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

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

Commonwealth of Pennsylvania
Environmental Resources
October 15, 1987

Subject: Source Test Review

To: Data File
Faylor-Middlecreek, Inc.
Union Township, Union County

From: Thomas P. Bianca TPB
Air Pollution Control Engineer
Division of Technical Services and Monitoring
Bureau of Air Quality Control

Through: Chief, Source Testing and Monitoring Section

Faylor-Middlecreek, Inc., operates a batch asphalt plant in Union Township, Union County. Aggregate is transported from storage bins by belt conveyors to a rotary dryer. The hot aggregate is discharged into a hot bucket elevator and transported to hot screens where the aggregate is separated by size into hot holding bins. The material is then weighed according to product specification into a pug mill where heated asphaltic oil is added and mixed. The product is either discharged directly into trucks or may be conveyed to heated storage silos.

Heat is supplied to the dryer through the combustion of reprocessed oil (R-100) purchased from the Baumgardner Company. The oil firing rate was approximately 402 to 414 GPH.

Effluent from various points in the plant are ducted to a settling chamber utilized as a primary collection device. The material captured by the settling chamber is recycled to the hot bucket elevator. The effluent is drawn by a 150-HP induced draft fan to a McCarter baghouse consisting of 12 compartments with 54 Nomex glass felt bags per compartment. The material collected by this unit is conveyed to a dust storage system. The effluent from the baghouse is then exhausted to the atmosphere through a 51 1/8-inch diameter stack having a discharge point 40 feet above grade.

Three particulate emission test runs were conducted by Mease Engineering Associates for New Source Performance Standards compliance and observed by Jeannine Kubli, Jim Orr, and Richard Maxwell, Jr., of the Williamsport Regional Office. The plant was operating at approximately 100% of normal operating capacity during the three test runs. Due to a plant shutdown two points were not sampled on Run #1, however, this should have minimal effect on the test results. The tests were conducted in accordance with the preapproved test protocol. The calculations are correct and the results appear to be valid.

The following was extracted from the report:

Run No.	1	2	3
Particulate Conc., gr/dscf	0.087	0.104	0.105
Mass Emission Rate lbs/hr	25.4	28.9	28.5
Allowable Conc., gr/dscf	0.04	0.04	0.04

COMMONWEALTH OF PENNSYLVANIA

September 29, 1987

SUBJECT: Test Report Review
Faylor-Middlecreek
Winfield Plant
Union Township, Union County
Application 60-30,F-001A

TO: L. Blaine DeHaven, Chief
Source Testing & Monitoring Section

FROM: Richard L. Maxwell, Jr.
Chief, Engineering Services
Bureau of Air Quality Control
Williamsport Regional Office

Enclosed is the test report for particulate source testing performed on Faylor's Winfield batch asphalt plant on 8/24/87 by Michael Mease for the determination for compliance with Subpart I of the Federal NSPS. Also enclosed is a copy of my test observation memo. Would you please have someone on your staff review this report for Chapter 139 conformance, etc.?

RLM/skb

Enclosure

cc: File

COMMONWEALTH OF PENNSYLVANIA

September 8, 1987

SUBJECT: Stack Test Observation
Faylor-Middlecreek
Union Township, Union County
60-303-001

TO: Files

FROM: Richard L. Maxwell, Jr. RLM J
Chief, Engineering Services
Williamsport Regional Office

On 8/24/87, Jeannine M. Kubli, Jim R. Orr and I observed particulate stack testing performed on Faylor-Middlecreek's Winfield batch asphalt plant by Mike Mease and an associate.

Sampling occurred at 12 points per port, 5 minutes per point, with the exception of the third test, where the sampling time was reduced to 4.5 minutes per point. The sampling location was as previously described, approximately one stack diameter upstream of an expanding stack exit section and four diameters downstream of the fan. The test train appeared to be as it should.

The bag pulsing cycle on the fabric collector was determined to be 15 seconds (as determined by repeated measurements with a stop watch). Emissions were noted when the bags pulsed, no matter which section of bags was being pulsed. Jim Orr periodically performed opacity readings of these emissions during the second and third tests (see enclosed). It is apparent that the emissions during bag pulsing are still excessive. The bag cleaning air pressure was observed to be 80 psi throughout the testing.

The collector pressure drop was approximately 5 inches during most of the test. Top mix was being produced during most of the test period. As the plant had no batch counter, there was no easy way to monitor throughput during each test. Although equipped with a computer, records are maintained of the material loaded into trucks rather than the material produced by the plant. Since the plant is equipped with two asphalt concrete storage silos, these records don't necessarily match. The company planned to determine the approximate dryer throughput by periodic readings of the cold feed belt and fuel oil meter. Additionally, during the latter part of the second test and the third test, Albert Mabus stayed in the plant control room and counted the batches produced.

9/8/87

Al Mabus reported verbal results today — .099 GR/DSCF.

RLM

Upon our arrival at the plant at approximately 9 a.m., we were informed that the first of three planned tests was to be concluded within a few minutes. Immediately after learning this, however, the dryer feed belt jammed and the plant had to be shut down for repairs. After about 45 minutes on hold, I was asked if the first test, which had 9 of 120 minutes remaining (5 minutes on the last point and 4 of 5 on the next to the last point) could be considered as completed. I agreed with the qualification that two additional full term tests would have to be conducted even if a second day was required.

The final leak check on the first test showed virtually no leakage at 7 inches Hg.

The second test started at approximately 10:45 a.m. and ended about 12:50 p.m. Base was run for about half an hour during this test. The leak rate during the final check was observed to be .007 cfm at 7 inches Hg. The third test started at approximately 1:45 p.m. while we were off-site. We returned at 2:20 p.m., but the plant had to be shut down at approximately 2:45 due to a jammed asphalt concrete silo unloading valve. We were forced to leave the plant site prior to the resumption of sampling, which was later reported to have occurred at approximately 3:45.

I observed the cleanup of the nozzle and probe for the first two tests. It appeared to be done correctly. As Mr. Mease had brought along three separate filter box/impinger train modules, these did not have to be cleaned up on-site. I did observe the filters from the first two tests, however, and noted that the filters were both discolored and that the glassware prior to the filter contained an accumulation of brown powder.

An oil sample was taken from the oil storage tank after the second test.

During a phone conversation the following morning, I learned that the company had replaced the original McCarter bags with BHA bags in 1985 but had replaced these with new McCarter bags this past spring. Not only did the BHA bags not have any bleed-through problems on pulsing whereas the McCarter bags do, but the BHA bags still do not have any problems at their new location (Pottsville plant). Mr. Mabus additionally informed me that during a recent inspection of the collector, several bags were noted to extend below the bottom of the cages indicating that they may have stretched in use. It would seem probable that the material the McCarter bags are made of stretches too readily allowing the weave to open up and dust to be forced through upon pulsing. The pulsing bleed-through problems clearly are not being caused by lack of adequate filter cake. This was proven by the fact that the collector pressure drop, which had decreased during the breakdown which occurred during the latter part of the first test due to the air being left on during the repair period, increased from two inches to five inches in a matter of a few minutes following resumption of dryer use.

RLM:lm

[illegible]

Pulse rev. - 15 sec

Pulse Duration 3-4 sec long

11:00 a

[illegible]/31/87

Mountain

Stack

300'

Observer

wind - 0-8mph

Pt. Cloudy

0 Sun

10	30	11:08 a 45	30
35	10	40	10
30	50	45	40
30	15	30	0 End of Pulse
30	50	40	30
30	35	25	
30	40	35	
25	25	30	
10		20	
0 End of Pulse		35	
50		35	
35		30	
30		40	
25		15	
35		35	
20		30	
30		30	
30		20	
10		25	
35		10	

11:21

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30

0
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10
0

End of Pulses

11:40A

40
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30
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30
40
25
0 End of Pulse
25
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End of Pulse

12:12p 35
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45
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5 End of Pulse
30
5 End of Pulse
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12:25 25
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a:32p	35	0	250p
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	10		

SEP 24 1987

SOURCE TEST REPORT

Particulate Emissions

Faylor Middlecreek
Winfield, Pennsylvania
August, 1987

RECEIVED
SEP 28 1987
Air Quality Control
Williamsport Reg.

Client: Faylor Middlecreek
P.O. Box 177
Winfield, Pennsylvania

Testing Firm: Mease Engineering Associates
P.O. Box 721
State College, Pennsylvania

CONTENTS

1.0 Summary of Results

2.0 Lab & Field Data

3.0 Test Procedures

4.0 Calibrations

5.0 Calculations

SECTION 1.0

Summary of Results

CLIENT:	Faylor Middlecreek, Inc. P.O. Box 177 Winfield, Pennsylvania
TEST LOCATION:	Faylor Middlecreek, Inc. P.O. Box 177 Winfield, Pennsylvania
UNIT TESTED:	Asphalt Dryer/Baghouse
TEST PURPOSE:	Determine the particulate emission rate as required by the Pennsylvania Department of Environmental Resources to determine compliance with applicable air pollution emission regulations.
TEST EQUIPMENT:	Research Appliance Company "STAKSAMPLR" Portable Gas Sampler, Model #2343.
TEST METHODS:	Environmental Protection Agency Method 5 and as modified by the Pennsylvania Dept. Environmental Resources 'Source Testing Manual"
TEST OBSERVER:	Mr. Richard Maxwell Pennsylvania Department of Environmental Resources
TEST PERSONNEL:	Michael J. Mease Miles W. Carpenter
TESTING FIRM:	Mease Engineering Associates P.O. Box 721 State College, PA 16804
TEST ENGINEER:	

Michael J. Mease
Pennsylvania Professional Engineer No. 26809-E

RECEIVED
SEP 28 1987
DER-AIR QUALITY CONTROL
WILLIAMSPORT REGION

TEST DATA SUMMARY

Process: Asphalt Dryer/Baghouse

	Run #1	Run #2	Run #3
Test Date and Times	8-31-87 7:11- 9:06 am	8-31-87 10:46am- 12:48 pm	8-31-87 1:47- 4:37 pm
Stack Diameter, Inches	51.125	51.125	51.125
Sampling Nozzle Diameter, Inches	0.189	0.189	0.189
Testing Time, Minutes	111	120	108
Stack Gas Volume Sampled, ACF	57.581	58.242	51.313
Stack Gas Volume Sampled, SCF @ 70 deg. F., 29.92 in.Hg.,dry	55.8	56.4	49.5
Stack Gas Temperature, deg. F.	244	250	242
Stack Gas Moisture Content, %	16.7	17.7	18.0
Stack Gas Composition,			
%CO2	4.43	4.37	4.50
%O2	15.9	15.4	16.0
Stack Gas Molecular Weight	27.5	27.3	27.3
Stack Gas Velocity, Ft./Sec.	63.7	61.5	59.6
Stack Gas Flowrate, ACFM	54,500	52,600	51,000
Stack Gas Flowrate, SCFM @ 70 deg. F., 29.92 in.Hg.,dry	34,300	32,400	31,700
Particulate Captured, Grams (Front Half & Back Insoluble)	0.3130	0.3809	0.3368
Particulate Concentration,			
Grains/SCF	0.087	0.104	0.105
Grains/ACF	0.054	0.064	0.065
Particulate Mass Rate, Lb./Hr.	25.4	28.9	28.5
Percent Isokinetic of Test	107	106	106

TEST PROCEDURE SUMMARY

The sampling ports on the 51.125 inch diameter stack were located approximately 160 inches downstream (3.13 diameters) from a flow disturbance and approximately 46 inches (0.90 diameters) from an upstream flow disturbance. Two separate traverses of twelve points each were sampled for a total of twenty-four sampling points. The sampling points were located at the following distances, in inches, from the inside stack walls: 1.07, 3.43, 6.03, 9.05, 12.78, 18.20, 32.92, 38.34, 42.08, 45.09, 47.70, and 50.05.

