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.

AP42 Section: 11.1

Reference Number: 40

Title: Written communication from L. M. Weise, Wisconsin Department Of Natural Resources, to B. L. Strong, Midwest Research Institute, Cary, NC,

May 15, 1992.

AP-42 Section 11.1
Reference
Report Sect. 4
Reference 40

State of Wisconsin \ DEPARTMENT OF NATUR

WISCONSIN
DEPT. OF NATURAL RESOURCES
Carroll D. Besadny
Secretary

Southern District Headquarters
3911 Fish Hatchery Road
Fitchburg, Wisconsin 53711
TELEPHONE 608-275-3266
TELEFAX 608-275-3338

RECEIVED MAY 18 1992

May 15, 1992

FILE CODE: 4500

Mr. Brian Strong
MRI
Suite 350, 401 Harrison Oaks blvd.
Cary, NC 27513

SUBJECT: Update to AP-42 for Asphalt Plants

Dear Mr. Strong:

I am enclosing copies of the formaldehyde testing on asphalt plants that has been performed in Wisconsin over the past few years. There are 26 separate test reviews.

One of the tests, from 9/27/91, included benzene and total organics. This is the only testing that I am aware of performed in the State of Wisconsin for VOC's. You may be more successful in getting this type of information from other states such as California.

We do not have any test data on carbon monoxide emissions. Asphalt Plant manufacturers, however, normally guarantee a certain CO emission level for the plants they sell. The manufacturers may have additional data on these rates.

As I discussed with you, the National Asphalt Pavement Association (NAPA) conducted a series of tests last summer to determine emission rates of a variety of pollutants from formaldehyde to VOC's. I am aware that they felt there were some interferences with some of the test methods used due to the high moisture content in the gas streams. I am not aware that they have released the results of the testing that was done. The contact at NAPA is Mr. Tom Burnham. I'm sorry, I don't have a phone number for him.

I wish you the best of luck in your endeavor to update this section. If you need additional information, please feel free to call me at (608) 275-3291.

Sincerely,

Lynda M. Wiese
Air Program Supervisor
Southern District

Report to

PAYNE & DOLAN, INC.
Waukesha, Wisconsin

for

STACK EMISSION TEST
Verona, Wisconsin
Control No. 5

October 11, 1991

by

ENVIRONMENTAL TECHNOLOGY & ENGINEERING CORPORATION
13020 West Bluemound Road
Elm Grove, Wisconsin 53122
414-784-2434

SUMMARY

On October 11, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. Control no. 5 asphalt plant located in Verona, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.022 gr/dscf	55 %
2	0.017	42
3	0.017	42
AVG	0.019 gr/dscf	47 %

dscf/m : ?
7000 gr/lb
gr/dscf : 7000 x dscf/m
x 60 m/hr
: lb/hr

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	1.38 lb/hr	0.0049 lb/ton
2	1.30	0.0046
3	1.19	0.0042
AVG	1.29 lb/hr	0.0046 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All individual readings were either 0 % and thus the six minute average opacities were all well below the permit limit of 20 %.

1.0 GENERAL

On Friday, October 11, 1991, Environmental Technology and Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. Control no. 5 drum mix asphalt plant located in Verona, Wisconsin. The test was a provision of an Air Pollution Control Permit. The State of Wisconsin Department of Natural Resources (DNR) has established a particulate emission limit of 0.04 grains per dry standard cubic foot (gr/dscf). The purpose of this test was to demonstrate the compliance status of this plant with the particulate limits set by the DNR. In addition, the permit also required a test to determine the formaldehyde emissions and that opacity observations be performed by a certified reader.

The plant tested was a Gencor counterflow drum mix asphalt plant equipped with a baghouse for particulate control. During the test period, the plant production rate was approximately 280 tons per hour and the mix was composed of approximately 70 % virgin material and 30 % recycled material. The plant was fired with natural gas. John Romaker of Payne & Dolan was responsible for plant operation The field tests, corresponding laboratory analysis and report preparation were coordinated by Bill Dick of ETE Corp. . The test procedures, plant operating conditions, and stack opacity were witnessed by Lynn Cutts and Marty Burkholder of the Wisconsin DNR Southern District Office. .

The following sections of this report document the activities and results of the test program. The report presents all of the relevant data collected and discussions on the interpretation of the data are provided where appropriate. The report, therefore, includes much necessary detail. The results, however, have been summarized in the SUMMARY section at the beginning of this report for those readers not wishing to be burdened by the details.

FIGURE 2-1

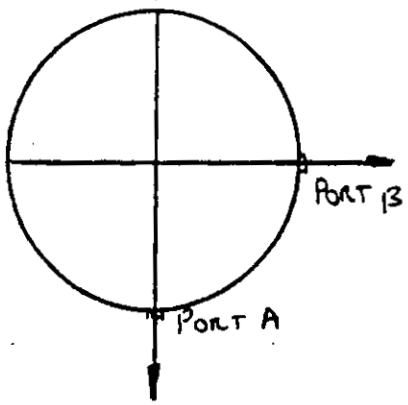
PLANT PAYNE & DOLAN

LOCATION VERONA

PROCESS DRUM MIX PLANT

DIMENSIONS 54" ϕ

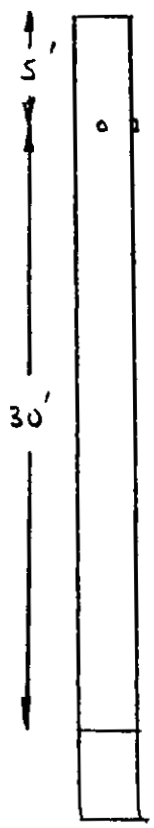
COMMENTS



TEST SECTION

POINT	DISTANCE FROM STACK WALL
1	1.4"
2	4.4
3	7.9
4	12.2
5	15.7
6	38.3
7	41.8
8	46.1
9	49.6
10	52.6

SAMPLING LOCATION



PAYNE & DOLAN CONTROL # 5 TEST 1 10-11-91 TABLE 2-1

BAROMETRIC PRESSURE, in Hg = 29.050
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.904
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 35.90
WATER COLLECTED, ml = 351.00
PARTICULATE COLLECTED, grams = 0.0504
CO2 = 6.50 O2 = 11.50 CO = 0.00 N2 = 82.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.800	1.35	65	64.20
2	275	0.820	1.40	66	65.00
3	280	0.840	1.45	66	66.01
4	280	0.980	1.70	67	71.30
5	280	0.760	1.30	68	62.79
6	275	0.580	1.00	69	54.67
7	270	0.540	0.93	70	52.57
8	270	0.440	0.76	71	47.45
9	270	0.440	0.76	72	47.45
10	275	0.340	0.59	73	41.85
11	275	0.800	1.40	78	64.20
12	275	0.800	1.40	79	64.20
13	275	0.800	1.40	80	64.20
14	270	0.720	1.22	80	60.70
15	270	0.700	1.20	81	59.85
16	270	0.660	1.15	82	58.11
17	275	0.600	1.05	82	55.60
18	270	0.580	1.00	84	54.48
19	275	0.540	0.93	86	52.75
20	270	0.500	0.86	88	50.58
AVG VALUES	274		1.143	75	57.90

TOTAL GAS WITHDRAWN, scf = 51.85
DRY GAS WITHDRAWN, scf = 35.33
WATER VAPOR WITHDRAWN, scf = 16.52
PERCENT WATER VAPOR = 31.86
ACTUAL WET FLOW RATE, acfm = 55,248.28
STANDARD DRY FLOW RATE, scfm = 26,284.01
, m3/hr = 44,661.80
PARTICULATE CONCENTRATION, grains/dscf = 0.022
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.033
PARTICULATE EMISSION RATE, lb/hr = 5.07
PERCENT OF ISOKINETIC SAMPLING = 104.53

PAYNE & DOLAN CONTROL # 5 TEST 2 10-11-91 TABLE 2-2

BAROMETRIC PRESSURE, in Hg = 29.050
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.904
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 35.83
WATER COLLECTED, ml = 340.00
PARTICULATE COLLECTED, grams = 0.0395
CO2 = 7.00 O2 = 10.50 CO = 0.00 N2 = 82.50

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.840	1.48	90	65.65
2	270	0.840	1.48	91	65.42
3	275	0.760	1.35	91	62.44
4	275	0.800	1.40	91	64.07
5	270	0.780	1.38	92	63.04
6	270	0.560	1.00	93	53.42
7	270	0.560	1.00	94	53.42
8	270	0.440	0.78	94	47.35
9	275	0.540	0.95	95	52.64
10	270	0.500	0.90	95	50.48
11	275	0.840	1.48	97	65.65
12	270	0.800	1.40	97	63.85
13	270	0.800	1.40	97	63.85
14	275	0.740	1.30	97	61.62
15	280	0.700	1.22	98	60.13
16	280	0.640	1.12	99	57.50
17	275	0.600	1.05	99	55.48
18	275	0.620	1.10	99	56.40
19	270	0.660	1.15	99	57.99
20	270	0.620	1.10	99	56.21
AVG VALUES	273		1.202	95	58.83

TOTAL GAS WITHDRAWN, scf = 51.35
DRY GAS WITHDRAWN, scf = 35.35
WATER VAPOR WITHDRAWN, scf = 16.00
PERCENT WATER VAPOR = 31.16
ACTUAL WET FLOW RATE, acfm = 56,137.34
STANDARD DRY FLOW RATE, scfm = 27,008.76
, m3/hr = 45,893.29
PARTICULATE CONCENTRATION, grains/dscf = 0.017
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.025
PARTICULATE EMISSION RATE, lb/hr = 4.03
PERCENT OF ISOKINETIC SAMPLING = 101.79

PAYNE & DOLAN CONTROL # 5 TEST 3 10-11-91 TABLE 2-3

BAROMETRIC PRESSURE, in Hg = 29.050
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.904
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 36.25
WATER COLLECTED, ml = 357.00
PARTICULATE COLLECTED, grams = 0.0385
CO2 = 6.80 O2 = 10.80 CO = 0.00 N2 = 82.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.860	1.50	100	66.56
2	270	0.860	1.50	100	66.33
3	275	0.820	1.45	99	64.99
4	275	0.820	1.45	99	64.99
5	270	0.760	1.35	98	62.36
6	270	0.580	1.02	98	54.48
7	275	0.540	0.96	98	52.74
8	275	0.540	0.96	98	52.74
9	270	0.500	0.88	98	50.58
10	270	0.500	0.88	98	50.58
11	275	0.800	1.40	98	64.20
12	275	0.820	1.45	98	64.99
13	270	0.820	1.45	98	64.77
14	275	0.820	1.45	98	64.99
15	280	0.760	1.35	98	62.78
16	275	0.660	1.15	98	58.31
17	275	0.640	1.12	98	57.42
18	270	0.640	1.12	98	57.22
19	270	0.640	1.12	98	57.22
20	270	0.600	1.05	98	55.41
AVG VALUES	273		1.231	98	59.68

TOTAL GAS WITHDRAWN, scf = 52.58
DRY GAS WITHDRAWN, scf = 35.78
WATER VAPOR WITHDRAWN, scf = 16.80
PERCENT WATER VAPOR = 31.96
ACTUAL WET FLOW RATE, acfm = 56,953.14
STANDARD DRY FLOW RATE, scfm = 27,085.59
, m3/hr = 46,023.83
PARTICULATE CONCENTRATION, grains/dscf = 0.017
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.024
PARTICULATE EMISSION RATE, lb/hr = 3.91
PERCENT OF ISOKINETIC SAMPLING = 102.73

2.2 Formaldehyde Emissions

The formaldehyde emissions were determined concurrently with the particulate and opacity observations using NIOSH Method 3500. A brief description of the method is included in section 3.0 of this report. The numerical results are presented below:

Test	LB/HR	LB/TON
1	1.38 lb/hr	0.0049 lb/ton
2	1.30	0.0046
3	1.19	0.0042
AVG	1.29 lb/hr	0.0046 lb/ton

2.3 Visible Emissions (Opacity)

The visible emissions (opacity) was observed for three sixty minute periods which coincided with the particulate emission tests. The opacity was observed in accordance with the procedures outlined in EPA Method 9 -Visible Determination of the Opacity of Emissions from Stationary Sources. All individual opacity readings were 0 % and thus the six minute average opacities were well below the permit limit of 20 %. Copies of the field data observation sheets are included in the APPENDIX to this report.

3.0 METHOD OF TEST

3.1 Particulate Matter

The equipment used to sample was the Western Precipitation Division of the Joy Manufacturing Company Emission Parameter Analyzer. Samples were collected and analyzed in accordance with procedures outlined in 40 CFR 60 Appendix A, Method 5 - Determination of Particulate Emissions from Stationary Sources.

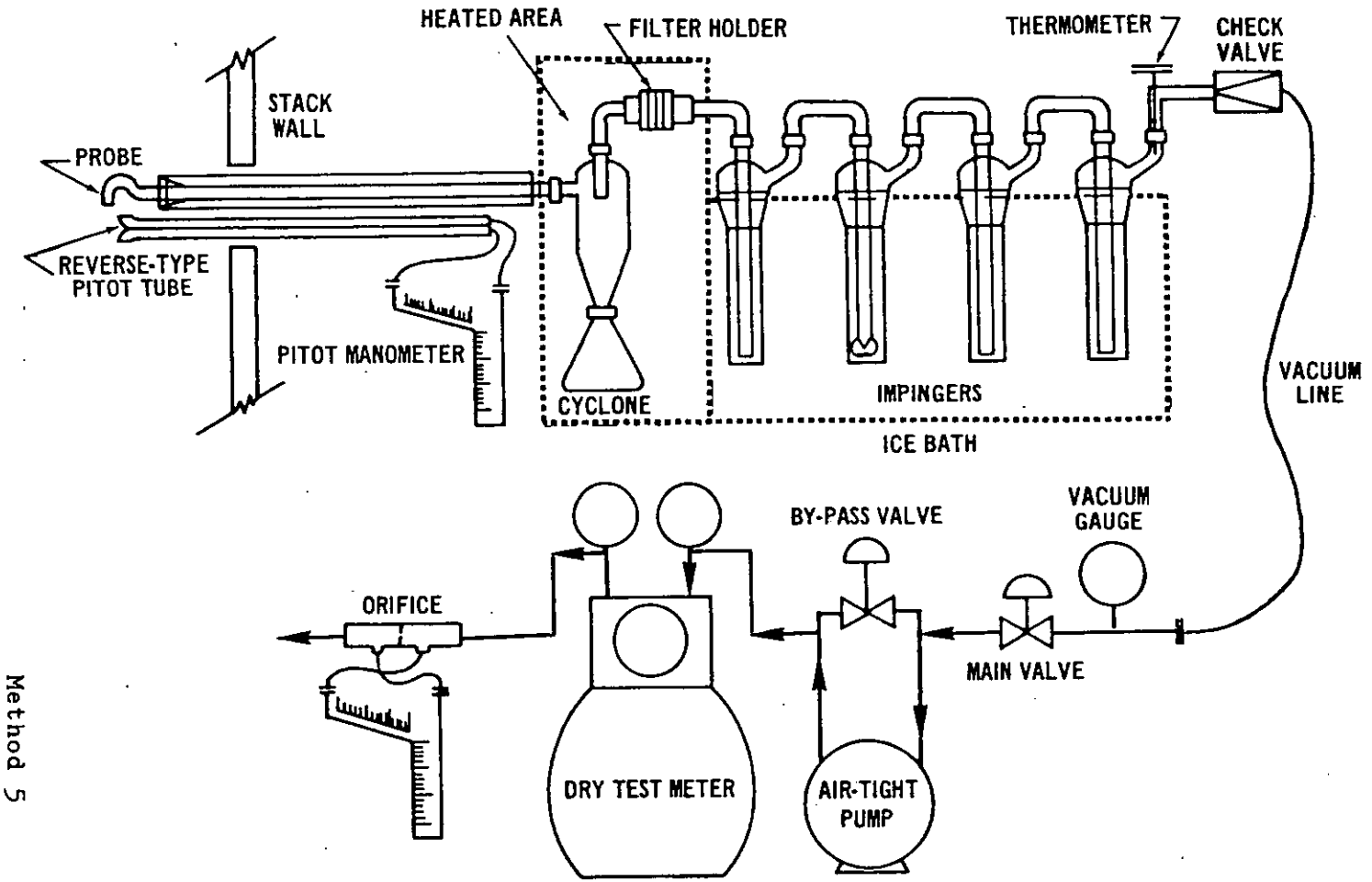
The sampling train consisted of a stainless steel probe tip, a heated stainless steel lined probe, a glass cyclone and flask, and a heated 125 millimeter Whatman 934-AH fiberglass filter. A series of four impingers followed in an ice bath. The first was a modified Greenburg-Smith impinger with 100 ml of distilled water; the second was a Greenburg-Smith impinger with 100 ml water; the third was a modified Greenburg-Smith impinger dry; the fourth was also a modified Greenburg-Smith impinger containing a tared quantity of silica gel. The gas then passed through a vacuum pump, calibrated dry gas meter, and a calibrated orifice. A schematic drawing of the sampling train is included.

The temperatures at strategic locations within the sampling devices, were monitored by RTDs and read directly from a gauge on the control unit.

The initial gas stream velocity was obtained from a preliminary traverse using an "S" type pitot tube. The initial moisture was estimated from previous tests of similar processes. This data, along with the stack temperature, was used to set a nomograph so that rapid calculations of isokinetic sampling conditions could be made.

The principle of the method was to collect the sample representative of the exhaust by adjusting the sample collection velocity to match the exhaust gas stream velocity at the point of collection. The velocity at the point of collection was measured with an "S" type pitot tube attached to the probe and the collection velocity was matched to the stack gas velocity by adjusting the flow as indicated by the calibrated orifice.

To determine the molecular weight of the stack gas, samples were drawn into an Orsat analyzer and analyzed for percentage CO2, O2, CO, and N2.



Particulate sampling train.

At the completion of the test, the probe and glassware preceding the filter were washed with acetone which was placed in a tared beaker and evaporated to dryness at room temperature. The filter and beaker were then desiccated to the tared humidity conditions and weighed. The impinger contents were measured and weighed for determination of the actual moisture content of the exhaust gas stream.

The combined weight of the filter catch and the probe washing residue was used to determine the particulate emission rates.

A computer was used to calculate the stack velocities, emission concentrations, emission rates and volumetric flow rates using the field and laboratory data.

3.2 Formaldehyde

The sampling and analysis were performed using procedures outlined in NIOSH Method 3500, the method accepted by the Wisconsin Department of Natural Resources for determining formaldehyde emissions.

Sampling was performed by drawing a known quantity of stack exhaust through appropriate sampling media by means of a battery operated pump. The media consisted of a train of three midget impingers; each contained 15 milliliters of a one percent sodium bisulfite solution and were followed by a water trap. The impingers were set in an ice water bath to accommodate the temperature of the gas stream sampled. The sampling volumes were determined through the use of a calibrated dry gas meter.

Following the sampling, the samples were sealed and brought back to the lab for analysis. The samples were analyzed via colorimetric methods as described in the NIOSH procedures. Each impinger was analyzed separately to insure the complete absorption of all formaldehyde in the solution.

4.0 CALIBRATIONS

The probe tip, pitot tube, dry gas meter, and orifice were calibrated prior to the test according to procedures outlined in the Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment as published by the EPA. The values obtained were:

Probe tip diameter	d =	0.250"
Pitot tube coeff.	Cp =	0.85
Orifice coeff.	*d*H@ =	1.779

The dry gas meter presently installed in the control box is a temperature compensating meter. The correction factor for this dry gas meter is represented by:

$$\text{Gama} = 1.010 + (Td - 70) \times .00012$$

where: Td = Dry Gas Meter Temperature

The most recent calibration was performed October 9, 1991.

APPENDIX A

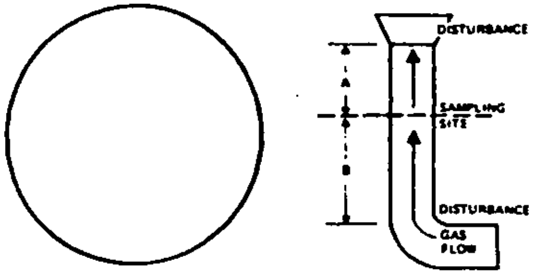
FIELD & LABORATORY DATA SHEETS

Environmental Technology & Engineering Corp.

.04 gr/dscf EPA M5

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT Payne & Dolan
DATE 10-11-91
LOCATION Verona
OPERATOR WJD
STACK NO. Control 5
RUN NO. 1
SAMPLE BOX NO. 1
METER BOX NO. 1

AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.05
ASSUMED MOISTURE, % 25
PROBE LENGTH, in. 5'
NOZZLE DIAMETER, in. 1/4
STACK DIAMETER, in. 54
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

Cp. 0.85
γ: 1.010
METER ΔH 1.779 } 10-9-91
C FACTOR
PROCESS WEIGHT RATE 270-300 TPH 35% RAP NAT GAS
ORSAT RESULTS
CO_2 6.5
O_2 11.5
CO
N_2 82.0

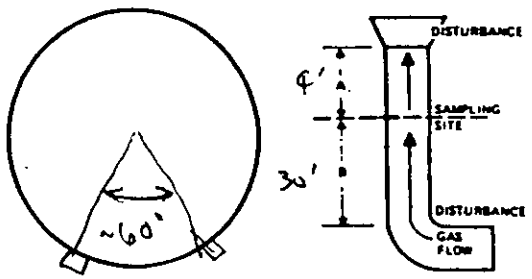
Pre Leak
Pitot Check
Post Leak

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	KOH γ 1.025 SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
A 1	0855(0)		275	.80		1.35		8610.00		65	641.00/66			
2	58	-0.30	275	.82		1.40		12.0		66	643.00/62			
3	01		280	.84		1.45		14.1		66	2.00/64			
4	04		280	.98		1.70		16.2		67				
5	07		280	.76		1.30		18.3		68				
6	10	-0.25	275	.58		1.00		20.3		69				
7	13		270	.54		0.93		22.0		70				
8	16		270	.44		0.76		23.6		71				
9	19	-0.15	270	.44		0.76		25.1		72				
10	22		275	.34		0.59		26.5		73				
B 11	25/27		275	.80		1.40		27.9		78				
12	30	-0.30	275	.80		1.40		29.9		79				
13	33		275	.80		1.40		32.0		80				
14	36		270	.72		1.22		34.0		80				
15	39	-0.25	270	.70		1.20		35.8		81				
16	42		270	.66		1.15		37.7		82				
17	45		275	.60		1.05		39.5		82				
18	48		270	.58		1.00		41.3		84				
19	51		275	.54		0.93		42.8		86				
20	54		270	.50		0.86		44.4		88				
	(0957)							8645.90						
									35.90					

Environmental Technology & Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT Payne & Duncan
DATE 10-11-91
LOCATION Yorkona
OPERATOR WJD
STACK NO. Control 5
RUN NO. 2
SAMPLE BOX NO. 4
METER BOX NO. 1

AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.05
ASSUMED MOISTURE, % 25
PROBE LENGTH, in. 5'
NOZZLE DIAMETER, in. 1/4
STACK DIAMETER, in. 54
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH, _____
C FACTOR _____
PROCESS WEIGHT RATE _____

ORSAT RESULTS
CO_2 7.0
O_2 10.5
CO
N_2 82.5

Pyrex Liner
Pitot Used

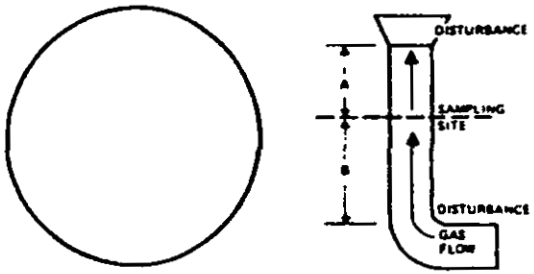
TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD ($\sqrt{P_s}$)		PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft^3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °F	OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F (Hoit)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
A 1	10:00		275	.84		1.40		847.00		90	693.00/60			
2	13	-0.30	270	.84		1.38		49.1		91	695.00/69			
3	16		275	.76		1.35		51.0		91	2.00/63			
4	19		275	.80		1.40		53.9		91				
5	22	-0.25	270	.78		1.38		54.9		92				
6	25		270	.54		1.50		56.8		93				
7	28		270	.56		1.60		58.5		94				
8	31		270	.46		0.78		60.2		94				
9	34	-0.20	275	.54		0.95		61.6		95				
10	37		270	.50		0.90		63.1		95				
B 11	40/42		271	.84		1.46		64.65		97				
12	45		270	.80		1.40		66.6		97				
13	48	-0.30	270	.80		1.40		68.5		97				
14	51		275	.74		1.30		70.5		97				
15	54		280	.70		1.22		72.4		98				
16	57		280	.64		1.12		74.3		98				
17	00	-0.25	275	.60		1.05		76.0		99				
18	03		275	.62		1.10		77.6		99				
19	06		270	.66		1.15		79.4		99				
20	09		270	.62		1.10		81.1		99				
	111200							882.83	35.83					

Environmental Technology & Engineering Corp.

GONON COUNTERFLOW

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT PAYNE & DOLAN
DATE 10-11-91
LOCATION VERONA
OPERATOR WJD
STACK NO. CONTROL 5
RUN NO. 3
SAMPLE BOX NO. 5
METER BOX NO. 1

AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
ASSUMED MOISTURE, %
PROBE LENGTH, in.
NOZZLE DIAMETER, in. 1/4
STACK DIAMETER, in. 54
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH,
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2 6.8
O_2
CO
N_2

PRE LEAK CHECK
PITOT LEAK CHECK

HCOH

TRAVERSE POINT NUMBER	SAMPLING TIME (A), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s) ($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °F	OUTLET ($T_{m_{OUT}}$), F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge	VELOCITY fps
A1	112500		275	.86	1.50		8685.00		100	695.00/69			
2	28	-0.30	270	.86	1.50		87.0		100	697.02/67			
3	31		275	.82	1.45		88.9		99	2.02/6.5			
4	34		275	.82	1.45		90.9		99				
5	37	-0.25	270	.76	1.35		92.8		98				
6	40		270	.58	1.02		94.8		98				
7	43		275	.54	0.96		96.5		98				
8	46	-0.20	275	.54	0.96		98.0		98				
9	49		270	.50	0.88		99.4		98				
10	52		270	.50	0.88		01.1		98				
B11	55/56		275	.80	1.40		02.7		98				
12	59		275	.82	1.45		04.6		98				
13	02		270	.82	1.45		06.5		98				
14	05		275	.82	1.45		08.5		98				
15	08		280	.76	1.35		10.5		98				
16	11		275	.66	1.15		12.5		98				
17	14		275	.64	1.12		14.3		98				
18	17		270	.64	1.12		16.0		98				
19	20		270	.64	1.12		17.6		98				
20	23		270	.60	1.05		19.5		98				
	1226						8721.25						
							36.25						

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME P&D VERONA DATE OF TEST 10-11-91

JOB NO. 1332 TEST ENGINEER WJD

RUN NO. 1 STACK CONTROL 5

Sample Box 1 Filter 1497 Wash Bottle —

Beaker No. 10

WATER COLLECTED

Impinger No.	Final Wt. g	Initial Wt. g	Collected grams
1	243	100	143
2	256	100	156
3	29	0	29
SIL GEL	680	657	23
		TOTAL	351

PARTICULATE COLLECTED

	Final Wt. g	Tare Wt. g	Collected grams
Blank Filter	.8067	.7969	.0098
Washings (.0006)	104.2845	104.2433	.0406
		TOTAL	0.0504

WATER COLLECTED [351] GRAMS

PARTICULATE COLLECTED [0.0504] GRAMS

NOTES:

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME P&D VERONA
JOB NO. 1332

DATE OF TEST 10-11-91
TEST ENGINEER WJD

RUN NO. 2 STACK CONTROL 5
Sample Box 4 Filter 1477 Wash Bottle -
Beaker No. 12

WATER COLLECTED

Impinger No.	Final Wt. g	Initial Wt. g	Collected grams
1	255	100	155
2	222	100	122
3	47	0	47
SIL GEL	668	652	16
		TOTAL	340

PARTICULATE COLLECTED

	Final Wt. g	Tare Wt. g	Collected grams
Blank Filter	.8181	.8108	.0073
Washings (.0006)	105.4393	105.4061	.0322
		TOTAL	0.0395

WATER COLLECTED [340] GRAMS
PARTICULATE COLLECTED [0.0395] GRAMS

NOTES:

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME P&D VERONA
JOB NO. 1332
DATE OF TEST 10-11-91
TEST ENGINEER WJD

RUN NO. 3 STACK CONTROL 5
Sample Box 5 Filter 1478 Wash Bottle -
Beaker No. 14

WATER COLLECTED

Impinger No.	Final Wt. g	Initial Wt. g	Collected grams
1	330	100	230
2	212	100	112
3	5	0	5
SILGEL	679	669	10
		TOTAL	357

PARTICULATE COLLECTED

		Final Wt. g	Tare Wt. g	Collected grams
Filter	Blank	.8014	.7979	.0035
Washings	(.0006)	103.2582	103.2226	.0350
			TOTAL	0.0385

WATER COLLECTED 357 GRAMS
PARTICULATE COLLECTED 0.0385 GRAMS

NOTES:

Environmental Technology & Engineering Corp.

Name of Company: Payne & Dolan	Date: 10-11-91
Location:	FID Number:
City, State, Zip Code: Verona	Observer Certification Date: 10-8-91
Discharge Location: SAME	Control Device: Baghouse
Height of Discharge Above Ground: 40'	Steam Plume? (Yes) No; (Attached) Detached

	Initial		Final
Time of Observation	0855		
Observer Location: Distance to Discharge	400'		
Direction from Discharge	E		
Height of Observation Point in Relation to Discharge	+20		
Plume Description (Color, Length, etc.)	steam 100'		
Plume Background Description	Sky	Trees	
Weather Conditions: Wind Direction	0-5	10-15	
Wind Speed	WNW		
Ambient Temperature	45		
Sky Conditions (clear, overcast, % clouds, etc.)	CLR		

Describe Point in Plume at Which Opacity was Determined: 150' downstream

Remarks:

9:10 Wind 10-15
Background Trees

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

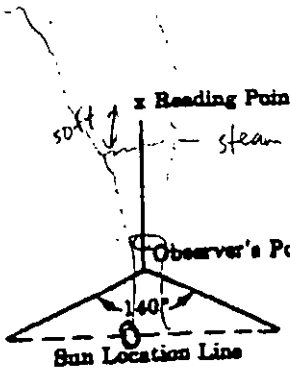
Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start – End	Opacity: Sum	Opacity: Average

Signature of Observer: [signature]

Name of Observer (Please print): Chris Hunrick

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

13020 W. BLUEMOUND RD.
ELM GROVE, WIS. 53122
PHO
(414) 784-243

Environmental Technology & Engineering Corp.

SMOKE FORM

Name of Company: Payne & Dolan	Date: 10-11-91
Location:	FID Number:
City, State, Zip Code: Verona	Observer Certification Date: 10-8-91
Discharge Location: SAME	Control Device: Baghouse
Height of Discharge Above Ground: 40'	Steam Plume? (Yes) No; (Attached) Detached

	Initial		Final
Time of Observation	10:12		11:12
Observer Location Distance to Discharge	400'		
Direction from Discharge	E		
Height of Observation Point in Relation to Discharge	+ 20		
Plume Description (Color, Length, etc.)	Steam 75'		
Plume Background Description	Trees	Sky	
Weather Conditions Wind Direction	NW		
Wind Speed	10-15		
Ambient Temperature	50		
Sky Conditions (clear, overcast, % clouds, etc.)	CLR		

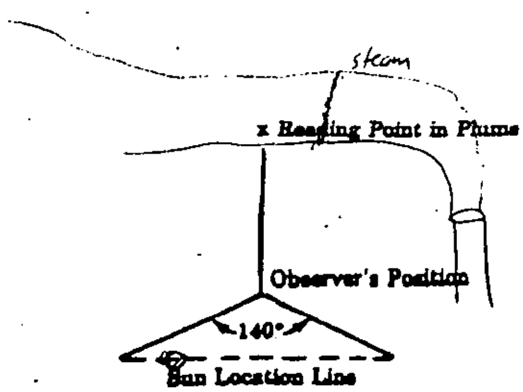
Describe Point in Plume at Which Opacity was Determined: 100' downstream

Remarks:

Wind Backed Down 0-5 at 10:55

Signature of Observer	Name of Observer (Please print)
[signature]	Chris Huonink

Sketch of Observer, Discharge, and Sun Location.



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

Summary of Average Opacity
(From Computer Program)

Set Number	Time	Opacity	
	Start – End	Sum	Average

Allowable Source Opacity

13020 W. BLUEMOUND RD.
ELM GROVE, WIS. 53122
PHONE
(414) 784-2434

Environmental Technology & Engineering Corp.

SMOKE FORM

Name of Company: Payne & Dolan	Date: 10-11-91
Location:	FID Number:
City, State, Zip Code:	Observer Certification Date: 10-8-91
Discharge Location: SAME	Control Device:
Height of Discharge Above Ground:	Steam Plume? (Yes) No — (Attached) Detached

	Initial		Final
Time of Observation	11:25		12:25
Observer Location — Distance to Discharge	300'		
Direction from Discharge	SSE		
Height of Observation Point in Relation to Discharge	+ 20		
Plume Description (Color, Length, etc.)	Steam 50'		
Plume Background Description	Trees		
Weather Conditions — Wind Direction	NW		
Wind Speed	5-10		
Ambient Temperature	55		
Sky Conditions (clear, overcast, % clouds, etc.)	CLR		

Describe Point in Plume at Which Opacity was Determined: 15' downstream

Remarks:

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

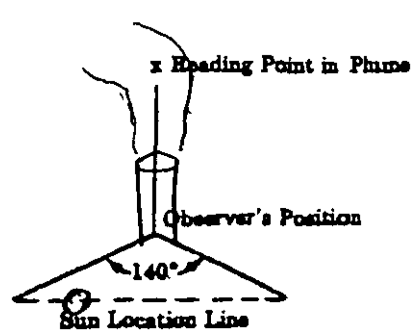
Summary of Average Opacity (From Computer Program)

Set Number	Time Start – End	Opacity Sum	Opacity Average

Allowable Source Opacity

Signature of Observer: CLH	Name of Observer (Please print): Chris Huenink

Sketch of Observer, Discharge, and Sun Location.



13020 W. BLUEMOUND RD.
ELM GROVE, WIS. 53122
PHONE (414) 784-2434

F I B MIX6 [illegible] 6.90%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 08:05:20 10/11/91

F I B MIX10 267TPH 308F 22TONS 6.50%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 08:22:00 10/11/91

F I B MIX10 253TPH 318F 95TONS 6.50%aac 296F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 08:38:40 10/11/91

F I B MIX10 256TPH 308F 167TONS 6.50%aac 297F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 08:55:20 10/11/91

F I B MIX6 342TPH 314F 73TONS 5.50%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 09:12:00 10/11/91

25% RAP
NAT. GAS FUEL ↓

F I B MIX6 288TPH 311F 152TONS 5.90%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 09:28:40 10/11/91

F I B MIX6 282TPH 303F 230TONS 5.77%aac 298F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 09:45:20 10/11/91

F I B MIX6 261TPH 299F 308TONS 5.90%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 10:02:00 10/11/91

F I B MIX6 281TPH 299F 385TONS 5.65%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 10:18:40 10/11/91

F I B MIX6 277TPH 302F 463TONS 5.90%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 10:35:20 10/11/91

F I B MIX6 279TPH 303F 541TONS 5.90%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 10:52:01 10/11/91

F I B MIX6 277TPH 304F 29TONS 6.30%aac 299F [4.9%R1+ 4.9%R2]

35% RAP ↓

RECORDATION 7BINS 2RCYS 2MFLS 11:08:41 10/11/91

F I B MIX6 272TPH 305F 106TONS 6.30%aac 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2MFLS 11:25:22 10/11/91

RECORDATION 7BINS 2RCYS 2AFLS 11:42:02 10/11/91

F I B MIX8 281TPH 297F 261TONS 6.30%asc 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2AFLS 11:58:42 10/11/91

F I B MIX8 280TPH 301F 339TONS 6.30%asc 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2AFLS 12:15:24 10/11/91

F I B MIX8 273TPH 299F 417TONS 6.20%asc 299F [4.9%R1+ 4.9%R2]

RECORDATION 7BINS 2RCYS 2AFLS 12:32:05 10/11/91

F I B MIX8 277TPH 299F 494TONS 6.40%asc 299F [4.9%R1+ 4.9%R2]

HCOH Analysis - Payne + Dolan

10/16/91

SAMPLE ID	SAMPLE VOL	ALIQ VOL	C ACID VOL	RDG	RDG - BLANK	µg/ALIQ	µg/SAMPLE		µg TOTAL
VERONA 1A	29.6	0.50	1.0	.943	.907	11.7	693		797
1B	18.1	1.00		.498	.462	5.72	104		
2A	30.3	0.50		.858	.822	10.6	642		731
2B	12.5	1.00		.599	.563	7.15	89		
3A	29.0	0.50		.747	.711	9.13	530		668
3B	16.5	1.00		.693	.657	8.38	138		
FRANKLIN 1A	29.0	0.50		.502	.466	5.77	335		344
1B	10.3	1.00		.107	.071	0.85	9		
2A	27.7	0.50		.449	.413	5.05	280		284
2B	8.9	1.00		.074	.038	0.45	4		
3A	25.4	0.50		.290	.254	3.10	157		163
3B	8.0	1.00		.104	.068	0.80	6		
BLANKS									
VERONA		0.50		.036					
		1.00		.036					
FRANKLIN		0.50		.038					
		1.00		.036					
DILUTION		3.00		.040					

PAYNE & DAW — CONTROL NO. 5

FORMALDEHYDE CALCULATIONS — 10-11-91

TEST 1 — V_M = 2.00 ft³ — T_m = 64°F — P_b = 29.05 — γ = 1.029

780 TPH

$$V_{m\,std} = 2.00 \times 1.029 \times \frac{528}{524} \times \frac{29.05}{29.92}$$

$$= 2.01 \text{ SCF} = .057 \text{ m}^3$$

$$C = \frac{0.797 \text{ mg}}{.057 \text{ m}^3} = 14.0 \text{ mg/m}^3$$

ER = 1.38 lb/hr.

= 0.0049 lb/ton

TEST 2 — V_M = 2.00 — T_m = 63 F

780 TPH

$V_{m\,std}$ = 2.01 SCF = .057 m³

$$C = \frac{0.731 \text{ mg}}{.057} = 12.8 \text{ mg/m}^3$$

ER = 1.30 lb/hr.

= 0.0046 lb/ton

TEST 3 — V_m = 2.02 — T_m = 65

780 TPH

$V_{m\,std}$ = 2.03 SCF = .057 m³

$$C = \frac{0.668 \text{ mg}}{.057 \text{ m}^3} = 11.7 \text{ mg/m}^3$$

ER = 1.19 lb/hr.

