
	Temp., °F	Ref. Temp., °F	Temp., °F	Ref. Temp., °F
DGM # 1965	71/71	71	70/70	70
DGM # 1348	70/71	71	—	—
DGM # —	—	—	—	—
DGM # —	—	—	—	—
Impinger #1	71	71	70	70
Impinger #2	72	71	70	70
Impinger #3	71	71	70	70
Impinger #4	71	71	71	70
Impinger #5	71	71	70	70
WB # 2	71	71	70	70
DB # 2	72	71	70	70
Box #1	71	71	70	70
Box #2	71	71	70	70
Box #3	70	71	70	70
Box #4	—	—	—	—
Box #5	—	—	—	—
Box #6	—	—	—	—
WB Omega 873	71	71	69	70
DB Omega 873	71	71	70	70
WB Omega #1	71	71	70	70
DB Omega #1	71	71	70	70
Probe 4' #1	71	71	70	70
Probe 4' #2	70	71	70	70
Probe —' #1	—	—	—	—
Probe —' #2	—	—	—	—
—	—	—	—	—

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RAC STAKSAMPLR CALIBRATION SHEET

Meter Box Serial Number: 1965 Barometric Pressure (P_b): 29.040

Leak Check @ 5.0 in. H_2O: OK Date: 12-26-89 Calibrated by: JAB

Pump: OK Pump Oil: OK Clean Quick Connects: OK

Manometers: OK Dry Test Meter: OK Thermometers: OK

Lights: OK Electrical Check: OK Variac: OK

Vacuum Gauge: OK Leak Check @ 27" Hg.: <0.001 CFM

Man. Orifice	CF_m	CF_d	T_m	IT_d	OT_d	T_d ave.	Time t
0.5	5	5.35	65.2	104.5	90.0	97.25	12.80
1.0	5	5.38	65.2	110.0	92.0	101.00	9.28
1.5	10	10.79	65.2	116.0	96.0	106.00	15.24
2.0	10	10.80	65.5	118.0	96.5	107.25	13.35
3.0	10	10.76	65.5	121.0	99.0	110.00	11.10
4.0	10	10.77	65.6	122.5	100.5	111.50	9.68

Calculate Y and $\Delta H_@$ as follows:

$$Y = \frac{CF_m P_b (T_{d\ ave.} + 460)}{CF_d (P_b + \Delta H/13.6)(T_m + 460)} = 1.00 \qquad \Delta H_@ = \frac{0.0317\ \Delta H}{P_b (T_d + 460)} \left(\frac{(T_m + 460)\ t}{CF_m}\right)^2 = 1.84$$

Tolerances: $Y = 0.90 - \underline{1.00} - 1.10\ Y +/- 0.02Y$ $\Delta H_@ = 1.6 - \underline{1.84} - 2.1$ $\Delta H_{@i} +/- 0.15$ in.

CALIBRATION CALCULATIONS PUMP AND ORIFICE METER

Manometer Delta H 0.5 in. H_2O

$$Y = \frac{5 \times 29.040\ (\ 97.25 + 460)}{5.35\ (29.040 + 0.0368)(65.2 + 460)} = 0.990 \qquad \Delta H_@ = \frac{0.01585}{29.040\ (\ 97.25 + 460)} \left(\frac{(65.2 + 460)\ 12.80}{5}\right)^2 = 1.630$$

Manometer Delta H 1.0 in. H_2O

$$Y = \frac{5 \times 29.040\ (101.00 + 460)}{5.38\ (29.040 + 0.0737)(65.2 + 460)} = 0.990 \qquad \Delta H_@ = \frac{0.03170}{29.040\ (101.00 + 460)} \left(\frac{(65.2 + 460)\ 9.28}{5}\right)^2 = 1.805$$

Manometer Delta H 1.5 in. H_2O

$$Y = \frac{10 \times 29.040\ (106.00 + 460)}{10.79\ (29.040 + 0.1103)(65.2 + 460)} = 0.995 \qquad \Delta H_@ = \frac{0.04755}{29.040\ (106.00 + 460)} \left(\frac{(65.2 + 460)\ 15.24}{10}\right)^2 = 1.793$$

Manometer Delta H 2.0 in. H_2O

$$Y = \frac{10 \times 29.040\ (107.25 + 460)}{10.80\ (29.040 + 0.1471)(65.5 + 460)} = 0.994 \qquad \Delta H_@ = \frac{0.06340}{29.040\ (107.25 + 460)} \left(\frac{(65.5 + 460)\ 13.35}{10}\right)^2 = 1.912$$

Manometer Delta H 3.0 in. H_2O

$$Y = \frac{10 \times 29.040\ (110.00 + 460)}{10.76\ (29.040 + 0.2206)(65.5 + 460)} = 1.000 \qquad \Delta H_@ = \frac{0.09510}{29.040\ (110.00 + 460)} \left(\frac{(65.5 + 460)\ 11.10}{10}\right)^2 = 1.939$$