The tests followed the EPA Method 5 procedures and those procedures as required by the Pennsylvania Department of Environmental Resources. These included washing the probe with both acetone and distilled water and the analysis of impinger solutions as outlined in Section 3.0 of this report.

Test No. 1:

The test protocol estimated average test times of five minutes per sample point for a total test time of 120 minutes. Test No. 1 began at 7:11 am and continued uninterruptedly until 9:06 when the process shut down. The sampling train was on sample point number twenty-three (one minute), with a test time of 111 minutes. The asphalt plant operators estimated a shut down of perhaps one hour to correct the problem. The test team members discussed the possibility of terminating the test at this point, with Mr. Richard Maxwell of the Williamsport D.E.R. office. The velocity profile was fairly constant during this point and the preceeding points. The sample volume of the test had also exceeded fifty cubic feet. With the back log of trucks awaiting asphalt and the unsteady nature of asphalt plants, Mr. Maxwell agreed to terminate this test so that the test team could prepare for the second test during the plant shutdown.

TEST PROCEDURE SUMMARY

Test No. 2:

Test No. 2 was conducted without interruption from 10:46 am to 12:48 pm. Each sampling point was sampled for five minutes each for a total test time of 120 minutes.

Test No. 3:

The asphalt plant operators were unsure of the amount of product that they could produce during the mid and late afternoon hours. Calculations of sample volumes showed that a reduction of sampling time from five minutes to four and one half minutes per point would result in an approximate sample volume of fifty cubic feet. This was discussed with the test observer and approved. Therefore, the test team sampled twenty four sample points at four and one half minutes each for a total test time of 108 minutes.

The test began at 1:47 pm and was interrupted to correct a plant shutdown from 2:48 to 3:48 pm. The test resumed at 3:48 and concluded at 4:37 pm.

SAMPLE RESULTS SUMMARY

Process emissions were calculated by using the front half of the sampling train and the insoluble portion of the rear half of the sampling train. The captured particulate was a light brown color. Large amounts of particulate were also noted in the glass elbows that connected the probe to the glass filter holder. The fact that this particulate was visible and the large amount of particulate in the probe wash infer that large particles were emitted from the stack. Each of the three tests displayed this particulate matter in the glass elbow.

The average particulate concentration was determined to be 0.099 grains per standard cubic foot. The average particulate emission rate rate was determined to be 27.6 pounds per hour.

SECTION 2.0

Lab & Field Data

Mease Engineering Associates

Environmental Consultants

LABORATORY WORKSHEET

Client: FAYLOR MIDDLE CREEK Run No. & Date: 1 8-31-87

Process: ASPHALT DRYER Sample Box No.: 1

Filter Analysis:

Filter Wt., grams	0.8934
Filter Tare, gms	0.6231
Part. Increase, gm.	0.2703

Impinger Water Increase:

Silica Gel Impinger (#4):

Final Wt., gms	907.3
Tare Wt., gms	893.6
H_2O Increase	13.7

Total Water Volume Increase:

Impinger #1	195	ml
Impinger #2	27	ml
Impinger #3	2	ml
Impinger #4	13.7	ml
TOTAL INCREASE	237.7	ml

Impinger Analysis:

Wash Bottle No.	1
Filter Wt., gms	0.0175
Filter Tare, gms	0.0163
Total Insoluble	0.0012
Final Beaker Wt.	155.7341
Tare Wt. (No. 31)	155.7260
Total Soluble	0.0081

Particulate Weight Summary:

Filter	0.2703	
Probe Wash	0.0415	
Impingers (Sol.)		
Impingers (Insol.)	0.0012	
Total (w/imp.)	0.3130	grams
Total (w/o imp.)		grams

Probe Wash Analysis:

Wash Volume, ml.	180
Acetone Density, mg/ml	
Blank Volume, ml	

Insoluble Residue-Water Rinse

Final Wt.	0.0547
Filter Tare Wt.	0.0162
Insol. Part. Wt.	0.0385

Water Wash Analysis, Bottle No.

Beaker Wt., gms	152.0724
Tare Wt. (No. 32)	152.0704
Soluble Part. Wt., gms	0.0020

Acetone/Front Half/Soluble

Wash Bottle No.	FDD #1
Beaker Wt., Gms.	152.0677
#34 Tare Wt., Gms.	152.0663
Soluble Wt. Gms.	0.0010

Acetone/Back Half/Soluble

Wash Bottle No.	1
Beaker Wt., Gms.	155.7398
Tare Wt., Gms.	155.7388
Soluble Wt, Gms.	0.001

Signature: Michael J. Mease

Date: 9-5-87

Mease Engineering Associates

Environmental Consultants

LABORATORY WORKSHEET

Client: FAYLOR MIDDLEFORK Run No. & Date: 2 8-3-87

Process: ASPHALT DRYER Sample Box No.: 2

Filter Analysis:

Filter Wt., grams	0.9225
Filter Tare, gms	0.6243
Part. Increase, gm.	0.2982

Impinger Water Increase:

Silica Gel Impinger (#4):

Final Wt., gms	863.2
Tare Wt., gms	848.0
H_2O Increase	15.2

Total Water Volume Increase:

Impinger #1	215	ml
Impinger #2	26	ml
Impinger #3	1	ml
Impinger #4	15.2	ml
TOTAL INCREASE	257.2	ml

Impinger Analysis:

Wash Bottle No.	2
Filter Wt., gms	0.0174
Filter Tare, gms	0.0164
Total Insoluble	0.0015
Final Beaker Wt.	152.0851
Tare Wt. (No. 32)	152.0724
Total Soluble	0.0127

Particulate Weight Summary:

Filter	0.2982	
Probe Wash	0.0812	
Impingers (Sol.)		
Impingers (Insol.)	0.0015	
Total (w/imp.)	0.3809	grams
Total (w/o imp.)		grams

Signature: Michael J. Mease

Date: 9-5-87

Probe Wash Analysis:

Wash Volume, ml.	120
Acetone Density, mg/ml	
Blank Volume, ml	

Insoluble Residue-Water Rinse

Final Wt.	0.0887
Filter Tare Wt.	0.0160
Insol. Part. Wt.	0.0727

Water Wash Analysis, Bottle No. 9

Beaker Wt., gms	155.7260
Tare Wt. (No. 31)	155.7230
Soluble Part. Wt., gms	0.0030

Acetone/Front Half/Soluble

Wash Bottle No.	3/5
Beaker Wt., Gms.	158.1841
#33 Tare Wt., Gms.	158.1786
Soluble Wt. Gms.	0.0055

Acetone/Back Half/Soluble

Wash Bottle No.	2
Beaker Wt., Gms.	152.0915
Tare Wt., Gms.	152.0898
Soluble Wt, Gms.	0.0015

Mease Engineering Associates

Environmental Consultants

LABORATORY WORKSHEET

Client: [illegible] Run No. & Date: 3 8-31-87

Process: [illegible] Sample Box No.: 3

Filter Analysis:

Filter Wt., grams 0.8353
Filter Tare, gms 0.6380
Part. Increase, gm. 0.1973

Impinger Water Increase:

Silica Gel Impinger (#4):
Final Wt., gms 547.3
Tare Wt., gms 531.3
H_2O Increase 16.0

Total Water Volume Increase:
Impinger #1 190 ml
Impinger #2 22 ml
Impinger #3 2 ml
Impinger #4 16.0 ml
TOTAL INCREASE 230.0 ml

Impinger Analysis:

Wash Bottle No. 3
Filter Wt., gms 0.0787
Filter Tare, gms 0.0765
Total Insoluble 0.0022
Final Beaker Wt. 158.2101
Tare Wt. (No. 33) 158.1984
Total Soluble 0.0117

Particulate Weight Summary:

Filter 0.1971
Probe Wash 0.1377
Impingers (Sol.)
Impingers (Insol.) 0.0018
Total (w/imp.) 0.3368 grams
Total (w/o imp.) grams

Signature: [illegible]

Date: 9-5-87

Probe Wash Analysis:

Wash Volume, ml. 125
Acetone Density, mg/ml
Blank Volume, ml

Insoluble Residue-Water Rinse
Final Wt. 0.1385
Filter Tare Wt. 0.0759
Insol. Part. Wt. 0.1226

Water Wash Analysis, Bottle No. 4
Beaker Wt., gms 158.198
Tare Wt. (No. 33) 158.187
Soluble Part. Wt., gms 0.012

Acetone/Front Half/Soluble
Wash Bottle No. 2
Beaker Wt., Gms. 157.722
Tare Wt., Gms. 157.700
Soluble Wt. Gms. 0.022

Acetone/Back Half/Soluble
Wash Bottle No. 3
Beaker Wt., Gms. 159.255
Tare Wt., Gms. 159.[illegible]
Soluble Wt, Gms. 0.[illegible]

MEASE ENGINEERING ASSOCIATES

FIELD DATA

Run no. 1

Location MYLOR MIDDLEFIELD

Date 8-31-87

Operator MEASE/[illegible]

Sample box no. 1 A

Initial dry gas meter reading 23.343

K Factor 1.08

C_p 0.84

C_M 1.01

Stack dimen. 51 1/8 x 51.125" ϕ

Stack press., in. H_2O −0.64

Gas composition, % O_2 16.3 15.8 15.6

% CO_2 4.3 4.5 4.5

% N_2

Time, start 7:11 AM

Time, finish 9:06 AM

Ambient Temp., °F 72

Bar. press., in. hg. 30.06

Assumed moisture, % 14-15

Probe tip diameter, in. 3/16 - 0.187

Probe length 6' [illegible]

Probe heater setting 65

Box heater setting 250

Leak checks, pre [illegible]

post: 0.002 CFM @ 7" Hg

Wash bottle no. H_2O [illegible]

Notes: 9:06 - DOWN - SPARED CONTAINER [illegible] AFTER DISCONNECT WITH FINISHED MANUAL [illegible]