= 0.0042 lb/ton

APPENDIX B

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS

1. DRY MOLECULAR WEIGHT (Md) lb/lb-mole

   Md = .44*% CO2 + .32*%O2 + .282*%N2 + .28*%CO

2. WATER VAPOR PERCENT (%H2O)

   Vw std = 0.04707*(Vf - Vi)

   where: Vw std = standard cubic feet of water vapor
   Vf = Final volume of impingers, ml
   Vi = Initial volume of impingers, ml

   %H2O = Vw std * 100/(Vm std + Vw std)

   where Vm std = standard cubic feet of gas sampled

3. WET MOLECULAR WEIGHT (Ms) lb/lb-mole

   Ms = Md*(1 - %H2O/100) + 18*%H2O/100

4. STACK PRESSURE (Ps) in. Hg

   Ps = Pb + Pg/13.6

   where: Pb = barometric pressure (uncorrected), in. Hg
   Pg = stack gauge pressure, in. H2O
   13.6 = specific gravity of mercury (Hg)

5. AVERAGE STACK VELOCITY (Vs) feet per second

   Vs = Kp*Cp* (DELP) Tsavg/(Ps*Ms)

   where: Kp = 85.49 unit conversion
   Cp = 0.85, pitot tube calibration factor
   DELP = square root of velocity head, in. H2O
   Tsavg = average stack temperature, deg R (460+F)
   Ps = stack pressure
   Ms = wet molecular weight

6. STACK GAS FLOW RATE (Qs) std cubic feet per minute

   Qs = 60*(1 - %H2O/100)*Vs*A*(528*Ps/Tsavg/29.92)

   where: A = stack area, ft2
   528 = std temperature, deg R
   29.92 = std pressure, in. Hg

7. **DRY GAS VOLUME (Vm std)** std cubic feet

Vm std = GAMA*(Vm-(AL-.02)t)*(Pb+DELH/13.6)/29.92

where: GAMA = dry gas meter calibration factor
Vm = volume of dry gas metered, cubic feet
AL = post test leak rate, cubic feet per minute
t = total time of test, minutes
DELH = average orifice pressure drop, in.H2O

8. **PARTICULATE CONCENTRATION (Cs)** grains/dry std cubic foot

Cs = Mn * 15.43/Vm std

where: Mn = particulate captured, grams
15.43 = grains per gram

9. **EMISSION RATE (ER)** pounds per hour

PMRA = Mn*A*60/(t*An*453.6) AREA METHOD lb/hr

PMRC = Cs*Qs*60/(15.43*453.6) CONC. METHOD lb/hr

ER = (PMRA + PMRC)/2

where: An = area of sampling nozzle, square feet

10. **EMISSION CONCENTRATION (EC)** lb/1000 lb exhaust gas

EC = ER * 386700 * (1-%H2O/100)/(Qs*60*Ms)

where: 386700 = cubic feet per lb mole * 1000

11. **ISOKINETIC SAMPLING PERCENTAGE (I)** %

I = PMRA/PMRC

SAMPLE CALCULATION

BAROMETRIC PRESSURE, in Hg (Pb) = 29.200
STACK PRESSURE, in Hg (Pb + Pg/13.6) = 29.178
TIP DIAMETER, in (An = PI*D^2/576) = .2450
STACK AREA, sq ft (A) = 10.560
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf (Vm) = 66.06
WATER COLLECTED, ml (Vf - Vi) = 86.00
PARTICULATE COLLECTED, grams (Mn) = 0.0755
CO2 = 0.60 O2 = 21.00 CO = 0.00 N2 = 78.40
WET MOLECULAR WEIGHT, lb/mole (Ms) = 28.45

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE DEL H inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	110	1.450	4.05	32	72.51
2	110	1.350	3.75	32	69.97
3	110	1.350	3.75	32	69.97
4	110	1.300	3.70	32	68.66
5	110	1.250	3.60	32	67.33
6	110	1.250	3.60	32	67.33
7	110	1.050	2.95	32	61.71
8	110	1.000	2.85	32	60.22
9	110	1.000	2.85	34	60.22
10	110	1.050	2.95	34	61.71
11	110	0.950	2.75	38	58.69
12	115	0.950	2.75	38	58.95
13	115	1.300	3.70	42	68.96
14	115	1.250	3.60	42	67.62
15	115	1.200	3.40	42	66.26
16	115	1.200	3.40	42	66.26
17	115	1.150	3.30	44	64.86
18	115	1.150	3.30	46	64.86
19	115	1.050	2.95	48	61.98
20	115	1.150	3.30	48	64.86
21	115	1.000	2.85	50	60.48
22	115	1.100	3.15	50	63.43
23	115	1.050	2.95	50	61.98
24	115	0.900	2.55	50	57.38
AVG VALUES	113		3.250	40	64.42

TOTAL GAS WITHDRAWN, scf = 69.39
DRY GAS WITHDRAWN, scf (Vmstd) = 65.35
WATER VAPOR WITHDRAWN, scf (Vwstd) = 4.05
PERCENT WATER VAPOR (%H2O) = 5.83
ACTUAL WET FLOW RATE, acfm = 40,819.39
STANDARD DRY FLOW RATE, scfm (Qs) = 34,558.69
PARTICULATE CONCENTRATION, grains/dscf (Cs) = 0.018
PARTICULATE EMISSION RATE, lb/hr (ER) = 5.325
PARTICULATE EMISSIONS, lb/1000 lb (EC) = 0.033
PERCENT OF ISOKINETIC SAMPLING (I) = 101.67

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

Date: December 10, 1991

File Ref: 4530-3

To: Files

From: Neal Baudhuin, NCD N. B.

Subject: Review of Stack Test Performed for Forest County Highway Department Asphalt Plant

I. SOURCE

Forest County Highway Department
County Court House
Crandon, Wisconsin 54520

Contact: Ronald Brooks, Commissioner

FID# 721029100

Test Date: August 30, 1991
Location: U.S. Highway 55, southwest of Crandon, Wisconsin

II. SOURCE DESCRIPTION

The source tested was a Barber-Greene Model 859 continuous, batch hot mix asphalt plant. It is rated at 142 tons per hour (TPH). It does not have recycle capability. During the test the plant was producing approximately 140 TPH. The drier was being fired with distillate (#2) fuel oil.

Particulate matter emissions are controlled by a medium efficiency multicyclone followed by a wet scrubber. The multicyclone unit has 33 cyclones, and it has room for 40 - 48 cyclones. The scrubber has 60 nozzles for water distribution. The scrubber water pressure was 45 psi. The multicyclone has a draft limit switch between the exhaust fan and multicyclone that shuts the burner down if the pressure is too low. There are locations for pressure taps, but no gauges were present. There is a temperature probe in the exhaust system that kicks out the burner if the temperature is too high.

III. SAMPLING OPERATION

A. Purpose of the Test

The test was performed to satisfy the requirements of Mandatory Operation Permit # 721029100-N01 issued March 13, 1991, and to demonstrate compliance with the particulate matter emission limits contained in the permit. Formaldehyde emissions were also tested to determine applicability of NR 445 requirements.

Test Method ✓
Control System ✓
runs ✓
Source ✓
Process Desc. X
Prod. Rate ✓
Prod. Capacity ✓
Problems Encountered X
Test Data ✓

B. Sampling Firm

Environmental Technology & Engineering
13020 West Bluemound Road
Elm Grove, Wisconsin 53122

Crew: Lowell and Chris Huenink, 414/784-2434

C. Test Method

The particulate matter test method was EPA Method 5, Determination of Particulate Emission from Stationary Sources, and included determination of the back half catch. The test was performed in the circular stack, diameter 7.9 feet, through two ports at perpendicular axis of the stack. The ports were located 6 feet from the stack exit and 15 feet from the nearest upstream disturbance, the scrubber duct into the stack. Each of 12 points per port were sampled for 2.5 minutes for a total of 60 minutes of sampling.

The formaldehyde emissions were sampled using NIOSH Method 3500. Exhaust gas was sampled at a uniform rate of approximately one liter per minute. A total of 2.0 cubic feet of sample was collected during each of three runs.

D. Test Date

The testing was performed on August 30, 1991. The weather was clear to partly cloudy with light and variable wind from the northwest and an ambient temperature of 80 - 85F.

E. Test Witness

The test was witnessed by Mr. Neal Baudhuin of the Department's North Central District office in Rhinelander. Mr. Baudhuin witnessed only the end of Run #2 and #3 of the test. Mr. Baudhuin performed EPA Method 9 visible emissions evaluations during Run #3.

IV. TEST RESULTS

The results listed below for particulate are those calculated by ETE. The original report contained some numerical errors and ETE submitted the corrected data and calculation sheets. The results for formaldehyde are from the ETE test report. Calculations were checked and found to be accurate. The Department's calculations do not come out exactly the same as ETE's because ETE uses a dry gas meter that is temperature compensating. The meter correction factor (gama) was 1.020 at the last calibration.

A. Particulate Matter

RUN NUMBER	EMISSION RATE (LB/HR)	EMISSION CONCENTRATION (LB/1,000 LB GAS)	ISOKINETIC RATIO (%)
1	62.87	0.265	92.80
2	55.87	0.247	97.69
3	59.56	0.256	94.48
AVE	59.43	0.256	94.99

B. Formaldehyde

RUN NUMBER	EMISSION RATE (LB/HR)
1	1.96
2	2.82
3	1.76
AVE	2.18

C. Visible Emissions

RUN NUMBER	AVERAGE OPACITY (%)	HIGH SIX MINUTE (%)
1	-	-
2	-	-
3	25.3	30.4

V. APPLICABLE EMISSION LIMITATIONS

The emission limits that apply to this source are as follows:

Particulate: 0.3 pound per 1,000 pounds of exhaust gas
Section NR 415.05(1)(i), Wisconsin Administrative Code.

Visible Emissions: 40% opacity
Section NR 431.04(1), Wisconsin Administrative Code

Formaldehyde: 250 pounds per year or Best Available Control Technology (BACT), Section NR 445.05, Wisconsin Administrative Code.

VI. DISCUSSION OF RESULTS

The emission concentration of 0.256 pound per 1,000 pound of exhaust gas is below the limit of 0.3 pound per 1,000 pound exhaust gas. The isokinetic ratio of 94.99% is between the limits of 90 - 110% that the Department uses to judge the validity of stack tests.

The formaldehyde emission rate of 2.18 pounds per hour would allow Langlade County to operate a total of only 114 hours per year before exceeding the 250 pound per year de minimis level over which BACT would need to be applied. Based on the production rate of 140 TPH, this would result in an Emission Factor (EF) of 0.0156 pound of formaldehyde per ton, and allow production of only about 16,000 tons of asphalt per year before exceeding the 250 pound per year de minimis. In 1990 the plant operated for 324 hours and produced 29,532 tons of asphalt.

cc: Joe Perez, AM/10-STK
U.S. EPA-Region V
Forest County Highway Department

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny
Secretary

North Central District Headquarters
P. O. Box 818
Rhinelander, Wisconsin 54501
(715)362-7616

December 10, 1991

File Ref.: 4530-3

Mr. Ronald Brooks, Commissioner
Forest County Highway Department
County Court House
Crandon, Wisconsin 54520

Dear Mr. Brooks:

I have reviewed the report submitted by Environmental Technology and Engineering Corporation on the stack testing performed on August 30, 1991 on the Forest County Highway Department asphalt plant. A copy of the test review is attached.

ETE's initial report had some errors, and ETE submitted corrected report pages to the Department. The particulate matter test result of 0.265 pound per 1,000 pounds of exhaust gas is in compliance with the 0.3 pound per 1,000 pounds limitation. The opacity during Test Run #3 was an average of 25.3%, which is in compliance with the 40% opacity limitation.

The formaldehyde emission rate was 2.18 pounds per hour, which calculates to 0.0156 pound per ton of asphalt. This is relatively high compared to tests at other asphalt plants. The production hour and annual tons of asphalt that I mention in the DISCUSSION OF RESULTS section are not limitations. The 250 pounds of formaldehyde emitted per year is a de minimis level over which a control strategy referred to as Best Available Control Technology (BACT) will need to be applied. The Department is currently working with the Wisconsin Asphalt Pavement Association to determine how BACT is going to be defined. Section NR 445.05(7)(b)2., Wisconsin Administrative Code, requires you to submit to the Department by April 1, 1992, a compliance plan for formaldehyde control.

If you have any questions, please feel free to contact me at 715/369-8958.

Sincerely,

Neal Baudhuin

Neal Baudhuin, P.E.
Air Management Program Supervisor
North Central District

RECEIVED
DEC 13 1991

Attach.

cc: Bureau of Air Management, AM/10

SUMMARY

On August 30, 1991, Environmental Technology & Engineering Corp personnel performed stack emissions testing on the Forest County Highway Department Asphalt Plant located on Highway 55 west of of Crandon, Wisconsin. The purpose of the testing was to demonstrate compliance with the particulate matter emissions limits set forth in Wisconsin Administrative Code. The emissions from the operations were controlled with a set of cyclone collectors followed by a wet scrubber.

Testing to determine total particulate matter emissions were performed using EPA Method 5. The results were well below the DNR limitation and are shown below:

Test	Particulate Emission Concentration
1	0.265 lb/1000 lb gas
2	~~0.269~~ 0.227 lb/1000 lb gas
3	~~0.244~~ 0.256 lb/1000 lb gas
AVG	0.256 lb/1000 lb gas
DNR Limitation	0.3 lb/1000 lb gas

Formaldehyde emissions were determined using modified NIOSH Method 3500 sampling and analytical methods. The results indicated the following emission rates:

Test	Formaldehyde Emission Rate
1	1.96 lb/hr
2	2.82 lb/hr
3	1.76 lb/hr
AVG	2.18 lb/hr
DNR Limitation	250 pounds per year

Visible emissions were determined using EPA Method 9 by the DNR witness on-site during the test efforts. All readings indicated an opacity level below the permit limitation of 40 percent.

FOREST COUNTY ASPHALT PLANT TEST 1 TABLE 2-1 8-30-91

BAROMETRIC PRESSURE, in Hg = 28.700
TIP DIAMETER, in .3710
STACK AREA, sq ft = 49.020
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 41.00
WATER COLLECTED, ml = 167.00
PARTICULATE COLLECTED, grams = 0.4204
CO2 = 3.00 O2 = 15.40 CO = 0.00 N2 = 81.60

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	125	0.340	4.65	78	36.55
2	130	0.270	3.65	78	32.71
3	130	0.200	2.75	80	28.15
4	130	0.120	1.70	80	21.81
5	130	0.080	1.00	80	17.80
6	130	0.040	0.56	80	12.59
7	130	0.000	0.00	82	0.00
8	130	0.000	0.00	82	0.00
9	130	0.020	0.30	82	8.90
10	130	0.600	0.85	84	48.76
11	130	0.120	1.70	84	21.81
12	130	0.210	2.90	86	28.85
13	130	0.520	7.00	88	45.39
14	130	0.500	6.80	90	44.51
15	130	0.410	5.65	92	40.31
16	130	0.320	4.40	92	35.61
17	130	0.160	2.20	92	25.18
18	130	0.050	0.72	92	14.08
19	130	0.220	3.00	94	29.52
20	130	0.160	2.20	96	25.18
21	130	0.000	0.00	98	0.00
22	130	0.000	0.00	98	0.00
23	130	0.000	0.00	100	0.00
24	130	0.040	0.56	100	12.59
AVG VALUES	130		2.191	88	22.09

TOTAL GAS WITHDRAWN, scf = 47.57
DRY GAS WITHDRAWN, scf = 39.71
WATER VAPOR WITHDRAWN, scf = 7.86
PERCENT WATER VAPOR = 16.52
ACTUAL WET FLOW RATE, acfm = 64,985.24
STANDARD DRY FLOW RATE, scfm = 46,580.30
PARTICULATE CONCENTRATION, grains/dscf = 0.1633
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.265
PARTICULATE EMISSION RATE, lb/hr = 62.87
PERCENT OF ISOKINETIC SAMPLING = 92.80

FOREST COUNTY ASPHALT PLANT TEST 2 TABLE 2-2 8-30-91

BAROMETRIC PRESSURE, in Hg = 28.700
TIP DIAMETER, in .3710
STACK AREA, sq ft = 49.020
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.50
WATER COLLECTED, ml = 183.00
PARTICULATE COLLECTED, grams = ~~0.4020~~ .3836
CO2 = 3.00 O2 = 15.40 CO = 0.00 N2 = 81.60

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	130	0.420	5.70	98	40.91
2	130	0.370	5.00	98	38.40
3	130	0.320	4.30	100	35.71
4	130	0.220	3.00	100	29.61
5	130	0.120	1.70	104	21.87
6	130	0.040	0.56	106	12.63
7	130	0.000	0.00	108	0.00
8	130	0.000	0.00	108	0.00
9	130	0.060	0.85	108	15.46
10	130	0.080	1.10	110	17.86
11	130	0.120	1.70	110	21.87
12	130	0.200	2.80	110	28.23
13	125	0.470	6.50	112	43.10
14	130	0.470	6.50	114	43.28
15	130	0.440	6.00	114	41.88
16	130	0.320	4.50	114	35.71
17	130	0.210	2.80	114	28.93
18	130	0.080	1.10	114	17.86
19	130	0.000	0.00	116	0.00
20	130	0.000	0.00	116	0.00
21	130	0.000	0.00	116	0.00
22	130	0.000	0.00	116	0.00
23	130	0.040	0.56	118	12.63
24	130	0.120	1.70	118	21.87
AVG VALUES	130		2.349	110	21.16

TOTAL GAS WITHDRAWN, scf = 47.96
DRY GAS WITHDRAWN, scf = 39.35
WATER VAPOR WITHDRAWN, scf = 8.61
PERCENT WATER VAPOR = 17.96
ACTUAL WET FLOW RATE, acfm = 62,233.14
STANDARD DRY FLOW RATE, scfm = 43,840.15
PARTICULATE CONCENTRATION, grains/dscf = ~~0.1575~~ 0.1504
PARTICULATE EMISSIONS, lb/1000 lb wet gas = ~~0.259~~ 0.247
PARTICULATE EMISSION RATE, lb/hr = ~~58.55~~ 55.87
PERCENT OF ISOKINETIC SAMPLING = 97.69

FOREST COUNTY ASPHALT PLANT TEST 3 TABLE 2-3 8-30-91

BAROMETRIC PRESSURE, in Hg = 28.700
TIP DIAMETER, in .3710
STACK AREA, sq ft = 49.020
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.90
WATER COLLECTED, ml = 162.00
PARTICULATE COLLECTED, grams = ~~0.3836~~ .4020
CO2 = 3.20 O2 = 15.40 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	130	0.410	5.70	118	40.25
2	130	0.400	5.60	118	39.76
3	130	0.320	4.50	116	35.56
4	130	0.200	2.80	116	28.11
5	130	0.120	1.70	116	21.78
6	130	0.050	0.70	116	14.06
7	130	0.000	0.00	116	0.00
8	130	0.000	0.00	118	0.00
9	130	0.040	0.56	118	12.57
10	130	0.110	1.50	118	20.85
11	130	0.160	2.20	118	25.14
12	130	0.210	2.90	118	28.81
13	130	0.520	7.20	120	45.33
14	130	0.520	7.20	120	45.33
15	130	0.450	6.20	120	42.17
16	130	0.320	4.50	120	35.56
17	130	0.140	1.95	120	23.52
18	130	0.090	1.25	120	18.86
19	130	0.000	0.00	120	0.00
20	130	0.000	0.00	120	0.00
21	130	0.000	0.00	120	0.00
22	130	0.030	0.41	120	10.89
23	130	0.030	0.41	120	10.89
24	130	0.100	1.40	120	19.88
AVG VALUES	130		2.445	119	21.64

TOTAL GAS WITHDRAWN, scf = 47.41
DRY GAS WITHDRAWN, scf = 39.79
WATER VAPOR WITHDRAWN, scf = 7.63
PERCENT WATER VAPOR = 16.08
ACTUAL WET FLOW RATE, acfm = 63,638.64
STANDARD DRY FLOW RATE, scfm = 45,839.49
PARTICULATE CONCENTRATION, grains/dscf = ~~0.1488~~ 0.1559
PARTICULATE EMISSIONS, lb/1000 lb wet gas = ~~0.244~~ 0.256
PARTICULATE EMISSION RATE, lb/hr = ~~56.84~~ 59.56
PERCENT OF ISOKINETIC SAMPLING = 94.48

9 COLUMN WORKSHEET
FORM 134

HCOH - FOREST CITY

9-10-91

SAMPLE ID	SAMPLE LIQ VOL	LIQ ALIQ	C. ACID VOL	RDG	RDG - BLANK	µg/ALIQ	µg/SAMP		TOTAL
			1.0						
1A	19.0	0.5		1.283	1.210	15.9	604		609 µg
1B	10.0	3.0		.251	.125	1.50	5.0		
2A	22.2	0.5		1.555	1.482	20.8	924		928 µg
2B	12.3	3.0		.200	.074	0.87	3.6		
3A	19.6	0.5		1.147	1.074	13.9	545		551 µg
3B	12.3	3.0		.243	.117	1.40	5.7		
FLD BLK		3.0		.126					
SOLN BLK		3.0		.062					

Date: May 8, 1992

To: Lynda Wiese - SD

From: Joe Perez - AM/10

Subject: Asphalt Plant Stack Tests for Formaldehyde

Here are 26 test reviews for asphalt plants that included formaldehyde. The Pitlick & Wick, Woodruff stack test of of 9/27/91 included Benzene and total organics.

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: December 6, 1990 FILE REF: 4530

TO: Files

FROM: Joe Perez - AM/3 jup

SUBJECT: Certification of Stack Test Results from City of Marinette
Received: 11/27/90

I. Source

City of Marinette Asphalt Plant - FID #438005810, Stack #S10
Marinette, WI

Permit: #438005810-N01
Test Date: October 9, 1990 - Particulate-Method 5 with Backhalf Formaldehyde-NIOSH #3500
Asphalt Plant: Batch Mix rated at 60 T/Hr
Tested at 35 T/Hr

Collector: Spray Type Wet Scrubber

Test Firm: Environmental Technology & Eng.
13020 West Bluemound Rd.
Elm Grove, WI 53122
Crew Chief: Bill Dick (414) 784-2434

II. Discussion of Results

I checked over the results and found them to be correct. The average emission rate of 0.668 Lb/10^3 Lb exhaust gas is over the emission limit of 0.30 Lb/10^3 Lb exhaust gas.

JUP:ms
v:\9101\am9citym.jup

cc: Mike DeBrock - LMD
U.S. EPA Region V

No Process Description.
Everything else OK.

Production rate
< 60 % of capacity

3

SUMMARY

On October 11, 1990, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the City of Marinette batch mix asphalt plant located in Marinette, Wisconsin. The average of the three particulate tests show the emissions to be above the limit of 0.30 pounds of particulate matter per 1,000 pounds of exhaust gas (lb/1000 lb) as specified by the State of Wisconsin Department of Natural Resources (DNR) in mandatory operation permit no. 438005810-NO1. The numerical test results are summarized below:

Test	Lb/Hr	Emissions	% of Allowable	% Isokinetic
1	28.05	0.727 lb/1000 lb	242 %	102
2	22.72	0.555	185	99
3	27.69	0.722	241	98
AVG	26.15	0.668 lb/1000 lb	223 %	100

In addition, the formaldehyde emissions were also determined as a permit condition. These numerical results follow:

Test	LB/HR	LB/TON
1	0.14 lb/hr	0.0040 lb/ton
2	0.15	0.0043
3	0.13	0.0037
AVG	0.14 lb/hr	0.0040 lb/ton

CITY OF MARINETTE ASPHALT PLANT TEST 1 TABLE 2-1 10-11-90

BAROMETRIC PRESSURE, in Hg = 29.350
TIP DIAMETER, in .3700
STACK AREA, sq ft = 8.727
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.40
WATER COLLECTED, ml = 120.00
PARTICULATE COLLECTED, grams = 1.1003
CO2 = 6.20 O2 = 13.80 CO = 0.00 N2 = 80.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	125	0.300	1.70	45	33.43
2	130	0.300	1.70	46	33.57
3	130	0.260	1.45	47	31.25
4	130	0.180	1.02	48	26.00
5	130	0.180	1.02	49	26.00
6	130	0.080	0.46	50	17.34
7	125	0.030	0.18	51	10.57
8	130	0.030	0.18	52	10.62
9	130	0.040	0.23	52	12.26
10	130	0.040	0.23	53	12.26
11	135	0.040	0.23	57	12.31
12	130	0.030	0.18	59	10.62
13	125	0.260	1.45	60	31.12
14	130	0.260	1.45	60	31.25
15	135	0.140	0.80	61	23.03
16	130	0.090	0.52	62	18.39
17	130	0.090	0.52	64	18.39
18	130	0.050	0.28	66	13.71
19	130	0.030	0.18	67	10.62
20	130	0.030	0.18	70	10.62
21	130	0.030	0.18	70	10.62
22	125	0.070	0.40	71	16.15
23	125	0.100	0.57	72	19.30
24	125	0.100	0.57	73	19.30
AVG VALUES	129		0.653	59	19.11

TOTAL GAS WITHDRAWN, scf = 46.12
DRY GAS WITHDRAWN, scf = 40.47
WATER VAPOR WITHDRAWN, scf = 5.65
PERCENT WATER VAPOR = 12.25
ACTUAL WET FLOW RATE, acfm = 10,007.66
STANDARD DRY FLOW RATE, scfm = 7,716.52
PARTICULATE CONCENTRATION, grains/dscf = 0.4195
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.727
PARTICULATE EMISSION RATE, lb/hr = 28.05
PERCENT OF ISOKINETIC SAMPLING = 102.19

CITY OF MARINETTE ASPHALT PLANT TEST 2 TABLE 2-2 10-11-90

BAROMETRIC PRESSURE, in Hg = 29.350
TIP DIAMETER, in .3700
STACK AREA, sq ft = 8.727
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 41.15
WATER COLLECTED, ml = 131.00
PARTICULATE COLLECTED, grams = 0.8766
CO2 = 6.20 O2 = 13.80 CO = 0.00 N2 = 80.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	130	0.300	1.70	70	33.62
2	130	0.300	1.70	71	33.62
3	130	0.240	1.35	72	30.07
4	135	0.180	1.02	73	26.15
5	130	0.140	0.80	72	22.97
6	125	0.100	0.56	73	19.33
7	130	0.050	0.28	74	13.73
8	130	0.030	0.18	75	10.63
9	135	0.030	0.18	75	10.68
10	130	0.030	0.18	76	10.63
11	130	0.080	0.45	77	17.36
12	125	0.100	0.56	78	19.33
13	130	0.350	1.85	79	36.32
14	130	0.320	1.80	80	34.72
15	130	0.300	1.70	80	33.62
16	130	0.240	1.35	81	30.07
17	130	0.140	0.80	81	22.97
18	125	0.070	0.40	82	16.17
19	130	0.030	0.18	84	10.63
20	125	0.020	0.12	85	8.64
21	130	0.020	0.12	86	8.68
22	130	0.020	0.12	88	8.68
23	130	0.050	0.28	89	13.73
24	125	0.070	0.40	90	16.17
AVG VALUES	129		0.753	79	20.36

TOTAL GAS WITHDRAWN, scf = 47.50
DRY GAS WITHDRAWN, scf = 41.33
WATER VAPOR WITHDRAWN, scf = 6.17
PERCENT WATER VAPOR = 12.98
ACTUAL WET FLOW RATE, acfm = 10,658.60
STANDARD DRY FLOW RATE, scfm = 8,146.73
PARTICULATE CONCENTRATION, grains/dscf = 0.3272
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.555
PARTICULATE EMISSION RATE, lb/hr = 22.72
PERCENT OF ISOKINETIC SAMPLING = 98.85

CITY OF MARINETTE ASPHALT PLANT TEST 3 TABLE 2-3 10-11-90

BAROMETRIC PRESSURE, in Hg = 29.350
TIP DIAMETER, in .3700
STACK AREA, sq ft = 8.727
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 37.89
WATER COLLECTED, ml = 125.00
PARTICULATE COLLECTED, grams = 1.0613
CO2 = 6.30 O2 = 13.70 CO = 0.00 N2 = 80.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	125	0.240	1.35	80	29.96
2	125	0.240	1.35	80	29.96
3	125	0.180	1.02	80	25.95
4	125	0.120	0.68	81	21.19
5	125	0.080	0.45	82	17.30
6	130	0.080	0.45	83	17.37
7	130	0.040	0.22	84	12.28
8	130	0.040	0.22	84	12.28
9	130	0.050	0.28	86	13.73
10	130	0.100	0.56	89	19.42
11	130	0.100	0.56	90	19.42
12	125	0.150	0.86	91	23.69
13	125	0.180	1.02	97	25.95
14	130	0.150	0.86	98	23.79
15	130	0.080	0.45	99	17.37
16	130	0.080	0.45	99	17.37
17	130	0.050	0.28	100	13.73
18	130	0.040	0.22	100	12.28
19	130	0.040	0.22	100	12.28
20	130	0.040	0.22	100	12.28
21	125	0.080	0.45	101	17.30
22	125	0.100	0.56	102	19.34
23	130	0.100	0.56	102	19.42
24	130	0.150	0.86	102	23.79
AVG VALUES	128		0.500	92	19.06

TOTAL GAS WITHDRAWN, scf = 43.99
DRY GAS WITHDRAWN, scf = 38.10
WATER VAPOR WITHDRAWN, scf = 5.88
PERCENT WATER VAPOR = 13.38
ACTUAL WET FLOW RATE, acfm = 9,981.08
STANDARD DRY FLOW RATE, scfm = 7,611.18
PARTICULATE CONCENTRATION, grains/dscf = 0.4298
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.722
PARTICULATE EMISSION RATE, lb/hr = 27.69
PERCENT OF ISOKINETIC SAMPLING = 97.54

City of Marinette Asphalt Formaldehyde Calculations

$\gamma = 1.017$

$P_b = 29.35$

Test 1

$V_m = 4.83$ FT^3 $\quad T_m = 495$ R (35 F)

$$V_{std} = 4.83 - 1.017 * \frac{529}{495} * \frac{29.35}{29.92} * .02832$$

$$= 5.14 \text{ scf} = 0.146 \text{ m}^3$$

$$C = \frac{.689 \text{ mg}}{.146 \text{ m}^3} = 4.72 \text{ mg/m}^3$$

$$ER = 4.72 * 7716.52 \frac{\text{ft}^3}{\text{min}} * 1.6992 \div 453600 = 0.14 \text{ lb/hr}$$

Test 2

$V_m = 2.58$

$T_m = 501$

$$V_{std} = 2.58 - 1.017 * \frac{529}{501} * \frac{29.35}{29.90} * .02832$$

$$= 2.69 \text{ scf} = 0.1071 \text{ m}^3$$

$$C = \frac{.365}{.076} = 4.80 \text{ mg/m}^3$$

$ER = 0.15$ lb/hr.

Test 3

$V_m = 2.79$

$T_m = 520$

$$V_{std} = 2.79 - 1.017 * \frac{529}{520} * \frac{29.35}{29.92} * .02832$$

$$= 2.83 \text{ scf} = 0.080 \text{ m}^3$$

$$C = \frac{.363}{.080} = 4.54 \text{ mg/m}^3$$

$ER = 0.13$ #/hr.

JP.

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 6-26-91

File Code: 4530

PRELIMINARY STACK TEST REVIEW Received: 6/18/91

By: A. Sieber Test Date: May 20, 91

Name of Source: Appleton Asphalt FID #: 999918160

Address:

City: Depere Permit #: 85-RV-012

Description of Source Tested: Appleton Asphalt has a portable asphalt plant. It is equipped w/ a ADM drum mixer. It is fired w/ #2 fuel oil.

Description of Control Equipment: Scrubber (wet)

Test Firm: ETE

Crew Chief & Phone#:

Pollutant Tested: Part. Test Method: 5

Pollutant Tested: Formaldehyde Test Method: NIOSH 3500

Pollutant Tested: Test Method:

Test Production Level: 175 TPH (70% virgin + 30% recycle)

Rated Production Level: 200 TPH @ 5%

Discussion of Results:

____ The stack test is invalid and will have to be redone because

* ETE forgot to correct for saturated stack conditions. Therefore isos. are a little different. ARS

HCHO

The test average result of 0.047 gr/dscf; .11 #/hr. is ____ is not X (part.)

in compliance with the emission limit of 0.04 gr/dscf.

CC Joe Perez-AM/3
US EPA Region V
Dennis Verhaagh - LMD

Test Method ✓
Control System ✓
runs ✓
Source ✓
Process Desc. X
Production Rate ✓
Production Capacity ✓
Problems Encountered ✓
Test Data ✓

Have full report!

4

PARTICULATE CHECKLIST

Name of Source: Appleton Asphalt Test Date: May 20, 91

1. Are the isokinetics per run between 90 and 110%? YES X NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES X NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES X NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES X NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES X NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES X NO__
   If an incorrect total is found, call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES X NO__
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Lb/DSCF = (Gr/DSCF)/7000

Eq. 3 Lb/Hr = 60*DSCFM*(Lb/DSCF)

Eq. 4 Lb/10^6 BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/Hr, or Lb/10^6 BTU, solve Eq. 1-4. Do your results match the consultant's? YES X NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES__ NO X
   If no, write in the correct average.

10. Is the average result in compliance? YES__ NO X
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES X NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On May 20, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Appleton Asphalt, Inc. Green Bay asphalt plant located on Scray Hill in DePere, Wisconsin. The average of the three particulate tests show the emissions to be above the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	.052 0.~~051~~ gr/dscf	128 %
2	.0492 0.~~047~~	117
3	.0414 0.~~040~~	100
AVG	.0472 0.~~046~~ gr/dscf	115 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.11 lb/hr	0.0006 lb/ton
2	0.12	0.0007
3	0.10	0.0006
AVG	0.11 lb/hr	0.0006 lb/ton

GREEN BAY ASPHALT TEST 1 TABLE 2-1 5-20-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .3720
STACK AREA, sq ft = 11.250
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 46.45
WATER COLLECTED, ml = 457.00
PARTICULATE COLLECTED, grams = 0.1528
CO2 = 8.40 O2 = 11.00 CO = 0.00 N2 = 80.60

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	155	0.190	2.15	80	28.33
2	155	0.190	2.15	81	28.33
3	155	0.200	2.25	82	29.06
4	155	0.200	2.25	82	29.06
5	155	0.190	2.15	83	28.33
6	155	0.160	1.80	86	26.00
7	155	0.180	2.00	87	27.57
8	155	0.180	2.00	88	27.57
9	155	0.140	1.60	89	24.32
10	155	0.140	1.60	90	24.32
11	155	0.170	1.70	92	26.80
12	155	0.170	1.70	93	26.80
13	155	0.180	1.80	93	27.57
14	155	0.180	1.80	94	27.57
15	155	0.100	1.05	95	20.55
16	155	0.230	2.35	97	31.17
17	155	0.230	2.35	97	31.17
18	155	0.230	2.35	98	31.17
19	155	0.210	2.15	98	29.78
20	155	0.200	2.0	98	29.06
21	155	0.170	1.7	98	26.80
22	150	0.170	1.7	89	26.69
23	150	0.150	1.5	90	25.07
24	155	0.150	1.55	80	25.17
25	155	0.120	1.25	80	22.51
AVG VALUES	155		1.884	90	27.23

TOTAL GAS WITHDRAWN, scf = 67.84
DRY GAS WITHDRAWN, scf = 46.33
WATER VAPOR WITHDRAWN, scf = 21.51
PERCENT WATER VAPOR = 31.71
ACTUAL WET FLOW RATE, acfm = 18,380.90
STANDARD DRY FLOW RATE, scfm = 10,594.07
, m3/hr = 18,001.44
PARTICULATE CONCENTRATION, grains/dscf = 0.051
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.075
PARTICULATE EMISSION RATE, lb/hr = 4.72
FORMALDEHYDE CONCENTRATION, mg/m3 = 2.77
FORMALDEHYDE EMISSION RATE, lb/hr = 0.11
PERCENT OF ISOKINETIC SAMPLING = 104.32

GREEN BAY ASPHALT TEST 2 TABLE 2-2 5-20-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .3720
STACK AREA, sq ft = 11.250
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 45.60
WATER COLLECTED, ml = 457.00
PARTICULATE COLLECTED, grams = 0.1386
CO2 = 8.80 O2 = 11.00 CO = 0.00 N2 = 80.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	155	0.170	1.75	82	26.80
2	155	0.160	1.65	83	26.00
3	155	0.150	1.55	84	25.17
4	155	0.150	1.55	84	25.17
5	155	0.120	1.25	84	22.51
6	155	0.240	2.50	88	31.84
7	155	0.240	2.50	90	31.84
8	155	0.240	2.50	91	31.84
9	155	0.230	2.40	91	31.17
10	155	0.230	2.40	91	31.17
11	155	0.170	1.75	95	26.80
12	155	0.160	1.65	96	26.00
13	155	0.150	1.55	97	25.17
14	155	0.150	1.55	98	25.17
15	155	0.110	1.15	100	21.56
16	155	0.230	2.40	102	31.17
17	150	0.180	1.85	82	27.46
18	150	0.180	1.85	96	27.46
19	155	0.160	1.65	97	26.00
20	155	0.160	1.65	98	26.00
21	155	0.240	2.50	101	31.84
22	155	0.230	2.40	102	31.17
23	155	0.230	2.40	102	31.17
24	155	0.230	2.40	103	31.17
25	155	0.200	2.05	103	29.07
AVG VALUES	155		1.954	94	28.03

TOTAL GAS WITHDRAWN, scf = 67.03
DRY GAS WITHDRAWN, scf = 45.51
WATER VAPOR WITHDRAWN, scf = 21.51
PERCENT WATER VAPOR = 32.09
ACTUAL WET FLOW RATE, acfm = 18,919.65
STANDARD DRY FLOW RATE, scfm = 10,842.78
, m3/hr = 18,424.04
PARTICULATE CONCENTRATION, grains/dscf = 0.047
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.067
PARTICULATE EMISSION RATE, lb/hr = 4.37
FORMALDEHYDE CONCENTRATION, mg/m3 = 2.85
FORMALDEHYDE EMISSION RATE, lb/hr = 0.12
PERCENT OF ISOKINETIC SAMPLING = 100.12

GREEN BAY ASPHALT TEST 3 TABLE 2-3 5-20-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .3720
STACK AREA, sq ft = 11.250
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 45.40
WATER COLLECTED, ml = 454.00
PARTICULATE COLLECTED, grams = 0.1177
CO2 = 8.60 O2 = 11.40 CO = 0.00 N2 = 80.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	150	0.220	2.25	102	30.36
2	155	0.240	2.50	105	31.84
3	155	0.240	2.50	105	31.84
4	155	0.230	2.40	105	31.17
5	155	0.190	1.95	105	28.33
6	155	0.160	1.65	108	26.00
7	155	0.160	1.65	108	26.00
8	155	0.180	1.85	109	27.58
9	155	0.180	1.85	109	27.58
10	155	0.140	1.45	110	24.32
11	155	0.160	1.65	110	26.00
12	155	0.170	1.75	110	26.80
13	150	0.170	1.75	110	26.69
14	155	0.160	1.65	110	26.00
15	155	0.130	1.35	110	23.43
16	155	0.230	2.40	110	31.17
17	155	0.240	2.50	110	31.84
18	155	0.240	2.50	110	31.84
19	155	0.220	2.25	110	30.49
20	155	0.210	2.15	110	29.79
21	155	0.180	1.85	110	27.58
22	155	0.160	1.65	110	26.00
23	155	0.150	1.55	110	25.17
24	155	0.140	1.45	110	24.32
25	155	0.120	1.25	110	22.52
AVG VALUES	155		1.910	109	27.79

TOTAL GAS WITHDRAWN, scf = 66.76
DRY GAS WITHDRAWN, scf = 45.39
WATER VAPOR WITHDRAWN, scf = 21.37
PERCENT WATER VAPOR = 32.01
ACTUAL WET FLOW RATE, acfm = 18,755.32
STANDARD DRY FLOW RATE, scfm = 10,761.92
, m3/hr = 18,286.66
PARTICULATE CONCENTRATION, grains/dscf = 0.040
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.058
PARTICULATE EMISSION RATE, lb/hr = 3.70
FORMALDEHYDE CONCENTRATION, mg/m3 = 2.60
FORMALDEHYDE EMISSION RATE, lb/hr = 0.10
PERCENT OF ISOKINETIC SAMPLING = 100.60