Manometer Delta H 4.0 in. H_2O

$$Y = \frac{10 \times 29.040\ (111.50 + 460)}{10.77\ (29.040 + 0.2941)(65.6 + 460)} = 0.999 \qquad \Delta H_@ = \frac{0.12680}{29.040\ (111.50 + 460)} \left(\frac{(65.6 + 460)\ 9.68}{10}\right)^2 = 1.967$$

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NOZZLE CALIBRATION

Date: 07-24-89
By: JAB

Set Number 1

Nozzle I.D.	D_1, in.	D_2, in.	D_3, in.	D_4, in.	D_5, in.	D, in.	$D_{ave.}$
.187-1	0.186	0.187	0.188	0.188	0.187	0.002	0.187
.187-2	0.190	0.189	0.189	0.189	0.190	0.001	0.189
.187-3	0.185	0.185	0.186	0.186	0.186	0.001	0.186
.203-1	0.207	0.208	0.207	0.207	0.208	0.001	0.207
.250-1	0.252	0.252	0.251	0.251	0.252	0.001	0.252
.250-2	0.253	0.252	0.254	0.253	0.253	0.002	0.253
.250-3	0.251	0.249	0.251	0.249	0.250	0.002	0.250
.300-1	0.303	0.303	0.303	0.304	0.303	0.001	0.303
.300-2	0.304	0.303	0.303	0.303	0.303	0.001	0.303
.300-3	0.300	0.300	0.300	0.299	0.300	0.001	0.300
.335-1	0.336	0.336	0.336	0.337	0.335	0.002	0.336
.375-1	0.375	0.376	0.376	0.375	0.375	0.001	0.375
.375-2	0.376	0.375	0.375	0.376	0.375	0.001	0.375
.375-3	0.375	0.375	0.374	0.375	0.374	0.001	0.375
.400-1	0.404	0.405	0.404	0.405	0.404	0.001	0.404
.500-1	0.504	0.504	0.504	0.505	0.504	0.001	0.504
.500-2	0.504	0.503	0.503	0.503	0.502	0.002	0.503
.500-3	0.503	0.502	0.503	0.502	0.502	0.001	0.502
.625-1	0.620	0.619	0.618	0.618	0.619	0.002	0.619
.775-1	0.770	0.778	0.780	0.780	0.780	0.002	0.779
1.00-1	1.000	1.000	0.999	1.000	1.000	0.001	1.000

Set Number 2

Nozzle I.D.	D_1, in.	D_2, in.	D_3, in.	D_4, in.	D_5, in.	D, in.	$D_{ave.}$
.187-1	0.185	0.185	0.185	0.186	0.184	0.002	0.185
.187-2	0.184	0.185	0.185	0.186	0.185	0.002	0.185
.187-3	0.186	0.186	0.186	0.187	0.186	0.001	0.186
.203-2	0.207	0.207	0.206	0.206	0.207	0.001	0.207
.250-1	0.249	0.251	0.250	0.250	0.251	0.002	0.250
.250-2	0.252	0.253	0.252	0.252	0.251	0.002	0.252
.250-3	0.250	0.249	0.250	0.250	0.250	0.001	0.250
.300-1	0.302	0.302	0.303	0.303	0.302	0.001	0.302
.300-2	0.303	0.302	0.303	0.302	0.301	0.002	0.302
.300-3	0.302	0.302	0.301	0.301	0.302	0.001	0.302
.335-2	0.339	0.339	0.340	0.340	0.339	0.001	0.339
.375-1	0.376	0.375	0.376	0.375	0.375	0.001	0.375
.375-2	0.377	0.376	0.376	0.376	0.376	0.001	0.376
.375-3	0.376	0.376	0.377	0.376	0.376	0.001	0.376
.500-1	0.496	0.496	0.497	0.496	0.497	0.001	0.496
.500-2	0.499	0.498	0.498	0.499	0.499	0.002	0.499
.500-3	0.498	0.498	0.499	0.498	0.497	0.002	0.498

Where:

$D_{1,2,3,4,5}$ = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

D = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

$D_{ave.}$ = average of D_1, D_2, D_3, D_4, and D_5.

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TYPE S PITOT TUBE INSPECTION DATA FORM

Date: 07-24-89
Calibrator: WQB

Specifications:
1.) Pitot tube assembly must be level.
2.) If pitot tube is damaged explain under comments section.
3.) $z = A \sin \tau$ (<0.125) and $w = A \sin \theta$ (<0.03125)
4.) α $<10°$ and β $<5°$