TOTAL 111 MINUTES

Point	Clock time	Dry gas meter	Pitot in. H_2O ΔP	Orifice in. H_2O ΔH	Dry gas temp. °F Inlet	Dry gas temp. °F Outlet	Stack temp. °F	Pump vacuum in. Hg.	Impinger temp. °F	Box temp. °F
1	5	25.713	0.71	0.71	81	79	224	4.5	450	225
2	5	28.161	0.73	0.74	90	82	217	5.0	450	220
3	5	30.615	0.74	0.74	94	84	228	5.0	450	225
4	5	32.963	0.68	0.67	97	85	240	4.5	450	220
5	5	35.297	0.68	0.67	98	87	247	4.5	450	225
6	5	37.557	0.62	0.62	97	88	237	4.0	54	215
7	5	40.264	0.93	0.93	95	87	235	5.0	56	220
8	5	42.926	0.85	0.86	96	88	229	5.0	56	225
9	5	45.978	1.18	1.13	95	82	264	6.0	56	225
10	5	48.738	1.11	1.08	95	87	260	6.0	57	230
11	5	51.403	0.93	0.91	99	88	249	5.5	58	240
12	5	53.882	0.92	0.79	103	90	244	5.0	57	240
13	5	56.160	0.82	0.68	98	91	266	5.0	52	225
14	5	58.944	1.21	1.00	104	93	270	5.5	53	230
15	5	61.780	1.35	1.12	108	95	272	6.0	56	240
16	5	64.818	1.42	1.20	111	96	261	6.5	56	240
17	5	67.801	1.26	1.08	110	97	252	6.0	57	235
18	5	70.538	1.18	1.01	111	98	261	6.0	57	230
19	5	73.162	0.97	0.85	112	99	234	5.0	57	215
20	5	75.618	0.83	0.73	111	99	233	5.0	57	220
21	5	78.036	0.81	0.71	110	100	239	5.0	56	225
22	5	80.438	0.81	0.72	107	100	228	5.0	56	220
[illegible]	1	[illegible]	0.74	0.65	105	100	219			
AVG										

MEASE ENGINEERING ASSOCIATES

FIELD DATA

Run no. 2
Location PAYLOE MIDDLE CREEK
Date 8-31-87
Operator MEASE/KARDAMIS
Sample box no. 2

K Factor 1.08
C_p 0.84
C_M 1.01
Stack dimen. -0.64
Stack press., in. H_2O
Gas composition, % O_2 16.1 13.6 16.5
% CO_2 3.7 5.7 4.0
% N_2
Time, start 10:46 AM
Time, finish 12:48 PM

Ambient Temp., °F 73
Bar. press., in. hg. 30.05
Assumed moisture, % 14.15
Probe tip diameter, in. 3/16 = 0.189
Probe length 6' GLASS
Probe heater setting 65
Box heater setting 250
Leak checks, pre: 0.012 cfm @ 16" H_2O (vac)
post: 0.007 cfm @ 7.5" Hg
Wash bottle no. WATER #3
Acetone #2b

Initial dry gas meter reading 81.928

Notes:

Point	Clock time	Dry gas meter	Pitot in. H_2O ΔP	Orifice in. H_2O ΔH	Dry gas temp. °F Inlet	Dry gas temp. °F Outlet	Stack temp. °F	Pump vacuum in. Hg.	Impinger temp. °F	Box temp. °F
1	5	84.961	1.18	1.16	84	84	188	6.5	450	240
2	5	87.763	1.09	0.97	93	92	214	6.0	450	250
3	5	90.456	1.01	0.89	96	92	220	5.5	450	250
4	5	92.939	0.82	0.76	99	93	223	5.0	450	250
5	5	95.358	0.84	0.71	96	92	245	5.0	450	245
6	5	97.617	0.74	0.61	98	93	269	4.5	450	245
7	5	99.943	0.81	0.66	98	94	282	5.0	450	250
8	5	102.258	0.83	0.67	100	96	288	5.0	54	240
9	5	104.448	0.84	0.68	101	97	290	5.0	56	250
10	5	107.036	0.84	0.68	102	97	290	5.0	57	240
11	5	109.348	0.78	0.64	104	98	282	5.0	57	250
12	5	111.488	0.66	0.56	103	99	253	4.0	60	250
13	5	113.911	0.83	0.70	99	98	256	5.0	60	230
14	5	116.201	0.75	0.63	100	98	257	5.0	58	235
15	5	118.376	0.71	0.61	99	98	242	4.5	57	240
16	5	120.590	0.71	0.60	96	95	246	4.5	56	235
17	5	122.778	0.71	0.60	96	95	248	4.5	57	240
18	5	125.251	0.84	0.73	98	96	234	5.5	58	235
19	5	127.678	0.82	0.70	99	96	241	5.0	59	225
20	5	130.056	0.79	0.68	98	96	238	5.0	57	230
21	5	132.666	0.98	0.84	99	95	240	5.5	57	225
22	5	135.464	1.07	0.91	100	96	253	6.0	55	230
23	5	138.091	1.02	0.96	99	96	246	6.0	56	[illegible]
24	[illegible]	140.[illegible]	[illegible]	[illegible]	101	96	241	4.0	57	[illegible]

MEASE ENGINEERING ASSOCIATES

FIELD DATA

Run no. 3
Location FANOR MOBILEHEEK
Date 8-31-87
Operator [illegible]
Sample box no. 3

K Factor 1.08
C_p 0.84
C_M [illegible]
Stack dimen. 51.125" ø
Stack press., in. H_2O -0.64
Gas composition, % O_2 16.4 15.7 16.0
% CO_2 4.2 4.7 4.6
% N_2
Time, start 1:47 PM
Time, finish 4:37 PM

Ambient Temp., °F 82
Bar. press., in. hg. 30.06
Assumed moisture, % 14.15
Probe tip diameter, in. 3/16 - 0.187
Probe length 6' STAINLESS
Probe heater setting 65
Box heater setting 240
Leak checks, pre: 0.017 cfm @ 16" Hg
post: 0.006 cfm @ 17" Hg
Wash bottle no. WATER / ACETONE

Notes: 4% MW FOR ST DUE TO [illegible] MOISTURE MEASUREMENT
@ STARTING 3 HR. PLUS MORE 3 HR

Initial dry gas meter reading 140.600

Point	Clock time	Dry gas meter	Pitot in. H_2O ΔP	Orifice in. H_2O ΔH	Dry gas temp. °F Inlet	Dry gas temp. °F Outlet	Stack temp. °F	Pump vacuum in. Hg.	Impinger temp. °F	Box temp. °F
1	4.5	140.286	0.92	0.88	94	93	167	4.5	450	230
2	4.5 9.0	145.117	0.74	0.66	98	97	213	4.0	450	250
3	4.5 13.5	147.156	0.70	0.62	100	98	225	4.0	450	235
4	4.5 18.0	149.173	0.70	0.61	101	98	237	4.0	450	240
5	4.5 22.5	151.163	0.67	0.58	101	98	242	4.0	450	245
6	4.5 27.0	153.188	0.72	0.62	100	98	245	4.0	450	250
7	4.5 31.5	155.252	0.76	0.65	102	98	249	4.5	52	240
8	4.5 36.0	157.493	0.91	0.77	102	98	254	5.0	53	230
9	4.5 40.5	159.714	0.96	0.81	105	99	258	5.0	56	225
10	4.5 45.0	162.191	1.02	0.86	106	99	258	5.0	57	230
11	4.5 49.5	164.329	0.77	0.67	106	99	241	4.5	56	225
12	4.5 54.0	166.273	0.62	0.57	106	100	200	4.0	54	230
13	4.5	168.722	1.10	0.96	103	100	238	5.5	59	250
14	4.5 58.5	171.176	1.06	0.91	106	101	246	5.5	59	230
15	4.5 63.0	173.366	1.00	0.86	93	91	230	5.0	60	240
16	4.5 67.5	175.756	0.84	0.73	96	94	234	5.0	61	240
17	4.5 72.0	177.996	0.83	0.72	98	95	239	5.0	62	250
18	4.5 76.5	180.048	0.80	0.69	98	95	242	4.5	63	220
19	4.5 81.0	182.081	0.73	0.62	99	95	249	4.0	64	230
20	4.5 85.5	183.976	0.65	0.55	99	95	258	4.0	63	235
21	4.5 90.0	185.914	0.75	0.61	102	96	279	4.0	60	230
22	4.5 94.5	187.902	0.79	0.64	102	96	289	4.0	61	240
23	4.5 99.0	189.816	0.80	0.60	102	96	265	4.0	62	230
24	4.5 103.5	191.912	0.62	0.54	103	98	241	3.5	60	240

taylor
middlecreek
inc

September 3, 1987

SUBJECT: WINFIELD BLACKTOP PLANT, PROCESS DESCRIPTION

Michael J. Mease, President
Mease Engineering Associates
P O Box 721
State College, PA 16804

Dear Mr. Mease:

I have enclosed a process description for our Winfield batch asphalt plant which was prepared for your stack test report by Albert Mabus.

Also included is a summary of the plants operating parameters on the day of the test, a process flow diagram and a McCarter baghouse brochure.

At your earliest convenience, please send us a copy of your findings to this office.

Sincerely yours,

FAYLOR-MIDDLECREEK, INC.

M. LEE EBERHART, JR.
President

MLEJR/AM/cfb

Enclosure

RECEIVED
SEP 1 1987
DER-AIR QUALITY CONTROL
WILLIAMSPORT REGION

p.o. box 177 winfield, pennsylvania 17889 phone (717) 524-2251

PROCESS DESCRIPTION

The asphalt plant operated by Faylor-Middlecreek, Inc. in Winfield, Pennsylvania was designed by The McCarter Corporation. The batch asphalt plant is a new McCarter M-300-18. The primary collector is a new McCarter McC 10' x 10' knockout box. The knockout box is followed by a McCarter McC-648-S baghouse. The baghouse, although it is not new, was retrofitted with 648 new single 14 ounce Nomex/glass felt bags which were purchased from the McCarter Corporation. Figure 1 shows a simplified process flow for the Winfield plant.

The process begins with the loading of the sized aggregates into the seven aggregate storage bins. From these bins calabrated feeders control the amount of material which is loaded onto the conveyor under the storage bins. A typical ratio for ID-2 wearing(top) would be 60 percent PA #1 aggregate(screenings) and 40 percent #1B aggregate. A typical ratio for base material(BCBC or ID-2 Binder) would be 70 percent 2B aggregate and 30 percent PA #1 aggregate(screenings).

The aggregate is transported from the storage bins by conveyors to the rotary dryer where it is heated from 250° to 350° F. The dryer is heated by a Hauck burner. The fuel firing rate ranged from 402 gallons per hour to 414 gallons per hour or from 1.64 gallons per ton to 1.68 gallons per ton. The burner is fired with reprocessed oil, R-100, which is purchased from the Baumgardner Company.