May 20, 1991 STACK TEST LOG

ADM PLANT - GREEN BAY - 999818160

FUEL #2

	TIME	AGG TPH	ASPH. TPH	RECYCLE T.P.H.		
TEST #1	915	130	6.2	46	182.2	
	925	131	6.2	48	186.2	
	935	133	6.6	45	184.6	
	945	136	6.6	43	185.6	
	955	133	6.4	42	181.4	
	1005	134	6.4	45	182.4	
	1010	133	6.4	41	180.4	
	1105	132	6.2	42	180.2	
	~~HLS~~					
	1215	128	6.0	40	179.0	AVG 181.8
TEST #2	1245	115	5.8	52	172.8	
	1255	118	5.9	55	178.9	3 1/8
	105	116	6.0	53	175	
	115	116	5.8	54	175.8	3 2/8
	125	114	5.9	56	174.9	
	~~225~~	116	6.0	52	174	3 2/8
	235	117	6.1	52	175.1	
	245	115	5.9	53	178.9	3 2/8
	255			AVG	175.1	

TEST #3

TIME	AGG. TPH	A$L TPH	Recycle TPH.		
3:30	116	5.7	52	173.9	3 7/8
340	117	5.9	51	173.9	
350	115	6.0	53	174	3 7/8
400	115	6.1	54	175.1	
410	116	6.0	53	175	3 7/8
450	117	6.0	53	176	
500	113	5.F	51	169.7	3 7/8
510	115	5.9	54	174.9	
520	114	5.8	53	172.8	3 7/8
530	116	5.9	52	173.9	
			Avg.	173.9	

GREEN BAY ASPHALT
FORMALDEHYDE CALCULATIONS

TEST 1 $V_M = 2.50\ ft^3$ $\gamma = 1.020$
181.8 TPH $T_M = 78°F$

$$V_{M\,std} = 2.50 * 1.020 * \frac{528}{538} * \frac{29.4}{29.92}$$

$$= 2.46\ SCF * .02832 = .070\ m^3$$

$$C = \frac{194\ mg}{.070\ m^3} = 2.77\ mg/m^3$$

ER = 0.11 lb/hr.
= .0006 lb/ton

TEST 2 $V_M = 2.50$
175.1 TPH $T_M = 84°F$

$V_{M\,std} = 2.43\ SCF = .069\ m^3$

$$C = \frac{.197}{.069} = 2.85\ mg/m^3$$

ER 0.12 lb/hr
.0007 lb/ton

TEST 3 $V_M = 2.00$
173.9 TPH $T_M = 84°F$

$V_{M\,std} = 1.95\ SCF = .055\ m^3$

$$C = \frac{.143}{.055} = 2.60\ mg/m^3$$

ER = 0.10 lb/hr.
= .0006 TPH

CALCULATION OF PARTICULATE CONCENTRATION
AND EMISSION RATE RESULTS WITH EPA METHOD 5 DATA

Run Number: 1
Test Site: Appleton Asphalt
Test Date: 5/20/91

	DATA
All data are in: 1=metric, 2=English:	2
Area of stack (ft2 or m2):	11.25
Pitot tube calibration coefficient (Cp):	0.85
Barometric pressure (in. Hg or mm Hg):	29.4
Nozzle diameter (ft or m):	0.031
Dry stack gas molecular weight:	29.784
Initial Dry Gas Meter reading (ft3 or m3):	0
Final Dry Gas Meter reading (ft3 or m3):	46.33
Dry Gas Meter calibration factor (Y):	1.032
Total run time (min):	62.5

	DATA
Particulate weight in probe rinse (mg):	0
Particulate weight in filter catch (mg):	152.8
Particulate weight in impinger catch (mg):	0
Volume of Water Vapor Condensed (ml):	404
Water Vapor Collected in Silica Gel (mg):	0
Percent Oxygen in Stack by Volume (dry):	11
Percent Carbon Dioxide in Stack by Volume (dry):	8.4
Leak Rate Correction Factor Used? 1=yes, 2=no:	2
Heat Input(mmBtu/hr):	0

MEASURED DATA FROM TEST RUN no: 1

Run Time (min)	Pitot Delta p (in H2O, mm H2O)	Orifice Delta H (in H2O, mm H2O)	Average DGM Temp (F,C)	Static Pressure (in H2O, mm H2O)	Stack Temp (F,C)
2.5	0.19	2.15	90	-0.1	155
2.5	0.19	2.15	90	-0.1	155
2.5	0.2	2.25	90	-0.1	155
2.5	0.2	2.25	90	-0.1	155
2.5	0.19	2.15	90	-0.1	155
2.5	0.16	1.8	90	-0.1	155
2.5	0.18	2	90	-0.1	155
2.5	0.18	2	90	-0.1	155
2.5	0.14	1.6	90	-0.1	155
2.5	0.14	1.6	90	-0.1	155
2.5	0.17	1.7	90	-0.1	155
2.5	0.17	1.7	90	-0.1	155
2.5	0.18	1.8	90	-0.1	155
2.5	0.18	1.8	90	-0.1	155
2.5	0.1	1.05	90	-0.1	155
2.5	0.23	2.35	90	-0.1	155
2.5	0.23	2.35	90	-0.1	155
2.5	0.23	2.35	90	-0.1	155
2.5	0.21	2.15	90	-0.1	155
2.5	0.2	2.05	90	-0.1	155
2.5	0.17	1.75	90	-0.1	155
2.5	0.17	1.75	90	-0.1	155
2.5	0.15	1.55	90	-0.1	155
2.5	0.15	1.55	90	-0.1	155
2.5	0.12	1.25	90	-0.1	155

Average Values	SR(VP)= 0.4222	OP= 1.9104	TS(R')= 615

RESULTS

Percent moisture in stack gas (%):	29.52
Wet Stack Gas Molecular Weight (Ms):	26.3
Average Stack Pressure (Ps)(in Hg,mm Hg):	29.39
Average Stack Gas Temperature (Ts)(R,K):	615
Average Stack Velocity (Vs-avg) (ft/sec,m/sec):	27.36
Actual Volumetric Flow Rate (Q)(acfm,acmm):	18467.6
Standard Volumetric Flow Rate (Qstd)(scfm,scmm,dry):	10977.3
Standard Volume Metered on DGM (Vmstd)(scf,scm,dry):	45.315

CALCULATION OF PARTICULATE CONCENTRATION
AND EMISSION RATE RESULTS WITH EPA METHOD 5 DATA

RESULTS	PMRA Pollutant Mass Rate (lbs/hr):	4.8211
	PMRC Pollutant Mass Rate (lbs/hr):	4.90
	PMRA-PMRC Ave. Pollutant Mass Rate (lbs/hr):	4.86
	Dry Catch Pollutant Mass Rate (g/hr):	2220.91
	Total Catch Pollutant Mass Rate (g/hr):	2220.91
	Dry Catch Concentration (grains/dscf,g/dscm):	5.20E-02
	Total Catch Concentration (grains/dscf,g/dscm):	5.20E-02
	Isokinetic Check (% I):	98.4
	Oxygen-Based Emission Rate (ng/J,lb/million Btu):	0.00E+00
	Carbon Dioxide-Based Emission Rate (ng/J,lb/million Btu):	0.00E+00
	Emission Concentration,standard conditions dry(mmBtu/hr):	0.00

CALCULATION OF PARTICULATE CONCENTRATION
AND EMISSION RATE RESULTS WITH EPA METHOD 5 DATA

Run Number: 2
Test Site: Appleton Asphalt
Test Date: 5/20/91

	DATA
All data are in: 1=metric, 2=English:	2
Area of stack (ft2 or m2):	11.25
Pitot tube calibration coefficient (Cp):	0.85
Barometric pressure (in. Hg or mm Hg):	29.4
Nozzle diameter (ft or m):	0.031
Dry stack gas molecular weight:	29.848
Initial Dry Gas Meter reading (ft3 or m3):	0
Final Dry Gas Meter reading (ft3 or m3):	45.51
Dry Gas Meter calibration factor (Y):	1.037
Total run time (min):	62.5

	DATA
Particulate weight in probe rinse (mg):	0
Particulate weight in filter catch (mg):	138.6
Particulate weight in impinger catch (mg):	0
Volume of Water Vapor Condensed (ml):	397
Water Vapor Collected in Silica Gel (mg):	0
Percent Oxygen in Stack by Volume (dry):	11
Percent Carbon Dioxide in Stack by Volume (dry):	8.8
Leak Rate Correction Factor Used? 1=yes, 2=no:	2
Heat Input(mmBtu/hr):	0

MEASURED DATA FROM TEST RUN no: 2

Run Time (min)	Pitot Delta p (in H2O, mm H2O)	Orifice Delta H (in H2O, mm H2O)	Average DGM Temp (F,C)	Static Pressure (in H2O, mm H2O)	Stack Temp (F,C)
2.5	0.17	1.75	94	-0.1	155
2.5	0.16	1.65	94	-0.1	155
2.5	0.15	1.55	94	-0.1	155
2.5	0.15	1.55	94	-0.1	155
2.5	0.12	1.25	94	-0.1	155
2.5	0.24	2.5	94	-0.1	155
2.5	0.24	2.5	94	-0.1	155
2.5	0.24	2.5	94	-0.1	155
2.5	0.23	2.4	94	-0.1	155
2.5	0.23	2.4	94	-0.1	155
2.5	0.17	1.75	94	-0.1	155
2.5	0.16	1.65	94	-0.1	155
2.5	0.15	1.55	94	-0.1	155
2.5	0.15	1.55	94	-0.1	155
2.5	0.11	1.15	94	-0.1	155
2.5	0.23	2.4	94	-0.1	155
2.5	0.18	1.85	94	-0.1	155
2.5	0.18	1.85	94	-0.1	155
2.5	0.16	1.65	94	-0.1	155
2.5	0.16	1.65	94	-0.1	155
2.5	0.24	2.5	94	-0.1	155
2.5	0.23	2.04	94	-0.1	155
2.5	0.23	2.04	94	-0.1	155
2.5	0.23	2.04	94	-0.1	155
2.5	0.2	2.05	94	-0.1	155
Average Values	SR(VP)= 0.4307	OP= 1.9050			TS(R')= 615

RESULTS

Percent moisture in stack gas (%):	29.58
Wet Stack Gas Molecular Weight (Ms):	26.3
Average Stack Pressure (Ps)(in Hg,mm Hg):	29.39
Average Stack Gas Temperature (Ts)(R,K):	615
Average Stack Velocity (Vs-avg) (ft/sec,m/sec):	27.89
Actual Volumetric Flow Rate (Q)(acfm,acmm):	18828.9
Standard Volumetric Flow Rate (Qstd)(scfm,scmm,dry):	11183.0
Standard Volume Metered on DGM (Vmstd)(scf,scm,dry):	44.408

CALCULATION OF PARTICULATE CONCENTRATION
AND EMISSION RATE RESULTS WITH EPA METHOD 5 DATA

RESULTS	PMRA Pollutant Mass Rate (lbs/hr):	4.3731
	PMRC Pollutant Mass Rate (lbs/hr):	4.62
	PMRA-PMRC Ave. Pollutant Mass Rate (lbs/hr):	4.50
	Dry Catch Pollutant Mass Rate (g/hr):	2094.16
	Total Catch Pollutant Mass Rate (g/hr):	2094.16
	Dry Catch Concentration (grains/dscf,g/dscm):	4.82E-02
	Total Catch Concentration (grains/dscf,g/dscm):	4.82E-02
	Isokinetic Check (% I):	94.7
	Oxygen-Based Emission Rate (ng/J,lb/million Btu):	0.00E+00
	Carbon Dioxide-Based Emission Rate (ng/J,lb/million Btu):	0.00E+00
	Emission Concentration,standard conditions dry(mmBtu/hr):	0.00

CALCULATION OF PARTICULATE CONCENTRATION
AND EMISSION RATE RESULTS WITH EPA METHOD 5 DATA

Run Number: 3
Test Site: Appleton Asphalt
Test Date: 5/20/91

	DATA
All data are in: 1=metric, 2=English:	2
Area of stack (ft2 or m2):	11.25
Pitot tube calibration coefficient (Cp):	0.85
Barometric pressure (in. Hg or mm Hg):	29.4
Nozzle diameter (ft or m):	0.031
Dry stack gas molecular weight:	29.832
Initial Dry Gas Meter reading (ft3 or m3):	0
Final Dry Gas Meter reading (ft3 or m3):	45.39
Dry Gas Meter calibration factor (Y):	1.055
Total run time (min):	62.5

	DATA
Particulate weight in probe rinse (mg):	0
Particulate weight in filter catch (mg):	117.7
Particulate weight in impinger catch (mg):	0
Volume of Water Vapor Condensed (ml):	396
Water Vapor Collected in Silica Gel (mg):	0
Percent Oxygen in Stack by Volume (dry):	11.4
Percent Carbon Dioxide in Stack by Volume (dry):	8.6
Leak Rate Correction Factor Used? 1=yes, 2=no:	2
Heat Input(mmBtu/hr):	0

MEASURED DATA FROM TEST RUN no: 3

Run Time (min)	Pitot Delta p (in H2O, mm H2O)	Orifice Delta H (in H2O, mm H2O)	Average DGM Temp (F,C)	Static Pressure (in H2O, mm H2O)	Stack Temp (F,C)
2.5	0.22	2.25	109	-0.1	155
2.5	0.24	2.5	109	-0.1	155
2.5	0.24	2.5	109	-0.1	155
2.5	0.23	2.4	109	-0.1	155
2.5	0.19	1.95	109	-0.1	155
2.5	0.16	1.65	109	-0.1	155
2.5	0.16	1.65	109	-0.1	155
2.5	0.18	1.85	109	-0.1	155
2.5	0.18	1.85	109	-0.1	155
2.5	0.14	1.45	109	-0.1	155
2.5	0.16	1.65	109	-0.1	155
2.5	0.17	1.75	109	-0.1	155
2.5	0.17	1.75	109	-0.1	155
2.5	0.16	1.65	109	-0.1	155
2.5	0.13	1.35	109	-0.1	155
2.5	0.23	2.4	109	-0.1	155
2.5	0.24	2.5	109	-0.1	155
2.5	0.24	2.5	109	-0.1	155
2.5	0.22	2.25	109	-0.1	155
2.5	0.21	2.15	109	-0.1	155
2.5	0.18	1.85	109	-0.1	155
2.5	0.16	1.65	109	-0.1	155
2.5	0.15	1.55	109	-0.1	155
2.5	0.14	1.45	109	-0.1	155
2.5	0.12	1.25	109	-0.1	155

Average Values	SR(VP)=	OP=			TS(R')=
	0.4310	1.9375			615

RESULTS

Percent moisture in stack gas (%):	29.78
Wet Stack Gas Molecular Weight (Ms):	26.3
Average Stack Pressure (Ps)(in Hg,mm Hg):	29.39
Average Stack Gas Temperature (Ts)(R,K):	615
Average Stack Velocity (Vs-avg) (ft/sec,m/sec):	27.93
Actual Volumetric Flow Rate (Q)(acfm,acmm):	18854.3
Standard Volumetric Flow Rate (Qstd)(scfm,scmm,dry):	11166.2
Standard Volume Metered on DGM (Vmstd)(scf,scm,dry):	43.872

CALCULATION OF PARTICULATE CONCENTRATION
AND EMISSION RATE RESULTS WITH EPA METHOD 5 DATA

RESULTS	PMRA Pollutant Mass Rate (lbs/hr):	3.7136
	PMRC Pollutant Mass Rate (lbs/hr):	3.96
	PMRA-PMRC Ave. Pollutant Mass Rate (lbs/hr):	3.84
	Dry Catch Pollutant Mass Rate (g/hr):	1797.40
	Total Catch Pollutant Mass Rate (g/hr):	1797.40
	Dry Catch Concentration (grains/dscf,g/dscm):	4.14E-02
	Total Catch Concentration (grains/dscf,g/dscm):	4.14E-02
	Isokinetic Check (% I):	93.7
	Oxygen-Based Emission Rate (ng/J,lb/million Btu):	0.00E+00
	Carbon Dioxide-Based Emission Rate (ng/J,lb/million Btu):	0.00E+00
	Emission Concentration,standard conditions dry(mmBtu/hr):	0.00

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 31, 1992 FILE REF: 4530

TO: FILES

Received: 11/13/91

FROM: Andy Seeber -AM/10 AS

SUBJECT: Review of Stack Test Performed at Pitlick & Wick, Woodruff

I. SOURCE

Pitlick & Wick
4827 Sand Beach Drive
Woodruff, WI 54568
FID #764121160
Permit #764121160-NO1, Issued 6-22-88
Particulates -Method 17
HCHO -NIOSH 3500
Benzene -Method 18
Total Organics -Method 18

Test Date: 9-27-91
Test Firm: ET&E
13020 W. Bluemound Rd.
Crew Chief: Mr. Lowell Huenink (414) 784-2434

II. SOURCE DESCRIPTION

The source tested was a drum mix asphalt plant rated at 200 TPH. It was tested at 140 TPH. The plant was burning waste oil during the test. Emissions are controlled by a baghouse. Benzene and total organics were tested during runs 2 and 3. During the third run, 20% of the aggregate was contaminated soil.

III. DISCUSSION OF RESULTS

The test results are shown in Table 1. The average particulate concentration of 0.0021 gr/dscf is under the limit of 0.04 gr/dscf. The average HCHO concentration of 526 #/yr is over the target limit of 250 #/yr. Benzene and total organics are not limited by the existing permit.

I assumed the benzene and total organics testing was done for informational purposes. The benzene and total organics results from run 2 to run 3 did not significantly increase with the introduction of the contaminated soil. The total organic results are given as n-Hexane, recalculating the results to carbon reduces the concentration only slightly. Therefore, I left the results as reported in n-Hexane. The average benzene concentration was <0.00066 #/hr and the average total organics concentration was 0.0857 #/hr.

cc: Neal Bauhuin -NCD
Joe Perez -AM/10
USEPA Region V

Test Method ✓
Control System ✓
runs ✓
Source ✓
Process Desc. X
Production Rate ✓
Production Capacity ✓
Problems Encountered X
Test Data ✓

5

SUMMARY

On September 27, 1991, Environmental Technology & Engineering Corp personnel performed stack emissions testing on the asphalt plant located on Highway 51 north of Woodruff, Wisconsin.

Testing to determine total particulate matter emissions were performed using EPA Method 17. The results were well below the DNR permit limitation and are shown below:

Test	Particulate Emission Concentration
1	0.0017 grains/dscf
2	0.0017 grains/dscf
3	0.0030 grains/dscf
AVG	0.0021 grains/dscf
Permit Limitation	0.039 grains/dscf

Formaldehyde emissions were determined using modified NIOSH Method 3500 sampling and analytical methods. The results indicated the following emission rates:

Test	(mg/m³)	Formaldehyde Emission Rate		(#/yr)
1	.955	0.056	lb/hr	491
2	1.261	0.068	lb/hr	596
3	1.007	0.056	lb/hr	491
AVG	1.074	0.060	lb/hr	526

Formaldehyde Limitation 250 pounds per year

During two of the tests, one with soil remediation (3rd test) and one with virgin aggregate (2nd test), the total organic compound emissions and the benzene emissions were determined using EPA Method 18. The results are shown below:

Test	Organic Compound (1) Emission Rate	Benzene Emission Rate
2, virgin aggregate	0.0906 lb/hr	< 0.00065 lb/hr
3, soil remediation	0.0807 lb/hr	< 0.00067 lb/hr

(1) Includes formaldehyde, benzene, and all other (unidentified) organics. Unidentified organics were calibrated as n-hexane.

Benzene Limitation	300 pounds per year
Total Organic Limitation	9.0 pounds per hour

PITLICK & WICK WOODRUFF-BAGHOUSE TEST 1 TABLE 2-1 9-27-91

BAROMETRIC PRESSURE, in Hg = 28.300
TIP DIAMETER, in .3040
STACK AREA, sq ft = 9.065
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 15
GAS METER VOLUME, acf = 51.76
WATER COLLECTED, ml = 281.00
PARTICULATE COLLECTED, grams = 0.0054
CO2 = 4.20 O2 = 15.40 CO = 0.00 N2 = 80.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	310	0.580	2.30	50	55.56
2	310	0.600	2.40	50	56.50
3	300	0.580	2.30	52	55.19
4	300	0.540	2.15	54	53.26
5	300	0.580	2.30	56	55.19
6	300	0.600	2.40	58	56.14
7	300	0.580	2.30	60	55.19
8	290	0.600	2.40	64	55.77
9	290	0.580	2.30	66	54.83
10	280	0.600	2.40	68	55.39
11	260	0.580	2.30	70	53.72
12	240	0.600	2.40	72	53.88
13	250	0.540	2.15	74	51.47
14	260	0.600	2.40	77	54.64
15	260	0.500	2.00	80	49.88
AVG VALUES	283		2.300	63	54.44

TOTAL GAS WITHDRAWN, scf = 62.54
DRY GAS WITHDRAWN, scf = 49.31
WATER VAPOR WITHDRAWN, scf = 13.23
PERCENT WATER VAPOR = 21.15
ACTUAL WET FLOW RATE, acfm = 29,610.30
STANDARD DRY FLOW RATE, scfm = 15,669.88
PARTICULATE CONCENTRATION, grains/dscf = 0.0017
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.003
PARTICULATE EMISSION RATE, lb/hr = 0.22
PERCENT OF ISOKINETIC SAMPLING = 94.34

PITLICK & WICK WOODRUFF-BAGHOUSE TEST 2 TABLE 2-2 9-27-91

BAROMETRIC PRESSURE, in Hg = 28.300
TIP DIAMETER, in .3040
STACK AREA, sq ft = 9.065
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 15
GAS METER VOLUME, acf = 46.40
WATER COLLECTED, ml = 253.00
PARTICULATE COLLECTED, grams = 0.0050
CO2 = 4.20 O2 = 15.40 CO = 0.00 N2 = 80.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	260	0.380	1.50	80	43.49
2	260	0.400	1.60	80	44.62
3	260	0.400	1.60	80	44.62
4	260	0.480	1.90	82	48.88
5	260	0.500	2.00	82	49.88
6	260	0.480	1.90	84	48.88
7	260	0.480	1.90	84	48.88
8	260	0.520	2.10	86	50.87
9	260	0.520	2.10	86	50.87
10	260	0.460	1.85	88	47.85
11	260	0.520	2.10	90	50.87
12	260	0.440	1.75	90	46.79
13	260	0.500	2.00	92	49.88
14	260	0.500	2.00	94	49.88
15	260	0.500	2.00	94	49.88
AVG VALUES	260		1.887	86	48.41

TOTAL GAS WITHDRAWN, scf = 56.19
DRY GAS WITHDRAWN, scf = 44.28
WATER VAPOR WITHDRAWN, scf = 11.91
PERCENT WATER VAPOR = 21.20
ACTUAL WET FLOW RATE, acfm = 26,329.84
STANDARD DRY FLOW RATE, scfm = 14,377.19
PARTICULATE CONCENTRATION, grains/dscf = 0.0017
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.003
PARTICULATE EMISSION RATE, lb/hr = 0.21
PERCENT OF ISOKINETIC SAMPLING = 92.32

PITLICK & WICK WOODRUFF-BAGHOUSE TEST 3 TABLE 2-3 9-27-91

BAROMETRIC PRESSURE, in Hg = 28.300
TIP DIAMETER, in .3040
STACK AREA, sq ft = 9.065
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 15
GAS METER VOLUME, acf = 47.34
WATER COLLECTED, ml = 260.00
PARTICULATE COLLECTED, grams = 0.0087
CO2 = 4.20 O2 = 15.40 CO = 0.00 N2 = 80.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	260	0.540	2.15	94	51.86
2	260	0.540	2.15	94	51.86
3	260	0.480	1.90	94	48.89
4	260	0.560	2.25	94	52.81
5	260	0.560	2.25	94	52.81
6	260	0.460	1.85	94	47.86
7	260	0.560	2.25	94	52.81
8	260	0.520	2.10	96	50.89
9	260	0.520	2.10	98	50.89
10	260	0.520	2.10	100	50.89
11	260	0.500	2.00	100	49.90
12	260	0.500	2.00	100	49.90
13	260	0.460	1.85	100	47.86
14	260	0.480	1.90	100	48.89
15	260	0.380	1.52	102	43.50
AVG VALUES	260		2.025	97	50.11

TOTAL GAS WITHDRAWN, scf = 57.49
DRY GAS WITHDRAWN, scf = 45.25
WATER VAPOR WITHDRAWN, scf = 12.24
PERCENT WATER VAPOR = 21.29
ACTUAL WET FLOW RATE, acfm = 27,253.66
STANDARD DRY FLOW RATE, scfm = 14,860.11
PARTICULATE CONCENTRATION, grains/dscf = 0.0030
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.005
PARTICULATE EMISSION RATE, lb/hr = 0.36
PERCENT OF ISOKINETIC SAMPLING = 91.28

JOB: PITLICK & WICK / WOODRUFF DATE: 9-27-91

BENZENE

G.C. CAL .00007765 mg/M³

(1) FLOW

PUMP No ORGANIC TEST PUMP CAL

PUMP CTS VOL SAMP =

G.C. AREA

ORGANIC CONC =

E.R. =

WITHOUT SOIL REMEDIATION

TEST (2) FLOW 14377 sctm 24430 M³/HR

PUMP MSA 5 PUMP CAL N/A

PUMP CTS - metered V_s = 0.0575

G.C. AREA < 9100 ORGANIC WT = < 0.7 µg

ORGANIC CONC. = < 0.012 mg/M³

E.R. = < 0.00066 #/hr

WITH SOIL REMEDIATION

TEST (3) FLOW 14860 sctm 25250 M³/hr

PUMP MSA 5 PUMP CAL N/A

PUMP CTS - metered V_s = 0.0589 M³

G.C. AREA < 9100 ORGANIC WT = < 0.7

ORGANIC CONC. = < 0.012 mg/M³

E.R. = < 0.00067 #/hr

JOB: PITLICK & WICK / WOODRUFF DATE: 9-27-91

TOTAL ORGANICS (as n-Hexane) G.C. CAL .0000445 mg/ct

(1) FLOW

PUMP NO PUMP CAL

PUMP CTS VOL SAMP =

G.C. AREA ORGANIC TEST

ORGANIC CONC =

E.R. =

WITHOUT SOIL REMEDIATION

TEST (2) FLOW 14377 scfm 24430 M^3/hr

PUMP MSA 5 PUMP CAL N/A

PUMP CTS - metered V_s = 0.0575 M^3

G.C. AREA 247745 ORGANIC WT = 23.4 µg

ORGANIC CONC. = 0.407 mg/M^3 (.34 mg/m^3 C.)

E.R. = 0.022 #/hr (.018 #/hr C.)

WITH SOIL REMEDIATION

TEST (3) FLOW 14860 scfm (25250 M^3/hr)

PUMP MSA 5 PUMP CAL N/A

PUMP CTS - metered V_s = 0.0589 M^3

G.C. AREA 266392 ORGANIC WT = 25.2 µg

ORGANIC CONC. = 0.428 mg/M^3

E.R. = 0.024 #/hr

Pitlick + Wick HCOH Analysis 10/3/91

SAMPLE ID	SAMPLE VOL(ml)	ALIQ VOL	C. ACID ml	RDG	RDG-BLANK	mg/ALIQ	mg/SAMP		TOTAL
PITLIK + WICK			1.0						mg
WOODRUFF									
1A	18.6	0.50	✓	.154	.118	1.41	52.5		53.6
26626 M³/hr.									0.0560 #/hr.
1B	9.2	1.0		.047	.011	.12	1.1		0.955 mg/M³
2A	21.9	0.50		.105	.069	.82	35.9		35.9
24430 M³/hr.									0.068 #/hr
Lost 2B	—	—							1.261 mg/M³
9-23-91 FLD BLK	[illegible]	1.0		.038					
3A	18.8	0.50		.099	.063	0.76	28.6		28.6
25 250 M³/hr.									0.0560 #/hr.
3B	~2.0	1.0	✓	.038	—				1.007 mg/M³

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: Jan 14, 1992

File Code: 4530

PRELIMINARY STACK TEST REVIEW

Received 12/2/92

By: Joe Perez jmp

Test Date: Nov 13, 1991

Name of Source: Kennedy & Sons

FID #: 999523470

Address: Townline Rd & HWY 51

Stack #: 01

City: Beloit, WI 53511

Process #: 01

Permit #: 87-POY-037A

Date Issued: 1987

Description of Source Tested: Bituma 300 drum mix asphalt plant rated at 300 T/Hr. During test, the plant was using 70% virgin and 30% recycle.

Description of Control Equipment: Venturi scrubber using 420GPM. ΔP was 19" H_2O

Test Firm: Environmental Technology & Eng., Mil, WI

Crew Chief & Phone#: Mr Bill Dick (414) 784-2434

Pollutant Tested: Particulate — Test Method: Method 5

Pollutant Tested: Formaldehyde — Test Method: NIOSH 3500

Pollutant Tested: _____ — Test Method: _____

Test Production Level: 267 T/Hr

Rated Production Level: 300 T/Hr

Discussion of Results:

Poll. Test Ave. - 0.041 Gr Part/DSCF — Limit - 0.040 Gr Part./DSCF — In Compliance? Y (N)

Poll. Test Ave. - 0.42 Lb HCOH/Hr — Limit - _____ — In Compliance? Y N

Poll. Test Ave. - 3,679 Lb HCOH/Yr — Limit - 250 Lb/Yr — In Compliance? Y (N)

Poll. Test Ave. - _____ — Limit - _____ — In Compliance? Y N

Is This a Valid Test? (Y) N If answer is no see page 2.

* Test may be reviewed in depth later, if necessary.

CC Joe Perez-AM/10
US EPA Region V
Tom Roushar-SD

No Process Desc.
Everything else OK

Have full report!

PARTICULATE CHECKLIST

Name of Source: Kennedy & Sons Test Date: NOV 13, 1991

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? NSPS source YES__ NO ✓
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 $Lb/10^6$ BTU = (Lb/Hr)/(10^6 BTU/Hr)

Eq. 9 $Lb/10^6$ BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or $Lb/10^6$ BTU, solve Eq. 1-9. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES__ NO ✓
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? 89.0 % YES__ NO ✓
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On November 13, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Wm.J. Kennedy & Son, Inc. ~~Boeing~~ Bitumo 300 drum mix asphalt plant located in Janesville, Wisconsin. The average of the three particulate tests show the emissions to be slightly above the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.033 gr/dscf	82 %
2	0.046	115
3	0.044	110
AVG	0.041 gr/dscf	102 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.48 lb/hr	0.0018 lb/ton
2	0.35	0.0013
3	0.44	0.0016
AVG	0.42 lb/hr	0.0016 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All individual readings were either 0 % or 5 % and thus the six minute average opacities were all well below the permit limit of 20 %.

1.0 GENERAL

On Wednesday, November 13, 1991, Environmental Technology and Engineering Corporation personnel performed a stack emission test on the Wm.J. Kennedy & Son, Inc. asphalt plant located in Janesville, Wisconsin. The test was a provision of an Air Pollution Control Permit. The State of Wisconsin Department of Natural Resources (DNR) has established a particulate emission limit of 0.04 grains per dry standard cubic foot (gr/dscf). The purpose of this test was to demonstrate the compliance status of this plant with the particulate limits set by the DNR. In addition, the permit also required a test to determine the formaldehyde emissions and that opacity observations be performed by a certified reader.

The plant tested was a ~~Boeing~~ B. Ferm 2 300 drum mix plant equipped with a wet scrubber for particulate control. During the test period, the plant production rate was approximately 270 tons per hour and the mix was composed of approximately 70 % virgin material and 30 % recycled material. The plant was fired with natural gas. Dave Barkley of Wm.J. Kennedy was responsible for plant operation during the tests. A copy of the plant production log is included in the APPENDIX to this report. The field tests, corresponding laboratory analysis and report preparation were coordinated by Bill Dick of ETE. The test procedures, plant operating conditions, and stack opacity were witnessed by Tom Roushar of the Wisconsin DNR Southern District Office.

The following sections of this report document the activities and results of the test program. The report presents all of the relevant data collected and discussions on the interpretation of the data are provided where appropriate. The report, therefore, includes much necessary detail. The results, however, have been summarized in the SUMMARY section at the beginning of this report for those readers not wishing to be burdened by the details.

Bitum2

KENNEDY ~~BOEING~~ 300 PLANT TEST 1 TABLE 2-1 11-13-91

BAROMETRIC PRESSURE, in Hg = 29.150
TIP DIAMETER, in .2500
STACK AREA, sq ft = 8.727
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 38.71
WATER COLLECTED, ml = 344.00
PARTICULATE COLLECTED, grams = 0.0804
CO2 = 6.20 O2 = 11.80 CO = 0.00 N2 = 82.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	150	0.680	1.45	42	53.62
2	150	0.620	1.32	43	51.20
3	155	0.620	1.32	44	51.41
4	155	0.660	1.42	45	53.05
5	150	0.660	1.42	46	52.83
6	155	0.660	1.42	48	53.05
7	155	0.650	1.30	50	52.64
8	160	0.600	1.20	51	50.78
9	160	0.580	1.16	51	49.93
10	155	0.500	1.00	51	46.17
11	155	0.600	1.20	53	50.58
12	155	0.640	1.28	54	52.24
13	155	0.660	1.32	54	53.05
14	155	0.680	1.36	55	53.84
15	155	0.680	1.36	56	53.84
16	155	0.650	1.30	56	52.64
17	160	0.620	1.24	57	51.62
18	160	0.600	1.20	58	50.78
19	160	0.550	1.10	59	48.62
20	155	0.500	1.00	60	46.17
AVG VALUES	156		1.269	52	51.40

TOTAL GAS WITHDRAWN, scf = 54.32
DRY GAS WITHDRAWN, scf = 38.13
WATER VAPOR WITHDRAWN, scf = 16.19
PERCENT WATER VAPOR = 29.81
ACTUAL WET FLOW RATE, acfm = 26,915.66
STANDARD DRY FLOW RATE, scfm = 15,771.08
, m3/hr = 26,798.21
PARTICULATE CONCENTRATION, grains/dscf = 0.033
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.049
PARTICULATE EMISSION RATE, lb/hr = 4.47
PERCENT OF ISOKINETIC SAMPLING = 103.17

KENNEDY ~~BOEING~~ Bitumz 300 PLANT TEST 2 TABLE 2-2 11-13-91

BAROMETRIC PRESSURE, in Hg = 29.150
TIP DIAMETER, in .2500
STACK AREA, sq ft = 8.727
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 38.45
WATER COLLECTED, ml = 367.00
PARTICULATE COLLECTED, grams = 0.1141
CO2 = 6.40 O2 = 11.60 CO = 0.00 N2 = 82.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	160	0.700	1.40	61	55.01
2	155	0.660	1.32	62	53.20
3	160	0.660	1.32	63	53.42
4	155	0.640	1.28	64	52.39
5	155	0.640	1.28	66	52.39
6	160	0.700	1.40	67	55.01
7	160	0.650	1.30	68	53.01
8	155	0.600	1.20	69	50.73
9	155	0.560	1.12	70	49.01
10	155	0.500	1.00	71	46.31
11	160	0.640	1.28	75	52.60
12	160	0.640	1.28	76	52.60
13	160	0.640	1.28	77	52.60
14	155	0.600	1.20	77	50.73
15	160	0.660	1.32	78	53.42
16	160	0.660	1.32	79	53.42
17	155	0.650	1.30	80	52.80
18	155	0.580	1.16	81	49.87
19	155	0.560	1.12	81	49.01
20	155	0.500	1.00	81	46.31
AVG VALUES	157		1.244	72	51.69

TOTAL GAS WITHDRAWN, scf = 55.24
DRY GAS WITHDRAWN, scf = 37.96
WATER VAPOR WITHDRAWN, scf = 17.27
PERCENT WATER VAPOR = 31.27
ACTUAL WET FLOW RATE, acfm = 27,066.61
STANDARD DRY FLOW RATE, scfm = 15,484.52
, m3/hr = 26,311.29
PARTICULATE CONCENTRATION, grains/dscf = 0.046
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.069
PARTICULATE EMISSION RATE, lb/hr = 6.30
PERCENT OF ISOKINETIC SAMPLING = 104.63

KENNEDY ~~BOEING~~ Bituma 300 PLANT TEST 3 TABLE 2-3 11-13-91

BAROMETRIC PRESSURE, in Hg = 29.150
TIP DIAMETER, in .2500
STACK AREA, sq ft = 8.727
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 37.03
WATER COLLECTED, ml = 359.00
PARTICULATE COLLECTED, grams = 0.1051
CO2 = 6.20 O2 = 11.60 CO = 0.00 N2 = 82.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	160	0.660	1.32	80	53.48
2	160	0.680	1.36	80	54.28
3	155	0.680	1.36	80	54.06
4	160	0.680	1.36	80	54.28
5	160	0.650	1.30	81	53.07
6	155	0.650	1.30	81	52.86
7	155	0.620	1.24	82	51.62
8	160	0.600	1.20	82	50.99
9	155	0.560	1.12	83	49.06
10	155	0.500	1.00	84	46.36
11	160	0.650	1.30	86	53.07
12	160	0.650	1.30	87	53.07
13	160	0.660	1.32	87	53.48
14	155	0.660	1.32	87	53.26
15	155	0.650	1.30	88	52.86
16	155	0.620	1.24	88	51.62
17	155	0.620	1.24	89	51.62
18	160	0.600	1.20	89	50.99
19	160	0.560	1.12	90	49.26
20	155	0.500	1.00	90	46.36
AVG VALUES	158		1.245	85	51.78

TOTAL GAS WITHDRAWN, scf = 53.51
DRY GAS WITHDRAWN, scf = 36.62
WATER VAPOR WITHDRAWN, scf = 16.90
PERCENT WATER VAPOR = 31.58
ACTUAL WET FLOW RATE, acfm = 27,113.82
STANDARD DRY FLOW RATE, scfm = 15,436.61
, m3/hr = 26,229.90
PARTICULATE CONCENTRATION, grains/dscf = 0.044
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.065
PARTICULATE EMISSION RATE, lb/hr = 5.90
PERCENT OF ISOKINETIC SAMPLING = 101.23

KENNEDY & SONS Bitumen 300

FORMALDEHYDE CALCULATIONS P_b = 29.15

γ = 1.023

TEST 1

0.70 TP11 V_M = 2.00 T_M = 50

$$V_{M\,std} = V_M * \gamma * \frac{528}{T_M} * \frac{P_b}{29.92}$$

= 2.07 scf = .059 m^3

$$C = \frac{2.475\ mg}{.059\ m^3} = 8.05\ mg/m^3$$

ER = 0.48 #/hr. = .0018 #/ton

TEST 2

V_M = 2.50 T_M = 53

$V_{M\,std}$ = 2.58 scf = .073 m^3

$$C = \frac{0.440}{.073} = 6.03\ mg/m^3$$

ER = 0.35 #/hr = .0013 #/ton

TEST 3

V_M = 1.25 T_M = 54

$V_{M\,std}$ = 1.29 scf = .036 m^3

$$C = \frac{0.273}{.036} = 7.58\ mg/m^3$$

ER = 0.44 #/hr = .0016 #/ton

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 11, 1991 FILE REF: 4530

TO: Files

FROM: Andy Seeber - AM/3

SUBJECT: Review of Stack Test Performed at Lake Mills Blacktop, Lake Mills

Received: 12/12/90

I. Source

Lake Mills Blacktop
Rt. 1, Crossman Rd.
Lake Mills, WI 53551
FID #999851380, Stack S01, Process P01
Permit #90-LMW-403 Issued: April 3, 1990
Test Date: October 15, 1990
Test Firm: Environmental Technology & Eng. Corp.
13020 W. Bluemound Rd.
Elm Grove, WI 53122
Crew Chief: Mr. Bill Dick (414) 784-2434

II. Source Description

The source tested was a Barber-Green DM-60 drum mix asphalt plant rated at 260 TPH. During the test the plant was producing 210 TPH. The plant was fired with waste oil. Particulate emissions are controlled by a venturi scrubber. The design pressure drop across the venturi is 13" of water.

III. Discussion of Results

The test results are shown in Table 1. The average emission concentration of 0.038 gr/dscf is below the emission limit of 0.040 gr/dscf. The average formaldehyde emission rate is .087 Lb/H.