I.D.	α_1°	α_2°	β_1°	β_2°	τ°	θ°	A, in.	z, in.	w, in.	P_A, in.	P_B, in.	D_t, in.
36''- 1	1.0	1.5	1.0	1.5	2.0	0.5	0.730	0.025	0.00640	0.365	0.365	0.376
36''- 2	2.0	2.0	2.0	1.5	0.0	0.5	1.152	0.000	0.01005	0.576	0.576	0.376
40''- 1	1.0	0.0	1.0	0.0	0.5	0.5	1.112	0.010	0.00970	0.556	0.556	0.385
54''- 1	1.0	0.5	0.5	1.0	1.0	1.5	0.960	0.017	0.02513	0.480	0.480	0.385
66''- 1	1.0	0.0	3.0	2.0	0.5	1.5	1.042	0.009	0.02728	0.521	0.521	0.375
96''- 1	0.0	2.0	2.0	1.5	2.0	1.5	0.902	0.032	0.02361	0.451	0.451	0.380
3' - 1	0.0	0.0	0.0	0.0	0.0	1.0	1.057	0.000	0.01845	0.528	0.529	0.376
3' - 2	0.5	0.5	0.0	0.5	0.5	0.0	1.044	0.009	0.00000	0.522	0.522	0.375
3' - 3	0.5	0.5	1.0	0.5	0.5	1.0	1.044	0.009	0.01822	0.522	0.522	0.378
4' - 1	0.5	0.5	0.5	2.0	0.5	1.0	0.950	0.008	0.01658	0.475	0.475	0.378
4' - 2	0.0	0.5	0.0	1.5	1.0	0.5	0.889	0.016	0.00776	0.444	0.445	0.376
4' - 3	3.5	2.5	1.0	1.5	0.5	1.5	0.875	0.008	0.02290	0.437	0.438	0.376
4' - 4	0.5	3.5	2.5	1.5	0.5	1.0	0.837	0.007	0.01461	0.419	0.418	0.375
4' - 5	0.5	1.0	1.5	0.0	0.0	1.5	0.861	0.000	0.02254	0.431	0.430	0.374
4' - 6	0.5	0.0	0.5	0.5	1.0	1.5	0.947	0.017	0.02479	0.474	0.473	0.379
5' - 1	1.0	1.0	1.0	2.0	2.0	0.5	1.044	0.036	0.00911	0.522	0.522	0.373
5' - 2	0.5	1.0	1.0	1.5	0.5	0.5	1.046	0.009	0.00913	0.523	0.523	0.373
5' - 3	0.5	1.0	0.5	0.5	0.5	1.5	1.045	0.009	0.02736	0.523	0.522	0.376
5' - 4	3.0	0.5	0.0	0.5	2.5	1.0	1.027	0.045	0.01792	0.513	0.514	0.376
6' - 1	0.0	1.0	0.0	0.5	1.0	1.0	0.993	0.017	0.01745	0.496	0.497	0.376
6' - 2	0.5	0.0	0.0	0.5	2.0	1.0	1.008	0.035	0.01759	0.504	0.504	0.376
6' - 3	0.5	0.5	1.5	0.5	1.0	1.5	1.004	0.018	0.02628	0.502	0.502	0.377
6' - 4	1.0	0.5	1.0	0.0	2.0	1.0	1.000	0.035	0.01745	0.500	0.500	0.375
8' - 1	1.0	0.0	1.5	2.0	3.0	0.5	0.841	0.044	0.00734	0.420	0.421	0.378
8' - 2	1.0	0.0	2.5	3.0	2.0	2.0	0.871	0.030	0.03039	0.435	0.436	0.373
8' - 3	1.0	0.0	4.0	1.0	0.0	1.5	0.905	0.000	0.02369	0.452	0.453	0.374
8' - 4	2.0	2.0	0.0	0.0	0.0	0.0	1.007	0.000	0.00000	0.504	0.503	0.378
8' - 5	0.0	2.0	0.0	0.0	2.0	1.0	0.965	0.034	0.01684	0.482	0.483	0.380
8' - 6	0.5	2.0	0.5	2.0	1.0	0.0	0.917	0.016	0.00000	0.458	0.459	0.383
8'9''	1.0	2.0	1.5	1.5	1.0	2.0	0.895	0.016	0.03124	0.447	0.448	0.380
9'7''-1	0.0	1.0	0.0	1.0	0.0	0.5	0.905	0.000	0.00790	0.452	0.453	0.377
9'7''-2	0.0	1.0	3.0	2.0	3.0	1.5	0.951	0.050	0.02489	0.475	0.476	0.377
12'6''	1.5	1.5	2.5	2.5	0.0	0.5	0.809	0.000	0.00705	0.404	0.404	0.377

Comments: Only minor filing and cleaning required.

Pitot tubes requiring further calibration: None.