Once heated and dryed the aggregate discharges from the dyer to the hot elevator where it is transported by buckets to the hot screens. The aggregate is then screened and separated by size into the appropriate hot bin. The aggregate then drops from the hot bins into the weigh hopper according to the mix designs. Once the desired weight is reached the aggregate drops from the weigh hopper into the pug mixer. The aggregate is mixed dry for a designated period and the asphalt is injected into the pug mixer where the aggregate and asphalt are remixed. Roughly 6 percent asphalt is added to ID-2 wearing(top) and 4 percent asphalt is added to base mixes.

Once mixed the blacktop can be dumped directly from the pugmixer to the waiting truck or it can be transferred from the pug mixer to a drag conveyor and then to one of two storage silos. From the silos the blacktop can be dumped into the waiting truck.

Emissions are captured at various points on the plant and are routed by duct work to the knockout box where the larger particles settle out and are reintroduced into the hot elevator. From the knockout box the exhaust is drawn into the baghouse(See Supplement #1) by a 150 horsepower #49 exhaust fan. The clean air is drawn through the bags which are cleaned by 80 p.s.i.g. pulses of air and exits the baghouse through the stack. There are 12 compartments of bags, six on each side of the baghouse. Each compartment has nine rows of bags with six bags in each row or 54 bags in each compartment. One row of bags in each compartment is pulsed every fifteen seconds. The dust is knocked off of the bags during the pulsing and falls to the bottom of the baghouse and is removed by a screw conveyor. The dust is blown continuously from a rotary airlock valve to a dust storage silo. The dust is removed from the dust silo by a paddle auger. Water is introduced before the dust leaves the

auger. The dust is loaded onto haul trucks for transport and stockpiling.

Process information, taken by Albert Mabus a Faylor-Middlecreek, Inc. employee, has been summarized in Table 1. Plant production was determined by use of printed tickets and by taking direct samples from the conveyors under the storage bins. Fuel firing rate was determined by taking readings from a fuel usage meter located before the Hauck burner. Static Pressure readings were taken from the Magnahelic gauge in the operators control room.

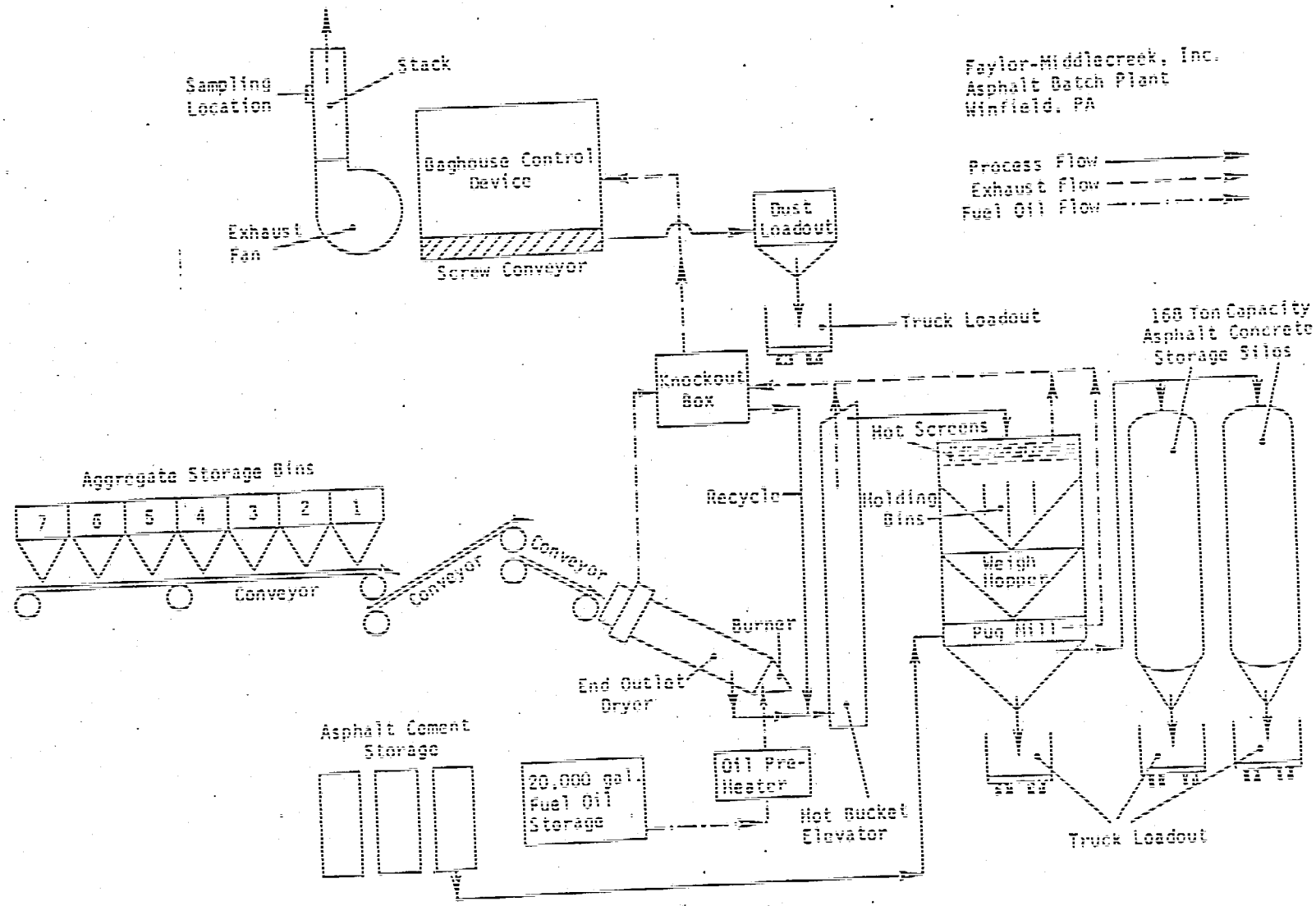
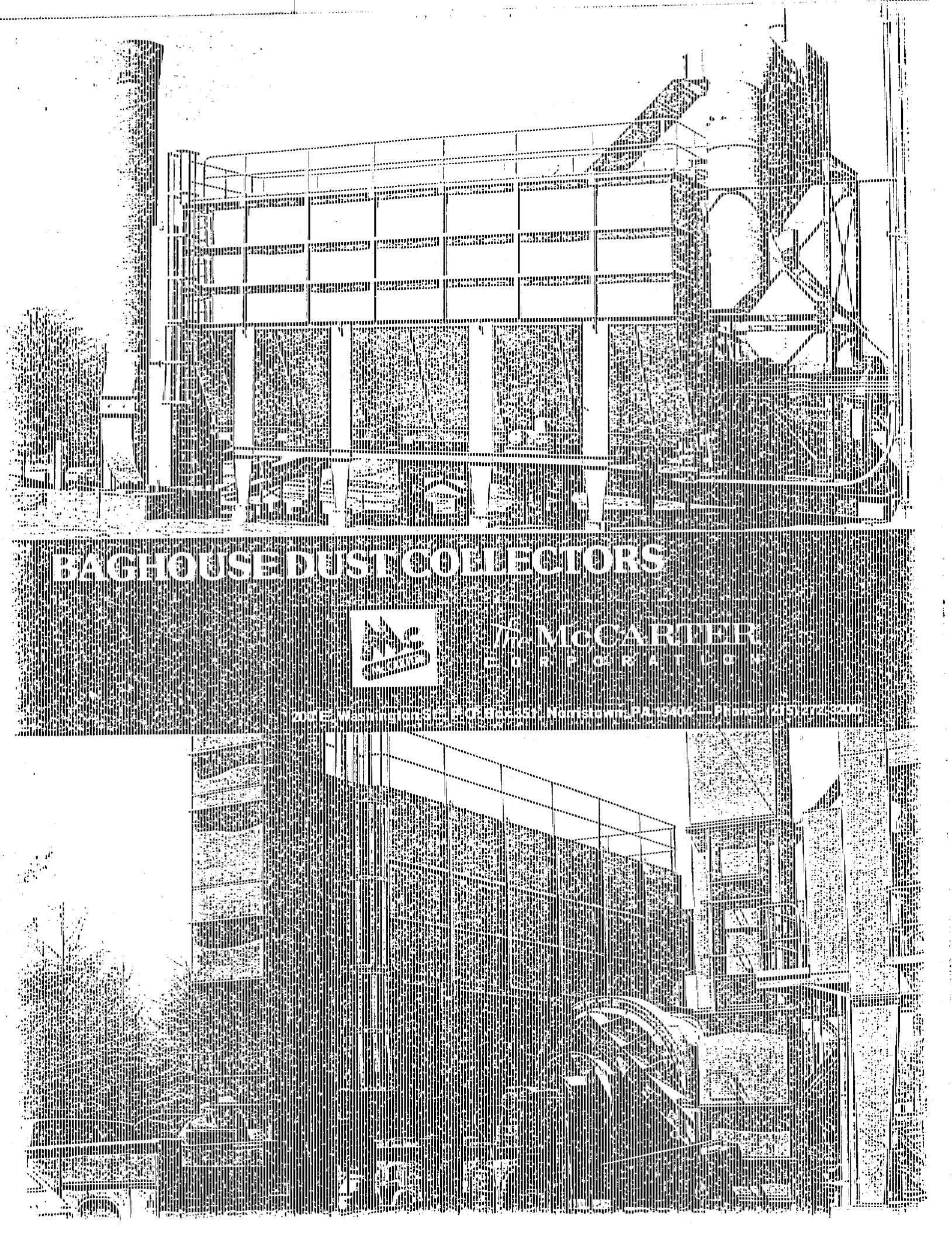
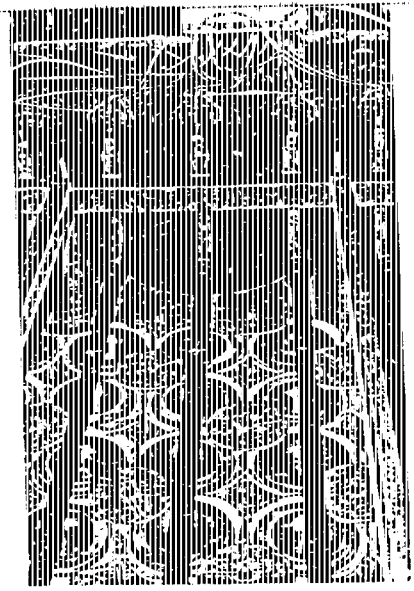