ET&E used EPA Method 5 and NIOSH Method 3500. I checked over the results and made no corrections. Since the source was not tested at capacity, it should be capped at the test level until another test (showing compliance) is performed at a higher production level.

v:\9103\am91akas.ars

cc: Ralph Patterson - SD
Joe Perez - AM/3
U.S. EPA Region V

SUMMARY

On October 15, 1990, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Lake Mills Blacktop portable drum mix asphalt plant located in Lake Mills, Wisconsin. The average of the three particulate tests show the emissions to be below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	LB/HR	Emissions	% ISO	% of Allowable
1	6.35	0.035 gr/dscf	101	87.5 %
2	6.69	0.038	102	95.0
3	6.56	0.041	100	102.5
AVG	6.63	0.038 gr/dscf	101 %	95.0 %

The opacity of the stack was also observed by a certified observer throughout a three (3) hour test period. The highest 6 minute average opacities for each of the three tests were all less than the permit limit of 20 %. The following table presents the highest 6 minute average for each test:

Test	Highest 6 Min Average Opacity
1	1.9 %
2	1.0 %
3	0.8 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.113 lb/hr	0.00054 lb/ton
2	0.088	0.00042
3	0.061	0.00029
AVG	0.087 lb/hr	0.00041 lb/ton

LAKE MILLS ASPHALT TEST 1 TABLE 2-1 10-15-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .1880
STACK AREA, sq ft = 6.111
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.74
WATER COLLECTED, ml = 208.00
PARTICULATE COLLECTED, grams = 0.0914
CO2 = 7.20 O2 = 10.20 CO = 0.00 N2 = 82.60

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	145	1.450	1.15	47	75.93
2	145	2.200	1.75	47	93.53
3	140	2.400	1.90	48	97.28
4	140	2.400	1.90	49	97.28
5	145	1.450	1.15	50	75.93
6	140	1.000	0.80	50	62.79
7	145	2.300	1.85	52	95.63
8	145	2.300	1.85	53	95.63
9	145	2.150	1.70	54	92.46
10	145	2.150	1.70	55	92.46
11	145	1.950	1.55	57	88.05
12	140	1.750	1.40	59	83.07
13	140	1.150	0.90	62	67.34
14	140	1.300	1.05	63	71.60
15	145	1.300	1.05	64	71.89
16	145	1.300	1.05	65	71.89
17	140	1.150	0.90	67	67.34
18	140	1.000	0.80	69	62.79
19	145	1.950	1.55	70	88.05
20	145	1.950	1.55	71	88.05
21	145	2.400	1.90	73	97.69
22	145	2.150	1.70	74	92.46
23	140	1.950	1.55	76	87.69
24	140	1.250	1.00	77	70.21
AVG VALUES	143		1.404	61	82.79

TOTAL GAS WITHDRAWN, scf = 49.92
DRY GAS WITHDRAWN, scf = 40.13
WATER VAPOR WITHDRAWN, scf = 9.79
PERCENT WATER VAPOR = 19.61
ACTUAL WET FLOW RATE, acfm = 30,356.89
STANDARD DRY FLOW RATE, scfm = 20,925.65
PARTICULATE CONCENTRATION, grains/dscf = 0.0351
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.057
PARTICULATE EMISSION RATE, lb/hr = 6.35
PERCENT OF ISOKINETIC SAMPLING = 101.33

LAKE MILLS ASPHALT TEST 2 TABLE 2-2 10-15-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .1880
STACK AREA, sq ft = 6.111
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.20
WATER COLLECTED, ml = 259.00
PARTICULATE COLLECTED, grams = 0.0969
CO2 = 7.00 O2 = 10.20 CO = 0.00 N2 = 82.80

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	145	1.900	1.52	80	87.68
2	145	1.900	1.52	80	87.68
3	145	2.400	1.90	81	98.55
4	150	2.400	1.90	81	98.95
5	145	1.750	1.40	82	84.15
6	140	1.250	1.00	83	70.83
7	145	1.100	0.88	83	66.72
8	145	1.350	1.08	84	73.91
9	145	1.500	1.20	85	77.91
10	145	1.500	1.20	86	77.91
11	140	1.250	1.00	86	70.83
12	145	1.050	0.86	86	65.18
13	140	2.300	1.85	88	96.07
14	145	2.200	1.75	89	94.35
15	145	2.200	1.75	90	94.35
16	145	2.200	1.75	90	94.35
17	145	1.900	1.52	90	87.68
18	150	1.900	1.52	90	88.04
19	145	1.600	1.26	91	80.46
20	150	2.250	1.80	92	95.81
21	150	2.400	1.90	93	98.95
22	150	2.400	1.90	94	98.95
23	145	2.100	1.60	94	92.18
24	145	1.250	1.00	95	71.12
AVG VALUES	145		1.461	87	85.53

TOTAL GAS WITHDRAWN, scf = 51.92
DRY GAS WITHDRAWN, scf = 39.73
WATER VAPOR WITHDRAWN, scf = 12.19
PERCENT WATER VAPOR = 23.48
ACTUAL WET FLOW RATE, acfm = 31,359.13
STANDARD DRY FLOW RATE, scfm = 20,491.51
PARTICULATE CONCENTRATION, grains/dscf = 0.0376
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.060
PARTICULATE EMISSION RATE, lb/hr = 6.69
PERCENT OF ISOKINETIC SAMPLING = 102.45

LAKE MILLS ASPHALT TEST 3 TABLE 2-3 10-15-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .1880
STACK AREA, sq ft = 6.111
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 37.38
WATER COLLECTED, ml = 280.00
PARTICULATE COLLECTED, grams = 0.0979
CO2 = 6.70 O2 = 10.40 CO = 0.00 N2 = 82.90

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	150	1.700	1.22	92	83.84
2	150	2.300	1.65	94	97.52
3	145	2.450	1.75	94	100.23
4	150	2.100	1.50	94	93.18
5	150	2.100	1.50	94	93.18
6	150	1.250	0.90	94	71.89
7	150	2.350	1.70	95	98.57
8	150	2.350	1.70	95	98.57
9	150	2.250	1.60	95	96.45
10	150	2.100	1.50	95	93.18
11	150	2.000	1.45	95	90.94
12	145	1.650	1.18	95	82.26
13	150	1.200	0.85	98	70.44
14	150	1.300	0.94	99	73.31
15	150	1.300	0.94	100	73.31
16	150	1.200	0.86	100	70.44
17	150	1.200	0.86	100	70.44
18	150	1.000	0.72	100	64.30
19	150	1.800	1.30	102	86.27
20	150	1.900	1.35	102	88.63
21	155	2.300	1.65	103	97.92
22	155	2.300	1.65	103	97.92
23	150	1.900	1.35	104	88.63
24	150	1.300	0.94	105	73.31
AVG VALUES	150		1.294	98	85.61

TOTAL GAS WITHDRAWN, scf = 50.15
DRY GAS WITHDRAWN, scf = 36.97
WATER VAPOR WITHDRAWN, scf = 13.18
PERCENT WATER VAPOR = 26.28
ACTUAL WET FLOW RATE, acfm = 31,391.23
STANDARD DRY FLOW RATE, scfm = 19,613.90
PARTICULATE CONCENTRATION, grains/dscf = 0.0409
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.062
PARTICULATE EMISSION RATE, lb/hr = 6.86
PERCENT OF ISOKINETIC SAMPLING = 99.61

FORMALDEHYDE 10/25/90

PROBE ID	LIQ VOL	LIQ ALIQ	C. ACID VOL	RDG	RDG - BLK	µg/ALIQ	µg/SAMPLE	CONC mg/m³	ER lb/hr
RINETTE					(-.029)				
1A	26.0	1.0 / 0.2	1.0	1.368 / .365	.336	4.64	603		
1B	18.5	1.0		.365	.336	4.64	86		
							689		
2A	22.7	1.0 / 0.3		1.020 / .372	.343	4.74	359		
2B	13.4	1.0		0.064	.035	0.48	6		
							365		
3A	22.4	1.0 / 0.3		1.059 / .374	.345	4.77	356		
3B	15.6	1.0		0.060	.031	0.43	7		
							363		
AMON					(-.084)				
1A	26.6	1.0		0.430	.346	4.78	127		
1B	12.0	1.0		0.105	.021	0.29	3		
							130		
2A	25.9	1.0		0.329	.245	3.38	88		
2B	12.0	1.0		0.128	.044	0.61	7		
							95		
3A	24.8	1.0		0.263	.179	2.47	61		
3B	16.1	1.0		0.130	.046	0.64	10		
							71		
MAR H_2O	-	3.0		.094					
AMON H_2O	-	3.0		YELLOW / 2.1					
MAR BLANK	-	3.0		.029					
MURPHY BLANK	-	3.0		.084					

γ = 1.017
P_b = 29.40

Lee. Mills Asphalt
Formaldehyde Calculation

Test 1 V_m = 3.08 T_M = 53 F Q = 20925.45 scfm = 35556.86 m³/hr.

$$V_{M\,std} = 308 * 1.017 * \frac{508}{513} * \frac{29.4}{29.92} * .0703$$

= 3.17 SCF = .090 m³

$$C = \frac{130\,mg}{.090\,m^3} = 1.44\ mg/m^3$$

ER = 0.113 #/hr. = .00054 #/ton

Test 2 V_m = 3.00 T_m = 62 F Q = 20491.51 = 34818.37 m³/hr.

$V_{M\,std}$ = 3.03 SCF = .086 m³

$$C = \frac{95\,mg}{.086\,m^3} = 1.10\ mg/m^3$$

ER = 0.088 #/hr = .00042 #/ton

Test 3 V_m = 3.00 T_m = 64 Q = 1961390 = 33329.94 m³/hr.

$V_{M\,std}$ = 3.03 SCF = .086 m³

$$C = \frac{71\,mg}{.086\,m^3} = 0.83\ mg/m^3$$

ER = 0.061 #/hr. = .00029 #/ton

AVG ER = 0.087 #/hr.
= 0.00041 #/ton

WJD
11-2-90

NAME OF SOURCE: LAKE MILLS BLACKTOP

LOCATION OF SOURCE: LAKE MILLS

PROCESS TESTED:

DATE OF TEST: 101590

RUN NUMBER: 1

N NUMBER OF SAMPLING POINTS= 24

VM DGM VOL,METER COND DRY= 40.74 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 208 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 7.2 %

%O2 % OXYGEN BY VOL,DRY BASIS= 10.2 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 82.6 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 28.1 IN HG

AS AREA OF THE SAMPLING SITE= 6.111 SQ FEET

MT TOTAL DRY PARTICULATE= .0914 GM

T TOTAL SAMPLING TIME= 60 MIN

AN AREA OF THE NOZZLE= .000193 SQ FEET

LAKE MILLS BLACKTOP,,RUN: 1

CALCULATED RESULTS

TS STACK TEMPERATURE = 142.7083 DEG F

VMSTD DGM VOL,STD COND DRY= 40.17254 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 9.79056 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 19.59558 %

MD MOLE FRACTION OF DRY GAS= .8040442

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.56 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 27.29475 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 84.71545 FPS

QACT ACTUAL STACK GAS FLOW RATE= 31061.77 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 20548.38 SCFMD

%EA AVE % EXCESS AIR= 87.88255 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 6.380251 LB/HR

PMRC AVE PMR BY CONC METHOD= 6.184183 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 6.282217 LB/HR

C EMISSION CONC,STD COND DRY= 3.510612E-02 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 94516.91 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 6.646659E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 108543.6 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 5.787735E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 103.1705 %

NAME OF SOURCE: LAKE MILLS BLACKTOP

LOCATION OF SOURCE: LAKE MILLS

PROCESS TESTED:

DATE OF TEST: 101590

RUN NUMBER: 2

N NUMBER OF SAMPLING POINTS= 24

VM DGM VOL,METER COND DRY= 40.282 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 259 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 7 %

%O2 % OXYGEN BY VOL,DRY BASIS= 10.2 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 82.8 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 28.07 IN HG

AS AREA OF THE SAMPLING SITE= 6.111 SQ FEET

MT TOTAL DRY PARTICULATE= .0969 GM

T TOTAL SAMPLING TIME= 60 MIN

AN AREA OF THE NOZZLE= .000193 SQ FEET

LAKE MILLS BLACKTOP, ,RUN: 2

CALCULATED RESULTS

TS STACK TEMPERATURE = 145.4167 DEG F

VMSTD DGM VOL,STD COND DRY= 39.72653 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 12.19113 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 23.48166 %

MD MOLE FRACTION OF DRY GAS= .7651833

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.528 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.82103 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 87.57015 FPS

QACT ACTUAL STACK GAS FLOW RATE= 32108.47 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 20102.29 SCFMD

%EA AVE % EXCESS AIR= 87.48455 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 6.764183 LB/HR

PMRC AVE PMR BY CONC METHOD= 6.485992 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 6.625088 LB/HR

C EMISSION CONC,STD COND DRY= 3.763649E-02 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 92364.9 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 7.172733E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 109643.5 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 6.042389E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 104.2891 %

NAME OF SOURCE: LAKE MILLS BLACKTOP

LOCATION OF SOURCE: LAKE MILLS

PROCESS TESTED:

DATE OF TEST: 101590

RUN NUMBER: 3

N NUMBER OF SAMPLING POINTS= 24

VM DGM VOL,METER COND DRY= 37.506 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 280 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 6.7 %

%O2 % OXYGEN BY VOL,DRY BASIS= 10.4 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 82.9 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 28.05 IN HG

AS AREA OF THE SAMPLING SITE= 6.111 SQ FEET

MT TOTAL DRY PARTICULATE= .0979 GM

T TOTAL SAMPLING TIME= 60 MIN

AN AREA OF THE NOZZLE= .000193 SQ FEET

LAKE MILLS BLACKTOP,,RUN: 3

CALCULATED RESULTS

TS STACK TEMPERATURE = 150 DEG F

VMSTD DGM VOL,STD COND DRY= 36.97345 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 13.1796 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 26.27876 %

MD MOLE FRACTION OF DRY GAS= .7372124

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.488 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.46909 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 87.69616 FPS

QACT ACTUAL STACK GAS FLOW RATE= 32154.68 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 19235.88 SCFMD

%EA AVE % EXCESS AIR= 90.54815 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 6.833989 LB/HR

PMRC AVE PMR BY CONC METHOD= 6.737405 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 6.785697 LB/HR

C EMISSION CONC,STD COND DRY= 4.085627E-02 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 88264.25 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 7.687934E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 107469.7 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 6.314056E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 101.4335 %

→ Perez, 9/11/[illegible]

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

Date: September 16, 1991

File Ref: 4530-3

To: Files

From: Neal Baudhuin, NCD

Subject: Review of Stack Test Performed for Langlade County Highway Department Asphalt Plant

Received: 9/11/91

I. SOURCE

Langlade County Highway Department
1521 Arctic Road
Antigo, Wisconsin 54409

Contact: Paul Shuman, Commissioner

FID# 734046060

Test Date: August 15, 1991
Location: County Highway C, north of Antigo, Wisconsin

II. SOURCE DESCRIPTION

The source tested was a Barber-Greene DM-50 drum mix asphalt plant. It is rated at 100 tons per hour (TPH). It does not have recycle capability. During the test the plant was producing approximately 127 TPH which is over the rated production. The drier was being fired with natural gas, and has distillate oil capability.

Particulate matter emissions are controlled by a Standard Havens Model Magnum-19-8.5 pulse jet baghouse with a 4.7 to 1 air to cloth ratio. The mix temperature was 305F and the stack temperature 370F by the control panel gauges. Pressure drop across the baghouse was 1.9 to 2.1 inches of water. The baghouse is preceded by a large baffled "knockout box". The emissions were previously controlled with a venturi scrubber. The baghouse was installed the spring of 1991.

III. SAMPLING OPERATION

A. Purpose of the Test

The test was performed to satisfy the requirements of Mandatory Operation Permit # 734046060-N01 issued September 11, 1991, and to demonstrate compliance with the particulate matter emission limits contained in the permit. Formaldehyde emissions were also tested to determine applicability of NR 445 requirements.

SEP 19 1991

Plant performing above rated capacity.
Method 17 partic. test.

No Process Description!

8

B. Sampling Firm

Environmental Technology & Engineering
13020 West Bluemound Road
Elm Grove, Wisconsin 53122

Crew: Mike and Chris Huenink, 414/784-2434

C. Test Method

The particulate matter test method was EPA Method 17, Stationary Source In-Stack Filtration Method. The test was performed in the rectangular stack, 27.5" x 39", through six ports. The ports are located 3 feet from the stack exit and 18 feet from the nearest upstream disturbance, the exhaust fan outlet. Each of 3 points per port were sampled for 3.5 minutes for a total of 63 minutes of sampling.

The formaldehyde emissions were sampled using NIOSH Method 3500. Exhaust gas was sampled at a uniform rate of approximately one liter per minute. A total of 2.5 cubic feet of sample was collected during each of three runs.

D. Test Date

The testing was performed on August 15, 1991. The weather was clear to partly cloudy with wind from the southwest, light to moderate velocity and an ambient temperature of 75 - 80F.

E. Test Witness

The test was witnessed by Mr. Neal Baudhuin of the Department's North Central District office in Rhinelander. Mr. Baudhuin witnessed only Runs #2 and #3 of the test. Mr. Baudhuin performed EPA Method 9 visible emissions evaluations during Runs #2 and #3.

IV. TEST RESULTS

The results listed below for particulate are those calculated by the Department as ETE's calculation for Run #2 did not use the correct amount of particulate collected (0.0032 grams is correct rather than the 0.0042 grams used by ETE). ETE is submitting corrected calculations for Run #2. The results for formaldehyde are from the ETE test report. Calculations were checked and found to be accurate.

A. Particulate Matter

RUN NUMBER	EMISSION RATE (LB/HR)	EMISSION CONCENTRATION (GR/DSCF)	ISOKINETIC RATIO (%)	
1	0.22	~~0.0023~~ 0.0023	~~101.82~~	105
2	0.15	~~0.0017~~ 0.0016	~~97.23~~	101
3	0.17	~~0.0019~~ 0.0017	~~94.30~~	100
AVE	0.18	~~0.0020~~ 0.0019	~~97.78~~	102

B. Formaldehyde

RUN NUMBER	EMISSION RATE (LB/HR)
1	0.0548
2	0.0603
3	0.0487
AVE	0.0546

C. Visible Emissions

RUN NUMBER	AVERAGE OPACITY (%)	HIGH SIX MINUTE (%)
1	-	-
2	7.2	8.8
3	2.4	2.9

V. APPLICABLE EMISSION LIMITATIONS

The emission limits that apply to this source are as follows:

Particulate: 0.039 grain per dry standard cubic foot exhaust gas Section NR 440.25(3)(a)1., Wisconsin Administrative Code.

Visible Emissions: 20% opacity
Section NR 440.25(3)(a)2. and 431.06(1), Wisconsin Administrative Code

Formaldehyde: 250 pounds per year or Best Available Control Technology (BACT), Section NR 445.05, Wisconsin Administrative Code.

VI. DISCUSSION OF RESULTS

The emission concentration of 0.002~~0~~ 17 grain per dry standard cubic foot is well below the limit of 0.039 gr/DSCF. The isokinetic ratio of ~~97.7~~ 105% is between the limits of 90 - 110% that the Department uses to judge the validity of stack tests. In addition to the mathematical error in the Run #2 particulate catch there seems to be slight differences between how ETE's program calculates results and the Department's computer program.

The formaldehyde emission rate of 0.0546 pound per hour would allow Langlade County to operate a total of 4,579 hours per year before exceeding the 250 pound per year de minimis level over which BACT would be applied. Based on the production rate of 127 TPH, this would result in an Emission Factor (EF) of 0.00043 pound of formaldehyde per ton, and allow production of 581,395 tons of asphalt per year before exceeding the 250 pound per year de minimis.

cc: Joe Perez, AM/10-STK
U.S. EPA-Region V
Langlade County Highway Department

SUMMARY

On August 15, 1991, Environmental Technology & Engineering Corp personnel performed stack emissions testing on the Langlade County Highway Department Asphalt Plant located on County Road C north of Antigo, Wisconsin. The purpose of the testing was to demonstrate compliance with the particulate, visible emissions, and formaldehyde limits set forth in Wisconsin DNR Air Pollution Control Permit (M.O.P.) No. 734046060-NO1. The emissions from the operations were controlled with a newly installed baghouse.

Testing to determine total particulate matter emissions were performed using EPA Method 17. The results were well below the DNR permit limitation and are shown below:

Test	Particulate Emission Concentration
1	0.0023 grains/dscf
2	0.0021 grains/dscf
3	0.0017 grains/dscf
AVG	0.0020 grains/dscf
DNR Permit Limitation	0.04 grains/dscf

Formaldehyde emissions were determined using modified NIOSH Method 3500 sampling and analytical methods. The results indicated the following emission rates:

Test	Formaldehyde Emission Rate
1	0.0548 lb/hr
2	0.0603 lb/hr
3	0.0487 lb/hr
AVG	0.0546 lb/hr
DNR Permit Limitation	250 pounds per year

Visible emissions were determined using EPA Method 9 by the DNR witness on-site during the test efforts. All readings indicated an opacity level below the permit limitation of 20 percent.

LANGLADE CTY ASPHALT TEST 1 8-15-91 TABLE 2-1

BAROMETRIC PRESSURE, in Hg = 28.350
TIP DIAMETER, in .2500
STACK AREA, sq ft = 7.450
SAMPLING TIME PER POINT, min = 3.50
NUMBER OF POINTS = 18
GAS METER VOLUME, acf = 35.11
WATER COLLECTED, ml = 303.00
PARTICULATE COLLECTED, grams = 0.0049
CO2 = 4.60 O2 = 13.00 CO = 0.00 N2 = 82.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	250	0.200	0.38	73	31.90
2	250	0.260	0.48	74	36.37
3	250	0.220	0.40	75	33.46
4	250	0.340	0.63	77	41.59
5	250	0.340	0.63	78	41.59
6	250	0.260	0.48	80	36.37
7	255	0.420	0.77	81	46.39
8	255	0.540	0.97	81	52.60
9	255	0.440	0.80	82	47.48
10	255	0.720	1.30	84	60.74
11	255	0.680	1.25	88	59.03
12	255	0.640	1.15	90	57.26
13	225	0.780	1.40	90	61.88
14	225	0.750	1.35	90	60.68
15	230	0.760	1.38	91	61.30
16	230	0.640	1.15	91	56.25
17	235	0.680	1.25	91	58.19
18	240	0.640	1.15	91	56.66
AVG VALUES	245		0.940	84	49.99

TOTAL GAS WITHDRAWN, scf = 47.73
DRY GAS WITHDRAWN, scf = 33.47
WATER VAPOR WITHDRAWN, scf = 14.26
PERCENT WATER VAPOR = 29.88
ACTUAL WET FLOW RATE, acfm = 22,343.51
STANDARD DRY FLOW RATE, scfm = 11,106.88
, m3/hr = 18,872.81
PARTICULATE CONCENTRATION, grains/dscf = 0.0023
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.0034
PARTICULATE EMISSION RATE, lb/hr = 0.22
PERCENT OF ISOKINETIC SAMPLING = 104.55

LANGLADE CTY ASPHALT TEST 2 8-15-91 TABLE 2-2

BAROMETRIC PRESSURE, in Hg = 28.350
TIP DIAMETER, in .2500
STACK AREA, sq ft = 7.450
SAMPLING TIME PER POINT, min = 3.50
NUMBER OF POINTS = 18
GAS METER VOLUME, acf = 33.07
WATER COLLECTED, ml = 267.00
PARTICULATE COLLECTED, grams = ~~0.0042~~ .0032
CO2 = 4.60 O2 = 13.20 CO = 0.00 N2 = 82.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	225	0.620	1.10	91	54.99
2	235	0.600	1.08	91	54.49
3	240	0.580	1.05	91	53.77
4	245	0.740	1.33	91	60.95
5	250	0.720	1.30	91	60.33
6	250	0.670	1.20	92	58.20
7	250	0.600	1.08	93	55.08
8	250	0.580	1.05	95	54.15
9	250	0.560	1.00	97	53.21
10	250	0.430	0.78	98	46.63
11	250	0.460	0.84	99	48.22
12	250	0.370	0.68	99	43.25
13	250	0.280	0.52	99	37.62
14	250	0.360	0.66	100	42.66
15	250	0.260	0.48	100	36.26
16	250	0.220	0.40	101	33.35
17	250	0.260	0.48	102	36.26
18	250	0.180	0.34	102	30.17
AVG VALUES	247		0.854	96	47.75

TOTAL GAS WITHDRAWN, scf = 44.13
DRY GAS WITHDRAWN, scf = 31.57
WATER VAPOR WITHDRAWN, scf = 12.57
PERCENT WATER VAPOR = 28.48
ACTUAL WET FLOW RATE, acfm = 21,346.26
STANDARD DRY FLOW RATE, scfm = 10,797.91
, m3/hr = 18,347.82
PARTICULATE CONCENTRATION, grains/dscf = ~~0.0021~~ .0016
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.0031
PARTICULATE EMISSION RATE, lb/hr = ~~0.19~~ .15
PERCENT OF ISOKINETIC SAMPLING = 101.43

LANGLADE CTY ASPHALT TEST 3 8-15-91 TABLE 2-3

BAROMETRIC PRESSURE, in Hg = 28.350
TIP DIAMETER, in .2500
STACK AREA, sq ft = 7.450
SAMPLING TIME PER POINT, min = 3.50
NUMBER OF POINTS = 18
GAS METER VOLUME, acf = 33.66
WATER COLLECTED, ml = 251.00
PARTICULATE COLLECTED, grams = 0.0036
CO2 = 4.50 O2 = 13.20 CO = 0.00 N2 = 82.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	250	0.160	0.30	102	28.35
2	250	0.220	0.40	102	33.24
3	250	0.170	0.32	102	29.22
4	250	0.250	0.46	103	35.43
5	250	0.360	0.66	103	42.52
6	250	0.220	0.40	103	33.24
7	250	0.430	0.79	103	46.47
8	250	0.480	0.87	103	49.10
9	250	0.420	0.77	104	45.93
10	250	0.630	1.15	105	56.25
11	250	0.660	1.19	106	57.57
12	250	0.620	1.12	107	55.80
13	250	0.750	1.35	107	61.37
14	250	0.780	1.40	108	62.59
15	250	0.750	1.35	109	61.37
16	250	0.720	1.30	110	60.13
17	250	0.700	1.25	110	59.29
18	250	0.660	1.20	110	57.57
AVG VALUES	250		0.904	105	48.64

TOTAL GAS WITHDRAWN, scf = 43.98
DRY GAS WITHDRAWN, scf = 32.17
WATER VAPOR WITHDRAWN, scf = 11.81
PERCENT WATER VAPOR = 26.86
ACTUAL WET FLOW RATE, acfm = 21,740.90
STANDARD DRY FLOW RATE, scfm = 11,197.44
, m3/hr = 19,026.69
PARTICULATE CONCENTRATION, grains/dscf = 0.0017
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.0026
PARTICULATE EMISSION RATE, lb/hr = 0.17
PERCENT OF ISOKINETIC SAMPLING = 99.67

LANGLADE CTY ASPHALT - HCOH CALCS 9/3/91

TEST 1 2.50 ft^3 75 F $\gamma = 1.029$

A) $2.50\,ft^3 (1.029)\ .02832\ m^3/ft^3 \left(\frac{28.35}{29.9}\right) \frac{528}{535} = 0.0682\ m^3$

B) $\frac{0.0899\ mg}{0.0682\ m^3} = 1.32\ mg/m^3$

C) $1.32\ mg/m^3 (18,873\ m^3/HR)\ 1\#/453600\ mg = 0.0548\ \#/HR$

TEST 2 2.50 ft^3 81 F

$2.50 (1.029) .02832 \left(\frac{28.35}{29.9}\right) \frac{528}{541} = 0.0674\ m^3$

$\frac{0.1005\ mg}{.0674\ m^3} = 1.49\ mg/m^3$

$1.49 (18,348)\ 1/453600 = 0.0603\ \#/HR$

TEST 3 2.50 ft^3 85 F

$2.50 (1.029) .02832 \left(\frac{28.35}{29.9}\right) \frac{528}{545} = 0.0669\ m^3$

$\frac{0.0773\ mg}{0.0669\ m^3} = 1.16\ mg/m^3$

$1.16 (19,027)\ 1/453600 = 0.0487\ \#/HR$

AVG: 1.32 mg/m^3 0.0546 $\#/HR$

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: MARCH 12, 1992 File Code: 4530

PRELIMINARY STACK TEST REVIEW Receiv: 9/17/91

By: RENEE LESJAK Test Date: Aug 14, 1991

Name of Source: LINCOLN CTY HWY DEPT FID #: 735055530

Address: 100 COOPER ST. Stack #: S10

City: Merrill, WI Process #: B P30

Permit #: 735055530-N01 Date Issued: March 13, 1991

Description of Source Tested: Batch asphalt plant, Barber Greene DA 60 x 387, rated at 150 TPH burning #2 fuel oil

Description of Control Equipment: Cyclone and wet scrubber

Test Firm: ET & E
Crew Chief & Phone#: Michael Huenink 414/784-2934

Pollutant Tested: Particulates Test Method: Method 5
Pollutant Tested: Formaldehyde Test Method: NIOSH method 3500
Pollutant Tested: Test Method:

Test Production Level: ~ 133 TPH
Rated Production Level: 150 TPH

Discussion of Results:

Poll. Test Ave. = 0.089 lb Part/10^3 lb gas Limit = 0.3 lb/10^3 lb gas
In Compliance? (Y) N

Poll. Test Ave. = 0.139 lb form./hr Limit = 0.028 lb/hr
In Compliance? Y (N)

Poll. Test Ave. = Limit =
In Compliance? Y N

Poll. Test Ave. = Limit =
In Compliance? Y N

0.028 lb formaldehyde/hr is NR445 target limit

Is This a Valid Test? (Y) N If answer is no, please indicate the reason.

* Test may be reviewed in depth later, if necessary.

CC Joe Perez-AM/10
US EPA Region V
Neil Baudhuin-NCD
Renee Lesjak-SD

PARTICULATE CHECKLIST

Name of Source: Lincoln City Hwy Dept Test Date: 8/14/91

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES ✓ NO__
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 $Lb/10^6$ BTU = (Lb/Hr)/(10^6 BTU/Hr)

Eq. 9 $Lb/10^6$ BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or $Lb/10^6$ BTU, solve the needed Eq. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES ✓ NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES__ NO ✓
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

GASEOUS TEST CHECKLIST

Name of Source: Lincoln City Hwy Gas Tested: Formaldehyde Test Date: 8/14/91

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ Moisture\ as\ Decimal)$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-Stack\ O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/Stack\ CO_2$

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2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*Molecular\ Weight\ of\ Gas/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*Molecular\ Weight\ of\ Gas$

Eq. 6 $Lb/DSCF = 6.243*10^{-8}*(mg/DSCM)$

Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$ Eq. 8 $Lb/10^6\ BTU = (Lb/Hr)*(10^6\ BTU/Hr)$

Eq. 9 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-Stack\ O_2)$

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3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-9. Eq. 1-3 may also be needed. Do your results match the consultant's? YES✓ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 10 $\%\ Capture\ Eff. = \frac{(Lb\ VOC/Hr\ to\ Control\ Equip.)*100}{(Lb\ VOC/Hr\ Input\ to\ Process)}$

Eq. 11 $\%\ Destruction\ Eff. = \frac{(Inlet\ Lb\ VOC/Hr - Outlet\ Lb\ VOC/Hr)*100}{(Inlet\ Lb\ VOC/Hr)}$

Eq. 12 $\%\ Overall\ Eff. = (\%\ Cap.\ Eff./100)*(\%\ Dest.\ Eff./100)*100$

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4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-12. Eq. 1-8 may also be needed. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES✓ NO__
   If no, write in the correct average.

6. Is the average result in compliance? YES__ NO✓
   If no, the District should issue an NOV.

7. Was the source operating at a level representative of full capacity? YES__ NO✓
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On August 14, 1991, Environmental Technology & Engineering Corp personnel performed stack emissions testing on the Lincoln County Highway Department Asphalt Plant located on County Road R north of Merrill, Wisconsin. The purpose of the testing was to demonstrate compliance with the particulate, visible emissions, and formaldehyde limits set forth in Wisconsin DNR Air Pollution Control Permit (M.O.P.) No. 735055530-NO1. The emissions from the operations were controlled with a set of cyclone collectors followed by a wet scrubber.

Testing to determine total particulate matter emissions were performed using EPA Method 5. The results were well below the DNR permit limitation and are shown below:

Test	Particulate Emission Concentration
1	0.085 lb/1000 lb gas
2	0.098 lb/1000 lb gas
3	0.084 lb/1000 lb gas
AVG	0.089 lb/1000 lb gas
DNR Permit Limitation	0.3 lb/1000 lb gas

Formaldehyde emissions were determined using modified NIOSH Method 3500 sampling and analytical methods. The results indicated the following emission rates:

Test	Formaldehyde Emission Rate
1	0.133 lb/hr
2	0.138 lb/hr
3	0.147 lb/hr
AVG	0.139 lb/hr
DNR Permit Limitation	250 pounds per year

Visible emissions were determined using EPA Method 9 by the DNR witness on-site during the test efforts. All readings indicated an opacity level below the permit limitation of 40 percent.

LINCOLN CTY ASPHALT TEST 1 8-14-91 TABLE 2-1

BAROMETRIC PRESSURE, in Hg = 28.500
TIP DIAMETER, in .4380
STACK AREA, sq ft = 42.240
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 28.494
GAS METER VOLUME, acf = 38.80
WATER COLLECTED, ml = 406.0
PARTICULATE COLLECTED, grams = 0.1391
PERCENT CONDENSIBLE, % = 9.1
WET MOLECULAR WT = 25.83
CO2 = 8.10 O2 = 10.10 CO = 0.00 N2 = 81.80

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	160	0.000	0.00	60	0.00
2	160	0.000	0.00	60	0.00
3	160	0.050	0.96	60	14.91
4	165	0.050	0.96	61	14.97
5	165	0.080	1.55	62	18.94
6	170	0.120	2.25	64	23.29
7	170	0.000	0.00	66	0.00
8	170	0.000	0.00	67	0.00
9	170	0.020	0.39	68	9.51
10	170	0.040	0.77	70	13.45
11	170	0.070	1.35	72	17.79
12	170	0.110	2.05	76	22.30
13	170	0.000	0.00	77	0.00
14	170	0.000	0.00	77	0.00
15	170	0.030	0.59	78	11.64
16	170	0.040	0.77	80	13.45
17	170	0.060	1.15	80	16.47
18	170	0.080	1.55	80	19.01
19	170	0.000	0.00	80	0.00
20	170	0.000	0.00	80	0.00
21	170	0.030	0.59	80	11.64
22	170	0.050	0.96	80	15.03
23	170	0.070	1.35	82	17.79
24	170	0.090	1.70	86	20.17
AVG VALUES	168		0.789	73	10.85

TOTAL GAS WITHDRAWN, scf = 56.23
DRY AIR WITHDRAWN, scf = 37.12 ✓
WATER VAPOR WITHDRAWN, scf = 19.11
PERCENT WATER VAPOR = 33.99
ACTUAL WET FLOW RATE, acfm = 27,493.51
STANDARD DRY FLOW RATE, scfm = 14,524.62
PARTICULATE CONCENTRATION, grains/dscf = 0.058
PARTICULATE EMISSION RATE, lb/hr = 7.47
LB PARTICULATE PER 1000 LB GAS = 0.085
PERCENT OF ISOKINETIC SAMPLING = 107.49 ✓

LINCOLN CTY ASPHALT TEST 2 8-14-91 TABLE 2-2

BAROMETRIC PRESSURE, in Hg = 28.500
TIP DIAMETER, in .4380
STACK AREA, sq ft = 42.240
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 28.493
GAS METER VOLUME, acf = 36.63
WATER COLLECTED, ml = 401.0
PARTICULATE COLLECTED, grams = 0.1582
PERCENT CONDENSIBLE, % = 12.3
WET MOLECULAR WT = 25.78
CO2 = 8.80 O2 = 9.60 CO = 0.00 N2 = 81.60

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	170	0.000	0.00	92	0.00
2	170	0.000	0.00	92	0.00
3	170	0.030	0.57	92	11.66
4	170	0.060	1.12	92	16.48
5	170	0.080	1.50	92	19.03
6	170	0.110	2.00	92	22.32
7	170	0.000	0.00	94	0.00
8	170	0.000	0.00	94	0.00
9	170	0.020	0.38	96	9.52
10	170	0.040	0.75	97	13.46
11	170	0.070	1.30	98	17.81
12	170	0.110	2.00	98	22.32
13	170	0.000	0.00	100	0.00
14	170	0.000	0.00	100	0.00
15	170	0.020	0.38	101	9.52
16	170	0.060	1.15	102	16.48
17	170	0.090	1.65	102	20.19
18	170	0.120	2.20	103	23.31
19	170	0.000	0.00	104	0.00
20	170	0.000	0.00	104	0.00
21	170	0.020	0.38	106	9.52
22	170	0.040	0.75	106	13.46
23	170	0.070	1.30	104	17.81
24	170	0.090	1.65	106	20.19
AVG VALUES	170		0.795	99	10.96

TOTAL GAS WITHDRAWN, scf = 54.03
DRY AIR WITHDRAWN, scf = 35.15
WATER VAPOR WITHDRAWN, scf = 18.88
PERCENT WATER VAPOR = 34.94
ACTUAL WET FLOW RATE, acfm = 27,780.70
STANDARD DRY FLOW RATE, scfm = 14,426.55
PARTICULATE CONCENTRATION, grains/dscf = 0.069
PARTICULATE EMISSION RATE, lb/hr = 8.69
LB PARTICULATE PER 1000 LB GAS = 0.098
PERCENT OF ISOKINETIC SAMPLING = 102.48

LINCOLN CTY ASPHALT TEST 3 8-14-91 TABLE 2-3

BAROMETRIC PRESSURE, in Hg = 28.500
TIP DIAMETER, in .4380
STACK AREA, sq ft = 42.240
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 28.493
GAS METER VOLUME, acf = 36.26
WATER COLLECTED, ml = 351.0
PARTICULATE COLLECTED, grams = 0.1326
PERCENT CONDENSIBLE, % = 23.2
WET MOLECULAR WT = 26.07
CO2 = 8.50 O2 = 9.10 CO = 0.00 N2 = 82.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	170	0.000	0.00	107	0.00
2	170	0.000	0.00	107	0.00
3	170	0.040	0.75	107	13.39
4	170	0.070	1.30	105	17.71
5	170	0.110	2.00	104	22.20
6	170	0.150	2.70	104	25.92
7	170	0.000	0.00	105	0.00
8	170	0.000	0.00	105	0.00
9	170	0.020	0.38	107	9.46
10	175	0.050	0.94	108	15.02
11	175	0.120	2.20	110	23.28
12	175	0.050	0.94	110	15.02
13	175	0.000	0.00	112	0.00
14	175	0.000	0.00	112	0.00
15	175	0.020	0.38	113	9.50
16	175	0.040	0.75	114	13.44
17	175	0.070	1.30	114	17.78
18	175	0.090	1.65	116	20.16
19	175	0.000	0.00	117	0.00
20	175	0.000	0.00	117	0.00
21	175	0.020	0.38	118	9.50
22	175	0.030	0.57	118	11.64
23	175	0.070	1.30	119	17.78
24	175	0.070	1.30	120	17.78
AVG VALUES	173		0.785	111	10.82

TOTAL GAS WITHDRAWN, scf = 51.37
DRY AIR WITHDRAWN, scf = 34.85 ✓
WATER VAPOR WITHDRAWN, scf = 16.52
PERCENT WATER VAPOR = 32.16
ACTUAL WET FLOW RATE, acfm = 27,410.78
STANDARD DRY FLOW RATE, scfm = 14,768.14
PARTICULATE CONCENTRATION, grains/dscf = 0.059
PARTICULATE EMISSION RATE, lb/hr = 7.40
LB PARTICULATE PER 1000 LB GAS = 0.084
PERCENT OF ISOKINETIC SAMPLING = 99.25 ✓

LINCOLN CTY – HCOH CALCS 8/28/91

$P_B = 28.5$

TEST 1 $3.09 ft^3$ $T_{AVG} = 86 F$ $\delta = 1.029$

$3.09 ft^3 (.02832 m^3/ft^3) 1.029 \left(\frac{528}{546}\right) \frac{28.5}{29.9} = 0.0830 m^3$

$\frac{.203 mg}{.0830 m^3} = 2.45 mg/m^3$

$2.45 mg/m^3 (14,525 ft^3/min) 60 min/HR (.02832 m^3/ft^3) 1\#/453600 mg$
$= 0.133 \#/HR$

TEST 2 $3.00 ft^3$ $T_{AVG} = 102 F$

$3.00(.02832) 1.029 \left(\frac{528}{562}\right) \frac{28.5}{29.9} = 0.0783 m^3$

$\frac{.200}{.0783} = 2.55 mg/m^3$

$2.55(14,427) 60(.02832)/453600 = 0.138 \#/HR$

TEST 3 $3.00 ft^3$ $T_{AVG} = 106 F$

$3.00(.02832) 1.029 \left(\frac{528}{566}\right) \frac{28.5}{29.9} = 0.0777 m^3$

$\frac{.207}{.0777} = 2.66 mg/m^3$

$2.66(14,768) 60(.02832)/453600 = 0.147 \#/HR$

2 p.