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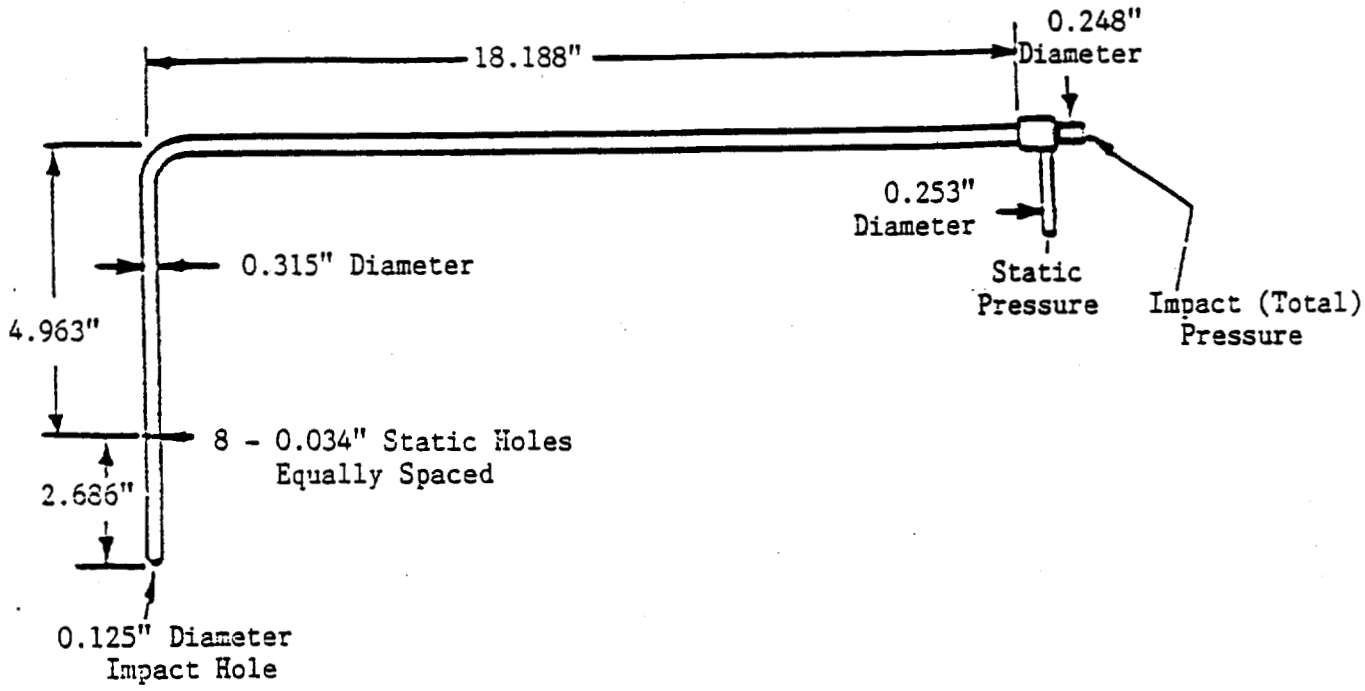
Standard Pitot Tube Calibration

Serial # 160 - 18 - 1



2.7.1	Hemispherical Tip
2.7.2	8.53 Diameters
2.7.3	15.76 Diameters
2.7.4	0.034"
2.7.5	90° curved bend

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METER BOX
TEMPERATURE SENSOR CALIBRATION DATA FORM
TOLERANCE: +/- 5.4 F

DATE: 07/25/89
AMBIENT TEMPERATURE, F : 72
CALIBRATOR: WGB

BAROMETRIC PRESSURE: 29.419
REFERENCE THERMOMETER # 22 & #5

REFERENCE POINT #		SOURCE	REFERENCE THERMOMETER TEMPERATURE, F	THERMOCOUPLE POTENTIOMETER TEMPERATURE, F	TEMPERATURE DIFFERENCE, %
Meter Box					
1264A	A.	ice bath	35	36	-.20
	B.	water bath	70	69	0.19
	C.	oil bath	122	120	0.34
	D.	oil bath	170	169	0.16
1264B	A.	ice bath	35	36	-.20
	B.	water bath	70	70	0.00
	C.	oil bath	123	124	-.17
	D.	oil bath	171	172	-.16
1348A	A.	ice bath	35	33	0.40
	B.	water bath	70	70	0.00
	C.	oil bath	125	127	-.34
	D.	oil bath	171	171	0.00
1348B	A.	ice bath	35	36	-.20
	B.	water bath	70	70	0.00
	C.	oil bath	126	128	-.34
	D.	oil bath	171	170	0.16
1401A	A.	ice bath	35	36	-.20
	B.	water bath	70	70	0.00
	C.	oil bath	128	128	0.00
	D.	oil bath	172	174	-.32
1401B	A.	ice bath	35	34	0.20
	B.	water bath	70	71	-.19
	C.	oil bath	129	131	-.34
	D.	oil bath	172	172	0.00
1965A	A.	ice bath	35	34	0.20
	B.	water bath	70	69	0.19
	C.	oil bath	130	130	0.00
	D.	oil bath	172	174	-.32
1965B	A.	ice bath	35	35	0.00
	B.	water bath	70	70	0.00
	C.	oil bath	134	136	-.34
	D.	oil bath	172	173	-.16

$$\text{TEMPERATURE DIFFERENCE} = \frac{(\text{REF TEMP, F} + 460) - (\text{TEST TEMP, F} + 460)}{\text{REF TEMP, F} + 460} \times 100 <= 1.5\%$$

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PROBE THERMOCOUPLE
TEMPERATURE SENSOR CALIBRATION DATA FORM
TOLERANCE: +/- 5.4 F