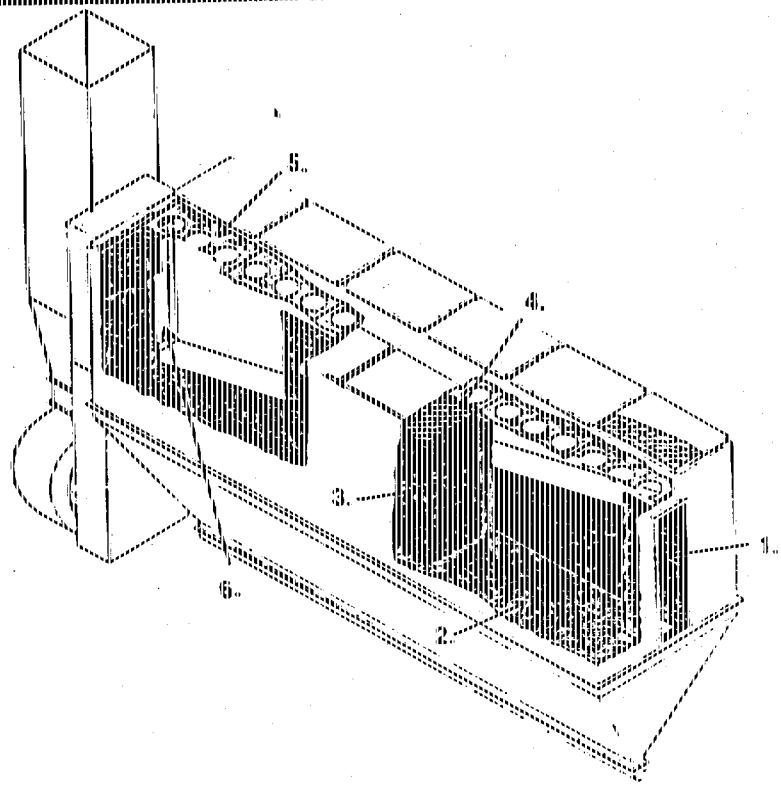
Figure 1. Process Flow Diagram


BAGHOUSE DUST COLLECTORS
McCARTER
CORPORATION

Only McCarter Offers ALL These Features



- Tube sheets are fabricated from ¼" plate; screw conveyor flights are 3/16".
- Access to the tube sheet for changing bags is facilitated by large, easily removed covers.
- Heat resistant paint is applied to the interior of the baghouse covers and the top of the tube sheet to help prevent corrosion.
- Grease fittings are located externally for easy lubrication of screw conveyor fittings.
- Clean-out doors are located under the hanger bearings, allowing the bearing to be changed from outside the baghouse.
- McCarter baghouses are built for asphalt plant use by a manufacturer of asphalt plants.
- The baghouse may be used with or without a primary dust collector; the center plenum acts as a giant knock-out box for coarse particles.
- Low air velocities and low static pressure are due to the center plenum design that uniformly distributes the air flow over all the bags.
- Field erection costs are reduced with the modular shop-wired, fully assembled two piece design.



Air Flow

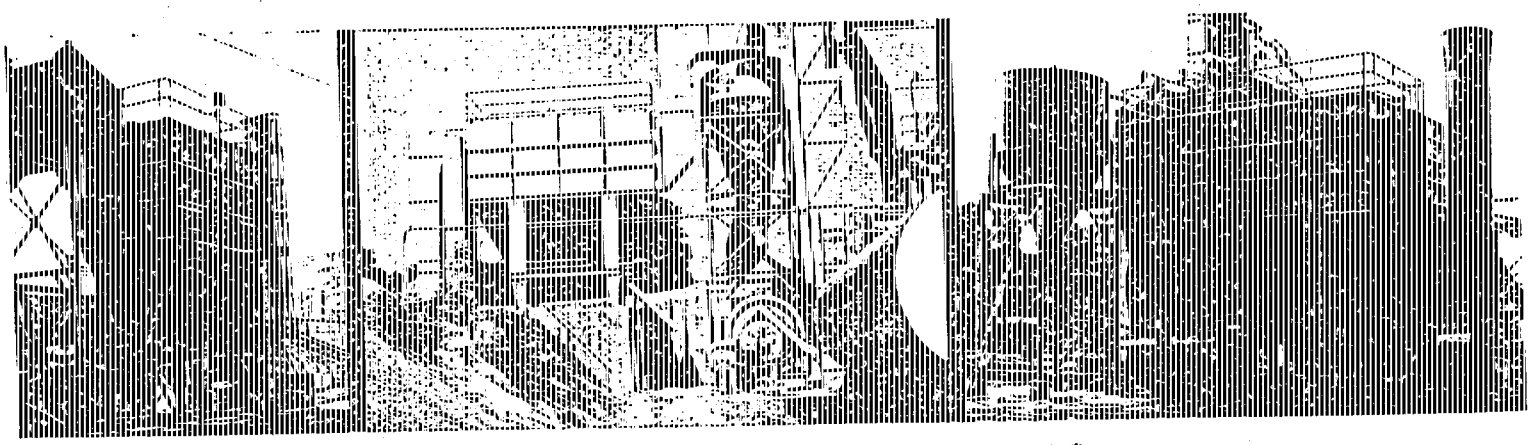
1. Dirty, dust-laden air from dryer exhaust enters the intake plenum
2. Reduction of exhaust velocity in the hopper section causes larger particles to drop from suspension
3. Air passes into and through filter bags, leaving particulate matter on the outside of the bags
4. Cleaned air exits from inside the bags into the upper chamber
5. Clean air is then drawn into the clean air exhaust plenum
6. From the exhaust plenum, the clean air exits from the baghouse and is drawn into the exhaust stack

Jet-Pulse Instantaneous Cleaning Action

- Air is distributed evenly to every bag to insure extended life.
- Only the highest quality Nomex bags are used, sewn by nationally known manufacturers.
- Collector always remains operational ——— even during the cleaning cycle.
- Fully adjustable solid state pulse frequency and duration control meets all requirements.
- Power savings provided by low back-pressure design.
- Meets ALL air pollution codes — PERIOD!

Cover Photographs: Top McC-756 Bottom McC-648

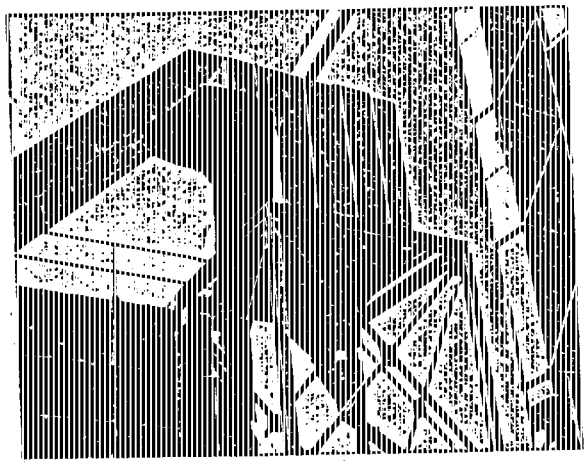
Some of the More than 100 Baghouses McCarter Has Built



McC-324-S McC432-S McC540-S

Other McCarter Dust Handling Equipment

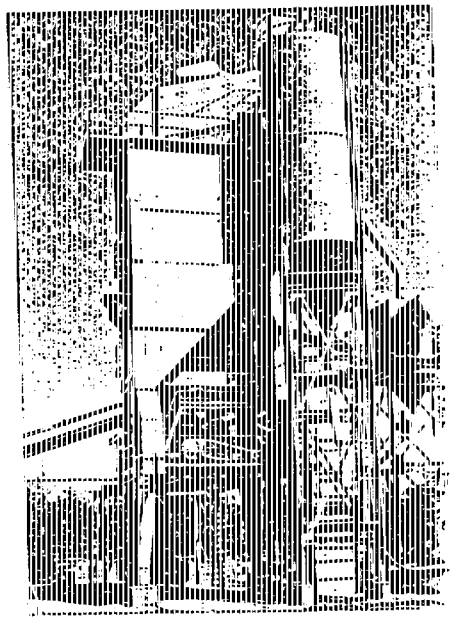
In addition to the full range of baghouse sizes, McCarter offers a complete line of dust handling equipment. Our engineering department can analyze your particular situation and recommend the proper combination of components to meet your specific needs.



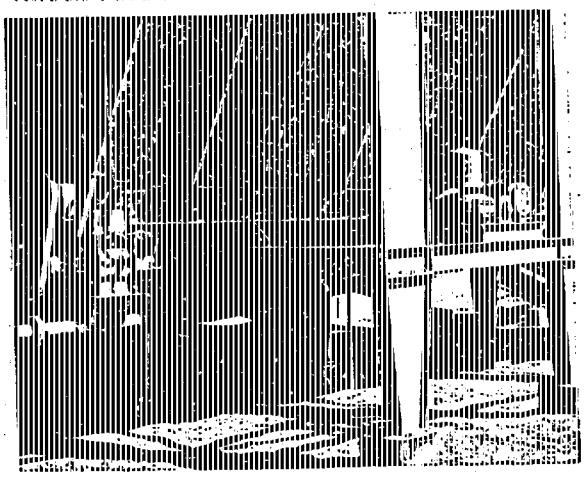
Knock-out Box

Which better satisfies your needs for a primary dust collector; a knock-out box or cyclone? Both types of collectors are manufactured by McCarter so that you have a choice, depending on the gradation split you desire. The collectors are heavy construction and are provided with a one-piece welded frame for easy installation. We can also provide low velocity connecting ductwork.

McCarter also provides options for dust transfer systems in conjunction with the dust handling equipment. Depending on the particular circumstances, our engineering staff will determine whether a dust transfer pod or a continuous constant speed blower is the best choice, taking into consideration all the other equipment in the system as well as the customer's needs.