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: April 12, 1991 FILE REF: 4530

TO: Files

FROM: Andy Seeber - AM/10 AS

SUBJECT: Review of Stack Test Performed at Murphy Construction Co., New London

Receiv: 3/25/91

I. Source

Central Paving Corp. (Murphy Construction)
1911 W. Wisconsin Ave.
Appleton, WI 54914
Permit # 445081120 - J01 Issued: October 12, 1988
FID #445081120, Stack S11, Process P30
Test Date: October 23, 1990
Test Firm: Environmental Technology & Eng. Corp.
13020 W. Bluemound Road
Elm Grove, WI 53122
Crew Chief: Mr. Bill Dick (414) 784-2434

II. Source Description

The source tested was a Barber-Greene 70 conventional batch mix asphalt plant rated at 150 TPH. During the test the plant was producing 190 TPH. The plant was fired with #2 fuel oil. Particulate emissions are controlled by a Stansteel baghouse.

III. Discussion of Results

The test results are shown in Table 1. The average particulate concentration of 0.013 #/10^3 # gas is below the emission limit of 0.111 #/10^3# gas. Formaldehyde emissions were tested only for informational purposes and averaged 0.040 lbs/hr.

ET&E used EPA Method 5 and NIOSH 3500. I checked over the results & made no corrections. The report contained calibration data for the sampling equipment and production data for the plant.

v:\9104\am9murph.ars

cc: Larry Weix - LMD
Joe Perez - AM/10
U.S. EPA, Region V

Production rate ~ 40% greater than rated capacity.

No process description!

10

SUMMARY

On October 23, 1990, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Central Paving batch mix asphalt plant located in New London, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.11 pounds of particulate matter per 1,000 pounds of exhaust gas (lb/1000 lb) as specified by the State of Wisconsin Department of Natural Resources (DNR) in mandatory operation permit no. 445081120-J01. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.014 lb/1000 lb	13 %
2	0.012	11
3	0.012	11
AVG	0.013 lb/1000 lb	12 %

In addition, the formaldehyde emissions were also determined for informational purposes. These numerical results follow:

Test	LB/HR	LB/TON
1	0.04 lb/hr	0.0002 lb/ton
2	0.04	0.0002
3	0.03	0.0002
AVG	0.04 lb/hr	0.0002 lb/ton

Also, the opacity was observed by a certified reader for a 20 minute period during each test run. All individual readings as well as the 6 minute averages were 0 %.

CENTRAL PAVING NEW LONDON TEST 1 TABLE 2-1 10-23-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3050
STACK AREA, sq ft = 11.229
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 22
GAS METER VOLUME, acf = 39.45
WATER COLLECTED, ml = 209.00
PARTICULATE COLLECTED, grams = 0.0212
CO2 = 5.90 O2 = 12.70 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	250	0.180	0.90	42	29.18
2	250	0.220	1.18	42	32.26
3	250	0.280	1.40	43	36.39
4	250	0.360	1.75	44	41.26
5	250	0.320	1.60	44	38.90
6	250	0.140	0.70	45	25.73
7	250	0.180	0.80	45	29.18
8	250	0.300	1.50	46	37.67
9	250	0.380	1.85	48	42.39
10	250	0.420	2.10	49	44.57
11	250	0.280	1.40	52	36.39
12	250	0.300	1.50	53	37.67
13	250	0.300	1.50	54	37.67
14	250	0.400	2.00	55	43.49
15	250	0.480	2.35	57	47.65
16	250	0.360	1.75	65	41.26
17	250	0.260	1.28	67	35.07
18	250	0.260	1.28	68	35.07
19	250	0.300	1.50	69	37.67
20	250	0.480	2.35	70	47.65
21	250	0.340	1.70	71	40.10
22	250	0.300	1.50	72	37.67
AVG VALUES	250		1.540	55	37.95

TOTAL GAS WITHDRAWN, scf = 48.28
DRY GAS WITHDRAWN, scf = 38.45
WATER VAPOR WITHDRAWN, scf = 9.84
PERCENT WATER VAPOR = 20.37
ACTUAL WET FLOW RATE, acfm = 25,567.27
STANDARD DRY FLOW RATE, scfm = 14,720.92
PARTICULATE CONCENTRATION, grains/dscf = 0.009
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.014
PARTICULATE EMISSION RATE, lb/hr = 1.10
PERCENT OF ISOKINETIC SAMPLING = 105.11

CENTRAL PAVING NEW LONDON TEST 2 TABLE 3-2 10-23-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3050
STACK AREA, sq ft = 11.229
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 42.55
WATER COLLECTED, ml = 239.00
PARTICULATE COLLECTED, grams = 0.0205
CO2 = 6.40 O2 = 13.00 CO = 0.00 N2 = 81.60

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	235	0.180	0.90	70	28.90
2	235	0.220	1.10	71	31.95
3	240	0.260	1.30	71	34.86
4	245	0.360	1.80	71	41.17
5	245	0.340	1.70	71	40.01
6	250	0.140	0.70	72	25.76
7	250	0.200	1.00	72	30.79
8	250	0.240	1.20	72	33.73
9	250	0.320	1.60	72	38.95
10	250	0.360	1.80	72	41.31
11	250	0.260	1.30	72	35.11
12	250	0.300	1.50	72	37.71
13	250	0.300	1.50	72	37.71
14	245	0.300	1.50	72	37.58
15	250	0.460	2.30	72	46.70
16	250	0.300	1.50	72	37.71
17	245	0.200	1.00	72	30.68
18	250	0.240	1.20	72	33.73
19	250	0.280	1.40	72	36.43
20	250	0.460	2.30	72	46.70
21	250	0.300	1.50	72	37.71
22	250	0.260	1.30	72	35.11
23	250	0.300	1.50	72	37.71
24	250	0.380	1.85	72	42.45
25	250	0.440	2.20	72	45.67
AVG VALUES	248		1.479	72	37.05

TOTAL GAS WITHDRAWN, scf = 52.80
DRY GAS WITHDRAWN, scf = 41.55
WATER VAPOR WITHDRAWN, scf = 11.25
PERCENT WATER VAPOR = 21.31
ACTUAL WET FLOW RATE, acfm = 24,960.22
STANDARD DRY FLOW RATE, scfm = 14,251.13
PARTICULATE CONCENTRATION, grains/dscf = 0.008
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.012
PARTICULATE EMISSION RATE, lb/hr = 0.95
PERCENT OF ISOKINETIC SAMPLING = 103.25

CENTRAL PAVING NEW LONDON TEST 3 TABLE 2-3 10-23-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3050
STACK AREA, sq ft = 11.229
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 43.02
WATER COLLECTED, ml = 235.00
PARTICULATE COLLECTED, grams = 0.0205
CO2 = 6.30 O2 = 12.20 CO = 0.00 N2 = 81.50

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	230	0.180	0.90	70	28.75
2	235	0.220	1.10	70	31.90
3	235	0.240	1.20	70	33.32
4	240	0.360	1.80	70	40.96
5	240	0.380	1.85	71	42.08
6	245	0.140	0.70	71	25.63
7	245	0.240	1.20	71	33.56
8	250	0.300	1.50	71	37.66
9	245	0.360	1.80	71	41.10
10	250	0.460	2.30	71	46.63
11	250	0.280	1.40	71	36.38
12	250	0.320	1.60	72	38.89
13	250	0.300	1.50	72	37.66
14	250	0.300	1.50	72	37.66
15	250	0.480	2.40	72	47.63
16	250	0.300	1.50	72	37.66
17	250	0.220	1.10	72	32.25
18	250	0.260	1.30	72	35.06
19	250	0.360	1.80	73	41.25
20	250	0.500	2.50	73	48.61
21	250	0.300	1.50	73	37.66
22	245	0.300	1.50	73	37.52
23	245	0.320	1.60	73	38.75
24	250	0.360	1.80	73	41.25
25	250	0.460	2.30	73	46.63
AVG VALUES	246		1.586	72	38.26

TOTAL GAS WITHDRAWN, scf = 53.85
DRY GAS WITHDRAWN, scf = 42.80
WATER VAPOR WITHDRAWN, scf = 11.06
PERCENT WATER VAPOR = 20.54
ACTUAL WET FLOW RATE, acfm = 25,775.97
STANDARD DRY FLOW RATE, scfm = 14,890.37
PARTICULATE CONCENTRATION, grains/dscf = 0.007
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.012
PARTICULATE EMISSION RATE, lb/hr = 0.95
PERCENT OF ISOKINETIC SAMPLING = 101.79

CENTRAL PAINT - NEW LONDON

FORMALDEHYDE RESULTS

$\gamma = 1.017$

$P_b = 29.10$

TEST 1 $V_M = 3.00$

$T_M = 64°F$

$V_{M\,std} = 3.00 * 1.017 * \frac{528}{524} * \frac{29.1}{29.92} * .07833$

$= 2.99\ SCF = .085\ m^3$

$C = \frac{57\ mg}{.085\ m^3} = 0.67\ mg/m^3$

ER: 0.04 lb/hr. 0.0002 #/ton

TEST 2 $V_M = 3.00$

$T_M = 56°F$

$V_{M\,std} = 3.00 * 1.017 * \frac{528}{518} * \frac{29.1}{29.92} * .07833$

$= \frac{3.00}{2.95}\ SCF = \frac{.086}{.084}\ m^3$

$C = \frac{61}{.086} = 0.71\ mg/m^3$

ER: 0.04 lb/hr 0.0002 #/ton

TEST 3 $V_M = 3.00$

$T_M = 59°F$

$V_{M\,std} = 3.00 * 1.017 * \frac{528}{519} * \frac{29.1}{29.92} * .07833$

$= 3.07\ SCF = .086\ m^3$

$C = \frac{53\ mg}{.086} = 0.62\ mg/m^3$

ER: 0.03 lb/hr. 0.0002 #/ton

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 11/12/91

File Code: 4530

Received: 10/24/91

PRELIMINARY STACK TEST REVIEW

By: David Sellers Test Date: 9/24/91

Name of Source: N.E. Asphalt, Control 55 FID #: 114007080

Address: Prospect Road

City: Horicon, WI. Permit #: 114007080 - 002

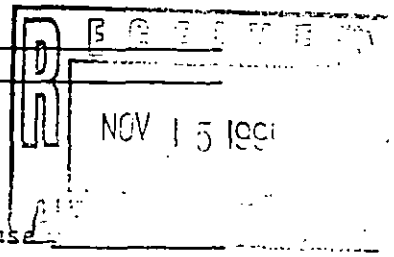
Description of Source Tested: Batch mix Asphalt Plant and controlled by a baghouse/burning waste oil.

Description of Control Equipment: Standard Havens pulse jet baghouse, air/cloth ratio 5.5:1. Nomex Bags.

Test Firm: Environmental Technology and Engineering
Crew Chief & Phone#: Bill Dick 414/784-2434

Pollutant Tested: particulates Test Method: Method 5
Pollutant Tested: formaldehyde Test Method: NIOSH 3500
Pollutant Tested: Opacity Test Method: Method 9

Test Production Level: 263 TPH
Rated Production Level: 276 TPH



Discussion of Results:

____ The stack test is invalid and will have to be redone because _____

The test average result of 0.004 gr/dsct is ✓ is not ____

in compliance with the emission limit of 0.04 gr/dsct.

Formaldehyde Emissions were 0.46 lbs/hr or 0.0018 lbs/ton asphalt.
Opacity was under the 20% Limit.

CC Joe Peter-AM/3
US EPA Region V

PARTICULATE CHECKLIST

Name of Source: Northeast Asphalt Control 55 Test Date: 9/24/91

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES__ NO ✓ NSPS
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

	Run 1	Run 2	Run 3
Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF	0.004	0.004	0.001

Eq. 2 Lb/DSCF = (Gr/DSCF)/7000

Eq. 3 Lb/Hr = 60*DSCFM*(Lb/DSCF)

Eq. 4 Lb/10^6 BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/Hr, or Lb/10^6 BTU, solve Eq. 1-4. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES ✓ NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES ✓ NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

GASEOUS TEST CHECKLIST

Name of Source: N.E. Asphalt #55 Gas Tested: Formaldehyde Test Date: 9/24/91

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Run 1 Run 2 Run 3
168 mg 171 mg 146 mg

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ Moisture\ as\ Decimal)$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-Stack\ O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/Stack\ CO_2$

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES___ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*Molecular\ Weight\ of\ Gas/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*Molecular\ Weight\ of\ Gas$

Eq. 6 $Lb/DSCF = 6.243*10^{-2}*(mg/DSCM)$

Run 1 Run 2 Run 3
0.52 0.97 0.39

Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$

Eq. 8 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-Stack\ O_2)$

3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-8. Eq. 1-3 may also be needed. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

0.46 avg.

Eq. 9 $\%\ Capture\ Eff. = \frac{(Lb/Hr\ VOC\ to\ Control\ Equip.)*100}{(Lb/Hr\ VOC\ input\ to\ Process)}$

Eq. 10 $\%\ Dest\ Eff. = \frac{(Inlet\ Lb\ Per\ Hr\ VOC - Outlet\ Lb\ Per\ Hr\ VOC)*100}{(Inlet\ Lb\ Per\ Hr\ VOC)}$

Eq. 11 $\%\ Overall\ Eff. = (\%\ Cap.\ Eff./100)*(\%\ Dest.\ Eff./100)*100$

Not Applicable

4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-11. Eq. 1-8 may also be needed. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES__ NO__
   If no, write in the correct average.

6. Is the average result in compliance? YES__ NO__
   If no, the District should issue an NOV.

7. Was the source operating at a level representative of full capacity? YES ✓ NO__
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On September 24, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Northeast Asphalt, Inc. Control 55 asphalt plant located in Horicon, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Lb/Hr	Emissions	% of Allowable	% Isokinetic
1	1.60	0.004 gr/dscf	10 %	98
2	1.40	0.004	10	96
3	1.29	0.004	10	98
		---	--	
AVG	1.43	0.004 gr/dscf	10 %	97

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.52 lb/hr	0.0020 lb/ton
2	0.47	0.0018
3	0.40	0.0015
	---	---
AVG	0.46 lb/hr	0.0018 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All individual readings were either 0 or 5 % and thus the six minute average opacities were all well below the permit limit of 20 %.

NORTHEAST ASPHALT CONTROL 55 TEST 1 TABLE 2-1 9-24-91

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .2450
STACK AREA, sq ft = 20.444
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.63
WATER COLLECTED, ml = 150.00
PARTICULATE COLLECTED, grams = 0.0115
CO2 = 4.20 O2 = 15.00 CO = 0.00 N2 = 80.80

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	265	0.680	1.36	56	56.64
2	265	0.780	1.56	57	60.66
3	270	0.700	1.40	58	57.66
4	270	0.680	1.36	58	56.83
5	270	0.800	1.60	58	61.64
6	275	0.800	1.60	59	61.85
7	275	0.740	1.48	60	59.49
8	275	0.680	1.36	60	57.03
9	280	0.820	1.64	62	62.84
10	280	0.760	1.52	63	60.49
11	280	0.700	1.40	63	58.06
12	280	0.680	1.36	64	57.22
13	280	0.740	1.48	66	59.69
14	280	0.660	1.32	68	56.37
15	280	0.700	1.40	69	58.06
16	280	0.700	1.40	72	58.06
17	280	0.760	1.52	74	60.49
18	280	0.640	1.28	76	55.51
19	280	0.700	1.40	77	58.06
20	280	0.640	1.28	78	55.51
21	280	0.640	1.28	82	55.51
22	280	0.640	1.28	83	55.51
23	280	0.660	1.32	84	56.37
24	280	0.600	1.20	85	53.75
AVG VALUES	277		1.408	68	58.05

TOTAL GAS WITHDRAWN, scf = 47.06
DRY GAS WITHDRAWN, scf = 40.00
WATER VAPOR WITHDRAWN, scf = 7.06
PERCENT WATER VAPOR = 15.00
ACTUAL WET FLOW RATE, acfm = 71,211.91
STANDARD DRY FLOW RATE, scfm = 42,439.81
, m3/hr = 72,113.72
PARTICULATE CONCENTRATION, grains/dscf = 0.004
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.007
PARTICULATE EMISSION RATE, lb/hr = 1.60
PERCENT OF ISOKINETIC SAMPLING = 98.11

NORTHEAST ASPHALT CONTROL 55 TEST 2 TABLE 2-2 9-24-91

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .2450
STACK AREA, sq ft = 20.444
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 39.62
WATER COLLECTED, ml = 158.00
PARTICULATE COLLECTED, grams = 0.0100
CO2 = 4.40 O2 = 15.00 CO = 0.00 N2 = 80.60

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.620	1.24	90	54.54
2	275	0.660	1.32	90	56.27
3	280	0.700	1.40	90	58.14
4	280	0.680	1.36	90	57.31
5	280	0.640	1.28	90	55.60
6	270	0.700	1.40	91	57.75
7	265	0.700	1.40	92	57.55
8	270	0.780	1.56	92	60.96
9	265	0.640	1.28	92	55.03
10	265	0.760	1.52	93	59.97
11	270	0.780	1.56	93	60.96
12	270	0.800	1.60	93	61.74
13	270	0.700	1.40	93	57.75
14	270	0.720	1.44	93	58.57
15	270	0.760	1.52	93	60.17
16	280	0.700	1.40	92	58.14
17	275	0.660	1.32	94	56.27
18	275	0.700	1.40	94	57.95
19	275	0.800	1.60	94	61.95
20	275	0.740	1.48	94	59.58
21	270	0.640	1.28	94	55.22
22	265	0.700	1.40	94	57.55
23	265	0.740	1.48	95	59.17
24	265	0.700	1.40	95	57.55
AVG VALUES	272		1.418	93	58.15

TOTAL GAS WITHDRAWN, scf = 46.56
DRY GAS WITHDRAWN, scf = 39.12
WATER VAPOR WITHDRAWN, scf = 7.44
PERCENT WATER VAPOR = 15.97
ACTUAL WET FLOW RATE, acfm = 71,334.01
STANDARD DRY FLOW RATE, scfm = 42,326.28
, m3/hr = 71,920.81
PARTICULATE CONCENTRATION, grains/dscf = 0.004
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.006
PARTICULATE EMISSION RATE, lb/hr = 1.40
PERCENT OF ISOKINETIC SAMPLING = 96.21

NORTHEAST ASPHALT CONTROL 55 TEST 3 TABLE 2-3 9-24-91

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .2450
STACK AREA, sq ft = 20.444
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.02
WATER COLLECTED, ml = 169.00
PARTICULATE COLLECTED, grams = 0.0093
CO2 = 4.20 O2 = 14.80 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.660	1.32	92	56.39
2	280	0.740	1.48	92	59.92
3	275	0.740	1.48	92	59.71
4	275	0.700	1.40	92	58.08
5	275	0.820	1.64	93	62.86
6	275	0.780	1.56	83	61.31
7	270	0.740	1.48	92	59.51
8	270	0.680	1.36	92	57.05
9	280	0.700	1.40	92	58.27
10	280	0.760	1.52	92	60.72
11	280	0.800	1.60	92	62.30
12	280	0.700	1.40	92	58.27
13	275	0.700	1.40	92	58.08
14	275	0.740	1.48	92	59.71
15	275	0.760	1.52	92	60.51
16	280	0.700	1.40	92	58.27
17	280	0.780	1.56	92	61.51
18	280	0.660	1.32	92	56.58
19	275	0.720	1.44	93	58.90
20	275	0.620	1.24	93	54.66
21	275	0.640	1.28	93	55.53
22	275	0.640	1.28	93	55.53
23	275	0.680	1.36	93	57.24
24	280	0.680	1.36	93	57.44
AVG VALUES	276		1.428	92	58.68

TOTAL GAS WITHDRAWN, scf = 47.47
DRY GAS WITHDRAWN, scf = 39.51
WATER VAPOR WITHDRAWN, scf = 7.95
PERCENT WATER VAPOR = 16.76
ACTUAL WET FLOW RATE, acfm = 71,981.15
STANDARD DRY FLOW RATE, scfm = 42,036.31
, m3/hr = 71,428.09
PARTICULATE CONCENTRATION, grains/dscf = 0.004
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.006
PARTICULATE EMISSION RATE, lb/hr = 1.29
PERCENT OF ISOKINETIC SAMPLING = 97.85

NORTHEAST ASPHALT
CONTROL 55 - HORIZON
FORMALDEHYDE CALCULATIONS

$P_p = 29.30$
$\gamma = 1.029$

TEST 1 $V_M = 2.00$ $T_M = 62°F$

205 TPH $V_{M\,std} = 2.00 * 1.029 * \frac{528}{522} * \frac{29.3}{29.92}$
$= 2.04$ SCF $= .058\ m^3$

$C = \frac{188\ mg}{.058} = 3.24\ mg/m^3$
$ER = 0.52\ \#/hr$
$= .0020\ \#/ton$

TEST 2 $V_M = 2.00$ $T_M = 60°F$
205 TPH $V_{M\,std} = 2.05$ SCF $= .058\ m^3$

$C = \frac{171\ mg}{.058} = 2.95\ mg/m^3$

$ER = 0.47\ \#/hr$
$= .0018\ \#/ton$

TEST 3 $V_M = 2.00$ $T_M = 55°F$
205 TPH $V_{M\,std} = 2.07$ SCF $= .058\ m^3$

$C = \frac{146\ mg}{.058} = 2.52\ mg/m^3$

$ER = 0.40\ \#/hr$
$= .0015\ \#/ton$

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 3-23-92 File Code: 4530

PRELIMINARY STACK TEST REVIEW Received: 11/1/91

By: A. Sucher Test Date: 9-17-91

Name of Source: Northwest Asphalt #59 (Payne) FID #: 999 187 860

Address: Hwy 21 + Cty T Stack #: N/A

City: Wautoma, WI Process #: P30

Permit #: 999187860 - 001 Date Issued: 9-11-87

Description of Source Tested: Batch mix asphalt plant. The plant was fired w/ waste fuel oil.

Description of Control Equipment: Baghouse - reverse pulse

Test Firm: ET + E

Crew Chief & Phone#: Bill Dick (414) 784-2434

Pollutant Tested: Particulate Test Method: 17

Pollutant Tested: HCHO Test Method: NIOSH 3500

Pollutant Tested: Test Method:

Test Production Level: 150 T/Hr (100% virgin)

Rated Production Level: 200 T/Hr

Discussion of Results:

Poll. Test Ave. = 0.094 Limit = 0.3 #Pm/10³ # gas

In Compliance? (Y) N

Poll. Test Ave. = 0.23 or 2540 #/yr Limit = 0.029 #/Hr or 250 #/yr HCHO

In Compliance? Y (N)

Poll. Test Ave. = Limit =

In Compliance? Y N

Poll. Test Ave. = Limit =

In Compliance? Y N

Is This a Valid Test? (Y) N If answer is no, please indicate the reason.

Test may be reviewed in depth later, if necessary.

→ CC Joe Perez-AM/10
US EPA Region V
Stan Mermall - Oshkosh Area
G. Volpentesta - SED
M. Griffin - SED

Partic. Method 17?

No Process Description

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PARTICULATE CHECKLIST

Name of Source: Northwest Asphalt #59 Test Date: 9-17-91

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES ✓ NO__
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

✓ Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 $Lb/10^6$ BTU = (Lb/Hr)/(10^6 BTU/Hr)

Eq. 9 $Lb/10^6$ BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or $Lb/10^6$ BTU, solve the needed Eq. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES ✓ NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES ✓ NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

GASEOUS TEST CHECKLIST

Name of Source: [illegible] #59 Gas Tested: HC HO Test Date: 9-17-99

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ \text{Moisture as Decimal})$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-\text{Stack } O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/\text{Stack } CO_2$

---

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*\text{Molecular Weight of Gas}/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*\text{Molecular Weight of Gas}$

Eq. 6 $Lb/DSCF = 6.243*10^{-8}*(mg/DSCM)$

✓ Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$ Eq. 8 $Lb/10^6\ BTU = (Lb/Hr)*(10^6\ BTU/Hr)$

Eq. 9 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-\text{Stack } O_2)$

---

3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-9. Eq. 1-3 may also be needed. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 10 $\%\ \text{Capture Eff.} = \dfrac{(\text{Lb VOC/Hr to Control Equip.})*100}{(\text{Lb VOC/Hr Input to Process})}$

Eq. 11 $\%\ \text{Destruction Eff.} = \dfrac{(\text{Inlet Lb VOC/Hr} - \text{Outlet Lb VOC/Hr})*100}{(\text{Inlet Lb VOC/Hr})}$

Eq. 12 $\%\ \text{Overall Eff.} = (\%\ \text{Cap. Eff.}/100)*(\%\ \text{Dest. Eff.}/100)*100$

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4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-12. Eq. 1-8 may also be needed. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

6. Is the average result in compliance? YES__ NO ✓
   If no, the District should issue an NOV.

7. Was the source operating at a level representative of full capacity? YES ✓ NO__
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On September 17, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Northeast Asphalt, Inc. Control 59 asphalt plant located in Wautoma, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.30 pounds of particulate matter per 1000 pounds of exhaust gas (lb/1000 lb) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.093 lb/1000 lb	31 %
2	0.087	29
3	0.102	34
AVG	0.094 lb/1000 lb	31 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.25 lb/hr	0.0017 lb/ton
2	0.32	0.0022
3	0.30	0.0020
AVG	0.29 lb/hr	0.0020 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All individual readings were either 0 or 5 % and thus the six minute average opacities were all well below the permit limit of 20 %.

NORTHEAST ASPHALT CONTROL 55 TEST 3 TABLE 2-3 9-24-91

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .2450
STACK AREA, sq ft = 20.444
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.02
WATER COLLECTED, ml = 169.00
PARTICULATE COLLECTED, grams = 0.0093
CO2 = 4.20 O2 = 14.80 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.660	1.32	92	56.39
2	280	0.740	1.48	92	59.92
3	275	0.740	1.48	92	59.71
4	275	0.700	1.40	92	58.08
5	275	0.820	1.64	93	62.86
6	275	0.780	1.56	83	61.31
7	270	0.740	1.48	92	59.51
8	270	0.680	1.36	92	57.05
9	280	0.700	1.40	92	58.27
10	280	0.760	1.52	92	60.72
11	280	0.800	1.60	92	62.30
12	280	0.700	1.40	92	58.27
13	275	0.700	1.40	92	58.08
14	275	0.740	1.48	92	59.71
15	275	0.760	1.52	92	60.51
16	280	0.700	1.40	92	58.27
17	280	0.780	1.56	92	61.51
18	280	0.660	1.32	92	56.58
19	275	0.720	1.44	93	58.90
20	275	0.620	1.24	93	54.66
21	275	0.640	1.28	93	55.53
22	275	0.640	1.28	93	55.53
23	275	0.680	1.36	93	57.24
24	280	0.680	1.36	93	57.44
AVG VALUES	276		1.428	92	58.68

TOTAL GAS WITHDRAWN, scf = 47.47
DRY GAS WITHDRAWN, scf = 39.51
WATER VAPOR WITHDRAWN, scf = 7.95
PERCENT WATER VAPOR = 16.76
ACTUAL WET FLOW RATE, acfm = 71,981.15
STANDARD DRY FLOW RATE, scfm = 42,036.31
, m3/hr = 71,428.09
PARTICULATE CONCENTRATION, grains/dscf = 0.004
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.006
PARTICULATE EMISSION RATE, lb/hr = 1.29
PERCENT OF ISOKINETIC SAMPLING = 97.85

NORTHEAST ASPHALT CONTROL 59 TEST 1 TABLE 2-1 9-17-91

BAROMETRIC PRESSURE, in Hg = 29.250
TIP DIAMETER, in .2450
STACK AREA, sq ft = 9.472
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 45.07
WATER COLLECTED, ml = 225.00
PARTICULATE COLLECTED, grams = 0.1677
CO2 = 4.00 O2 = 14.80 CO = 0.00 N2 = 81.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	290	1.400	2.45	68	83.53
2	290	1.250	2.20	69	78.93
3	290	1.100	1.90	70	74.04
4	295	0.950	1.65	70	69.04
5	290	0.700	1.20	71	59.07
6	285	0.700	1.20	72	58.87
7	290	1.250	2.20	74	78.93
8	290	1.000	1.75	75	70.60
9	295	0.850	1.50	76	65.30
10	290	0.800	1.40	77	63.14
11	295	0.750	1.30	78	61.34
12	290	0.700	1.20	79	59.07
13	295	1.650	2.85	82	90.99
14	290	1.350	2.35	83	82.03
15	295	1.000	1.75	84	70.83
16	295	0.850	1.50	86	65.30
17	295	0.800	1.40	89	63.35
18	295	0.700	1.20	90	59.26
19	295	1.800	3.10	91	95.03
20	285	1.600	2.80	93	89.00
21	285	1.250	2.20	93	78.67
22	280	1.050	1.85	94	71.86
23	280	0.900	1.55	96	66.53
24	280	0.700	1.20	97	58.67
AVG VALUES	290		1.821	82	71.39

TOTAL GAS WITHDRAWN, scf = 55.00
DRY GAS WITHDRAWN, scf = 44.41
WATER VAPOR WITHDRAWN, scf = 10.59
PERCENT WATER VAPOR = 19.25
ACTUAL WET FLOW RATE, acfm = 40,572.80
STANDARD DRY FLOW RATE, scfm = 22,518.63
, m3/hr = 38,263.66
PARTICULATE CONCENTRATION, grains/dscf = 0.058
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.093
PARTICULATE EMISSION RATE, lb/hr = 10.97
PERCENT OF ISOKINETIC SAMPLING = 95.12

NORTHEAST ASPHALT CONTROL 59 TEST 2 TABLE 2-2 9-17-91

BAROMETRIC PRESSURE, in Hg = 29.250
TIP DIAMETER, in .2450
STACK AREA, sq ft = 9.472
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 44.00
WATER COLLECTED, ml = 221.00
PARTICULATE COLLECTED, grams = 0.1566
CO2 = 4.20 O2 = 14.80 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	285	1.400	2.45	98	83.22
2	290	1.300	2.25	99	80.46
3	290	1.100	1.90	99	74.02
4	290	0.900	1.55	99	66.95
5	290	0.900	1.55	99	66.95
6	290	0.750	1.30	100	61.12
7	295	1.300	2.25	100	80.73
8	295	1.100	1.90	100	74.26
9	295	0.900	1.55	101	67.17
10	290	0.800	1.40	102	63.12
11	290	0.800	1.40	103	63.12
12	290	0.800	1.40	103	63.12
13	290	1.600	2.80	104	89.27
14	295	1.300	2.25	105	80.73
15	285	1.000	1.75	105	70.34
16	280	0.900	1.55	107	66.50
17	285	0.800	1.40	108	62.91
18	280	0.700	1.20	108	58.65
19	280	1.800	3.10	109	94.05
20	280	1.600	2.80	110	88.67
21	285	1.200	2.10	110	77.05
22	285	1.000	1.75	111	70.34
23	285	0.900	1.55	111	66.73
24	280	0.700	1.20	112	58.65
AVG VALUES	288		1.848	104	72.01

TOTAL GAS WITHDRAWN, scf = 53.88
DRY GAS WITHDRAWN, scf = 43.48
WATER VAPOR WITHDRAWN, scf = 10.40
PERCENT WATER VAPOR = 19.31
ACTUAL WET FLOW RATE, acfm = 40,922.08
STANDARD DRY FLOW RATE, scfm = 22,773.94
, m3/hr = 38,697.48
PARTICULATE CONCENTRATION, grains/dscf = 0.056
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.087
PARTICULATE EMISSION RATE, lb/hr = 10.42
PERCENT OF ISOKINETIC SAMPLING = 92.07

NORTHEAST ASPHALT CONTROL 59 TEST 3 TABLE 2-3 9-17-91

BAROMETRIC PRESSURE, in Hg = 29.250
TIP DIAMETER, in .2450
STACK AREA, sq ft = 9.472
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 44.28
WATER COLLECTED, ml = 218.00
PARTICULATE COLLECTED, grams = 0.1840
CO2 = 4.00 O2 = 14.60 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	285	1.400	2.45	107	83.22
2	290	1.250	2.20	108	78.89
3	290	1.000	1.75	108	70.57
4	290	0.950	1.65	108	68.78
5	290	0.900	1.55	108	66.94
6	285	0.750	1.30	109	60.91
7	290	1.300	2.25	109	80.46
8	295	1.200	2.10	109	77.56
9	295	1.000	1.75	109	70.80
10	290	0.800	1.40	109	63.12
11	290	0.750	1.30	109	61.11
12	290	0.700	1.20	109	59.04
13	290	1.650	2.85	110	90.64
14	285	1.300	2.25	110	80.19
15	285	1.000	1.75	110	70.33
16	285	0.950	1.65	110	68.55
17	285	0.850	1.50	110	64.84
18	285	0.700	1.20	110	58.84
19	285	1.800	3.10	112	94.36
20	285	1.600	2.80	113	88.96
21	285	1.250	2.20	113	78.63
22	280	1.000	1.75	113	70.09
23	280	0.850	1.50	113	64.62
24	280	0.750	1.30	114	60.70
AVG VALUES	287		1.865	110	72.17

TOTAL GAS WITHDRAWN, scf = 54.05
DRY GAS WITHDRAWN, scf = 43.79
WATER VAPOR WITHDRAWN, scf = 10.26
PERCENT WATER VAPOR = 18.99
ACTUAL WET FLOW RATE, acfm = 41,017.22
STANDARD DRY FLOW RATE, scfm = 22,930.46
, m3/hr = 38,963.43
PARTICULATE CONCENTRATION, grains/dscf = 0.065
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.102
PARTICULATE EMISSION RATE, lb/hr = 12.24
PERCENT OF ISOKINETIC SAMPLING = 92.09

NORTHEAST ASPHALT
CONTROL 59 - WAUTOMA
FORMALDEHYDE CALCULATIONS

P_p - 29.25
γ = 1.029

TEST 1 V_M = 1.80 T_M = 67 F

$V_{M\,std} = 1.80 * 1.029 * \frac{528}{527} * \frac{29.25}{29.92}$

165 TPH

= 1.81 SCF = .051 m^3

$C = \frac{153\,mg}{.051} = 3.00\,mg/m^3$

ER = 0.25 #/hr.

= .0017 #/ton

TEST 2 V_M = 2.00 T_M = 72 F

$V_{M\,std}$ = 2.00 SCF = .057 m^3

167 TPH

$C = \frac{216\,mg}{.057} = 3.79\,mg/m^3$

ER = 0.32 #/hr.

= .0022 #/ton

TEST 3 V_M = 2.00 T_M = 80 F

$V_{M\,std}$ = 1.97 SCF = .056 m^3

167 TPH

$C = \frac{196\,mg}{.056} = 3.50\,mg/m^3$

ER = 0.30 #/hr.

= .0020 #/ton

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 11, 1991 FILE REF: 4530

TO: Files

FROM: Andy Seeber - AM/3

SUBJECT: Review of Stack Test Performed at Northeast Asphalt (Control #54), Shawano

Received: 11/6/90

I. Source

Northeast Asphalt Inc. - Plant #54
451 Woodside Road
Green Bay, WI 54301
FID # 436041760, Stack S10, Process P30
Permit # 436041760-N01 Issued: May 18, 1989
Test Date: September 26, 1990
Test Firm: Environmental Technology & Engineering Corp.
13020 Bluemound Road
Elm Grove, WI 53122
Crew Chief: Mr. Bill Dick (414) 784-2434

II. Source Description

The source tested was a Hetherington & Burner MV-48 batch mix asphalt plant rated at 200 TPH. During the test the plant was producing 180 TPH and the mix was composed of 70% virgin material and 30% recycle. The plant was fired with waste oil. Particulate emissions are controlled by a baghouse.

III. Discussion of Results

The test results are shown in Table 1. The average emission concentration of 0.173 $lb/10^3$ lb gas is below the emission limit of 0.30 $lb/10^3$ lb gas.

ET&E used EPA Method 5 including the backhalf. I checked over the results and made minor corrections to the emission results. The report contained calibration data for the sampling equipment and production data for the plant.

v:\9103\am9noe54.ars

cc: Mike DeBrock - LMD
Joe Perez - AM/3
U.S. EPA Region V

No Process Description.
Everything else OK.

13

2.0 RESULTS

2.1 Particulate Emissions

Isokinetic sampling for particulate matter was performed in accordance with the procedures outlined in EPA Method 5 - "Determination of Particulate Emissions from Stationary Sources" - as published in the Federal Register. The "back half" particulate was also determined in accordance with the "Modified Method 5 Test Method for Condensible Particulate" published by the DNR. A brief summary of this method is included in section 3.0 of this report. The tests were performed in the final discharge stack at the location shown in Figure 2-1. This same figure also depicts the location of the exact test points relative to the stack wall. The stack flow parameters recorded during testing and the weights of particulate collected were used to compute the emissions for each test of the three-test sequence. These data were then entered into a computer and printouts showing detailed results are included as Tables 2-1, 2-2, and 2-3.