DATE: 07/25/89
AMBIENT TEMPERATURE, F : 72
CALIBRATOR: WQB

BAROMETRIC PRESSURE: 29.419
REFERENCE THERMOMETER # #22 & #5

REFERENCE POINT #		SOURCE	REFERENCE THERMOMETER TEMPERATURE, F	THERMOCOUPLE POTENTIOMETER TEMPERATURE, F	TEMPERATURE DIFFERENCE, %
Probe - #					
4'-1	A.	oil bath	92	92	0.00
	B.	oil bath	242	242	0.00
	C.	oil bath	383	385	-.24
4'-2	A.	oil bath	92	92	0.00
	B.	oil bath	242	243	-.14
	C.	oil bath	384	385	-.12
5'-1	A.	oil bath	95	93	0.36
	B.	oil bath	242	243	-.14
	C.	oil bath	392	395	-.35
5'-2	A.	oil bath	97	96	0.18
	B.	oil bath	242	242	0.00
	C.	oil bath	384	385	-.12
6'-1	A.	oil bath	98	97	0.18
	B.	oil bath	242	243	-.14
	C.	oil bath	391	392	-.12
6'-2	A.	oil bath	98	96	0.36
	B.	oil bath	244	246	-.28
	C.	oil bath	385	386	-.12
8'-1	A.	oil bath	100	98	0.36
	B.	oil bath	246	248	-.28
	C.	oil bath	385	385	0.00
8'-2	A.	oil bath	100	99	0.18
	B.	oil bath	246	246	0.00
	C.	oil bath	385	385	0.00
8'-3	A.	oil bath	100	98	0.36
	B.	oil bath	246	248	-.28
	C.	oil bath	385	385	0.00
8' 9"	A.	oil bath	102	101	0.18
	B.	oil bath	247	249	-.28
	C.	oil bath	386	386	0.00
9' 7"	A.	oil bath	102	101	0.18
	B.	oil bath	248	249	-.14
	C.	oil bath	391	392	-.12
12' 6"	A.	oil bath	103	102	0.18
	B.	oil bath	249	249	0.00
	C.	oil bath	392	393	-.12

$$\text{TEMPERATURE DIFFERENCE} = \frac{(\text{REF TEMP, F} + 460) - (\text{TEST TEMP, F} + 460)}{\text{REF TEMP, F} + 460} \times 100 <= 1.5\%$$

pace laboratories, inc.

SAMPLE BOX
TEMPERATURE SENSOR CALIBRATION DATA FORM
TOLERANCE: +/- 5.4 F

DATE: 07/25/89 BAROMETRIC PRESSURE: 29.419
AMBIENT TEMPERATURE, F : 72 REFERENCE THERMOMETER # 22 & #5
CALIBRATOR: WGB

REFERENCE POINT #		SOURCE	REFERENCE THERMOMETER TEMPERATURE, F	THERMOCOUPLE POTENTIOMETER TEMPERATURE, F	TEMPERATURE DIFFERENCE, %
Sample Box					
#1	A.	oil bath	122	121	0.17
	B.	oil bath	200	200	0.00
	C.	oil bath	220	220	0.00
	D.	oil bath	260	260	0.00
	E.	oil bath	287	288	-.13
#2	A.	oil bath	122	122	0.00
	B.	oil bath	200	202	-.30
	C.	oil bath	220	219	0.15
	D.	oil bath	260	260	0.00
	E.	oil bath	287	285	0.27
#3	A.	oil bath	122	121	0.17
	B.	oil bath	200	201	-.15
	C.	oil bath	220	220	0.00
	D.	oil bath	264	265	-.14
	E.	oil bath	289	289	0.00
#4	A.	oil bath	122	123	-.17
	B.	oil bath	200	201	-.15
	C.	oil bath	220	219	0.15
	D.	oil bath	264	264	0.00
	E.	oil bath	290	291	-.13
#5	A.	oil bath	123	123	0.00
	B.	oil bath	200	199	0.15
	C.	oil bath	220	221	-.15
	D.	oil bath	268	268	0.00
	E.	oil bath	291	291	0.00
#6	A.	oil bath	123	124	-.17
	B.	oil bath	200	199	0.15
	C.	oil bath	223	221	0.29
	D.	oil bath	268	266	0.27
	E.	oil bath	291	292	-.13
#7	A.	oil bath	123	124	-.17
	B.	oil bath	200	198	0.30
	C.	oil bath	234	232	0.29
	D.	oil bath	273	275	-.27
	E.	oil bath	294	295	-.13
#8	A.	oil bath	124	124	0.00
	B.	oil bath	200	201	-.15
	C.	oil bath	234	233	0.14
	D.	oil bath	274	275	-.14
	E.	oil bath	296	297	-.13

$$\text{TEMPERATURE DIFFERENCE} = \frac{(\text{REF TEMP, F} + 460) - (\text{TEST TEMP, F} + 460)}{\text{REF TEMP, F} + 460} \times 100 <= 1.5\%$$