300 Ton Dust Silo

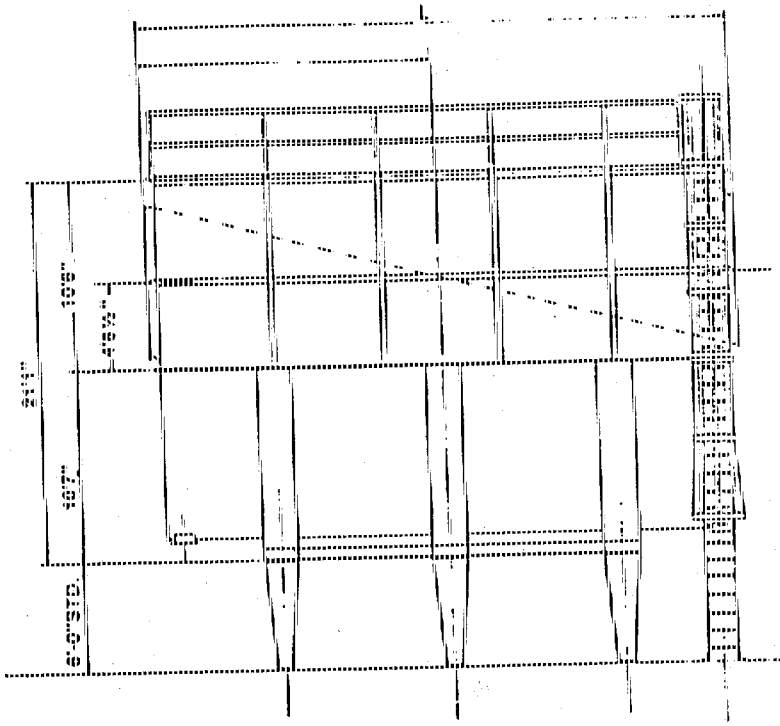


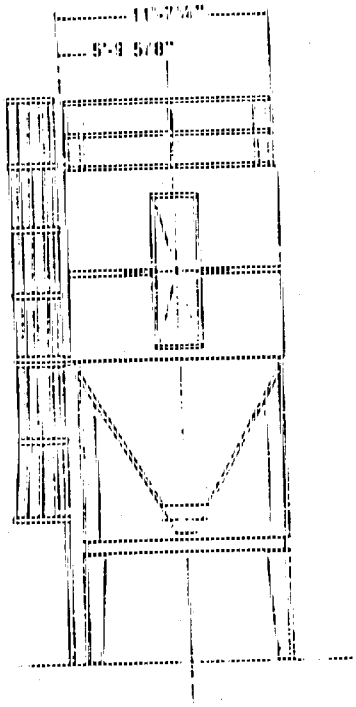
Rotary Airlock with Constant Speed Blower

If you need a dust or mineral filler silo, McCarter is also able to supply th Whether your requirements are large or small, McCarter has a silo size to your needs. All McCarter silos feature internal fill lines, steep sloping nec "fluffers" on the cone section PLUS the capability of selecting eithe pneumatic transfer system or screw conveyor to transfer material from silo to the weigh hopper.

McCARTER EQUIPMENT ——— designed with integrity, built with care, so can BUY WITH CONFIDENCE!

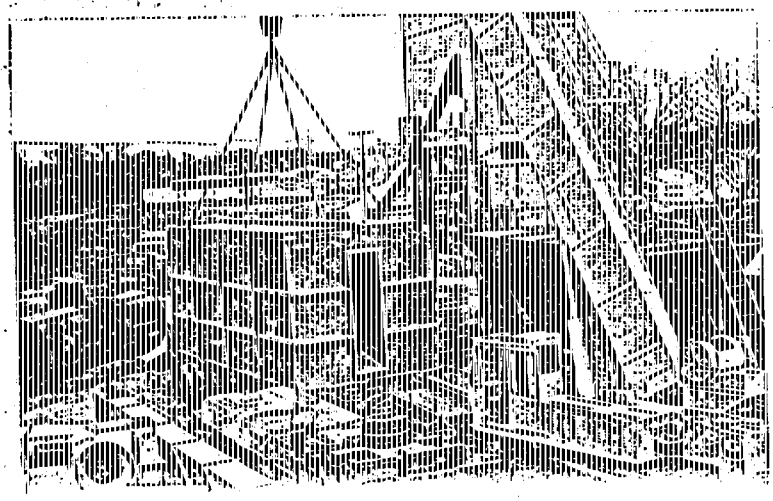
PECIFICATIONS FOR McCARTER ENTER-PLENUM BAGHOUSES





McCarter Model Number	Design CFM Capacity At 250° F*	Cloth Area Sq. Ft.	No of Bags	Length	CFM of 120 psi Cleaning Air Reqd	Approx. Shipping Weight (lbs.)
SINGLE BAG DESIGN (Based on 6.0:1 air to cloth ratio)*						
McC-324-S	27,500	4,500	324	19'-9"	65	18,000
McC-432-S	36,650	6,110	432	26'-0"	85	23,000
McC-540-S	45,800	7,640	540	32'-3"	105	29,000
McC-648-S	55,000	9,160	648	38'-6"	130	36,000
McC-756-S	64,150	10,690	756	44'-9"	150	46,000
DOUBLE BAG DESIGN (Based on 5.5:1 air to cloth ratio)*						
McC-324-D	39,600	7,200	324	19'-9"	65	18,000
McC-432-D	52,800	9,600	432	26'-0"	85	23,000
McC-540-D	66,000	12,000	540	32'-3"	105	29,000
McC-648-D	79,200	14,400	648	38'-6"	130	36,000
McC-756-D	92,400	16,800	756	44'-9"	150	46,000

* slightly higher or lower ratios can be applied.



McCARTER

200 East Washington St. P.O. Box 351
Norristown, Pennsylvania 19404
Phone: (215) 272-3200

ADDITIONAL PRODUCTS:

Complete Asphalt Batch Plants
Bucket Elevators
Rotary Airlocks
Duct Work

taylor
middlecreek
inc

SUMMARY OF TABLE I PLANT OPERATING PARAMETERS

Test Date	8/31/87	8/31/87	8/31/87
Test Number	1	2	3
Production Rate (tons/hour)	240	252	249
Fuel Firing Rate (gals./hour)	402	414	414
Fuel Useage (gals./ton)	1.68	1.64	1.66
Baghouse Static Pressure(inches)	5.2	5.1	5.5
Mix Type During Test	95.6% ID-2 Wearing(Top)	62.6% ID-2 Wearing (Top)	87.5% ID-2 Wearing (top)
	4.4 % B.C.B.C.(Base)	31.4 % ID-2 Binder (Base)	7.0 % ID-2 Binder (Base)
		6.0 % B.C.B.C. (Base)	5.5 % B.C.B.C. (Base)

SECTION 3.0

Test Procedures

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120

July 17, 1987

Bureau of Air Quality Control

717-787-6547

Mr. Michael J. Mease
Mease Engineering Associates
P.O. Box 721
State College, PA 16804

Dear Mr. Mease:

The particulate test plan submitted for the Faylor-Middlecreek, Inc., Union Township batch asphalt plant is acceptable to the Department.

Final acceptance of the test report will be contingent upon fulfilling all of the applicable requirements of Chapter 139 of the Department of Environmental Resources' Rules and Regulations and the Source Testing Manual.

If you should have any questions regarding this matter, please feel free to contact me.

Very truly yours,

Richard St. Louis, Chief
Source Testing Unit

Mease Engineering Associates

Engineers & Surveyors

July 08, 1987

Mr. Richard Maxwell
Bureau of Air Quality Control
Pennsylvania Department of Environmental Resources
200 Pine Street
Williamsport, PA 17701

Re: Source Test Protocol
Taylor Middlecreek
Winfield, PA

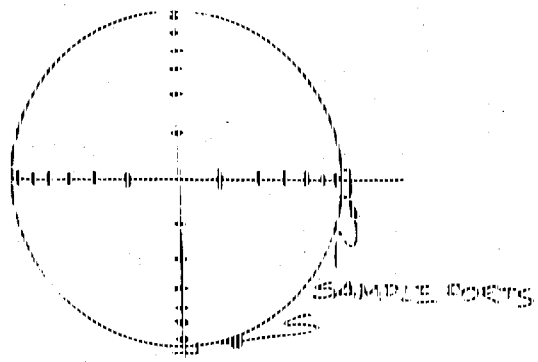
Dear Mr. Maxwell:

We hereby propose to perform a series of particulate source emission tests at the subject facility with the following test procedures:

Three particulate tests of approximately two hours each will be conducted using the DER procedures (back half analysis of test train included) on an asphalt dryer/baghouse process.

The vertical stack is forty-two inches in diameter and approximately forty feet high. The two sampling ports will be located approximately 80% of the distance between the fan inlet to the stack feet and the top of the stack (estimate of 4 diameters downstream and 1 diameter upstream from flow disturbances). We anticipate sampling twenty four sampling points (twelve per traverse) at five minutes each for a total test time of one hundred twenty minutes. We propose to perform three tests, with a minimum sample volume of 50 DSCF per emission test.

The sampling ports and sample point configurations are:



P.O. BOX 721 • STATE COLLEGE, PENNSYLVANIA 16804 • PHONE 814-692-4225

Sampling points will be located at the following points:

Point	% Diameter	Location (In. from stack wall)
1	2.1	1.00
2	6.7	2.81
3	11.8	4.96
4	17.7	7.43
5	25.0	10.50
6	35.6	14.95
7	64.4	27.05
8	75.0	31.50
9	82.3	34.57
10	88.2	37.04
11	93.3	39.19
12	97.9	41.00

Stack gas composition will be determined with several grab samples using a Fyrite Analyzer at the stack sampling ports.

The emission test train will use the standard Research Appliance Company "STAKSAMPLR", model #2343, with a stainless steel probe. Should cyclonic flow be evident, the test procedures will be discussed with D.E.R. officials prior to the commencement of tests.

We anticipate one test day to complete the tests. We will perform test equipment preparations and flowrate checks the day before testing and begin testing early the following morning. The typical uneven operation of asphalt plants may require a second day of testing. The tests are tentatively scheduled for the week of August 31, 1987. Sampling may begin Monday morning. We certainly will call with the exact test date and time.

Very truly yours,

MEASE ENGINEERING ASSOCIATES

Michael J. Mease, P.E.
President

MJM: eps
ccs: Mr. Albert Mabus
Faylor Middlecreek

ATTACHMENT NO. 2
DER ANALYTICAL PROCEDURES

DETERMINATION OF PARTICULATE EMISSIONS FROM SOURCE TESTS

I. Introduction

This procedure determines gravimetrically the particulate captured on collection surfaces and in solutions during source testing. The sampling train should be analyzed within a maximum of 48 hours after collection.

II. Pretest Preparation

A. Field Materials

1. Glass fiber filters, Gelman type A, or equal.
2. Alundum thimbles, Norton grades AL788, AL899, AL485, or equal.
3. Triple distilled and deionized water.
4. Acetone, reagent grade.
5. Silica gel, indicating type, 6-16 mesh.

B. Glass Fiber Filters

1. Heat the filter to 900°F for one hour then desiccate for 24 hours.
2. Identify all filters sequentially using a five-digit number. The first digit equals the diameter of the filter; e.g., "30079" signifies the 79th 3" filter weighed.
3. Weigh the filter to the nearest 0.1 mg. Record the weight, the identification number and the date.
4. Place the filter in a clean, dry container (petri dish) which is identified with the number of the enclosed filter and seal the container. DO NOT FOLD FILTERS.

C. Alundum Filters

1. Sand the lip and outside of the filter (thimble) to remove loose particles. Check the thimble to assure a proper seal in the filter holder.
2. Wash the thimble a minimum of four times in clean distilled water using an ultrasonic cleaner. Use clean water each time.
3. Air dry the thimble.
4. Identify the thimbles sequentially using Coors ceramic ink. Use an alpha numeric system of five characters. The first is the letter A; e.g., "A0079" signifies the 79th alundum filter weighed.

5. Place the thimble in a cold muffle furnace and heat to 600°F at a rate not to exceed 200°F per hour. Increase the temperature to 1200°F and hold for four hours minimum.

6. Cool in a desiccator for 24 hours and weigh to the nearest 0.1 mg. Record the weight, identification number and date.

7. Place the thimble in a clean, dry container which is identified with the number of the enclosed thimble and seal the container.