The three individual tests as well as the average of the three particulate tests show the emissions to be below the limit of 0.30 pounds of particulate matter per 1,000 pounds of exhaust gas (lb/1000 lb) as specified by the State of Wisconsin Department of Natural Resources (DNR) in a mandatory operation permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.175 ~~0.166~~ lb/1000 lb	55 %
2	0.175 0.172	57
3	0.173 0.170	57
AVG	0.173 ~~0.169~~ lb/1000 lb	56 %

2.2 Formaldehyde Emissions

The formaldehyde emissions were determined concurrently with the particulate and opacity observations using NIOSH Method 3500. A brief description of the method is included in section 3.0 of this report. The numerical results are presented below:

Test	ug Sample / DSCF	LB/HR	LB/TON
1	128 2.92	0.14 lb/hr	0.0008 lb/ton
2	171 3.98	0.18	0.0010
3	137 3.34	0.15	0.0008
AVG		0.16 lb/hr	0.0009 lb/ton

NORTHEAST ASPHALT SHAWANO TEST 1 TABLE 2-1 9-26-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2400
STACK AREA, sq ft = 11.516
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 15
GAS METER VOLUME, acf = 38.55
WATER COLLECTED, ml = 228.00
PARTICULATE COLLECTED, grams = 0.2639 .2639
CO2 = 4.40 O2 = 14.60 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	325	1.000	1.60	61	72.31
2	325	0.940	1.50	64	70.10
3	325	0.900	1.45	66	68.60
4	325	0.900	1.45	70	68.60
5	320	0.760	1.25	72	62.83
6	325	0.900	1.45	77	68.60
7	325	0.860	1.40	80	67.05
8	325	0.860	1.40	83	67.05
9	325	0.860	1.40	86	67.05
10	320	0.760	1.25	90	62.83
11	320	0.920	1.50	94	69.13
12	320	0.840	1.30	98	66.06
13	315	0.800	1.28	100	64.26
14	315	0.800	1.28	102	64.26
15	310	0.640	1.00	103	57.29
AVG VALUES	321		1.367	83	66.40

TOTAL GAS WITHDRAWN, scf = 49.90
DRY GAS WITHDRAWN, scf = 39.17
WATER VAPOR WITHDRAWN, scf = 10.73
PERCENT WATER VAPOR = 21.51
ACTUAL WET FLOW RATE, acfm = 45,880.99
STANDARD DRY FLOW RATE, scfm = 23,896.24
PARTICULATE CONCENTRATION, grains/dscf = 0.1032
PARTICULATE EMISSION RATE, lb/hr = 21.148
LB PARTICULATE PER 1000 LB GAS = 0.~~166~~ .172
PERCENT OF ISOKINETIC SAMPLING = 100.16

NORTHEAST ASPHALT SHAWANO TEST 2 TABLE 2-2 9-26-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2400
STACK AREA, sq ft = 11.516
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 15
GAS METER VOLUME, acf = 37.40
WATER COLLECTED, ml = 259.00
PARTICULATE COLLECTED, grams = 0.2723
CO2 = 4.50 O2 = 14.50 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	310	0.960	1.52	103	70.56
2	310	0.860	1.36	107	66.78
3	310	0.860	1.36	110	66.78
4	310	0.800	1.28	111	64.41
5	310	0.660	1.06	112	58.51
6	310	0.860	1.36	114	66.78
7	310	0.900	1.45	116	68.32
8	310	0.900	1.45	117	68.32
9	310	0.820	1.30	118	65.21
10	305	0.760	1.22	120	62.58
11	310	1.040	1.65	120	73.44
12	310	0.900	1.45	121	68.32
13	310	0.860	1.36	121	66.78
14	310	0.820	1.30	122	65.21
15	305	0.760	1.22	122	62.58
AVG VALUES	309		1.356	116	66.31

TOTAL GAS WITHDRAWN, scf = 50.34
DRY GAS WITHDRAWN, scf = 38.15
WATER VAPOR WITHDRAWN, scf = 12.19
PERCENT WATER VAPOR = 24.22
ACTUAL WET FLOW RATE, acfm = 45,815.31
STANDARD DRY FLOW RATE, scfm = 23,396.43
PARTICULATE CONCENTRATION, grains/dscf = 0.1101
PARTICULATE EMISSION RATE, lb/hr = 22.047
LB PARTICULATE PER 1000 LB GAS = ~~0.122~~ .175
PERCENT OF ISOKINETIC SAMPLING = 99.62

NORTHEAST ASPHALT SHAWANO TEST 3 TABLE 2-3 9-26-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2400
STACK AREA, sq ft = 11.516
SAMPLING TIME PER POINT, min = 4.00
NUMBER OF POINTS = 15
GAS METER VOLUME, acf = 37.08
WATER COLLECTED, ml = 244.00
PARTICULATE COLLECTED, grams = 0.2662
CO2 = 4.60 O2 = 14.40 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	310	0.920	1.47	127	68.92
2	315	0.860	1.36	128	66.85
3	315	0.860	1.36	129	66.85
4	310	0.860	1.36	130	66.64
5	310	0.780	1.25	130	63.46
6	310	1.060	1.70	130	73.98
7	310	0.900	1.45	130	68.17
8	310	0.860	1.36	130	66.64
9	310	0.860	1.36	130	66.64
10	305	0.760	1.22	130	62.44
11	310	0.920	1.47	130	68.92
12	310	0.860	1.36	130	66.64
13	310	0.820	1.30	130	65.07
14	305	0.800	1.28	130	64.06
15	305	0.660	1.06	130	58.19
AVG VALUES	310		1.357	130	66.23

TOTAL GAS WITHDRAWN, scf = 49.37
DRY GAS WITHDRAWN, scf = 37.88
WATER VAPOR WITHDRAWN, scf = 11.49
PERCENT WATER VAPOR = 23.27
ACTUAL WET FLOW RATE, acfm = 45,762.90
STANDARD DRY FLOW RATE, scfm = 23,653.60
PARTICULATE CONCENTRATION, grains/dscf = 0.1004
PARTICULATE EMISSION RATE, lb/hr = 21.748
LB PARTICULATE PER 1000 LB GAS = 0.170
PERCENT OF ISOKINETIC SAMPLING = 97.86

NORTHEAST ASPHALT
SHANAD

FORMALDEHYDE

10/1/90

SAMPLE ID	SAMPLE LIQ VOL	LIQ ALIQ	CHR ACID VOL	RDG	RDG LESS BLANK	µg/ALIQ	µg/SAMPLE
		ml					
ARKAN	27.9	3.0	1.0	CLOUDY, NO COLOR		<1	<9
S1	38.1	3.0		.782	.764	~9.1	
		1.0		.286	.268	3.35	(128)
S2A	25.0	3.0		1.5+			
		1.0		.534	.516	6.38	160
S2B+C	30.8	3.0		.103	.085	1.05	11
							(171)
S3A	28.0	3.0		1.077			
		1.0		.400	.382	4.76	133
S3B+C	15.7	3.0		0.078	.060	0.74	4
							(137)
FLD BLK	—	3.0		.018	—		
STD							
0 µg 3 MO	—	3.0		.018	—		
1	—	3.0		.099	.081		
3	—	3.0		.260	.242		
5	—	3.0		.416	.398		
8	—	3.0	✓	.666	.648		

NAME OF SOURCE: PAYNE & DOLAN #54

LOCATION OF SOURCE: SHAWANO

PROCESS TESTED:

DATE OF TEST: 102690

RUN NUMBER: 1

N NUMBER OF SAMPLING POINTS= 15

VM DGM VOL,METER COND DRY= 38.627 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 228 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 4.4 %

%O2 % OXYGEN BY VOL,DRY BASIS= 14.6 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 81 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.1 IN HG

AS AREA OF THE SAMPLING SITE= 11.516 SQ FEET

MT TOTAL DRY PARTICULATE= .2639 GM

T TOTAL SAMPLING TIME= 60 MIN

AN AREA OF THE NOZZLE= .000314 SQ FEET

PAYNE & DOLAN #54,,RUN: 1

PARTICULATE FIELD DATA

SAMPLING POINT NUMBER	STACK TEMP DEG F	VELOCITY PRESS IN H2O	SQ ROOT VEL PRESS	ORIFICE METER PRESS DROP IN H2O	DRY GAS METER TEMP DEG F INLET	DRY GAS METER TEMP DEG F OUTLET
1	325.0	1.000	1.00000	1.600	68.0	68.0
2	325.0	0.940	0.96954	1.500	68.0	68.0
3	325.0	0.900	0.94868	1.450	68.0	68.0
4	325.0	0.900	0.94868	1.450	68.0	68.0
5	320.0	0.760	0.87178	1.250	68.0	68.0
6	325.0	0.900	0.94868	1.450	68.0	68.0
7	325.0	0.860	0.92736	1.400	68.0	68.0
8	325.0	0.860	0.92736	1.400	68.0	68.0
9	325.0	0.860	0.92736	1.400	68.0	68.0
10	320.0	0.760	0.87178	1.250	68.0	68.0
11	320.0	0.920	0.95917	1.500	68.0	68.0
12	320.0	0.840	0.91652	1.300	68.0	68.0
13	315.0	0.800	0.89443	1.280	68.0	68.0
14	315.0	0.800	0.89443	1.280	68.0	68.0
15	310.0	0.640	0.80000	1.000	68.0	68.0
AVERAGE	TS=		SR(VP)=	OP=	TM=	
VALUES	781.3334 DEG R		.9203845	1.367333 IN H2O	528 DEG R	

PAYNE & DOLAN #54,,RUN: 1

CALCULATED RESULTS

TS STACK TEMPERATURE = 321.3334 DEG F

VMSTD DGM VOL,STD COND DRY= 38.08546 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 10.73196 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 21.98387 %

MD MOLE FRACTION OF DRY GAS= .7801613

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.288 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.80646 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 66.93535 FPS

QACT ACTUAL STACK GAS FLOW RATE= 46249.65 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 23714.93 SCFMD

%EA AVE % EXCESS AIR= 215.2123 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 21.33772 LB/HR

PMRC AVE PMR BY CONC METHOD= 21.73651 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 21.53711 LB/HR

C EMISSION CONC,STD COND DRY= .1069168 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 108078.4 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= .199273 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 126795.6 LB/HR

LB/MLB EMISSION CONC,STD COND WET= .1698569 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 98.16536 %

NAME OF SOURCE: PAYNE & DOLAN #54

LOCATION OF SOURCE: SHAWANO

PROCESS TESTED:

DATE OF TEST: 102690

RUN NUMBER: 2

N NUMBER OF SAMPLING POINTS= 15

VM DGM VOL,METER COND DRY= 37.624 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 259 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 4.5 %

%O2 % OXYGEN BY VOL,DRY BASIS= 14.5 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 81 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.1 IN HG

AS AREA OF THE SAMPLING SITE= 11.516 SQ FEET

MT TOTAL DRY PARTICULATE= .2723 GM

T TOTAL SAMPLING TIME= 60 MIN

AN AREA OF THE NOZZLE= .000314 SQ FEET

PAYNE & DOLAN #54,,RUN: 2

PARTICULATE FIELD DATA

SAMPLING POINT NUMBER	STACK TEMP DEG F	VELOCITY PRESS IN H2O	SQ ROOT VEL PRESS	ORIFICE METER PRESS DROP IN H2O	DRY GAS METER TEMP DEG F INLET	DRY GAS METER TEMP DEG F OUTLET
1	310.0	0.960	0.97980	1.520	68.0	68.0
2	310.0	0.860	0.92736	1.360	68.0	68.0
3	310.0	0.860	0.92736	1.360	68.0	68.0
4	310.0	0.800	0.89443	1.280	68.0	68.0
5	310.0	0.660	0.81240	1.060	68.0	68.0
6	310.0	0.860	0.92736	1.360	68.0	68.0
7	310.0	0.900	0.94868	1.450	68.0	68.0
8	310.0	0.900	0.94868	1.450	68.0	68.0
9	310.0	0.820	0.90554	1.300	68.0	68.0
10	305.0	0.760	0.87178	1.220	68.0	68.0
11	310.0	1.040	1.01980	1.650	68.0	68.0
12	310.0	0.900	0.94868	1.450	68.0	68.0
13	310.0	0.860	0.92736	1.360	68.0	68.0
14	310.0	0.820	0.90554	1.300	68.0	68.0
15	305.0	0.760	0.87178	1.220	68.0	68.0
AVERAGE	TS=		SR(VP)=	OP=	TM=	
VALUES	769.3334 DEG R		.9211042	1.356 IN H2O	528 DEG R	

PAYNE & DOLAN #54,,RUN: 2

CALCULATED RESULTS

TS STACK TEMPERATURE = 309.3334 DEG F

VMSTD DGM VOL,STD COND DRY= 37.09549 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 12.19113 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 24.73517 %

MD MOLE FRACTION OF DRY GAS= .7526482

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.3 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.50492 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 66.84832 FPS

QACT ACTUAL STACK GAS FLOW RATE= 46189.52 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 23205.25 SCFMD

%EA AVE % EXCESS AIR= 210.6333 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 22.0169 LB/HR

PMRC AVE PMR BY CONC METHOD= 22.53204 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 22.27447 LB/HR

C EMISSION CONC,STD COND DRY= .1132642 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 105798.9 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= .2105359 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 127159.3 LB/HR

LB/MLB EMISSION CONC,STD COND WET= .1751698 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 97.71375 %

NAME OF SOURCE: PAYNE & DOLAN #54

LOCATION OF SOURCE: SHAWANO

PROCESS TESTED:

DATE OF TEST: 102690

RUN NUMBER: 3

N NUMBER OF SAMPLING POINTS= 15

VM DGM VOL,METER COND DRY= 37.34 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 234 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 4.6 %

%O2 % OXYGEN BY VOL,DRY BASIS= 14.4 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 81 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.1 IN HG

AS AREA OF THE SAMPLING SITE= 11.516 SQ FEET

MT TOTAL DRY PARTICULATE= .2662 GM

T TOTAL SAMPLING TIME= 60 MIN

AN AREA OF THE NOZZLE= .000314 SQ FEET

PAYNE & DOLAN #54,,RUN: 3

PARTICULATE FIELD DATA

SAMPLING POINT NUMBER	STACK TEMP DEG F	VELOCITY PRESS IN H2O	SQ ROOT VEL PRESS	ORIFICE METER PRESS DROP IN H2O	DRY GAS METER TEMP DEG F INLET	DRY GAS METER TEMP DEG F OUTLET
1	310.0	0.920	0.95917	1.470	68.0	68.0
2	315.0	0.860	0.92736	1.360	68.0	68.0
3	315.0	0.860	0.92736	1.360	68.0	68.0
4	310.0	0.860	0.92736	1.360	68.0	68.0
5	310.0	0.780	0.88318	1.250	68.0	68.0
6	310.0	1.060	1.02956	1.700	68.0	68.0
7	310.0	0.900	0.94868	1.450	68.0	68.0
8	310.0	0.860	0.92736	1.360	68.0	68.0
9	310.0	0.860	0.92736	1.360	68.0	68.0
10	305.0	0.760	0.87178	1.220	68.0	68.0
11	310.0	0.920	0.95917	1.470	68.0	68.0
12	310.0	0.860	0.92736	1.360	68.0	68.0
13	310.0	0.820	0.90554	1.300	68.0	68.0
14	305.0	0.800	0.89443	1.280	68.0	68.0
15	305.0	0.660	0.81240	1.060	68.0	68.0
AVERAGE	TS=		SR(VP)=	OP=	TM=	
VALUES	769.6666 DEG R		.9218716	1.357333 IN H2O	528 DEG R	

PAYNE & DOLAN #54,,RUN: 3

CALCULATED RESULTS

TS STACK TEMPERATURE = 309.6666 DEG F

VMSTD DGM VOL,STD COND DRY= 36.8156 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 11.01438 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 23.02819 %

MD MOLE FRACTION OF DRY GAS= .769718

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.312 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.70705 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 66.6648 FPS

QACT ACTUAL STACK GAS FLOW RATE= 46062.71 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 23656.13 SCFMD

%EA AVE % EXCESS AIR= 206.1855 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 21.52368 LB/HR

PMRC AVE PMR BY CONC METHOD= 22.626 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 22.07484 LB/HR

C EMISSION CONC,STD COND DRY= .1115686 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 107898.8 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= .2045884 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 127721.9 LB/HR

LB/MLB EMISSION CONC,STD COND WET= .1728352 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 95.12811 %

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 2-19-92

File Code: 4530

PRELIMINARY* STACK TEST REVIEW Received: 9/19/91

By: A. Suber Test Date: 8-20-91

Name of Source: Northeast Asphalt (#21) FID #: 999 014 170

Address: Stack #: N/A

City: Denmark, WI Process #: N/A

Permit #: 90-DAA-249 Date Issued: 2-20-91

Description of Source Tested: Rotary drum mix asphalt plant

Description of Control Equipment: Baghouse

Test Firm: ETE

Crew Chief & Phone#: Bill Dick (414) 734-2434

Pollutant Tested: Part. Test Method: 17

Pollutant Tested: HCHO Test Method: NIOSH 3500

Pollutant Tested: OP Test Method: Method 9

Test Production Level: 300 TPH (55% virgin + 45% recycle)

Rated Production Level:

Discussion of Results:

Poll. Test Ave. - 0.007 Gr Part/DSCF Limit - 0.039 gr/dscf
In Compliance? (Y) N

Poll. Test Ave. - 0.231 LbHCOH/Hr Limit - .029 #/hr
In Compliance? Y (N)

Poll. Test Ave. - 15.4% OP Limit - 20%
In Compliance? Y N

Poll. Test Ave. - Limit -
In Compliance? Y N

Is This a Valid Test? (Y) N If answer is no see page 2.

* Test may be reviewed in depth later, if necessary.

cc Joe Perez-AM/10
US EPA Region V
[illegible] - SED

No Process Description.
No Plant Production Capacity.
Partic. Test Method 17

PARTICULATE CHECKLIST

Name of Source: Northwest Asphalt (#21) Test Date: 8-20-91

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES__ NO ✓
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

✓ Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 $Lb/10^6$ BTU = (Lb/Hr)/(10^6 BTU/Hr

Eq. 9 $Lb/10^6$ BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

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8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or $Lb/10^6$ BTU, solve Eq. 1-9. Do your results match the consultant's? YES__ NO ✓
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES__ NO ✓
   If no, write in the correct average.

10. Is the average result in compliance? YES ✓ NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES ✓ NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

GASEOUS TEST CHECKLIST

Name of Source: [illegible] Gas Tested: H2S Test Date: 9-26-91

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ Moisture\ as\ Decimal)$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-Stack\ O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/Stack\ CO_2$

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2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*Molecular\ Weight\ of\ Gas/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*Molecular\ Weight\ of\ Gas$

Eq. 6 $Lb/DSCF = 6.243*10^{-8}*(mg/DSCM)$

Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$ Eq. 8 $Lb/10^6\ BTU = (Lb/Hr)*(10^6\ BTU/Hr)$

Eq. 9 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-Stack\ O_2)$

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3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-9. Eq. 1-3 may also be needed. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 10 $\%\ Capture\ Eff. = \frac{(Lb\ VOC/Hr\ to\ Control\ Equip.)*100}{(Lb\ VOC/Hr\ Input\ to\ Process)}$

Eq. 11 $\%\ Destruction\ Eff. = \frac{(Inlet\ Lb\ VOC/Hr - Outlet\ Lb\ VOC/Hr)*100}{(Inlet\ Lb\ VOC/Hr)}$

Eq. 12 $\%\ Overall\ Eff. = (\%\ Cap.\ Eff./100)*(\%\ Dest.\ Eff./100)*100$

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4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-12. Eq. 1-8 may also be needed. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

6. Is the average result in compliance? YES__ NO ✓
   If no, the District should issue an NOV.

7. Was the source operating at a level representative of full capacity? YES ✓ NO__
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On August 20, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Northeast Asphalt, Inc. Control 21 asphalt plant located in Denmark, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 .039 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.006 gr/dscf	15 %
2	0.005	12
3	0.008	20
AVG	0.006 gr/dscf .007	15 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.266 lb/hr	0.0009 lb/ton
2	0.294	0.0010
3	0.283	0.0009
AVG	0.281 lb/hr	0.0009 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All six minute average readings were well below the permit limit of 20 %. The following table summarizes the highest six minute average for each test:

Test	6 Minute Avg Opacity
1	0.4
2	15.4
3	12.1

NORTHEAST ASPHALT CONTROL 21 TEST 1 TABLE 2-1 8-20-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2450
STACK AREA, sq ft = 13.722
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 38.45
WATER COLLECTED, ml = 287.00
PARTICULATE COLLECTED, grams = 0.0159
CO2 = 7.20 O2 = 11.80 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	280	1.100	1.85	80	74.03
2	280	0.950	1.60	80	68.79
3	280	0.850	1.45	80	65.07
4	280	1.050	1.75	80	72.32
5	280	1.000	1.70	82	70.58
6	280	0.550	0.92	84	52.34
7	285	0.550	0.92	86	52.52
8	285	0.700	1.20	88	59.25
9	285	1.000	1.70	88	70.82
10	285	0.550	0.92	90	52.52
11	285	0.550	0.92	90	52.52
12	285	0.750	1.30	92	61.33
13	285	0.950	1.60	94	69.03
14	285	0.650	1.10	94	57.10
15	285	0.800	1.35	96	63.34
16	285	0.800	1.35	98	63.34
17	285	0.950	1.60	100	69.03
18	285	0.900	1.50	102	67.18
19	285	0.800	1.35	104	63.34
20	285	0.700	1.15	106	59.25
AVG VALUES	284		1.362	91	63.19

TOTAL GAS WITHDRAWN, scf = 51.59
DRY GAS WITHDRAWN, scf = 38.08
WATER VAPOR WITHDRAWN, scf = 13.51
PERCENT WATER VAPOR = 26.19
ACTUAL WET FLOW RATE, acfm = 52,021.95
STANDARD DRY FLOW RATE, scfm = 26,775.62
, m3/hr = 45,497.13
PARTICULATE CONCENTRATION, grains/dscf = 0.006
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.010
PARTICULATE EMISSION RATE, lb/hr = 1.47
PERCENT OF ISOKINETIC SAMPLING = 99.37

NORTHEAST ASPHALT CONTROL 21 TEST 2 TABLE 2-2 8-20-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2450
STACK AREA, sq ft = 13.722
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 37.10
WATER COLLECTED, ml = 307.00
PARTICULATE COLLECTED, grams = 0.0126
CO2 = 7.00 O2 = 12.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	280	0.900	1.50	108	67.28
2	280	0.900	1.50	108	67.28
3	280	0.750	1.30	108	61.42
4	280	0.750	1.30	108	61.42
5	280	0.950	1.60	108	69.12
6	280	0.650	1.10	108	57.17
7	280	0.700	1.20	108	59.33
8	280	0.800	1.35	108	63.43
9	280	0.950	1.60	108	69.12
10	280	0.550	0.92	108	52.59
11	280	0.550	0.92	110	52.59
12	280	0.750	1.30	110	61.42
13	280	1.000	1.70	110	70.92
14	280	0.550	0.92	110	52.59
15	280	0.550	0.92	110	52.59
16	280	0.700	1.20	112	59.33
17	285	1.100	1.85	112	74.63
18	285	0.850	1.45	114	65.60
19	285	0.800	1.35	114	63.64
20	285	1.050	1.75	116	72.91
AVG VALUES	281		1.337	110	62.72

TOTAL GAS WITHDRAWN, scf = 51.28
DRY GAS WITHDRAWN, scf = 36.83
WATER VAPOR WITHDRAWN, scf = 14.45
PERCENT WATER VAPOR = 28.18
ACTUAL WET FLOW RATE, acfm = 51,638.42
STANDARD DRY FLOW RATE, scfm = 25,946.72
, m3/hr = 44,088.67
PARTICULATE CONCENTRATION, grains/dscf = 0.005
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.008
PARTICULATE EMISSION RATE, lb/hr = 1.17
PERCENT OF ISOKINETIC SAMPLING = 99.16

NORTHEAST ASPHALT CONTROL 21 TEST 3 TABLE 2-3 8-20-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2450
STACK AREA, sq ft = 13.722
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 37.21
WATER COLLECTED, ml = 308.00
PARTICULATE COLLECTED, grams = 0.0190
CO2 = 7.00 O2 = 12.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	280	1.050	1.75	100	72.67
2	280	0.900	1.50	100	67.28
3	280	0.900	1.50	100	67.28
4	280	1.000	1.70	100	70.92
5	280	0.950	1.60	100	69.12
6	280	0.550	0.92	102	52.59
7	280	0.550	0.92	104	52.59
8	280	0.700	1.20	106	59.33
9	280	0.950	1.60	108	69.12
10	280	0.600	1.00	108	54.93
11	280	0.650	1.10	108	57.18
12	280	0.700	1.20	110	59.33
13	280	0.900	1.50	110	67.28
14	280	0.700	1.20	110	59.33
15	280	0.750	1.30	110	61.42
16	280	0.750	1.30	110	61.42
17	280	1.000	1.70	112	70.92
18	280	0.900	1.50	112	67.28
19	280	0.800	1.35	114	63.43
20	280	0.700	1.20	114	59.33
AVG VALUES	280		1.352	107	63.14

TOTAL GAS WITHDRAWN, scf = 51.42
DRY GAS WITHDRAWN, scf = 36.92
WATER VAPOR WITHDRAWN, scf = 14.50
PERCENT WATER VAPOR = 28.19
ACTUAL WET FLOW RATE, acfm = 51,983.48
STANDARD DRY FLOW RATE, scfm = 26,150.90
, m3/hr = 44,435.61
PARTICULATE CONCENTRATION, grains/dscf = 0.008
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.012
PARTICULATE EMISSION RATE, lb/hr = 1.77
PERCENT OF ISOKINETIC SAMPLING = 98.65

FORMALDEHYDE CALCULATIONS
NORTHEAST ASPHALT
CONTROL 21 - DENMARK 300 TPH

$P_b = 29.25$
$\gamma = 1.020$

TEST 1 $V_m = 2.00$ $T_m = 89$ F

$V_{m\,std} = 1.020 \times 2.00 \times \frac{528}{549} \times \frac{29.35}{29.92}$

$= 1.92$ SCF $= .055\ m^3$

$C = \frac{146\ mg}{.055\ m^3} = 2.65\ mg/m^3$

ER: 0.266 #/hr.

$= 0.00089$ #/tm

TEST 2 $V_m = 2.00$ $T_m = 103$ F

$V_{m\,std} = 1.88$ SCF $= .053\ m^3$

$C = \frac{160\ mg}{.053} = 3.02\ mg/m^3$

ER: 0.294 #/hr.

$= 0.00098$ #/tm

TEST 3 $V_m = 2.00$ $T_m = 101$ F

$V_{m\,std} = 1.88$ SCF $= .053\ m^3$

$C = \frac{153\ mg}{.053} = 2.89\ mg/m^3$

ER: 0.283 #/hr.

$= 0.00094$ #/tm

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 7/31/91

File Code: 4530

Received 6/14/91

PRELIMINARY STACK TEST REVIEW

By: Marty Burkholder Test Date: 5/14/91

Name of Source: Payne & Dolan #6 FID #: 113015430

Address: 5338 Norway Grove School Rd.

City: DeForest, WI 53532 Permit #: 113015430-V01

Description of Source Tested: 300 T/Hr Stansteel batch asphalt plant. Emissions from drum dryer only were tested. (Plant has capacity to process recycle using a pugmill controlled by a wet scrubber. This process was not tested).

Description of Control Equipment: Baghouse

Test Firm: Env. Tech. & Eng. Corp.

Crew Chief & Phone#: ~~[illegible]~~ Bill Dick 414/784-2434

Pollutant Tested: Particulates Test Method: EPA Method 17

Pollutant Tested: Formaldehyde Test Method: NIOSH Method 3500

Pollutant Tested: Test Method:

Note: Formaldehyde testing not for compliance determination. Required by permit.

Test Production Level: 240 T/Hr.

Rated Production Level: 300 T/Hr.

Discussion of Results:

___ The stack test is invalid and will have to be redone because

---

The test average result of 0.023 gr/dscf is X is not ___

in compliance with the emission limit of 0.04 gr./dscf.

Formaldehyde Results

Test	LB/HR	LB/TON
1	2.34	0.011
2	1.76	0.008
3	2.17	0.010
Ave.	2.09	0.010

CC Joe Perez-AM/3
U.S. EPA Region V

Partic. Test Method 17?
No Process Description.
Everything Else OK

PARTICULATE CHECKLIST

Name of Source: Payne & Dolan #6 Test Date: 5/14/91

1. Are the isokinetics per run between 90 and 110%? YES X NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES X NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES X NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES X NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES X NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES X NO__
   If an incorrect total is found, call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES__ NO X
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Lb/DSCF = (Gr/DSCF)/7000

Eq. 3 Lb/Hr = 60*DSCFM*(Lb/DSCF)

Eq. 4 Lb/10^6 BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/Hr, or Lb/10^6 BTU, solve Eq. 1-4. Do your results match the consultant's? YES X NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES X NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES X NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES X NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On May 14, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. Control 6 batch mix asphalt plant located in DeForest, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.022 gr/dscf	55 %
2	0.024	60
3	0.023	58
AVG	0.023 gr/dscf	58 %

The opacity of the stack was also observed by a certified observer throughout a three (3) hour test period. All individual readings were either 0 % or 5 % which is well below the permit limit of 20 %.

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	2.34 lb/hr	0.011 lb/ton
2	1.76	0.008
3	2.17	0.010
AVG	2.09 lb/hr	0.010 lb/ton

PAYNE & DOLAN CONTROL 6 TEST 1 TABLE 2-1 5-14-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2420
STACK AREA, sq ft = 19.635
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 42.87
WATER COLLECTED, ml = 179.00
PARTICULATE COLLECTED, grams = 0.0604
CO2 = 3.60 O2 = 15.00 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	240	1.800	3.60	84	90.82
2	240	1.900	2.80	86	93.30
3	240	1.800	3.60	86	90.82
4	240	1.600	3.20	88	85.62
5	240	1.300	2.60	88	77.18
6	240	1.000	2.00	90	67.69
7	240	0.500	1.00	90	47.86
8	240	0.600	1.20	92	52.43
9	240	0.500	1.00	94	47.86
10	240	0.500	1.00	96	47.86
11	240	0.500	1.00	98	47.86
12	240	0.200	0.40	98	30.27
13	240	0.800	1.60	100	60.54
14	240	0.700	1.40	102	56.63
15	240	0.500	1.00	104	47.86
16	240	0.600	1.20	104	52.43
17	240	0.800	1.60	106	60.54
18	240	0.700	1.40	106	56.63
19	240	0.800	1.60	108	60.54
20	240	0.900	1.80	110	64.22
21	240	0.900	1.80	110	64.22
22	240	1.100	2.20	112	70.99
23	240	1.100	2.20	112	70.99
24	240	1.000	2.00	114	67.69
AVG VALUES	240		1.800	99	63.04

TOTAL GAS WITHDRAWN, scf = 51.23
DRY GAS WITHDRAWN, scf = 42.80
WATER VAPOR WITHDRAWN, scf = 8.43
PERCENT WATER VAPOR = 16.45
ACTUAL WET FLOW RATE, acfm = 74,263.60
STANDARD DRY FLOW RATE, scfm = 45,931.73
, m3/hr = 78,047.19
PARTICULATE CONCENTRATION, grains/dscf = 0.022
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.036
PARTICULATE EMISSION RATE, lb/hr = 8.38
PERCENT OF ISOKINETIC SAMPLING = 95.48

PAYNE & DOLAN CONTROL 6 TEST 2 TABLE 2-2 5-14-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2420
STACK AREA, sq ft = 19.635
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 41.96
WATER COLLECTED, ml = 198.00
PARTICULATE COLLECTED, grams = 0.0663
CO2 = 4.00 O2 = 14.60 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	260	1.400	2.80	118	81.46
2	260	1.400	2.80	116	81.46
3	260	1.100	2.20	116	72.21
4	265	1.000	2.00	116	69.09
5	265	1.000	2.00	116	69.09
6	265	1.000	2.00	116	69.09
7	265	0.600	1.20	118	53.51
8	265	0.800	1.60	118	61.79
9	265	0.700	1.40	118	57.80
10	265	0.800	1.60	120	61.79
11	265	0.800	1.60	120	61.79
12	265	0.600	1.20	122	53.51
13	270	0.600	1.20	122	53.70
14	270	0.600	1.20	124	53.70
15	270	0.600	1.20	124	53.70
16	270	0.700	1.40	124	58.00
17	270	0.700	1.40	124	58.00
18	270	0.600	1.20	124	53.70
19	270	0.900	1.80	124	65.77
20	265	1.000	2.00	126	69.09
21	265	1.200	2.40	126	75.68
22	265	1.200	2.40	126	75.68
23	265	1.000	2.00	128	69.09
24	265	0.500	1.00	128	48.85
AVG VALUES	266		1.733	121	63.65

TOTAL GAS WITHDRAWN, scf = 51.32
DRY GAS WITHDRAWN, scf = 42.00
WATER VAPOR WITHDRAWN, scf = 9.32
PERCENT WATER VAPOR = 18.16
ACTUAL WET FLOW RATE, acfm = 74,984.33
STANDARD DRY FLOW RATE, scfm = 43,803.84
, m3/hr = 74,431.48
PARTICULATE CONCENTRATION, grains/dscf = 0.024
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.040
PARTICULATE EMISSION RATE, lb/hr = 9.07
PERCENT OF ISOKINETIC SAMPLING = 98.24

AYNE & DOLAN CONTROL 6 TEST 3 TABLE 2-3 5-14-91

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2420
STACK AREA, sq ft = 19.635
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 42.26
WATER COLLECTED, ml = 188.00
PARTICULATE COLLECTED, grams = 0.0619
CO2 = 3.60 O2 = 15.00 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	240	1.600	3.20	126	85.77
2	240	1.800	3.60	126	90.98
3	240	1.700	2.40	126	88.41
4	240	1.700	3.40	126	88.41
5	240	1.600	3.20	126	85.77
6	245	1.400	2.80	126	80.52
7	245	0.700	1.40	126	56.94
8	245	0.600	1.20	128	52.71
9	245	0.500	1.00	128	48.12
10	250	0.500	1.00	128	48.29
11	250	0.400	0.80	130	43.19
12	250	0.400	0.80	130	43.19
13	245	0.800	1.60	130	60.87
14	240	0.900	1.80	130	64.33
15	240	0.800	1.60	130	60.65
16	240	0.700	1.40	130	56.73
17	240	0.600	1.20	130	52.53
18	240	0.600	1.20	130	52.53
19	240	0.800	1.60	130	60.65
20	240	1.000	2.00	130	67.81
21	240	1.100	2.20	130	71.12
22	240	1.200	2.40	130	74.28
23	240	1.200	2.40	130	74.28
24	240	0.900	1.80	130	64.33
AVG VALUES	242		1.917	129	65.52

TOTAL GAS WITHDRAWN, scf = 51.20
DRY GAS WITHDRAWN, scf = 42.35
WATER VAPOR WITHDRAWN, scf = 8.85
PERCENT WATER VAPOR = 17.28
ACTUAL WET FLOW RATE, acfm = 77,187.23
STANDARD DRY FLOW RATE, scfm = 47,102.44
, m3/hr = 80,036.46
PARTICULATE CONCENTRATION, grains/dscf = 0.023
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.036
PARTICULATE EMISSION RATE, lb/hr = 8.75
PERCENT OF ISOKINETIC SAMPLING = 92.13

PAYNE & DOLAN
CONTROL 6 - DEFOREST
FORMALDEHYDE CALCULATIONS

TEST 1 $Y_M = 2.50$ $\gamma = 1.020$
220 TPH $T_M = 94°F$

$$V_{M\,std} = 2.00 * 1.020 * \frac{29.4}{29.92} * \frac{508}{554} = 2.39\ scf = .068\ m^3$$

$$C = \frac{0.926\ mg}{.068\ m^3} = 13.6\ mg/m^3$$

$$ER = 2.34\ lb/hr. = .011\ lb/ton$$

TEST 2 $Y_M = 2.50$
220 TPH $T_M = 98F$

$$V_{M\,std} = 2.37\ scf = .067\ m^3$$
$$C = \frac{0.720}{.067} = 10.7\ mg/m^3$$
$$ER = 1.76\ lb/hr = .0081\ lb/ton$$

TEST 3 $Y_M = 2.02$
220 TPH $T_M = 98\ F$

$$V_{M\,std} = 1.91\ scf = .054\ m^3$$

$$C = \frac{.662}{.054} = 12.3\ mg/m^3$$

$$ER = 2.17\ lb/hr. = .010\ lb/ton$$

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 12/09/91

File Code: 4530

Received 12/12/91

PRELIMINARY STACK TEST REVIEW

By: Marty Barkholder Test Date: 10/11/91

Name of Source: Bayne & Salm #5 FID #: 113015980

Address: McKee Rd.

City: Verona Permit #: 90-RV-148

Description of Source Tested: Gencor counterflow drum mix asphalt plant - 400 TPH

Description of Control Equipment: Baghouse

Test Firm: Env. Tech + Eng.

Crew Chief & Phone#: Bill Dick 414/784-2434

Pollutant Tested: Particulates Test Method: EPA Method 5

Pollutant Tested: Formaldehyde Test Method: NIOSH 3500

Pollutant Tested: Test Method:

Test Production Level: 230 TPH

Rated Production Level: 400 TPH

Discussion of Results:

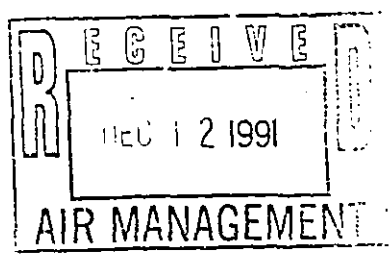
____ The stack test is invalid and will have to be redone because

---

The test average result of 0.019 gr/dscf is X is not ____ in compliance with the emission limit of 0.04 gr/dscf.

Formaldehyde ave. = 1.29 lb/hr. NR445 limit = 250 lb/yr.

cc: Joe Perez-AM/3
US EPA Region V



No Process Description
Everything else ok

10

PARTICULATE CHECKLIST

Name of Source: RA B # 5 Test Date: 10/11/11

1. Are the isokinetics per run between 90 and 110%? YES X NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES X NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES X NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES X NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES X NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES X NO__
   If an incorrect total is found, call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES__ NO X
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5. NSPS Source

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Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Lb/DSCF = (Gr/DSCF)/7000

Eq. 3 Lb/Hr = 60*DSCFM*(Lb/DSCF)

Eq. 4 Lb/10^6 BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/Hr, or Lb/10^6 BTU, solve Eq. 1-4. Do your results match the consultant's? YES X NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES X NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES X NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES__ NO X
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted. Was operating at 70% of capacity because of wet conditions. Will not be capped.

SUMMARY

On October 11, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. Control no. 5 asphalt plant located in Verona, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.022 gr/dscf	55 %
2	0.017	42
3	0.017	42
AVG	0.019 gr/dscf	47 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	1.38 lb/hr	0.0049 lb/ton
2	1.30	0.0046
3	1.19	0.0042
AVG	1.29 lb/hr	0.0046 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All individual readings were either 0 % and thus the six minute average opacities were all well below the permit limit of 20 %.