pace laboratories, inc

IMPINGER
TEMPERATURE SENSOR CALIBRATION DATA FORM
TOLERANCE: +/- 2.0 F

DATE: 07/25/89
AMBIENT TEMPERATURE, F : 72
CALIBRATOR: WQB

BAROMETRIC PRESSURE: 29.419
REFERENCE THERMOMETER # 22 & #5

REFERENCE POINT #		SOURCE	REFERENCE THERMOMETER TEMPERATURE, F	THERMOCOUPLE POTENTIOMETER TEMPERATURE, F	TEMPERATURE DIFFERENCE, %
Impinger					
#1	A.	ice bath	32	32	0.00
	B.	water bath	70	70	0.00
	C.	water bath	95	95	0.00
	D.	water bath	130	130	0.00
#2	A.	ice bath	32	32	0.00
	B.	water bath	70	71	-.19
	C.	water bath	95	95	0.00
	D.	water bath	130	130	0.00
#3	A.	ice bath	32	33	-.20
	B.	water bath	70	70	0.00
	C.	water bath	95	95	0.00
	D.	water bath	130	130	0.00
#4	A.	ice bath	32	33	-.20
	B.	water bath	70	71	-.19
	C.	water bath	95	95	0.00
	D.	water bath	130	131	-.17
#5	A.	ice bath	32	33	-.20
	B.	water bath	71	70	0.19
	C.	water bath	95	95	0.00
	D.	water bath	130	130	0.00

$$\text{TEMPERATURE DIFFERENCE} = \frac{(\text{REF TEMP, F} + 460) - (\text{TEST TEMP, F} + 460)}{\text{REF TEMP, F} + 460} \times 100 \leq 1.5\%$$

pace laboratories, inc.

WET - BULB & DRY - BULB: OMEGA TEMP
TEMPERATURE SENSOR CALIBRATION DATA FORM
TOLERANCE: +/- 5.4 F

DATE: 07/25/89
AMBIENT TEMPERATURE, F : 72
CALIBRATOR: WGB

BARCMETRIC PRESSURE: 29.419
REFERENCE THERMOMETER # 22 & #5

REFERENCE POINT #		SOURCE	REFERENCE THERMOMETER TEMPERATURE, F	THERMOCOUPLE POTENTIOMETER TEMPERATURE, F	TEMPERATURE DIFFERENCE, %
Omega Temp HH-2 #1					
Db1	A.	water bath	70	71	-.19
	B.	oil bath	120	120	0.00
	C.	oil bath	170	171	-.16
	D.	oil bath	220	221	-.15
	E.	oil bath	260	259	0.14
Wb1	A.	water bath	70	70	0.00
	B.	oil bath	120	121	-.17
	C.	oil bath	170	171	-.16
	D.	oil bath	220	219	0.15
	E.	oil bath	260	261	-.14
Omega Temp HH-2 #2					
Db2	A.	water bath	70	71	-.19
	B.	oil bath	120	121	-.17
	C.	oil bath	171	172	-.16
	D.	oil bath	221	222	-.15
	E.	oil bath	262	262	0.00
Wb2	A.	water bath	70	69	0.19
	B.	oil bath	121	122	-.17
	C.	oil bath	171	170	0.16
	D.	oil bath	222	222	0.00
	E.	oil bath	262	261	0.14
Omega Temp 873-F					
Db1	A.	water bath	71	71	0.00
	B.	oil bath	121	122	-.17
	C.	oil bath	173	173	0.00
	D.	oil bath	222	223	-.15
	E.	oil bath	262	263	-.14
Wb1	A.	water bath	72	71	0.19
	B.	oil bath	122	121	0.17
	C.	oil bath	173	174	-.16
	D.	oil bath	222	222	0.00
	E.	oil bath	262	261	0.14
Omega Temp 873-F High Temp					
	A.	oil bath	384	385	-.12
	B.	n. furnace	450	452	-.22
	C.	n. furnace	575	573	0.19
	D.	n. furnace	800	803	-.24
	E.	n. furnace	1140	1143	-.19

$$\text{TEMPERATURE DIFFERENCE} = \frac{(\text{REF TEMP, F} + 460) - (\text{TEST TEMP, F} + 460)}{\text{REF TEMP, F} + 460} \times 100 <= 1.5\%$$

pace laboratories, inc. WET BULB - DRY BULB - NOx & HOT BOX: BIMETALLIC
TEMPERATURE SENSOR CALIBRATION DATA FORM
TOLERANCE: +/- 5.4 F