D. Distilled Water, Acetone, and Silica Gel

1. Provide triple distilled, deionized water for the collection train and cleanup procedures and acetone for cleanup.

2. Store each in a sealable, clean container.

3. Retain a sample of each for a blank determination.

4. Dry approximately 300gm of silica gel at a temperature of 105°C for approximately 12 hours. Desiccate until cool and place in an air-tight container.

III. Particulate Analysis

A. Procedures

1. Remove the used glass fiber or alundum filters carefully to prevent loss of collected particulate or filter material and store in their original, relabeled, clean containers (separate petri dishes).

2. Measure to the nearest ml the volume of liquid in each impinger and record.

3. Place the impinger solutions in a labeled container and wash any residue in the impingers into the container using distilled water.

4. Add the washings from the back-half of the filter holder and inter-connecting glassware to step 3.

5. Wash the nozzle, probe, front-half of the filter holder, and the cyclone or cyclone bypass into a labeled container using distilled water. NOTE: any dry material in the cyclone is brushed onto the glass fiber filter.

6. Wash with acetone the impingers and the components in step 4 into a labeled container.

7. Wash with acetone the components in step 5 into a labeled container.

NOTE:

Steps III.A.1 through 7 are the responsibility of the source test team leader. When multiple tests are conducted and it is necessary to clean the sampling train in the field, proceed in accordance with these steps. Store the samples in an airtight, cool or refrigerated condition.

8. Identify and desiccate for 24 hours, a sufficient number of 0.22μ membrane filters to filter all liquid collections and washings.

9. Weigh and record the weights of the membrane filters.

10. Filter the solutions from (step 4) and (step 5) separately using preweighed and identified membrane filter(s). It may be necessary to start with an 0.8μ filter then finally the 0.22μ filter.

11. Measure the two filtrates from step 10 to the nearest ml and record the volumes.

12. Air dry, then desiccate for 24 hours, all membrane filters used in the above steps. Weigh to the nearest 0.1 mg and record the weights.

13. Identify and dry for two hours at 105° ± 5°C sufficient evaporating dishes to evaporate the filtrates. Desiccate until cool and weigh to the nearest 0.1 mg. Record the weights with their identification numbers.

14. Using the evaporating dishes, evaporate 300 ml of the filtrates from step 11 and 300 ml of the distilled water (blank) at a constant temperature of 105° ± 5°C. Desiccate the residue until cool, weigh until constant weights are achieved to the nearest 0.1 mg and record the final weight. THE WASHINGS FROM EACH INDIVIDUAL COLLECTION TRAIN HALF ARE TO BE KEPT SEPARATE.

15. Quantitatively transfer an equal volume of acetone washing (from steps 6 and 7) into separate preweighed evaporating dishes after measuring and recording each volume of acetone. AS ABOVE, KEEP EACH COLLECTION TRAIN HALF SEPARATE.

16. Place a measured quantity of unused acetone, equal to the transferred volume of acetone washing, into a preweighed evaporating dish for use as a blank.

17. Evaporate both the blank and the washings from steps 15 and 16 in a vacuum at 60°C.

18. Desiccate to constant weight, reweigh and record.

19. Handle the used glass fiber or alundum filters carefully to prevent loss of material.

20. Air dry the used alundum and glass fiber filters if necessary, desiccate 24 hours and weigh. Record the weights and the identification numbers.

21. Weigh and record the spent silica gel to the nearest 0.5gm.

22. Dry the spent silica gel at a temperature of 105°C for 12 hours.

23. Desiccate until cool then reweigh to the nearest 0.5gm and record.

B. Calculations

1. Front or Back-Half Water Wash

For each:

a. Insoluble Particulate

membrane filter weight - membrane filter tare weight

b. Soluble Particulate

$$(\text{filtrate dish wt.-tare wt.}) - (\text{water blank wt.-tare wt.}) \times \frac{\text{final wash vol.}}{\text{aliquot}}$$

2. Front- or Back-Half Acetone Wash

For each:

a. Soluble Particulate

$$(\text{washings dish wt.-tare wt.}) - (\text{acetone blank wt.-tare wt.}) \times \frac{\text{final acetone}}{\text{aliquot}}$$

3. Glass Fiber Filter or Alundum Filter

a. Insoluble Particulate

used filter weight - filter tare weight

4. Water Vapor

a. Silica gel

weight of spent silica gel - weight of dried silica gel

b. Impinger solution

final impinger volumes - initial impinger volumes

October 1982

SAMPLING TRAIN COMPONENTS, METHOD OF USE, AND ANALYTICAL TECHNIQUES

A. Components

1. Stainless steel or glass probe with minimum 3/16 inch diameter opening, heated above the dew point of the gas stream to be sampled.

2. Glass cyclone efficient for removal of particles of 5 microns or greater, and cyclone collection flask. In cases of low particulate loadings, a glass cyclone eliminator may be substituted.

3. In-line filter of 0.3 micron porosity.

4. Heated chamber for maintaining glass fiber filter and cyclone above the dew point of the gas stream to be sampled.

5. Impingers placed in the following order:

   a. A 500 ml. modified Greenburg-Smith impinger filled with 100 mls. of distilled deionized water.

   b. A 500 ml. Greenburg-Smith impinger filled with 100 mls. of distilled deionized water.

   c. A 500 ml. modified Greenburg-Smith impinger left dry to act as a water trap to remove entrained water.

   d. A 500 ml. modified Greenburg-Smith impinger containing approximately 200 grams of precisely weighed silica gel.

6. An ice bath in which the impingers are partially submerged to maintain exit temperature well below the dew point of the gas to be sampled.

7. Dry gas meter equipped with a vacuum gage registering up to 30 inches of mercury, and a calibrated orifice.

B. General Sampling Procedure

1. Starting with clean equipment, a leak check is performed by drawing a vacuum of 15 inches on system as indicated on the vacuum gage. Leak checks are also performed post-test and corrections may be necessary to account for increases in the leakage rate.

2. The sample is collected at isokinetic rates based upon a velocity profile determined with the use of an "S" type pitot tube.

3. Samples are taken at multiple points across the gas stream representing equal areas of cross-sectional flow, and each point is sampled for as long a time as is feasible.

4. Moisture content of the gas stream is determined by the condensation method, using a series of cooled impingers described above (A-5).

5. The duration of the test depends on the number of sample points and the time required to equally sample each point. In no case will the sample time be less than that required to collect a sufficient sample for complete analysis.

C. Analytical Techniques

1. Before use, the filter is desiccated for a period of 24 hours and weighed to the nearest 0.1 mg.

2. When processing the sample, any material deposited inside the sample probe, glass cyclone (or cyclone eliminator) and the front half of the filter holder is washed into a container using acetone, or other suitable solvent, evaporated to dryness at either ambient conditions or below the boiling point of acetone (55°C), desiccated for a period of 25 hours, and weighed to the nearest 0.1 mg.

3. After sampling, the in-line glass fiber filter is desiccated for a period of 24 hours and weighedto the nearest 0.1 mg.

4. The moisture content is determined by collecting the liquid in the impingers described above and measuring. the difference between 200 ml. and the measurement is recorded as increase in water. The spent silica gel is weighed to the nearest 0.1 gram and the increase is included in the moisture content determination.

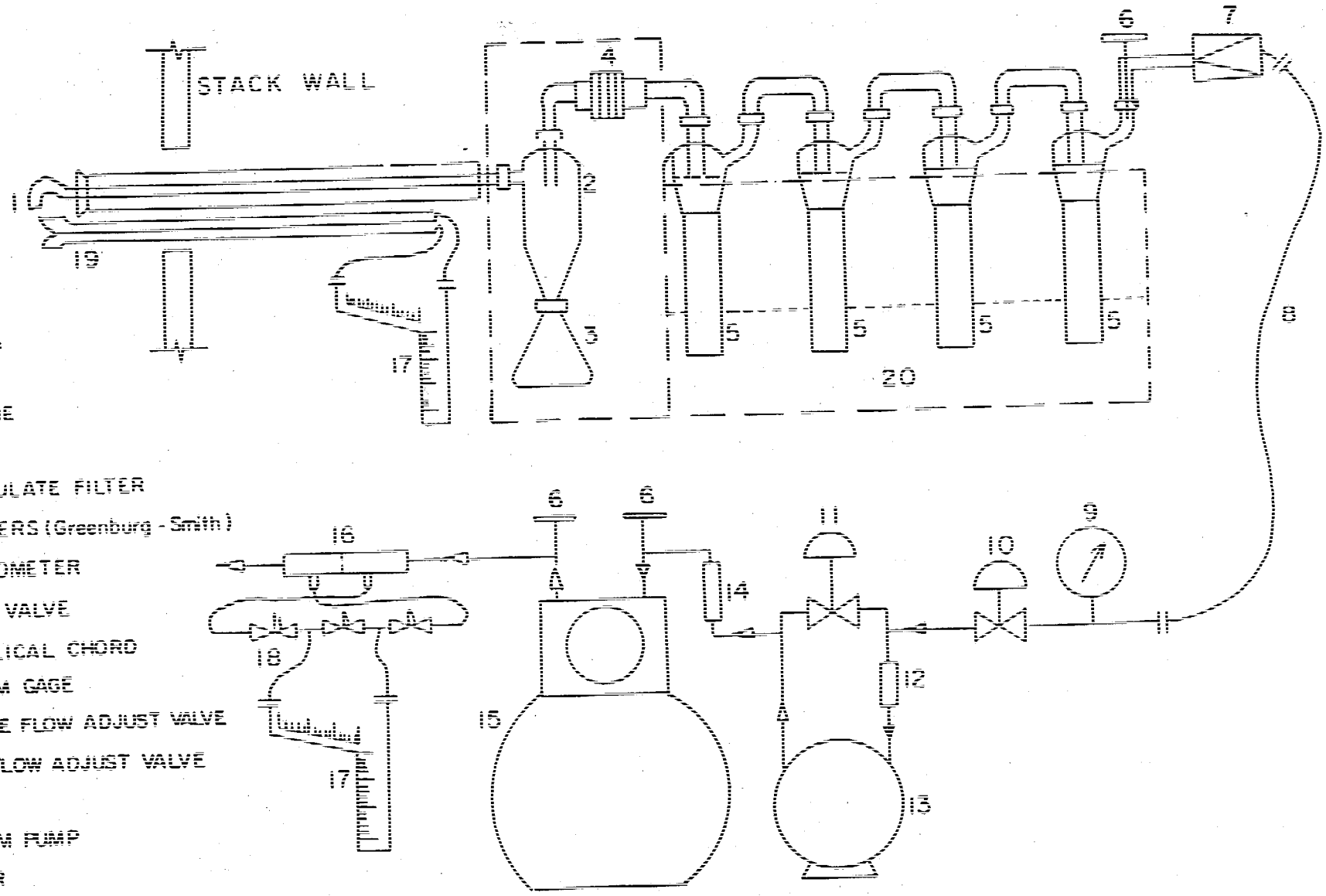
5. The liquid in the impingers may be analyzed for particulate matter and the weights may be included in the particulate catch.