PAYNE & DOLAN CONTROL # 5 TEST 1 10-11-91 TABLE 2-1

BAROMETRIC PRESSURE, in Hg = 29.050
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.904
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 35.90
WATER COLLECTED, ml = 351.00
PARTICULATE COLLECTED, grams = 0.0504
CO2 = 6.50 O2 = 11.50 CO = 0.00 N2 = 82.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.800	1.35	65	64.20
2	275	0.820	1.40	66	65.00
3	280	0.840	1.45	66	66.01
4	280	0.980	1.70	67	71.30
5	280	0.760	1.30	68	62.79
6	275	0.580	1.00	69	54.67
7	270	0.540	0.93	70	52.57
8	270	0.440	0.76	71	47.45
9	270	0.440	0.76	72	47.45
10	275	0.340	0.59	73	41.85
11	275	0.800	1.40	78	64.20
12	275	0.800	1.40	79	64.20
13	275	0.800	1.40	80	64.20
14	270	0.720	1.22	80	60.70
15	270	0.700	1.20	81	59.85
16	270	0.660	1.15	82	58.11
17	275	0.600	1.05	82	55.60
18	270	0.580	1.00	84	54.48
19	275	0.540	0.93	86	52.75
20	270	0.500	0.86	88	50.58
AVG VALUES	274		1.143	75	57.90

TOTAL GAS WITHDRAWN, scf = 51.85
DRY GAS WITHDRAWN, scf = 35.33
WATER VAPOR WITHDRAWN, scf = 16.52
PERCENT WATER VAPOR = 31.86
ACTUAL WET FLOW RATE, acfm = 55,248.28
STANDARD DRY FLOW RATE, scfm = 26,284.01
, m3/hr = 44,661.80
PARTICULATE CONCENTRATION, grains/dscf = 0.022
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.033
PARTICULATE EMISSION RATE, lb/hr = 5.07
PERCENT OF ISOKINETIC SAMPLING = 104.53

PAYNE & DOLAN CONTROL # 5 TEST 2 10-11-91 TABLE 2-2

BAROMETRIC PRESSURE, in Hg = 29.050
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.904
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 35.83
WATER COLLECTED, ml = 340.00
PARTICULATE COLLECTED, grams = 0.0395
CO2 = 7.00 O2 = 10.50 CO = 0.00 N2 = 82.50

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.840	1.48	90	65.65
2	270	0.840	1.48	91	65.42
3	275	0.760	1.35	91	62.44
4	275	0.800	1.40	91	64.07
5	270	0.780	1.38	92	63.04
6	270	0.560	1.00	93	53.42
7	270	0.560	1.00	94	53.42
8	270	0.440	0.78	94	47.35
9	275	0.540	0.95	95	52.64
10	270	0.500	0.90	95	50.48
11	275	0.840	1.48	97	65.65
12	270	0.800	1.40	97	63.85
13	270	0.800	1.40	97	63.85
14	275	0.740	1.30	97	61.62
15	280	0.700	1.22	98	60.13
16	280	0.640	1.12	99	57.50
17	275	0.600	1.05	99	55.48
18	275	0.620	1.10	99	56.40
19	270	0.660	1.15	99	57.99
20	270	0.620	1.10	99	56.21
AVG VALUES	273		1.202	95	58.83

TOTAL GAS WITHDRAWN, scf = 51.35
DRY GAS WITHDRAWN, scf = 35.35
WATER VAPOR WITHDRAWN, scf = 16.00
PERCENT WATER VAPOR = 31.16
ACTUAL WET FLOW RATE, acfm = 56,137.34
STANDARD DRY FLOW RATE, scfm = 27,008.76
, m3/hr = 45,893.29
PARTICULATE CONCENTRATION, grains/dscf = 0.017
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.025
PARTICULATE EMISSION RATE, lb/hr = 4.03
PERCENT OF ISOKINETIC SAMPLING = 101.79

PAYNE & DOLAN CONTROL # 5 TEST 3 10-11-91 TABLE 2-3

BAROMETRIC PRESSURE, in Hg = 29.050
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.904
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 36.25
WATER COLLECTED, ml = 357.00
PARTICULATE COLLECTED, grams = 0.0385
CO2 = 6.80 O2 = 10.80 CO = 0.00 N2 = 82.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.860	1.50	100	66.56
2	270	0.860	1.50	100	66.33
3	275	0.820	1.45	99	64.99
4	275	0.820	1.45	99	64.99
5	270	0.760	1.35	98	62.36
6	270	0.580	1.02	98	54.48
7	275	0.540	0.96	98	52.74
8	275	0.540	0.96	98	52.74
9	270	0.500	0.88	98	50.58
10	270	0.500	0.88	98	50.58
11	275	0.800	1.40	98	64.20
12	275	0.820	1.45	98	64.99
13	270	0.820	1.45	98	64.77
14	275	0.820	1.45	98	64.99
15	280	0.760	1.35	98	62.78
16	275	0.660	1.15	98	58.31
17	275	0.640	1.12	98	57.42
18	270	0.640	1.12	98	57.22
19	270	0.640	1.12	98	57.22
20	270	0.600	1.05	98	55.41
AVG VALUES	273		1.231	98	59.68

TOTAL GAS WITHDRAWN, scf = 52.58
DRY GAS WITHDRAWN, scf = 35.78
WATER VAPOR WITHDRAWN, scf = 16.80
PERCENT WATER VAPOR = 31.96
ACTUAL WET FLOW RATE, acfm = 56,953.14
STANDARD DRY FLOW RATE, scfm = 27,085.59
, m3/hr = 46,023.83
PARTICULATE CONCENTRATION, grains/dscf = 0.017
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.024
PARTICULATE EMISSION RATE, lb/hr = 3.91
PERCENT OF ISOKINETIC SAMPLING = 102.73

PAYNE & DAN — CONTROL NO. 5

FORMALDEHYDE CALCULATIONS — 10-11-91

TEST 1 — $V_M = 2.00\ ft^3$ $T_m = 64°F$ $P_b = 29.05$ $\gamma = 1.029$

780 TPH

$$V_{m\,std} = 2.00 \times 1.029 \times \frac{528}{524} \times \frac{29.05}{29.92}$$

$$= 2.01\ SCF = .057\ m^3$$

$$C = \frac{0.797\ mg}{.057\ m^3} = 14.0\ mg/m^3$$

$$ER = 1.38\ lb/hr.$$

$$= 0.0049\ lb/ton$$

TEST 2 — $V_M = 2.00$ $T_m = 63F$

780 TPH

$$V_{m\,std} = 2.01\ SCF = .057\ m^3$$

$$C = \frac{0.731\ mg}{.057} = 12.8\ mg/m^3$$

$$ER = 1.30\ lb/hr.$$

$$= 0.0046\ lb/ton$$

TEST 3 — $V_m = 2.02$ $T_m = 65$

880 TPH

$$V_{m\,std} = 2.03\ SCF = .057\ m^3$$

$$C = \frac{0.668\ mg}{.057\ m^3} = 11.7\ mg/m^3$$

$$ER = 1.19\ lb/hr.$$

$$= 0.0042\ lb/ton$$

1.0 GENERAL

On Friday, October 11, 1991, Environmental Technology and Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. Control no. 5 drum mix asphalt plant located in Verona, Wisconsin. The test was a provision of an Air Pollution Control Permit. The State of Wisconsin Department of Natural Resources (DNR) has established a particulate emission limit of 0.04 grains per dry standard cubic foot (gr/dscf). The purpose of this test was to demonstrate the compliance status of this plant with the particulate limits set by the DNR. In addition, the permit also required a test to determine the formaldehyde emissions and that opacity observations be performed by a certified reader.

The plant tested was a Gencor counterflow drum mix asphalt plant equipped with a baghouse for particulate control. During the test period, the plant production rate was approximately 280 tons per hour and the mix was composed of approximately 70 % virgin material and 30 % recycled material. The plant was fired with natural gas. John Romaker of Payne & Dolan was responsible for plant operation The field tests, corresponding laboratory analysis and report preparation were coordinated by Bill Dick of ETE Corp. The test procedures, plant operating conditions, and stack opacity were witnessed by Lynn Cutts and Marty Burkholder of the Wisconsin DNR Southern District Office.

The following sections of this report document the activities and results of the test program. The report presents all of the relevant data collected and discussions on the interpretation of the data are provided where appropriate. The report, therefore, includes much necessary detail. The results, however, have been summarized in the SUMMARY section at the beginning of this report for those readers not wishing to be burdened by the details.

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 3-12-92

File Code: 4530

PRELIMINARY STACK TEST REVIEW

Recei; Vi 12/26/91

By: Colin Duffy

Test Date: 11-14-91

Name of Source: Payne + Dolan Control FID #: 267009380

Address:

Stack #: S10

City: Cedar Lake

Process #: P30

Permit #: 267009380-N01

Date Issued: 12-28-90

Description of Source Tested: Asphalt Batch Plant

100% virgin material

Description of Control Equipment: Pulse Jet Baghouse

Test Firm: Environmental Technology + Engineering Corp.

Crew Chief & Phone#: Bill Dick

Pollutant Tested: Particulate Test Method: EPA Meth 17 + DNR Modified Meth

Pollutant Tested: Ar Test Method: EPA Method 17

Pollutant Tested: HCOH Opacity Test Method: NIOSH 3500 Method 9

Test Production Level: 98 Ton/Hr

Rated Production Level: 150 Ton/Hr

Discussion of Results:

Poll. Test Ave. = Part 1.27 lb/hr Limit = 3.0 lb/hr

In Compliance? Y (N)

Poll. Test Ave. = 0.0001 Lb Ar/Hr Limit = 0.0057 Lb/Hr

In Compliance? (Y) N

Poll. Test Ave. = 0.77 Lb HCOH/Hr Limit = 0.0285 Lb/Hr

In Compliance? Y (N)

Poll. Test Ave. = 15.0% Limit = 20% Opacity

In Compliance? (Y) N

Is This a Valid Test? (Y) N If answer is no, please indicate the reason.

* Test may be reviewed in depth later, if necessary.

CC Joe Perez-AM/10
US EPA Region V
Jim Chou-SED
Colin Duffy-AM/10

65% of capacity

Partic. Method 17?

Test for Arsenic.

No process description.

PARTICULATE CHECKLIST

Name of Source: Payne + Dolan Control 8 Test Date: 11-14-91

1. Are the isokinetics per run between 90 and 110%? YES X NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES X NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES X NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES X NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES X NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES X NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES X NO__
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 $Lb/10^6$ BTU = (Lb/Hr)/(10^6 BTU/Hr)

Eq. 9 $Lb/10^6$ BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

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8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or $Lb/10^6$ BTU, solve the needed Eq. Do your results match the consultant's? (within 4%) YES X NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES X NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES__ NO X
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES__ NO X
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

65% of Capacity

GASEOUS TEST CHECKLIST

Name of Source: Payne + Dolan 8 Gas Tested: HCHO Test Date: 11-14-91

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES X NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ \text{Moisture as Decimal})$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-\text{Stack } O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/\text{Stack } CO_2$

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2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? N/A YES__ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*\text{Molecular Weight of Gas}/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*\text{Molecular Weight of Gas}$

Eq. 6 $Lb/DSCF = 6.243*10^{-8}*(mg/DSCM)$

Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$ Eq. 8 $Lb/10^6\ BTU = (Lb/Hr)/(10^6\ BTU/Hr)$

Eq. 9 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-\text{Stack } O_2)$

---

3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-9. Eq. 1-3 may also be needed. Do your results match the consultant's? YES X NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 10 $\%\ \text{Capture Eff.} = \dfrac{(\text{Lb VOC/Hr to Control Equip.})*100}{(\text{Lb VOC/Hr Input to Process})}$

Eq. 11 $\%\ \text{Destruction Eff.} = \dfrac{(\text{Inlet Lb VOC/Hr} - \text{Outlet Lb VOC/Hr})*100}{(\text{Inlet Lb VOC/Hr})}$

Eq. 12 $\%\ \text{Overall Eff.} = (\%\ \text{Cap. Eff.}/100)*(\%\ \text{Dest. Eff.}/100)*100$

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4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-12. Eq. 1-8 may also be needed. Do your results match the consultant's? N/A YES__ NO__
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES X NO__
   If no, write in the correct average.

6. Is the average result in compliance? YES__ NO X
   If no, the District should issue an NOV.

7. Was the source operating at a level representative of full capacity? YES__ NO X
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted. 65% of Capacity

SUMMARY

On November 14, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. Control no. 8 asphalt plant located in Cedar Lake, Wisconsin. The average of the three particulate tests show the emissions to be above the limit of 3.0 pounds her hour as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Arsenic Emissions Lb/Hr	Part. Emissions	Lb/10³Lb dgs	% of Allowable	Iso Kinetic Ratio
1	.00004	23.06 lb/hr	.188	769 %	94
2	.00020	15.12	.124	504	93
3	.00005	16.63	.135	554	93
		-----		---	
AVG	0.00010	18.27 lb/hr	.149 Lb/10³Lb dgs	609 %	ave 93

Limit = 0.0057 Lb/Hr

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.96 lb/hr	0.0091 lb/ton
2	0.77	0.0063
3	0.57	0.0058
	-----	----
AVG	0.77 lb/hr	0.0077 lb/ton

HCOH Limit = 0.0285 Lb/Hr

The permit also required that opacity observations be performed concurrently with the particulate test. All the six minute average opacities were below the permit limit of 20 %. The following table summarizes the highest average opacity during each test:

Test	OPACITY
1	14.6 %
2	15.0
3	15.8

Permit Part. Limit is more restrictive of 3 Lb/Hr or 0.3 Lb/10³ Lb wet gas 3 Lb/Hr is more restrictive and applies.

PAYNE & DOLAN CONTROL 8 TEST 1 TABLE 2-1 11-14-91

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .2500
STACK AREA, sq ft = 9.000
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 51.48
WATER COLLECTED, ml = 223.00
PARTICULATE COLLECTED, grams = 0.3831
CO2 = 3.50 O2 = 15.00 CO = 0.00 N2 = 81.50

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	225	0.950	1.85	49	65.72
2	230	0.950	1.85	49	65.96
3	230	1.200	2.40	50	74.13
4	225	1.100	2.20	50	70.72
5	230	0.850	1.70	50	62.39
6	230	0.800	1.60	52	60.53
7	230	0.800	1.60	53	60.53
8	230	1.000	2.00	54	67.67
9	230	1.150	2.30	55	72.57
10	230	0.750	1.50	56	58.61
11	230	0.750	1.55	57	58.61
12	225	0.800	1.70	59	60.31
13	230	1.200	2.50	61	74.13
14	225	1.250	2.65	62	75.39
15	225	1.250	2.65	64	75.39
16	225	1.050	2.20	64	69.09
17	225	1.000	2.10	67	67.43
18	220	1.200	2.50	68	73.59
19	220	1.750	3.60	71	88.87
20	225	1.600	3.35	72	85.29
21	220	1.600	3.35	73	84.98
22	220	1.500	3.20	76	82.28
23	220	1.400	2.95	78	79.49
24	220	1.400	2.95	79	79.49
AVG VALUES	226		2.344	61	71.38

TOTAL GAS WITHDRAWN, scf = 61.31
DRY GAS WITHDRAWN, scf = 50.82
WATER VAPOR WITHDRAWN, scf = 10.50
PERCENT WATER VAPOR = 17.12
ACTUAL WET FLOW RATE, acfm = 38,546.19
STANDARD DRY FLOW RATE, scfm = 23,881.70
, m3/hr = 40,579.78
PARTICULATE CONCENTRATION, grains/dscf = 0.116
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.188
PARTICULATE EMISSION RATE, lb/hr = 23.06
PERCENT OF ISOKINETIC SAMPLING = 93.65

PAYNE & DOLAN CONTROL 8 TEST 2 TABLE 2-2 11-14-91

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .2500
STACK AREA, sq ft = 9.000
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 50.95
WATER COLLECTED, ml = 210.00
PARTICULATE COLLECTED, grams = 0.2498
CO2 = 3.20 O2 = 15.40 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	220	1.600	3.40	82	84.89
2	220	1.650	3.50	82	86.21
3	220	1.550	3.30	82	83.55
4	225	1.500	3.20	82	82.50
5	225	1.400	3.00	83	79.70
6	220	1.400	3.00	83	79.41
7	220	1.100	2.35	85	70.39
8	220	1.200	2.60	86	73.52
9	220	1.250	2.70	87	75.03
10	220	1.000	2.15	88	67.11
11	220	1.000	2.15	88	67.11
12	220	1.150	2.50	88	71.97
13	220	0.850	1.80	89	61.87
14	215	1.050	2.25	90	68.52
15	215	1.000	2.15	90	66.86
16	220	0.850	1.80	90	61.87
17	220	0.800	1.70	90	60.03
18	215	0.850	1.80	90	61.65
19	220	1.000	2.15	91	67.11
20	215	1.000	2.15	91	66.86
21	220	1.100	2.35	91	70.39
22	220	0.900	1.90	92	63.67
23	220	0.750	1.60	92	58.12
24	215	0.800	1.70	92	59.81
AVG VALUES	219		2.383	88	70.34

TOTAL GAS WITHDRAWN, scf = 60.34
DRY GAS WITHDRAWN, scf = 50.46
WATER VAPOR WITHDRAWN, scf = 9.88
PERCENT WATER VAPOR = 16.38
ACTUAL WET FLOW RATE, acfm = 37,983.13
STANDARD DRY FLOW RATE, scfm = 23,968.20
, m3/hr = 40,726.76
PARTICULATE CONCENTRATION, grains/dscf = 0.076
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.124
PARTICULATE EMISSION RATE, lb/hr = 15.12
PERCENT OF ISOKINETIC SAMPLING = 92.65

PAYNE & DOLAN CONTROL 8 TEST 3 TABLE 2-3 11-14-91

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .2500
STACK AREA, sq ft = 9.000
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 51.48
WATER COLLECTED, ml = 210.00
PARTICULATE COLLECTED, grams = 0.2748
CO2 = 3.40 O2 = 15.40 CO = 0.00 N2 = 81.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	220	0.950	2.00	92	65.36
2	220	1.000	2.15	92	67.06
3	215	1.150	2.50	92	71.65
4	215	1.100	2.35	92	70.07
5	220	0.900	1.90	92	63.62
6	220	0.800	1.70	92	59.98
7	215	0.850	1.80	93	61.60
8	220	1.000	2.15	93	67.06
9	220	1.100	2.35	93	70.33
10	220	0.900	1.90	93	63.62
11	220	0.800	1.70	93	59.98
12	220	0.850	1.80	93	61.82
13	215	1.100	2.35	93	70.07
14	220	1.250	2.70	93	74.97
15	220	1.250	2.70	93	74.97
16	220	0.950	2.00	94	65.36
17	220	0.900	1.90	94	63.62
18	215	1.100	2.35	94	70.07
19	220	1.700	3.65	95	87.43
20	220	1.700	3.65	95	87.43
21	220	1.600	3.40	95	84.82
22	220	1.500	3.25	95	82.13
23	220	1.400	3.00	95	79.34
24	215	1.400	3.00	95	79.05
AVG VALUES	219		2.427	93	70.89

TOTAL GAS WITHDRAWN, scf = 60.91
DRY GAS WITHDRAWN, scf = 51.02
WATER VAPOR WITHDRAWN, scf = 9.88
PERCENT WATER VAPOR = 16.23
ACTUAL WET FLOW RATE, acfm = 38,282.08
STANDARD DRY FLOW RATE, scfm = 24,223.03
, m3/hr = 41,159.77
PARTICULATE CONCENTRATION, grains/dscf = 0.083
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.135
PARTICULATE EMISSION RATE, lb/hr = 16.63
PERCENT OF ISOKINETIC SAMPLING = 92.70

PAYNE & POLAN
CEDAR LAKE PLANT
CONTROL 8

~ 15 MIN.

11-14-91

TIME	BATCH COUNT
0910	8
925	19
9:40	31
9:55	40
10:10	50
10:25	60
10:40	69
10:55	78
11:10	87
11:25	97
11:40	106
11:55	116
12:10	126
12:25	136
12:40	145
12:55	155
1:10	

2.5 TON/BATCH

TEST 1 0910 - 101130

TEST 2 1030 - 113130

TEST 3 1145 - 124630

HCOH Analysis – Payne + Dolan

11/15/91

SAMPLE ID	SAMPLE VOL	LIQ ALIQ	C. ACID VOL	RDG	RDG - BLANK	µg/ALIQ	µg/SAMPLE		TOTAL
CEDAR LAKE 1A	18.3	0.1	1.0	.304	.274	3.35	613		632
1B	11.3	1.0		.176	.137	1.65	18.6		
2A	14.4	0.1		.307	.277	3.38	487		487
2B	—	—		—	—	—	—		
3A	13.5	0.1		.237	.207	2.53	341.6		359
3B	10.2	1.0		.180	.141	1.70	17.3		
FLD BLANK	—	1.0		.039	—				

PAYNE + DOLAN CEDAR LAKE
FORMALDEHYDE CALCULATIONS

$P_b = 29.10$
$\gamma = 1.078$

TEST 1
105 TPH

$V_M = 2.04$ $T_M = 59$

$V_{Mstd} = V_M \times \gamma \times \frac{528}{T_M} \times \frac{P_b}{29.92}$

$= 2.07$ SCF $= .059\ m^3$

$C = \frac{0.632\ mg}{.059\ m^3} = 10.71\ mg/m^3$

ER: $0.96\ \#/hr = .0091\ \#/tm$

TEST 2
92.5 TPH

$V_M = 2.10$ $T_M = 64$

$V_{Mstd} = 2.01$ SCF $= .057\ m^3$

$C = \frac{0.487}{.057} = 8.54\ mg/m^3$

ER: $0.77\ \#/hr = .0083\ \#/tm$

TEST 3
97.5 TPH

$V_M = 2.00$ $T_M = 65$

$V_{Mstd} = 2.01$ SCF $= .057\ m^3$

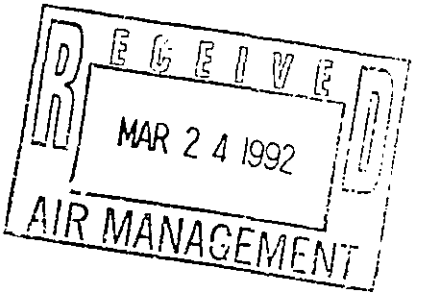
$C = \frac{0.359}{.057} = 6.30\ mg/m^3$

ER: $0.57\ \#/hr = .0058\ \#/tm$

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

Date: March 18, 1992 *File Ref:* 4530



To: SED Case File

From: Jeff McGlin JM

Subject: Review of stack test conducted at Payne and Doylan Control #24 Asphalt Plant in Appleton, Wisconsin on August 26, 1991.

Receive: 9/19/91

I. Source

X Payne and Doylan Control #24 (Northeast Asphalt #24)
P.O. Box 781
Waukesha, Wisconsin 53287
Test Date: Aug 26, 1991
Ervin Benish, Vice President
(414) 544-5231

FID #: 999010210

Permit #: 89-IRS-073 Issued: October 16, 1989

Asphalt Plant: P30 S10

II. Source Description

The home office location of Payne and Doylan Control #24 is in Waukesha, Wisconsin. On August 26, 1991, this source had a stack test conducted while in operation in Appleton, Wisconsin. This source is an asphalt concrete drum mix plant with a rated capacity of 400 tons of mix per hour. It has the capability to use recycled asphalt as well as virgin material and this source is a portable unit. It was manufactured by the CMI Corporation and is a Model PDM 940. The control device for particulate matter is a CMI reverse air pulse baghouse. The bags are made of Nomex and are capable of withstanding temperatures up to 425 degrees Fahrenheit. During the test period, the plant production rate was 220 tons per hour and the mix was composed of 65% virgin material and 35% recycled material. The plant was fired with waste fuel oil.

Operating @ 55% of capacity
No Process Description.
Everything else OK.

III. Sampling Operation

A. Purpose of Test

On October 16, 1989, the Department of Natural Resources issued permit number 89-IRS-073 to Payne and Doylan Control #24. Demonstration of compliance with the State of Wisconsin emission limits as stated within the above permit has to be shown by this particulate emission testing.

B. Sampling Firm

The source performance test was conducted by Mr. William Dick of Environmental Technology and Engineering Corporation, 13020 West Bluemound Road, Elm Grove, Wisconsin 53122.
Telephone: (414) 784-2434

C. Date of the Test

The test was conducted on August 26, 1991. It was a clear but hazy day, with winds of 10-15 mph, out of the southwest and the temperature was in the upper 70's.

D. Test Method

The equipment used to sample was the Western Precipitation Division of the Joy Manufacturing Company Emission Parameter Analyzer. The particulate emission sampling followed procedures in EPA Methods 1,2,3,4, and 5. Samples were collected and analyzed in accordance with procedures outlined in 40 CFR 60 Appendix A, Method 17 - Determination od Particulate Emissions from Stationary Sources.

Testing was conducted on the exhaust stack about 10 feet above ground level. ET & E sampled 25 points per run through two ports for 2.5 minutes each. The stack is rectangular with dimensions of 50.5 inches by 48 inches. The three runs were all successfully completed.

E. Test Witness

The test was witnessed by Tom Erickson of the Department of Natural Resource, Lake Michigan District. The first of the three runs was started at 9:30 AM.

IV. Summary of Test Results

Run No.	Isokinetic Ratio (%)	Particulate Emission Rate (gr / DSCF)
1	94.8	0.015
2	94.5	0.009
3	93.4	0.009
average	94.2	0.011
limit	90 - 110	0.04

The isokinetic ratio limits set by the Department are a range from 90 % to 110 %. All three tests are within the this range and the average isokinetic ratio was 94.2 %.

The particulate emission rate averaged 0.011 gr / DSCF which is less than the applicable emission limit of 0.04 gr / DSCF.

V. Applicable Emission Limit

NR 440.25(3)(a)1., Wisconsin Administrative Code limits the particulate emission from this asphalt plant to 0.04 gr / DSCF.

VI. Discussion of Results

The asphalt plant was being operated in a normal manner on the day of the testing. The 220 tons per hour of asphalt mix produced during the test, with 65 % virgin material and 35 % recycled material, was an average representation of the source.

During the test, the visible emission readings ranged from 5 - 15 % opacity. This is below the 20 % opacity limit.

ET & E show the emissions to be the same value I calculated. The isokinetic ratio limit set by the Department is a range from 90 % to 110 %. All three tests were in the range and the average value was 94.2 %. The average particulate emission rate was 0.011 gr / DSCF which is less than the applicable limit of 0.04 gr / DSCF. This review shows that on August 26, 1991, Payne and Doylan Control #24 was in compliance with permit number 89-IRS-073.

The average formaldehyde emission rate was 1.46 Lb/Hr which is over the NR445 target limit of 0.029Lb/Hr.

c: Bureau of Air Management - AM\10 - Joe Perez
U.S. EPA - Region V
Payne and Doylan Control #24
SED - Mike Griffin
Mike De Brock - LMD

SUMMARY

On August 26, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Northeast Asphalt, Inc. Control 24 asphalt plant located in Appleton, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.015 gr/dscf	37 %
2	0.009	23
3	0.009	23
AVG	0.011 gr/dscf	28 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	2.20 lb/hr	0.0099 lb/ton
2	1.31	0.0060
3	0.86	0.0039
AVG	1.46 lb/hr	0.0066 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All six minute average readings were well below the permit limit of 20 %. The following table summarizes the highest six minute average for each test:

Test	6 Minute Avg Opacity
1	5.8
2	5.6
3	15.0

NAME OF SOURCE: PAYNE & DOYLAN CONTROL #24

LOCATION OF SOURCE: APPLETON

PROCESS TESTED: P30 S10

DATE OF TEST: 8-26-91

RUN NUMBER: 1

N NUMBER OF SAMPLING POINTS= 25

VM DGM VOL,METER COND DRY= 44.183 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 280 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 3.5 %

%O2 % OXYGEN BY VOL,DRY BASIS= 15.5 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 81 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.36 IN HG

AS AREA OF THE SAMPLING SITE= 15.933 SQ FEET

MT TOTAL DRY PARTICULATE= .0419 GM

T TOTAL SAMPLING TIME= 52.5 MIN

AN AREA OF THE NOZZLE= .0003274 SQ FEET

FAYNE & DOYLAN CONTROL #24,P30 S10,RUN: 1

CALCULATED RESULTS

TS STACK TEMPERATURE = 283.8 DEG F

VMSTD DGM VOL,STD COND DRY= 43.62098 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 13.1796 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 23.20328 %

MD MOLE FRACTION OF DRY GAS= .7679672

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.16 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.56587 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 70.0134 FPS

QACT ACTUAL STACK GAS FLOW RATE= 70712.13 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 37827.6 SCFMD

%EA AVE % EXCESS AIR= 263.4262 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 4.559369 LB/HR

PMRC AVE PMR BY CONC METHOD= 4.806348 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 4.682859 LB/HR

C EMISSION CONC,STD COND DRY= 1.482124E-02 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 171759.6 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= .027264 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 203772 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 2.2980875-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 94.8614 %

NAME OF SOURCE: Payne & Doylan Control #24

LOCATION OF SOURCE: Appleton

PROCESS TESTED: P30 S10

DATE OF TEST: 8-26-91

RUN NUMBER: 2

N NUMBER OF SAMPLING POINTS= 25

VM DGM VOL,METER COND DRY= 42.869 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 295 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 4.2 %

%O2 % OXYGEN BY VOL,DRY BASIS= 14.8 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 81 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.359 IN HG

AS AREA OF THE SAMPLING SITE= 16.833 SQ FEET

MT TOTAL DRY PARTICULATE= .0241 GM

T TOTAL SAMPLING TIME= 62.5 MIN

AN AREA OF THE NOZZLE= .0003274 SQ FEET

Payne & Doylan Control #24,P30 S10,RUN: 2

CALCULATED RESULTS

TS STACK TEMPERATURE = 278.6 DEG F

VMSTD DGM VOL,STD COND DRY= 42.33052 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 13.88565 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 24.70045 %

MD MOLE FRACTION OF DRY GAS= .7529954

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.264 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.48174 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 69.03056 FPS

QACF ACTUAL STACK GAS FLOW RATE= 69719.48 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 36825.68 SCFMD

%EA AVE % EXCESS AIR= 224.7874 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 2.622453 LB/HR

PMRC AVE PMR BY CONC METHOD= 2.773333 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 2.697893 LB/HR

C EMISSION CONC,STD COND DRY= 8.784749E-03 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 167691.3 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= .0160884 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 201526.6 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 1.338728E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 94.55961 %

NAME OF SOURCE: Payne & Doylan Control #24

LOCATION OF SOURCE: Appleton

PROCESS TESTED: P30 S10

DATE OF TEST: 8-26-91

RUN NUMBER: 3

N NUMBER OF SAMPLING POINTS= 25

VM DGM VOL,METER COND DRY= 42.462 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 292 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 4 %

%O2 % OXYGEN BY VOL,DRY BASIS= 15 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 81 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.36 IN HG

AS AREA OF THE SAMPLING SITE= 16.833 SQ FEET

MT TOTAL DRY PARTICULATE= .0235 GM

T TOTAL SAMPLING TIME= 62.5 MIN

AN AREA OF THE NOZZLE= .0003274 SQ FEET

Fayne & Doylan Control #24,P30 S10,RUN: 3

CALCULATED RESULTS

TS STACK TEMPERATURE = 280.6 DEG F

VMSTD DGM VOL,STD COND DRY= 41.9286 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 13.74444 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 24.68779 %

MD MOLE FRACTION OF DRY GAS= .7531221

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.24 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.46509 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 69.34875 FPS

QACT ACTUAL STACK GAS FLOW RATE= 70040.85 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 36902.98 SCFMD

%EA AVE % EXCESS AIR= 234.9624 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 2.557164 LB/HR

PMRC AVE PMR BY CONC METHOD= 2.735941 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 2.646553 LB/HR

C EMISSION CONC,STD COND DRY= 8.648154E-03 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 167906 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 1.576211E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 201788.7 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 1.311546E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 93.46558 %

FORMALDEHYDE CALCULATIONS
NORTHEAST ASPHALT
CONTROL 24 · APPLETON 220 TPH P_b · 29.90
γ = 1.02

TEST 1 V_m = 2.50 T_m = 83F

$V_{Mstd} = 1.02 \times 2.50 \times \frac{529}{543} \times \frac{29.4}{29.92}$

= 1.955 SCF = 0.055 m^3

$C = \frac{855 mg}{.055} = 15,555 mg/m^3$

ER = 2.20 #/hr

= 0.0099 #/ton

TEST 2 V_m = 2.00 T_m = 93F

V_{Mstd} = 1.91 SCF = 0.054 m^3

$C = \frac{515 mg}{.054} = 9.54 mg/m^3$

ER = 1.31 #/hr

= 0.0060 #/ton

TEST 3 V_m = 2.50 T_m = 96F

V_{Mstd} = 1.90 SCF = 0.054 m^3

$C = \frac{337 mg}{.054} = 6.24 mg/m^3$

ER = 0.86 #/hr

= 0.0039 #/ton

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

Date: March 20, 1992 *File Ref:* 4530

Received: 11/7/91

To: SED Case File

From: Denese Helgeland DH

Subject: Review of Stack Test Conducted at
Payne & Dolan, Inc.
on October 7, 1991

I. Source

Payne & Dolan, Inc. #7
6211 West Rawson Avenue
Franklin, Wisconsin 53132

Peter Tolsma, Environmental Engineer
Payne & Dolan, Inc.
P.O. Box 1632
Waukesha, Wisconsin 53187
(414) 524-1849

FID #: 999902420

Permit #: 91-DAA-203 issued: March 6, 1991

Process #P10 (S10) Drum Mix Asphalt Plant

II. Source Description

Process #P10 is a Standard Havens counterflow drum mix asphalt plant. The plant is rated to produce 350 tons of asphalt per hour, fired on natural gas, #2 fuel oil and EPA specification used oil. The facility has burner heat input rating of 100 MMBtu per hour. Asphalt mix at the plant may be up to 25% recycled material.

Particulate emissions from the asphalt plant are controlled by a cyclone and baghouse. The pulse cleaned baghouse contains 2180 nomex bags, with a pressure drop across the baghouse of 3 to 4 inches of water.

III. Sampling Operation

A. Purpose of Test

The particulate emission and visible emission stack tests were conducted to determine compliance with limits established by Air Pollution Control Permit #91-DAA-203. The permit was issued March 6, 1991, to Payne & Dolan, Inc., for the construction and operation of an asphalt plant in Franklin, Wisconsin.

Partic. Method 17?
No Process Description.
Everything else OK!

B. Sampling Firm

Environmental Technology & Engineering Corp.
13020 West Bluemound Road
Elm Grove, Wisconsin 53122
(414) 784-2434

Crew Chief: Bill Dick

C. Date of Test

The test was conducted on October 7, 1991. It was a clear day with winds 10 to 15 mph out of the west. The temperature was in the upper 50's.

D. Test Method

Particulate emissions sampling followed procedures detailed in EPA Method 17, including the back half. Visible emissions readings were taken in accordance with EPA test method 9. These methods appear in detail in Title 40 of the Code of Federal Regulations, Part 60, Appendix A.

Testing was conducted on the baghouse exhaust stack. The rectangular stack measured 42 inches by 57.5 inches. Six sampling ports, 4 points per port, were used for the particulate testing.

Visible emissions were read by Chris Huenink, of ET & E, downstream from the exhaust stack, after the attached steam plume dissipated. Chris was positioned southeast of the stack and below the discharge point.

E. Test Witness

The test was witnessed by Denese Helgeland of the Department of Natural Resources, Southeast District. The first run began at 1150, after the facility had repaired a burners.

IV. Summary of Test Results

The isokinetic ratio limits set by the Department are 90% to 110%. All three tests were within the limit. The average isokinetic ratio for the three tests was 105.26 percent.

PARTICULATE EMISSIONS SUMMARY

Run No.	Isokinetic Ratio %	Particulate Emission Rate grains/dscf
1	106.63	0.001
2	104.61	0.001
3	104.54	0.001
average	105.26	0.001
Limit	90-110	0.039

The average particulate emissions were 0.001 grains per dry standard cubic foot of exhaust gas (gr/dscf). Based on the stack test results, particulate emissions from the baghouse are within permitted limitations.

Visible emission readings were 0% opacity for all three tests. Observations were made for standard 60 minute test period. Visible emission limits for the asphalt plant are 20% opacity or less. The plant is in compliance with this limit.

ET&E presented field and lab data for all three tests conducted. Payne & Dolan provided an analysis report from the fuel oil supplier on the EPA Spec Used Oil used during the test.

The Department required the facility to test the stack exhaust for formaldehyde emissions. The formaldehyde test was conducted using NIOSH Method 3500. A sodium bisulfite solution was the sampling medium used for this test. Test results indicated the average formaldehyde emissions were 0.53 pounds per hour. The de minimis level for formaldehyde in section NR 445, Wisconsin Administrative Code, is 250 pounds per year.

FORMALDEHYDE EMISSIONS SUMMARY

Run No.	Formaldehyde Emission Rate pounds per hour
1	0.69
2	0.57
3	0.32
average	0.53

V. Applicable Emission Limit

Pollutant	Applicable Wis. Admin. Code	Limitations
Particulate Matter	NR 440.25(3)(a)1., Wisconsin Administrative Code	0.039 grains per dry standard cubic foot of exhaust gas
Visible Emissions	NR 440.25(3)2., Wis. Admin. Code	20% Opacity

VI. Discussion of Results

ET&E conducted the compliance tests in accordance with the test methods and plan approved by the Department of Natural Resources. The tests were required to be conducted when the asphalt plant was operating at 100 percent capacity on waste fuel oil. The plant is rated at 350 tons per hour. During the stack test, the production varied from 300 to 315 tons per hour, which is the normal production range for the facility.

Based on the results, the average particulate emissions were 0.001 gr/dscf. Permit #91-DAA-203 requires Payne & Dolan to comply with the emissions limit in section NR 440.25(3)(a)1., Wis. Admin. Code, or 0.039 gr/dscf. The test data indicated that Payne & Dolan, Inc.-Control #7 is in compliance with the limit.

Although the test was conducted while the plant was not at 100% capacity, the emissions results are sufficiently low to permit operation at 350 tons per hour without a retest at this time.

Visible emissions were read in accordance with EPA Method 9 procedures. Results of the test indicated there were no visible emissions (0%). The facility is in compliance with the 20% opacity limitation of section NR 440.25(3)(a)2., Wis. Admin. Code.

Formaldehyde testing was conducted in accordance with NIOSH Method 3500, with sodium bisulfite solution used in the midget impingers. This test was required of the facility by permit #91-DAA-203, but there was no permit limitation for formaldehyde. Formaldehyde emissions during the three tests ranged from 0.32 pounds per hour (0.0011 pounds per ton of asphalt) to 0.69 pounds per hour (0.0023 pounds per ton of asphalt). Section NR 445, Wis. Admin. Code, has a de minimis level of 250 pounds per year. Based on the stack test results, the plant is capable of exceeding this level. The Department is in the process of determining BACT for asphalt plants. Results from a study conducted by the Department, indicate average formaldehyde emissions from asphalt plants to be 0.0020 pounds per ton of asphalt produced. Payne & Dolan-Control #7 is below this level. Until BACT is determined for asphalt plants, the facility will operate similar to the operations during the stack test.

c: Bureau of Air Management - AM\10-STK
U.S. EPA - Region V

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 3-19-92 File Code: 4530

PRELIMINARY* STACK TEST REVIEW

By: Denese Helgeland Test Date: Oct 7, 1991

Name of Source: Payne & Dolan-Franklin (central #7) FID #: 999902420

Address: 6211 W. Rawson Ave Stack #: S01

City: Franklin Process #: P01

Permit #: 91-DAA-203 Date Issued: March, 1991

Description of Source Tested: Drum mix asphalt plant with a pulse baghouse. Standard Havens Counterflow - 350 TPH 25% recycled material - fired on EPA Spec used oil

Description of Control Equipment: fabric filter baghouse with pressure drop of 3-4" in of water

Test Firm: Environmental Technology & Engineering
Crew Chief & Phone#: Bill Dick (414) 784-2434

Pollutant Tested: Particulates Test Method: 17 - Thimbles
Pollutant Tested: Visibles Test Method: 9
Pollutant Tested: FORMALDEHYDE Test Method:

Test Production Level: 300 Tons of asphalt per hour
Rated Production Level: 350 Tons of asphalt per hour

Discussion of Results:

Poll. Test Ave. - 0.001 grains part/dscf Limit - 0.039 grains part/dscf
In Compliance? (Y) N

Poll. Test Ave. - 0% opacity Limit - 20% opacity
In Compliance? (Y) N

Poll. Test Ave. - 0.53 lb/HR Limit - 250.0 lb HCHO/YR ≈ 0.029 lb HCHO/HR
LIMIT IS AN NR 445 TARGET LIMIT
~~In Compliance? Y N~~

Poll. Test Ave. - Limit -
In Compliance? Y N

Is This a Valid Test? (Y) N If answer is no see page 2.

* Test may be reviewed in depth later, if necessary.

CC Joe Perez-AM/10
US EPA Region V

PARTICULATE CHECKLIST

Name of Source: Payne & Dolan Franklin (control #7) Test Date: Oct 7, 1991

1. Are the isokinetics per run between 90 and 110%? YES X NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES X NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES X NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES X NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES X NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES X NO__
   If an incorrect total is found, call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES X NO__
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Lb/DSCF = (Gr/DSCF)/7000

Eq. 3 Lb/Hr = 60*DSCFM*(Lb/DSCF)

Eq. 4 Lb/10^6 BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

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8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/Hr, or Lb/10^6 BTU, solve Eq. 1-4. Do your results match the consultant's? YES X NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES X NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES X NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES X NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On October 7, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. asphalt plant located in Franklin, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.001 gr/dscf	2.5 %
2	0.001	2.5
3	0.001	2.5
AVG	0.001 gr/dscf	2.5 %

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.69 lb/hr	0.0023 lb/ton
2	0.57	0.0019
3	0.32	0.0011
AVG	0.53 lb/hr	0.0018 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All individual readings were either 0 % and thus the six minute average opacities were all well below the permit limit of 20 %.