DATE: 07/25/89 BAROMETRIC PRESSURE: 29.419
AMBIENT TEMPERATURE, F : 72 REFERENCE THERMOMETER # 22 & #5
CALIBRATOR: WGB

REFERENCE POINT #		SOURCE	REFERENCE THERMOMETER TEMPERATURE, F	THERMOCOUPLE POTENTIOMETER TEMPERATURE, F	TEMPERATURE DIFFERENCE, %
Bimetallic					
Wb1	A.	water bath	72	72	0.00
	B.	oil bath	130	130	0.00
	C.	oil bath	185	184	0.16
	D.	oil bath	242	243	-.14
	E.	oil bath	270	272	-.27
Db1	A.	water bath	72	71	0.19
	B.	oil bath	131	130	0.17
	C.	oil bath	185	185	0.00
	D.	oil bath	243	244	-.14
	E.	oil bath	270	271	-.14
Wb2	A.	water bath	72	72	0.00
	B.	oil bath	131	130	0.17
	C.	oil bath	185	184	0.16
	D.	oil bath	243	243	0.00
	E.	oil bath	270	271	-.14
Db2	A.	water bath	72	70	0.38
	B.	oil bath	131	130	0.17
	C.	oil bath	185	186	-.16
	D.	oil bath	243	243	0.00
	E.	oil bath	270	271	-.14
NOx	A.	water bath	72	71	0.19
	B.	oil bath	131	131	0.00
	C.	oil bath	185	186	-.16
	D.	oil bath	243	244	-.14
	E.	oil bath	270	272	-.27
Hot Box	A.	water bath	72	70	0.38
	B.	oil bath	131	130	0.17
	C.	oil bath	185	184	0.16
	D.	oil bath	244	242	0.28
	E.	oil bath	270	269	0.14

$$\text{TEMPERATURE DIFFERENCE} = \frac{(\text{REF TEMP, F} + 460) - (\text{TEST TEMP, F} + 460)}{\text{REF TEMP, F} + 460} \times 100 <= 1.5\%$$

Whatman Inc.

Whatman Inc. • 9 Bridewell Place, Clifton, New Jersey 07014 • Telephone: (201) 777-4825
Telex: 133426 • Cable: REEVEPAP

February 1, 1979

Mr. Paul R. Jenkins, Jr.
Vice-President
Environmental Testing Inc.
1700 University Commercial Place
Charlotte, North Carolina 28213

Dear Mr. Jenkins:

Further to our telephone conversation on January 15, 1979 Reeve Angel Grade 900AF is tested with a Q128 DOP Penetrometer manufactured by the Air Technology Association to measure DOP. This is a more sophisticated unit than that listed in the Federal Register, Part II, Thursday, August 18, 1977, Environmental Protection Agency, Standards of Performance for New Stationary Sources.

Grade 900AF will meet the EPA DOP requirements of 0.05 $\leq$ percent penetration on a 0.3 micron dioctyl phthalate smoke particles as listed on page 41778 of the Federal Register, Vol. 42, No. 160, Thursday, August 18, 1977 under 3. Reagent, 3.1.1 Filters.

I hope this will satisfy your inquiry. If we can be of any further service, please contact us at your convenience.

Very truly yours,

John Zacharias
Vice President
Business Manager, Paper Division, N. A.

JZ/mpm

GCA CORPORATION
Precision Scientific Group

3737 West Cortland Street
Chicago, Illinois 60647
Telephone: 312-227-2660
Telex: 254028

February 2, 1984

Environmental Testing
1700 University Commercial Place
Charlotte, N.C. 28213

Attn: Mr. Paul Jenkins

Subj: Certification Wet Test Meter

Dear Mr. Jenskins:

In lieu of any printed certification from our company, we offer as follows our statement on the referenced subject.

> "The Wet Test Meter catalog number 63123, has been tested at our plant facilities using a Meter Prover Bottle NBS registration No. 4897. The Meter was found to perform to our advertised specifications of plus or minus 1/2% error in flow rate and conforms to specifications of ASTM D-1071."

Respectfully,

Bob Husberg
Supervisor, Customer Service

BH/mg

CORNING

Science Products
Corning Glass Works
Corning, New York 14831 USA
Tel: 607-974-9000

a CORNING Laboratory Sciences Company

November 18, 1986

Mr. Paul Jenkins
Environmental Testing Inc.
1700 University Commercial Place
Charlotte, NC 28213

Dear Mr. Jenkins:

Confirming our telephone conversation, our volumetric apparatus is calibrated in conformance with ASTM Standard E 542.

Very truly yours,

Allen R. Fuller

Allen R. Fuller
Product Engineering Supervisor

b10012

METTLER

Weight Traceability Certificate

To: Pace Laboratory Inc
1700 Univ Commercial
Charlotte N.C. 28213

The balances listed below have been serviced by our representative on
JAN 24th 1990

This is to certify that the test weights used are traceable to the National Bureau of Standards.

	Analytical	Precision
METTLER identification number of test weights used:	348	
METTLER calibration date of test weights used:	04/01/89	
National Bureau of Standards test number:	737/0670-Met49	

Model and serial number of balances serviced:

AE163 C57742	
H54 677277	
AK160 A44922	

Michael D Reed
METTLER Service Representative

Jan 24th 1990
Date of Issue

KIMBLE
Division of
Owens-Illinois

December 11, 1986

Mr. Paul R. Jenkins
Environmental Testing, Inc.
1700 University Commercial Place
Charlotte, North Carolina 28213

REF: Calibration of volumetric glassware
Mr. P. Jenkins letter 12-5-86

Dear Mr. Jenkins,

Volumetric standards, utilized by Kimble for calibration of class A and B laboratory glassware, are designed to meet applicable calibration requirements of ASTM Standard E 542.

Accuracy of balances, weights and thermometers employed for calibration of volumetric standards is traceable to National Bureau of Standards.