6. The total particulate in the system is the sum of that collected in Nos. 2,3 and possibly 5. The contribution of each portion shall be individually identified. The inclusion of the impinger particulate catch is to be considered on an individual basis.

7. The emission rate and calculations are made from suitable measurements of gas temperature, moisture content, velocities and materials collected. In order for a test to be considered valid, isokinetic sampling rates shall be between 90% and 110%.

8. All equipment, including orifice meter, probe tip nozzles, dry gas meter, and temperature measuring devices is calibrated on a regular basis, dependent on the frequency of equipment use.

9. The stack gas content is determined by collecting a sample of stack gas and analyzing the contents with an Orsat analyzer or Fyrite analyzer.



LEGEND:

1. PROBE
2. CYCLONE
3. FLASK
4. PARTICULATE FILTER
5. IMPINGERS (Greenburg - Smith)
6. THERMOMETER
7. CHECK VALVE
8. UMBRILICAL CHORD
9. VACUUM GAGE
10. COURSE FLOW ADJUST VALVE
11. FINE FLOW ADJUST VALVE
12. OILER
13. VACUUM PUMP
14. FILTER
15. DRY GAS METER
16. ORFICE TUBE
17. INCLINE MANOMETER
18. SOLENOID VALVES
19. PITOT
20. ICE BATH

MEASE ENGINEERING ASSOC.
GENERAL ARRANGEMENT
SOURCE SAMPLING TRAIN

SECTION 4.0

Calibrations

Certificate

OF TRACEABILITY

This is to certify that the undersigned checked for Mease Engineering

Ainsworth, Model TC Balance Number 18185 on December 15, 1986

The following readings were obtained:

Sensitivity reciprocal unloaded .8 Mg.

Sensitivity reciprocal at 100 Gm. .73 Mg.

Arm length error 4 PPM

Chain weight NA Mg. NA Mg.

Rider 10 Mg 10 Mg.

Readability .1 Mg.

Optical scale NA Gm. NA Mg

Reading at half scale NA NA Mg

Taring device error NA Mg.

Traceability is through National Bureau of Standards Test No. 732/221797 and/or New Jersey Test No. NJ 82419

Dated: December 30, 1986

MATAWAN, NEW JERSEY

OMEGA BALANCE SERVICE, INC.

PITOT TUBE CALIBRATION

All pitot tubes are geometrically aligned and within the limits as prescribed in the Federal Register. Therefore, they are assigned a value of 0.84. In the event that a pitot tube tip is altered during transport, and the geometric qualifications cannot be met, the pitot tube is calibrated according to the Federal Register. In this case, the new calibration factor is listed in the report and used in the calculations.

TEMPERATURE SENSING DEVICE CALIBRATIONS

All temperature sensing devices used during a test series, including thermocouples and thermometers are calibrated after each test series, as specified in the Federal Register. In the event that these calibration factors fall within the limits as specied, no corrections are necessary. In the evnt that a device is outside the limits, as specified, the correction factor is listed and used in the calculations.

SAMPLING NOZZLE CALIBRATION

The sampling nozzle used during the test series is determined after each test series using a micrometer on several diameters as specified in the Federal Ragister.

Mease Engineering Associates

Environmental Consultants

DRY GAS METER AND ORIFICE METER CALIBRATION

Model Number 2343 Calibration Date 7-21-87

Serial Number _____ Signature [illegible]

Meter Box No. C Barometric Pressure, Pb 30.05

Wet Test Meter No. A-20 14524

01	03	04	05	06	07	08		
Orifice Manometer ΔH	Gas Volume		Temperature					
	Wet	Dry	Wet	Dry		Time		
in. H_2O	V_w ft³	V_d ft³	t_w °F	In t_{di} °F	Out t_{do} °F	θ Min.	Y	ΔH
0.5	5.000	5.131	77.5	94	88	12.95	0.998	1.8
1.0	5.000	5.116	77.5	98	91	9.26	1.006	1.86
2.0	10.000	10.296	77.5	101	92	8.01	1.001	1.8
3.0	10.000	10.284	77.5	102	92	10.885	1.000	1.9
					AVERAGE		1.001	1.8

$$Y = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)} \qquad \Delta H_@ = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w} \right]^2$$

Mease Engineering Associates

Environmental Consultants

DRY GAS METER AND ORIFICE METER CALIBRATION

Model Number 2343 Calibration Date 7-21-87

Serial Number _____ Signature [signature]

Meter Box No. D (new) Barometric Pressure, Pb 30.05

Wet Test Meter No. A1-20 14524

01	03	04	05	06	07	08	09	10
Orifice Manometer ΔH	Gas Volume		Temperature					
	Wet	Dry	Wet	Dry		Time		
in. H_2O	V_w ft³	V_d ft³	t_w °F	In t_{d1} °F	Out t_{d2} °F	θ Min.	Y	$\Delta H_@$
0.5	5.000	5.069	77.5	95	90	13.40	1.012	1.98
1.0	5.000	5.099	77.5	99	92	9.29	1.011	1.90
2.0	10.000	10.288	77.5	104	94	13.27	1.006	1.85
3.0	10.000	10.302	77.5	108	96	11.00	1.008	1.97
					AVERAGE		1.009	1.9[illegible]

$$Y = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$$

$$\Delta H_@ = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]$$

CARL POE CO., INC. 99 REINERMAN ST. • HOUSTON, TEXAS 77007 • 713-861-3816

December 9, 1986

Princeton Testing Lab
P.O. Box 3108
Princeton, NJ 08543
Attn: Glenn

Dear Sir/Madam:

This is to certify that your Model AL-20 American Wet Test Meter, Serial No. 14524, has been calibrated with an American 5 Ft. Bell Prover, Serial No. 1045. It is traceable to the Bureau of Standards.

Reference No. 26727, PI-TAPE.

Sincerely,

CARL POE CO., INC.

Carl W. Poe

CWP:mv

RECEIVED
DEC 17 1986

SECTION 5.0

Calculations

SOURCE SAMPLING CALCULATIONS: NOMENCLATURE

An	=	Nozzle Area, $ft.^2$
As	=	Stack Area, $ft.^2$
Bwo	=	Water Vapor Proportion, by volume, dimensionless
Cm	=	Meter Correction Factor, dimensionless
Cp	=	Pitot Coefficient, dimensionless
Cs	=	Particulate Concentration, units specified
$\Delta H_{avg.}$	=	Average Pressure Drop Across Orifice, $in.H_2O$
$\%H_2O$	=	Water Vapor Content, dimensionless
Is	=	Percent Isokinetic of Test, dimensionless
Kp	=	85.48, unit correction
Md	=	Molecular Weight of Dry Gas
Mn	=	Total Particulate Catch, grams
Ms	=	Molecular Weight of Stack Gas
$(\sqrt{\Delta P})_{avg}$	=	Average of the Square Roots of the Velocity Head
Pbar	=	Barometric Pressure, in. Hg.
pmr	=	Pollutant Mass Rate, lb./hr.
θ	=	Time, minutes
Pstd	=	29.92 in. Hg.
Qs	=	Stack Gas Flowrate, actual cubic feet per minute
(Qs)std	=	Stack Gas Flowrate, standard cubic feet per minute
Ts	=	Stack Gas Temperature, °R
Tstd	=	530°R
Vfc	=	Increase in Liquid Volume in Impingers, ml.
Vm	=	Volume Sampled at Meter Conditions, $ft.^3$
Vmstd	=	Volume of Air Metered at Standard Conditions
Vs	=	Stack Gas Velocity, ft./sec.
Vsstd	=	Stack Gas Velocity, standard conditions, ft./min.
Vwc	=	Volume of Liquid Collected, cubic feet

SAMPLE CALCULATIONS: Run #1

1. Volume of Water Collected

$$Vwc = (0.04707)(Vfc)$$
$$= (0.04707)(232.0)$$
$$= 11.1885$$

2. Volume of Air Metered

$$Vmstd = \frac{(Vm)(Tstd)(Pbar + \frac{\Delta H}{13.6})(Cm)}{(Tm)(Pstd)}$$
$$= \frac{(57.58)(530)(30.06 + \frac{0.8527}{13.6})(1.00)}{(554.26)(29.92)}$$
$$= 55.797 \text{ scf}$$

3. Moisture Content

$$Bwo = \frac{Vwc}{(Vwc + Vmstd)}$$
$$= \frac{11.1885}{11.1885 + 55.797}$$
$$= 0.167055$$

4. Molecular Weights

$$Md = (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + ((\%N_2 + \%CO) \times 0.28)$$
$$= (4.433 \times 0.44) + (5.90 \times 0.32) + (79.667 \times 0.28)$$
$$= 29.345$$

$$Ms = Md(1 - Bwo) + 18(Bwo)$$
$$= 29.345(1 - 0.167055) + 18(0.167055)$$
$$= 27.45$$

5. Velocity of Exit Gases

$$Vs = (Kp)(Cp)\sqrt{\frac{Ts}{(Ps)(Ms)}}\ \sqrt{\Delta P}\ avg.$$
$$= (85.48)(0.84)\sqrt{\frac{703.654}{(29.92)(27.45)}}\ (27.45)$$
$$= 63.666 \text{ ft/sec.}$$

SAMPLE CALCULATIONS: Run #1, Continued

6. Flowrates

$$Qs = (Vs)(As)(60)$$
$$= (63.666)(14.2559)(60)$$
$$= 54,457 \text{ ACFM}$$

$$Qs_{std} = \frac{(Qs)(Ps)(Tstd)(1-Bwo)}{(Pstd)(Ts)}$$
$$= \frac{(54,457)(30.01)(530)(1-0.167055)}{(29.92)(703.609)}$$
$$= 34,273.9 \text{ SCFM}$$

7. Particulate Concentration

$$Cs = \frac{(Mn)(15.43)}{Vmstd}$$
$$= \frac{(\quad)(15.43)}{55.787}$$
$$= \text{GRAINS/SCF}$$

8. Particulate Emission Rate

$$pmr = \frac{(Mn)(Qs_{std})(60)}{(Vmstd)(454)}$$
$$= \frac{(\quad)(34,273.9)(60)}{(55.787)(454)}$$
$$= \text{POUNDS/HOUR}$$

9. Isokinetics

$$Is = \frac{Vmstd}{(An)(B)(Vs_{std})} \quad \text{where } Vs_{std} = \frac{Qs_{std}}{As} = \frac{34,273.9}{14.2559} = 240$$
$$= \frac{55.787}{(0.000195)(111)(2404.19)}$$
$$= 1.07297 \text{ OR } 107\%$$

DER-AIR QUALITY CONTROL
WILLIAMSPORT REGION