Sincerely,

Lew Horan
Standards Dept.

Mike Mollick
Quality Control

cc: Mr. N. DeBello - M.O.
Mr. E. Trasoras - Q.A.

WALTER H. KESSLER COMPANY, INC.

THERMOMETERS KESSLER HYDROMETERS

ONE-SIXTY HICKS STREET • WESTBURY, LONG ISLAND, NEW YORK • 516 EDGEWOOD 4-4064

MANUFACTURERS CERTIFICATE OF CALIBRATION

This is to certify that the instrument listed below has been tested in our temperature calibration laboratory in accordance with the latest procedures in the finest constant temperature equipment available, against National Bureau of Standards certified master standards.

Certified for: Fisher Scientific Company

Description: Thermometer #15-041D -1/201°C in 0.2° Div Total Immersion

Instrument Serial No. 811 007 Date Certified: January 30, 1981

Reading of This Instrument	Reading of N.B.S. Standard (True Temperature)
+0.02C	0.00C
20.00C	20.00C
40.00C	40.00C
59.96C	60.00C
79.98C	80.00C
100.02C	100.00C
119.92C	120.00C
139.98C	140.00C
160.00C	160.00C
180.00C	180.00C
199.86C	200.00C

The tabulated readings apply provided the ice-point reading taken after exposure for not less than 3 days to a temperature of about 25° C (77° F) is +0.02C . If the ice-point reading is found to be higher (or lower) than stated, all other readings will be higher (or lower) by the same amount.

Serial & Test numbers of National Bureau of Standards certified instruments referenced in certification of the thermometer listed above:

NBS Standard M44165,78A-227,M44451,78A-220,78A-601/602

NBS Test No 176240,219883,176240,219883,219606

WALTER H. KESSLER COMPANY, INC.

Irene Ciccilla

the OMEGA Group

DATE: 12-10-85

CERTIFICATE OF CALIBRATION

CUSTOMER: ENVIRONMENTAL TESTING INC
1700 UNIV COMMERICAL PL
CHARLOTTE NC 28213

Customer Purchase Order: 2861RO
OMEGA Work Order No: SO 511268760
MODEL: MH-2
SERIAL NO: 14403

OMEGA ENGINEERING certifies that the above instrumentation has been calibrated and tested to meet or exceed the published specifications. This calibration and testing was performed using instrumentation and standards that are traceable to the U.S. National Bureau of Standards.

Reference: NATIONAL BUREAU OF STANDARDS TEST NO(s): 36320

Tony D'Inverno
Supervisor, Instrumentation

CAL-3

TECHNICAL DATA ON

EPM 2000 AIR SAMPLING FILTERS

SELECTED AS THE EPA STANDARD

EPM 2000 is the new Whatman filter which has been specifically developed for use in high volume air samplers, and has been chosen by the EPA for its technical excellence and overall suitability for use in the nationwide network of Hi-Vol air samplers. The high air flow rate and excellent particle retention characteristics make EPM 2000 the filter of choice for high volume sampling.

- Specifically developed for use with high volume air samplers.
- Chosen by the EPA for their National Air Surveillence Network (Contract No. 68-02-3709).
- Manufactured from 100% borosilicate glass microfibres under strictly controlled conditions.
- Retention efficiency 99.999% for NaCl particles, mass median 0.6 microns.
- Heat-treated after manufacture to remove organic traces.
- No binder used in manufacture for maximum purity.
- Each sheet individually numbered for rapid identification and recording.

EPM 2000 – THE STATE OF THE ART FILTER MEDIUM FOR HI-VOL AIR SAMPLING

Today, more than ever before, concern over the potential effects on human life of toxic particulates in the air, is running high. The sampling and analytical methods employed in the monitoring of air quality are becoming ever more sophisticated.

EPM 2000, as successor to the popular EPM 1000, has been developed to complement these methods as a technically advanced air filtration medium, suitable for both quantitative and qualitative measurements.

HIGH PURITY – HIGH PERFORMANCE

The EPA place specific requirements on the purity and performance of the glass microfibre filters which are used throughout their National Air Surveillence Network of pollution monitoring stations.

EPM 2000 is manufactured from 100% pure borosilicate glass microfibres, with no added binder, under strictly controlled conditions. Maximum purity is ensured by the use of heat treatment after manufacture to remove any traces of organic material which may interfere with subsequent analyses, and closely monitored quality assurance methods are employed. Detailed chemical analyses of trace pollutants can thus be carried out with utmost accuracy and minimum background interference.

EPM 2000 offers high flow rates while simultaneously providing exceptionally high particle retention efficiencies. Complete reliance can be placed on EPM 2000 to provide optimum results in airborne particulate collection.

Each 8" × 10" sheet of EPM 2000 is individually numbered for rapid identification and recording.

AVAILABILITY

Two sizes are available as standard

8" x 10" sheets (packs of 100)	Cat. No. 1882 866
4.7 cm circles (packs of 100)	Cat. No. 1882 047

PUBLICATION NO 888 EPM A