PAYNE & DOLAN FRANKLIN TEST 1 TABLE 2-1 10-7-91

BAROMETRIC PRESSURE, in Hg = 29.500
TIP DIAMETER, in .2500
STACK AREA, sq ft = 16.771
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 41.61
WATER COLLECTED, ml = 362.00
PARTICULATE COLLECTED, grams = 0.0023
CO2 = 7.00 O2 = 12.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.640	1.20	60	56.63
2	275	0.700	1.30	62	59.22
3	275	0.780	1.50	62	62.51
4	275	0.760	1.45	64	61.71
5	280	0.720	1.35	64	60.26
6	280	0.700	1.30	66	59.42
7	285	0.740	1.40	66	61.30
8	285	0.720	1.35	68	60.47
9	285	0.720	1.35	68	60.47
10	280	0.720	1.35	70	60.26
11	280	0.660	1.25	72	57.70
12	275	0.660	1.25	74	57.50
13	275	0.880	1.70	76	66.40
14	265	0.840	1.60	78	64.43
15	265	0.780	1.50	78	62.09
16	265	0.720	1.35	78	59.65
17	265	0.960	1.80	80	68.88
18	265	0.960	1.80	80	68.88
19	260	0.860	1.65	80	64.97
20	260	0.860	1.65	80	64.97
21	260	0.940	1.80	82	67.92
22	260	0.940	1.80	82	67.92
23	260	0.940	1.80	82	67.92
24	260	0.860	1.65	82	64.97
AVG VALUES	271		1.506	73	62.77

TOTAL GAS WITHDRAWN, scf = 58.32
DRY GAS WITHDRAWN, scf = 41.28
WATER VAPOR WITHDRAWN, scf = 17.04
PERCENT WATER VAPOR = 29.22
ACTUAL WET FLOW RATE, acfm = 63,161.40
STANDARD DRY FLOW RATE, scfm = 31,747.97
, m3/hr = 53,946.14
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.24
PERCENT OF ISOKINETIC SAMPLING = 106.63

PAYNE & DOLAN FRANKLIN TEST 2 TABLE 2-2 10-7-91

BAROMETRIC PRESSURE, in Hg = 29.500
TIP DIAMETER, in .2500
STACK AREA, sq ft = 16.771
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 40.00
WATER COLLECTED, ml = 340.00
PARTICULATE COLLECTED, grams = 0.0024
CO2 = 6.80 O2 = 12.00 CO = 0.00 N2 = 81.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	280	0.600	1.10	84	54.98
2	280	0.740	1.35	84	61.05
3	280	0.860	1.55	82	65.82
4	280	0.960	1.75	82	69.54
5	280	0.660	1.20	82	57.66
6	280	0.800	1.45	82	63.48
7	285	0.900	1.60	80	67.56
8	285	0.900	1.60	80	67.56
9	280	0.640	1.15	80	56.78
10	280	0.660	1.20	82	57.66
11	280	0.800	1.45	84	63.48
12	280	0.900	1.60	84	67.33
13	280	0.740	1.35	84	61.05
14	280	0.740	1.35	84	61.05
15	280	0.740	1.35	84	61.05
16	280	0.740	1.35	86	61.05
17	280	0.740	1.35	86	61.05
18	285	0.760	1.40	88	62.08
19	285	0.760	1.40	88	62.08
20	285	0.780	1.40	88	62.89
21	285	0.700	1.25	88	59.58
22	285	0.700	1.25	88	59.58
23	285	0.760	1.40	90	62.08
24	285	0.760	1.40	90	62.08
AVG VALUES	282		1.385	85	62.02

TOTAL GAS WITHDRAWN, scf = 55.73
DRY GAS WITHDRAWN, scf = 39.72
WATER VAPOR WITHDRAWN, scf = 16.00
PERCENT WATER VAPOR = 28.72
ACTUAL WET FLOW RATE, acfm = 62,410.82
STANDARD DRY FLOW RATE, scfm = 31,139.95
, m3/hr = 52,912.99
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.25
PERCENT OF ISOKINETIC SAMPLING = 104.61

PAYNE & DOLAN FRANKLIN TEST 3 TABLE 2-3 10-7-91

BAROMETRIC PRESSURE, in Hg = 29.500
TIP DIAMETER, in .2500
STACK AREA, sq ft = 16.771
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf = 38.88
WATER COLLECTED, ml = 354.00
PARTICULATE COLLECTED, grams = 0.0031
CO2 = 7.00 O2 = 11.80 CO = 0.00 N2 = 81.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	285	0.660	1.20	88	58.02
2	290	0.640	1.15	88	57.32
3	290	0.760	1.40	88	62.47
4	290	0.760	1.40	88	62.47
5	290	0.700	1.25	88	59.95
6	290	0.700	1.25	86	59.95
7	285	0.760	1.40	86	62.26
8	285	0.740	1.35	86	61.43
9	280	0.660	1.20	86	57.82
10	280	0.740	1.35	86	61.23
11	280	0.740	1.35	86	61.23
12	280	0.760	1.40	88	62.05
13	285	0.720	1.30	88	60.60
14	280	0.720	1.30	88	60.39
15	280	0.680	1.20	90	58.69
16	280	0.660	1.20	90	57.82
17	280	0.860	1.55	90	66.01
18	280	0.800	1.45	90	63.66
19	280	0.840	1.50	90	65.23
20	280	0.780	1.40	92	62.86
21	280	0.760	1.40	92	62.05
22	280	0.840	1.50	92	65.23
23	280	0.860	1.55	92	66.01
24	280	0.840	1.50	92	65.23
AVG VALUES	283		1.356	89	61.67

TOTAL GAS WITHDRAWN, scf = 55.29
DRY GAS WITHDRAWN, scf = 38.63
WATER VAPOR WITHDRAWN, scf = 16.66
PERCENT WATER VAPOR = 30.14
ACTUAL WET FLOW RATE, acfm = 62,052.34
STANDARD DRY FLOW RATE, scfm = 30,302.30
, m3/hr = 51,489.67
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.002
PARTICULATE EMISSION RATE, lb/hr = 0.33
PERCENT OF ISOKINETIC SAMPLING = 104.54

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

DATE: November 30, 1989

TO: Payne and Dolan #28 File

FROM: Jeff Skebba - SD Air Management JS

SUBJECT: Review of Stack Emission Test Conducted October 23, 1989 at Payne and Dolan #28

1. Conclusions and Recommendations

The results of this stack test show the facility demonstrated compliance with the particulate matter emission limit of 0.04 grains per dry standard cubic foot. Visible emissions evaluated during the three test runs were all less than the 20% opacity limit.

Formaldehyde emissions were found to be greater than the target limit set in the permit. This limit should be re-evaluated based on the test results.

The Southeast District will follow through on the Notice of Violation issued August 4, 1989.

2. Facility Information

Payne and Dolan #28
Home Office Address: P.O. Box 781
Waukesha, WI 53187

Plant location for test: 1 and 1/2 miles east of Marshall, WI (Dane County) on State Highway 19 at Cherry Lane

Facility ID# 999791320, Permit # 89-MWH-068

Facility Contacts: Larry Kristapovich, Engineer (414) 548-3258
Tim Meiner, Plant Operator

Date of Test: October 23, 1989

Company Conducting Test: Environmental Technology and Engineering Corporation
13020 West Bluemound Road
Elm Grove, WI 53122
(414) 784-2434

Note: Company referred to as ET & E in rest of this report.

RECEIVED
DEC 0 4 1989
BUREAU OF
AIR MANAGEMENT

Test Crew Chief: Bill Dick

Assisted By: Lowell Hueninck, Chris Hueninck
Test Witness: Jeff Skebba - SD Air Management

Partic. Test 17?
No Process Description
Everything else OK!

20

3. Facility Description

This is a portable drum mix asphalt plant equipped to process both virgin aggregate and recycled asphalt. It has a Genco Astro Flame burner fired on natural gas, #2 fuel oil or waste oil. Particulate matter emissions are controlled by a baghouse. The rated capacity of this plant is 250 tons per hour.

4. Applicable Emission Limitations

Pollutant	Limitation
Particulate Matter	NR 440.25(3)(a)1., Wis. Adm. Code 0.04 grains per dry standard cubic foot
Visible Emissions	NR 440.25(3)(a)2., Wis. Adm. Code 20% opacity
Formaldehyde	NR 445.03, Wis. Adm. Code target limit of 0.0378 pounds per hour

5. Test Methods

ET & E performed isokinetic sampling on the baghouse stack to measure particulate matter emissions using EPA Method 17. The back half of the sampling train wasn't analyzed because this was a New Source Performance Standard test. A complete description of the sampling train set up is found in section 3.0 of their report.

Formaldehyde emissions were measured by use of NIOSH Method 3500. This method utilizes miniature impingers, and was conducted simultaneous with the particulate sampling. A complete description of the sampling set up is found in section 3.2 of their report.

Visible emissions were evaluated for three one-hour periods by Bill Dick of ET & E. These readings were required as part of the compliance demonstration permit condition B.3. EPA Method 9 was used to evaluate these emissions.

6. Summary of Results

The following tables contain the particulate matter and formaldehyde emissions.

ET & E's Calculated Results:

Run #	Particulate Emissions	Isokinetic Ratio
1	0.008 grains/dscf	97.05%
2	0.011 grains/dscf	96.26%
3	0.008 grains/dscf	97.54%
Average =	0.009 grains/dscf	96.95%

Run #	Formaldehyde Emissions
1	2.22 pounds per hour
2	1.43 pounds per hour
3	1.14 pounds per hour

Average = 1.60 pounds per hour

Department's Computer Generated Results:

Run #	Particulate Emissions	Isokinetic Ratio
1	0.008 grains/dscf	96.48%
2	0.011 grains/dscf	95.45%
3	0.008 grains/dscf	96.64%

Average = 0.009 grains/dscf

7. Discussion of Results

This test was conducted while the plant was firing waste oil and adding recycled asphalt to the mix at a 40% replacement rate. Tim Meiner, plant operator, kept track of plant operating data during all three test runs. The following variables were recorded:

Mix temperature = 290 degrees Fahrenheit
Baghouse temperature = 275 to 285 degrees Fahrenheit
Recycle replacement rate = 40 percent
Asphalt production rate = 220 to 230 tons/hr (average = 226 tons/hr)
Exit gas temperature = 300 to 310 degrees Fahrenheit
Baghouse pressure drop = 4 to 5 inches of water
Rated Capacity = 250 T/Hr

The sampling train was checked each run. No leaks were detected. Since the filter was placed within the probe (curved filter), no pitot line leak checks were necessary. The probe tip was washed after each run with acetone. For run three, part of the filter stuck to the probe, so it was removed at ET & E's laboratory to avoid damaging the filter in the field. The filters for runs one and two were discolored slightly with a small accumulation of particulate. The filter for run three appeared to have slightly greater accumulation of particulate.

Adequate sample volume was drawn through the train on all three runs. Isokinetic sampling ratios were all within the 90-110% range, and are thus acceptable. The computer generated results agree closely with ET & E's results for both particulate matter concentrations and isokinetic ratios. I used 68 degrees Fahrenheit for both the inlet and outlet dry gas meter temperatures because ET & E's meter is calibrated to standard conditions.

Bill Dick of ET & E evaluated visible emissions for three one-hour periods during the test. All six-minute averages were less than the 20 percent allowed opacity. The highest six-minute averages for each run were:

Run 1 = 9.4 percent opacity
Run 2 = 7.7 percent opacity
Run 3 = 9.4 percent opacity

A corrected copy of particulate filter tare weight for test run three has been received. This didn't affect any of the calculations, since the total particulate catch was already listed correctly on the original sheet.

cc: Joe Perez - AM/3
John Stoffel - SED Air Management
U.S. EPA Region V

NAME OF SOURCE: Payne and Dolan #28

LOCATION OF SOURCE: Highway 19 - Marshall WI

PROCESS TESTED: P01 - Baghouse Stack

DATE OF TEST: 102389

RUN NUMBER: 1

N NUMBER OF SAMPLING POINTS= 25

VM DGM VOL,METER COND DRY= 48.33 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 304 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 7 %

%O2 % OXYGEN BY VOL,DRY BASIS= 11 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 82 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.34 IN HG

AS AREA OF THE SAMPLING SITE= 9.333 SQ FEET

MT TOTAL DRY PARTICULATE= .0241 GM

T TOTAL SAMPLING TIME= 62.5 MIN

AN AREA OF THE NOZZLE= .00032 SQ FEET

Payne and Dolan #28,P01 - Baghouse Stack,RUN: 1

CALCULATED RESULTS

TS STACK TEMPERATURE = 242.4 DEG F

VMSTD DGM VOL,STD COND DRY= 47.7043 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 14.30928 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 23.07443 %

MD MOLE FRACTION OF DRY GAS= .7692557

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.56 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.8926 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 72.66315 FPS

QACT ACTUAL STACK GAS FLOW RATE= 40689.91 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 23073.07 SCFMD

%EA AVE % EXCESS AIR= 103.3058 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 1.487634 LB/HR

PMRC AVE PMR BY CONC METHOD= 1.541887 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 1.514761 LB/HR

C EMISSION CONC,STD COND DRY= 7.795167E-03 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 106129.8 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 1.427272E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 125514.8 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 1.206838E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 96.48137 %

NAME OF SOURCE: Payne and Dolan #28

LOCATION OF SOURCE: Highway 19 - Marshall WI

PROCESS TESTED: P01 - Baghouse Stack

DATE OF TEST: 102389

RUN NUMBER: 2

N NUMBER OF SAMPLING POINTS= 25

VM DGM VOL,METER COND DRY= 41.59 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 297 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 7 %

%O2 % OXYGEN BY VOL,DRY BASIS= 11 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 82 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.35 IN HG

AS AREA OF THE SAMPLING SITE= 9.333 SQ FEET

MT TOTAL DRY PARTICULATE= .0284 GM

T TOTAL SAMPLING TIME= 62.5 MIN

AN AREA OF THE NOZZLE= .00032 SQ FEET

Payne and Dolan #28,P01 - Baghouse Stack,RUN: 2

CALCULATED RESULTS

TS STACK TEMPERATURE = 238.8 DEG F

VMSTD DGM VOL,STD COND DRY= 41.01375 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 13.97979 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 25.42078 %

MD MOLE FRACTION OF DRY GAS= .7457922

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.56 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.62136 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 64.77515 FPS

QACT ACTUAL STACK GAS FLOW RATE= 36272.79 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 20050.55 SCFMD

%EA AVE % EXCESS AIR= 103.3058 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 1.753063 LB/HR

PMRC AVE PMR BY CONC METHOD= 1.836551 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 1.794807 LB/HR

C EMISSION CONC,STD COND DRY= 1.068452E-02 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 92227.02 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 1.946075E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 111369.5 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 1.611579E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 95.45408 %

NAME OF SOURCE: Payne and Dolan #28

LOCATION OF SOURCE: Highway 19 - Marshall WI

PROCESS TESTED: P01 - Baghouse Stack

DATE OF TEST: 102389

RUN NUMBER: 3

N NUMBER OF SAMPLING POINTS= 25

VM DGM VOL,METER COND DRY= 41.57 CFD

PB BAR PRESS,STATION= 29.4 IN HG

VL TOTAL VOL OF WATER COLLECTED= 337 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 6 %

%O2 % OXYGEN BY VOL,DRY BASIS= 11.6 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 82.4 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 29.34 IN HG

AS AREA OF THE SAMPLING SITE= 9.333 SQ FEET

MT TOTAL DRY PARTICULATE= .0215 GM

T TOTAL SAMPLING TIME= 62.5 MIN

AN AREA OF THE NOZZLE= .00032 SQ FEET

Payne and Dolan #28,P01 - Baghouse Stack,RUN: 3

CALCULATED RESULTS

TS STACK TEMPERATURE = 240.6 DEG F

VMSTD DGM VOL,STD COND DRY= 40.99888 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 15.86259 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 27.8969 %

MD MOLE FRACTION OF DRY GAS= .721031

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.424 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 26.23706 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 66.34418 FPS

QACT ACTUAL STACK GAS FLOW RATE= 37151.41 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 19796.64 SCFMD

%EA AVE % EXCESS AIR= 114.2452 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 1.327142 LB/HR

PMRC AVE PMR BY CONC METHOD= 1.373238 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 1.35019 LB/HR

C EMISSION CONC,STD COND DRY= 8.091562E-03 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 90640.16 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 1.489616E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 112093.4 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 1.204522E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 96.6433 %

Rec'd 11/27/89.
cc: Joe Perez - Am 3
John Stoffel - SED

P & D WATERLOO
CONTROL 28

10-23-89

Time	Mix Temp	Baghouse Temp	% Recycle	Tons/hr	Exit Gas	Pressure Drop
10:15	290°	280°	40 %	221	300°	4½
10:30	290°	280°	40 %	220	300°	4½
10:45	290°	280°	40 %	222	310°	4½
11:00	290°	280°	40%	225	310°	4½
11:15	290°	280°	40%	224	310°	5
11:45	290°	275°	40%	225	305°	4
12:00	290°	280°	40%	228	310°	4
12:15	290°	285°	40%	229	310°	4
12:30	290°	280°	40%	230	310°	4
12:45	290°	280°	40%	230	310°	5
1:00	290°	285°	40%	230	300°	4
1:15	290°	285°	40%	226	310°	4
1:30	290°	280°	40%	222	300°	4
1:45	290°	280°	40%	221	310°	4
2:00	290°	280°	40%	220	310°	4
2:15	290°	280°	40%	228	310°	4
3:00	290°	280°	40%	229	310°	4½
3:15		280°	40%	230	310°	4

SMOKE FORM
Form 4500-29 Rev. 6-85

1/

Name of Company: PAYNE & DOLAN	Date: 10-23-89
Location: Hwy 19 & CHERRY LN	FID Number: ADECO PLANT
City, State, Zip Code	Observer Certification Date: 10-11-89
Discharge Location: WATERLOO	Control Device: BAGHOUSE
Height of Discharge Above Ground: ~ 30'	Steam Plume? Attached / Yes / Detached / (No)

	Initial		Final
Time of Observation	1150/1150		1235/1305
Observer Location			
Distance to Discharge	~ 120'		
Direction from Discharge	SE		
Height of Observation Point in Relation to Discharge	~ 40'		
Plume Description (Color, Length, etc.)	WHITE/GRAY ~100		
Plume Background Description	BLUE SKY/ CLOUDS		
Weather Conditions			
Wind Direction	S.SW		
Wind Speed	5-10		10-15
Ambient Temperature	60		
Sky Conditions (clear, overcast, % clouds, etc.)	MOSTLY CLEAR ~20% CLOUDS		

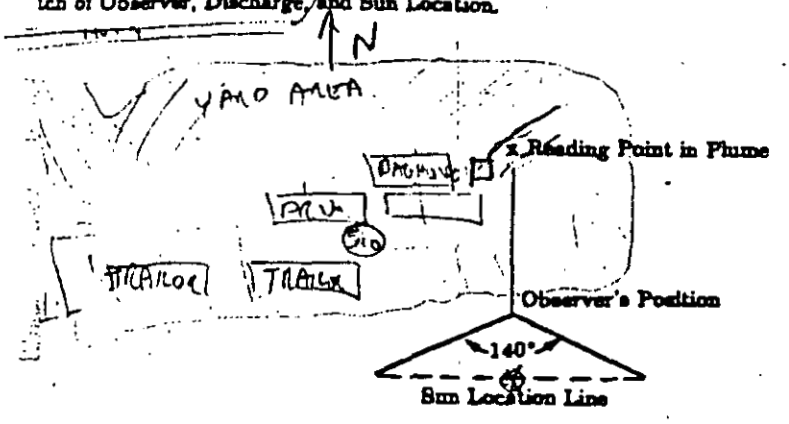
Describe Point in Plume at Which Opacity was Determined
~ 15' ABOVE TOP

Remarks:
SLIGHTLY DETACHED OIL PLUME
OPACITY READ INCLUDING THIN OIL
* SHIFTING TO MORE PAPER

COINCIDE WITH TEST 2

Signature of Observer: [signature] | Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



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

Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start – End	Opacity: Sum	Opacity: Average

Allowable Source Opacity

21

SMOKE FORM
Form 4500-29 Rev. 6-85

Field	Initial		Final
Name of Company: PAYNE & POLAN	Date: 10·23·81		
Location	FID Number		
City, State, Zip Code	Observer Certification Date: 10-11-89		
Discharge Location	Control Device: BAGHOUSE		
Height of Discharge Above Ground	Steam Plume? Yes / (No) — Attached / Detached		
Time of Observation	1330		1430
Observer Location — Distance to Discharge	~100'		
Direction from Discharge	S-SE		
Height of Observation Point in Relation to Discharge	~40'		
Plume Description (Color, Length, etc.)	WHITE ~ 50'		
Plume Background Description	LIGHT CLOUDS		
Weather Conditions — Wind Direction	S-SW		SW
Wind Speed	5·10		
Ambient Temperature	65		
Sky Conditions (clear, overcast, % clouds, etc.)	MOSTLY CLEAR ~10% CLOUDS		

Describe Point in Plume at Which Opacity was Determined: ~10' ABOVE DISCHARGE

Remarks: COINCIDE WITH TEST 3
* CLEAR BACKGROUND @ 1400
READ ~5% HIGHER THAN CLOUDY BACKGROUND

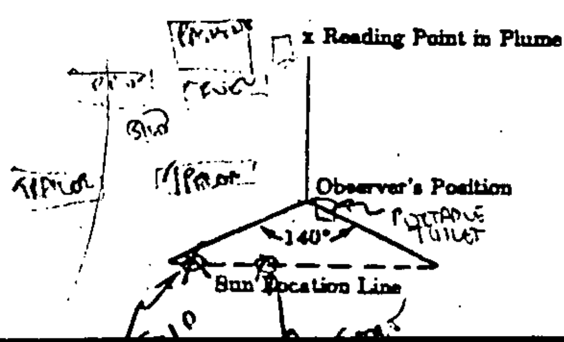
DETACHED OIL PLUME READ

TIM MEIWUR
~220 TPH — 40% RAP
WASTE OIL

Signature of Observer: [signature]

Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



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

Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

Allowable Source Opacity

SMOKE FORM
Form 4500-29 Rev. 6-85

3/

Name of Company: PAYNE & POLAN	Date: 10-23-89
Location: HENRY Hudd & HWY 19	FID Number:
City, State, Zip Code: WATERLOO	Observer Certification Date: 10-11-89
Discharge Location	Control Device: BAGHOUSE
Height of Discharge Above Ground: ~30'	Steam Plume? Attached / Yes / Detached / (No)

	Initial		Final
Time of Observation	1504		1604
Observer Location: Distance to Discharge	~100'	→	
Direction from Discharge	W	→	
Height of Observation Point in Relation to Discharge	- 30'	→	
Plume Description (Color, Length, etc.)	WHITE ~50'	→	
Plume Background Description	BLUE SKY	→	
Weather Conditions: Wind Direction	SW	→	
Wind Speed	~10	→	
Ambient Temperature	65	→	
Sky Conditions (clear, overcast, % clouds, etc.)	CLEAR	→	

Describe Point in Plume at Which Opacity was Determined
~10' ABOVE DISCHARGE

Remarks:
SLIGHT DETACHED OIL VAPOR PLUME READ

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

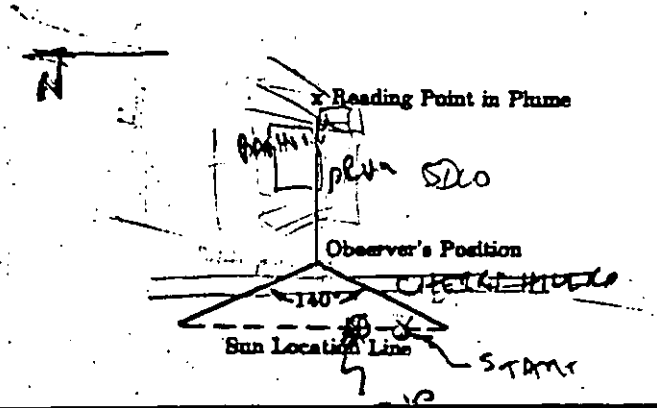
Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

Signature of Observer: William J. Dick

Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location



Allowable Source Opacity

REV 764

P+D FORMALDEHYDE

TEST DATE: 10-23-89
ANALYSIS DATE: 10-26-89

	VOL	RDG	AUQ	RDG LESS BLANK	AQUA	mg HCOH	STD FT³	mg/m³	lb/hr.
F-1	46.0	1.222	.50	1.197	(~21.2)	(1950)			
F-2	40.0	1.138	.50	1.113	19.4	1550			
F-3	44.0	.928	.50	.903	15.1	1330			
F-1	46.0	.634	.20	.609	9.3	2140	2.94	25.7	2.22
F-2	40.0	.529	.20	.504	7.6	1520	2.81	19.1	1.43
F-3	44.0	.424	.20	.399	5.9	1300	2.99	15.4	1.14
TDS									
0		.025	4						
1		.089	4	.064					
3		.220	4	.195					
5		.377	4	.352					
10		.683	4	.658					
20		1.170	4	1.145					
				220 TPH					
				40% RAP					
				BAGHOUSE					
				WASTE OIL					

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 2/10/92

File Code: 4530

PRELIMINARY STACK TEST REVIEW Received: 10/16/91

By: Warren Graham Test Date: 8/21/91

Name of Source: Mathy Constr. Co. Plant #54 FID #: 999011420

Address: Stack #: S10

City: Glidden, WI Process #: P10

Permit #: MIA-11-SAH-83-22-406A Date Issued: 10/11/90

Description of Source Tested: Asphalt Plant Baghouse - drum mix

Description of Control Equipment: Baghouse & Wet Scrubber

Test Firm: Mathy Envl.

Crew Chief & Phone#: Jim Tryba

Pollutant Tested: Formaldehyde Test Method: NOISH Method 3500 Bisulfate

Pollutant Tested: Particulate Test Method: 5

Pollutant Tested: Test Method:

Test Production Level: Avg. 230 Ton/Hr (36% moisture)

Rated Production Level: Approx 350 ton/hr (5% moisture)

Discussion of Results:

Poll. Test Ave. - .1452 lb/hr Limit - .0285 lb/hr HCHO based on 250 lb/yr

In Compliance? Y (N)

Poll. Test Ave. - .0216 gr/dscf PM Limit - .04 gr/dscf PM

In Compliance? (Y) N

Poll. Test Ave. - Limit -

In Compliance? Y N

Poll. Test Ave. - Limit -

In Compliance? Y N

Is This a Valid Test? (Y) N If answer is no see page 2.

* Test may be reviewed in depth later, if necessary.

CC Joe Perez-AM/10
US EPA Region V
Tom Woelfs - Eau Claire Area

Production rate ~66% of capacity.

No process description.

21

PARTICULATE CHECKLIST

Name of Source: Matty Constr. Plant #54 Test Date: 8/21/91

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES__ NO ✓
   (NSPS) sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

✓ Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Lb/DSCF = (Gr/DSCF)/7000

Eq. 3 Lb/Hr = 60*DSCFM*(Lb/DSCF)

Eq. 4 Lb/10^6 BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/Hr, or Lb/10^6 BTU, solve Eq. 1-4. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average. =.0216

10. Is the average result in compliance? .0216 < .04 YES ✓ NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES ✓ NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

Moisture is @ 26% instead of 5%

GASEOUS TEST CHECKLIST

Name of Source: Mathy Constr. #54 Gas Tested: HCHO (HCl?) Test Date: 8/21/91

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ Moisture\ as\ Decimal)$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-Stack\ O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/Stack\ CO_2$

---

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*Molecular\ Weight\ of\ Gas/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*Molecular\ Weight\ of\ Gas$

Eq. 6 $Lb/DSCF = 6.243*10^{-8}*(mg/DSCM)$

Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$ ✓ Eq. 8 $Lb/10^6\ BTU = (Lb/Hr)*(10^6\ BTU/Hr)$

Eq. 9 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-Stack\ O_2)$

---

3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-9. Eq. 1-3 may also be needed. Do your results match the consultant's? 250 lb/yr YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 10 % Capture Eff. = $\frac{(Lb\ VOC/Hr\ to\ Control\ Equip.)*100}{(Lb\ VOC/Hr\ Input\ to\ Process)}$

Eq. 11 % Destruction Eff. = $\frac{(Inlet\ Lb\ VOC/Hr - Outlet\ Lb\ VOC/Hr)*100}{(Inlet\ Lb\ VOC/Hr)}$

Eq. 12 % Overall Eff. = (% Cap. Eff./100)*(% Dest. Eff./100)*100

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4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-12. Eq. 1-8 may also be needed. Do your results match the consultant's? YES__ NO ✓
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average. .1452 lb/hr or 1272.24 lb/yr

6. Is the average result in compliance? YES__ NO ✓
   If no, the District should issue an NOV. 1272.24 lb/yr > 250 lb/yr

7. Was the source operating at a level representative of full capacity? YES ✓ NO__
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

26% Moisture

I. INTRODUCTION

On August 21 and 22, 1991, personnel from Mathy Environmental conducted a source emissions test for emissions compliance at Mathy Construction Plant #54 hot mix asphalt plant located in Glidden, Wisconsin.

The purpose of the test was to determine if the rate of particulate emissions from the plant's baghouse and the total contaminants by weight are below the allowable limits as set forth by the State of Wisconsin and to quantify the formaldehyde emissions from this process.

II. TEST RESULTS

Table I summarizes the test results. The allowable emissions limitation for the State of Wisconsin is found in the Wisconsin Administrative Code, Chapter NR415, Control of Particulate Emissions, where the limit of .04 grains per dry standard cubic foot is specified.

TABLE I

SUMMARY OF TEST RESULTS

Test Run	Time	Grains/ DSCF	Isokinetic Variation
54-1	60 min.	0.0243	106.2 %
54-2	60 min.	0.0216	104.0 %
54-3	60 min.	0.0189	104.1 %

Average = 0.0216 grains/dscf.

SUMMARY OF TEST DATA

	SAMPLING TRAIN DATA		Run #1	Run #2	Run #3
1.	Sampling time, minutes		60	60	60
2.	Sampling nozzle diameter, inches	Dn	0.245	0.245	0.245
3.	Sampling nozzle area, sq.ft.	An	0.000327	0.000327	0.000327
4.	Isokinetic variation, %	I	106.2	104.0	104.1
5.	Sample gas volume, cubic feet	Vm	35.593	36.789	36.760
6.	Avg.meter temperature, deg R	Tm	535.5	560.4	564.7
7.	Avg.oriface pressure drop, in.H2O	dH	1.13	1.13	1.13
8.	Total particulate collected, mg	Mn	57.00	50.00	43.40
	VELOCITY TRAVERSE DATA				
9.	Stack Area, sq.ft.	A	16.000	16.000	16.000
10.	Abs.stack gas pressure, in.Hg.	Ps	30.67	30.67	30.67
11.	Barometric pressure, in.Hg.	Pbar	30.70	30.70	30.70
12.	Avg.stack temperature, deg R	Ts	703.97	720.93	736.07
13.	Avg. sq.rt. velocity head (Cp=.84)		0.7579	0.7700	0.7700
14.	Avg.stack gas velocity, ft./sec.	Vs	50.804	52.206	52.730
	STACK MOISTURE CONTENT				
15.	Total water collected, ml	Vic	271	263	259
16.	Moisture in stack gas, %	Bws	26.03	25.81	25.66
	EMISSIONS DATA				
17.	Stack gas flow rate, dscf/hr.	Qsd	1664217	1674863	1660243
18.	Particulate concentration, gr/dscf	Cs	0.0243	0.0216	0.0189
19.	Particulate concentration, lb./hr.	E	5.78	5.17	4.48
20.	Particulate concentration, lb./Mlb.		0.0376	0.0335	0.0293
	FYRITE DATA				
21.	Percent CO2 by volume	CO2	6.0	7.0	6.0
22.	Percent O2 by volume	O2	13.0	15.0	13.0
23.	Percent CO by volume	CO	0.0	0.0	0.0
24.	Percent N2 by volume	N2	81.0	78.0	81.0

SUMMARY OF TEST DATA
(FORMALDEHYDE)

	SAMPLING TRAIN DATA		Run #2-F	Run #3-F	Run #4-F
1.	Sampling time, minutes		60	60	60
2.	Sampling nozzle diameter, inches	Dn	0.245	0.245	0.245
3.	Sampling nozzle area, sq.ft.	An	0.000327	0.000327	0.000327
4.	Isokinetic variation, %	I	N/A	N/A	N/A
5.	Sample gas volume, cubic feet	Vm	9.551	10.570	9.550
6.	Avg.meter temperature, deg R	Tm	552.5	561.2	562.0
7.	Avg.oriface pressure drop, in.H2O	dH	0.06	0.06	0.06
8.	Total formaldehyde collected, mg	Mn	0.479	0.481	0.458
		std (Vm)	9.356	10.167	9.178
	VELOCITY TRAVERSE DATA				
9.	Stack Area, sq.ft.	A	16.000	16.000	16.000
10.	Abs.stack gas pressure, in.Hg.	Ps	30.67	30.67	30.67
11.	Barometric pressure, in.Hg.	Pbar	30.70	30.70	30.70
12.	Avg.stack temperature, deg R	Ts	698.07	698.07	703.60
13.	Avg. sq.rt. velocity head (Cp=.84)		0.5935	0.6204	0.5863
14.	Avg.stack gas velocity, ft./sec.	Vs	39.618	41.222	39.271
	STACK MOISTURE CONTENT				
15.	Total water collected, ml	Vlc	70	69	68
16.	Moisture in stack gas, %	Bws	26.06	23.88	25.80
	EMISSIONS DATA				
17.	Stack gas flow rate, dscf/hr.	Qsd	1308229	1401327	1291096
18.	Formaldehyde concentration,gr/dscf	Cs	0.00079	0.00073	0.00077
19.	Formaldehyde concentration,lb./hr.	E	0.1476	0.1461	0.1420
20.	Formaldehyde concentration, lb./Mlb.		0.00122	0.00115	0.00119
	FYRITE DATA				
21.	Percent CO2 by volume	CO2	7.0	7.0	7.0
22.	Percent O2 by volume	O2	14.0	14.0	14.0
23.	Percent CO by volume	CO	0.0	0.0	0.0
24.	Percent N2 by volume	N2	79.0	79.0	79.0

Avg = .145

MATHY CONSTRUCTION COMPANY - ENVIRONMENTAL
PLANT DATA

Date - 8/21/91 Aggregate Moisture - 4 %

Plant Number - 54 Operator - Thomas Leis

Plant Location - Glidden, Wis

Plant Manufacturer - Bacing (Drum) / Standard Havens (Baghouse)

Plant Model / Type - Drum Mixer - Model 400

Burner Fuel Type - R-5 Burner Fuel

Mix Type - Virgin / Surface Oil Type - AC 120/150

Time	Burner Setting	Total Tonnage TPH	Aggregate TPH	Recycle TPH	Liquid Asphalt TPH	Mix Temp. F	Pressure Drop In./H2O
7:15	5.75	231	218	None	12.2	290°	1.9
8:30	6.00	229	217		12.1	280°	1.8
8:45	6.00	233	221		12.2	280°	1.8
9:00	5.75	228	216		12.0	275°	1.8
9:30	5.75	225	213		11.9	285°	1.8
10:30	5.75	228	216		11.9	285°	1.6
10:50	5.75	229	217		12.0	285°	2.2
11:45	5.75	230	218		12.2	285°	1.9
12:10	5.75	232	220		12.4	280°	2.4
1:30	5.75	232	220		12.3	285	2.4
2:15	5.75	228	216		12.2	280°	1.8
2:45	5.75	231	219		12.3	290°	2.3
3:30	5.75	230	218		12.2	285°	2.2
4:15	5.75	231	219		12.2	290°	2.1
4:30	5.75	235	222		12.3	280°	2.0
	AVE:	230					

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

Date: January 3, 1991

File Ref: 4530

To: Files

From: Mike Griffin - SED MG

Subject: Review of Stack Test Performed at Payne & Dolan CTR #53 Portable Asphalt Plant, Waukesha.

Received 1/3/91

I. Source

Payne & Dolan
P. O. Box 781
Waukesha, WI 53187
Contact: Mr. Ervin Benish (414) 524-1753
FID #999418640, Stack S10, Process P30
Permit #999418640-N01, April 23, 1990
Test Date: November 15, 1990
Test Firm: Environmental Technology & Engineering Corp.
13020 West Bluemound Road
Elm Grove, WI 53122

Crew Chief: Mr. William J. Dick (414) 784-2434

II. Source Description

The source tested as a Cedar Rapids drum mix asphalt plant rated at 320 T/Hr. The plant was located at the State Sand and Gravel Pit, 1/2 mile north of STH 24 on Crowbar Road, in Muskego. The plant was fired with waste oil and was producing about 270 T/Hr during the test. The mix was composed of 48% virgin material and 52% recycled material. The emissions were controlled by a baghouse. The pressure drop across the baghouse was about 3" of water.

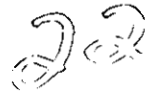
III. Sampling Operation

A. The test was done to satisfy the mandatory operation permit (999418640-N01) requirement to prove compliance with the particulate emission limitation and to document formaldehyde emissions.

EARTH YEAR
WISCONSIN
1970 April 22 1990

Partic. Method 17 ?

No Process Desc.



B. Test Method:
EPA Method 17; without back half. Andersen Method 17 sampling train with in-stack filter.

NIOSH 3500 method was used with midget impinge train. See enclosure (1) for sampling train layout.

EPA Method 9 for three runs by certified reader, Michael Huenink of E.T. & E.

For EPA Method 17, 5 sample ports were located horizontally on the (54" x 37") exhaust stack approximately 10' downstream and 3' upstream of the nearest flow disturbances. There were 5 sample points per port, for a total of 25 sample points. Sampling time per point was 2.5 minutes.

C. Date of Test:

The test was conducted on November 15, 1990. Opacity averaged 10% over the three one-hour test periods.

D. Test Witness:

Michael Griffin, Southeast District (414) 263-8554.

IV. Summary of Results

The average particulate emission rate of 0.012 gr/dscf demonstrates compliance with the emission limit of 0.04 gr/dscf. I reviewed the ET&E results, verified each with the computer program "stktest", and found them to be consistent and satisfactory. Provided below is the test summary.

Test	Emissions	% Isokinetic Ratio
1	0.011 gr/dscf	99.8
2	0.010	100
3	0.014	95.9
Ave	0.012 gr/dscf	98.6%

Visible emission readings were taken by Michael Huenink of ET &E. The average opacity reading over three hours was 10%.

Review and comments on NIOSH Method 3500 results are reserved for Bureau of Air Management. 1.09 Lb Formaldehyde/Hr ave.

V. Applicable Emission Limit

Particulates	s. NR 440.25(3)(2)1., WAC	0.04 gr/dscf
Visible Emissions	s. NR 440.25(3)(2)2., WAC	20% Opacity

VI. Discussion of Results

The source was operating normally during the test. No problems were encountered during the sampling procedure. The average emission concentration and isokinetic ratio was 0.012 gr/dscf and 98.6%, respectively. This is in compliance with the permit requirements.

During the testing, I noted the quality of the recycle material. During test runs #1 and #2, the recycle material was trucked in. It was very consistent in color and texture and appeared to be freshly crushed. During run #3, the recycle material was switched to that which was piled on site. It tended to be of a larger, coarse and inconsistent nature. Occasionally, pieces failed to penetrate the grate above the recycle hopper. This may attribute to the dramatic increase in formaldehyde emissions during run #3. The emission rates were as follows; 0.70, 0.60 and 1.96 lb/hr for test runs 1,2 and 3, respectively (1.09 lb/Hr ave.).

MG/pad

cc Joe Perez - AM/3
U.S. EPA Region V

AME OF SOURCE: PAYNE AND DOLAN CONTROL # 53

OCATION OF SOURCE: WAUKESHA - PORTABLE

ROCESS TESTED: ASPHALT PLANT

ATE OF TEST: 111590

UN NUMBER: 1

NUMBER OF SAMPLING POINTS= 25

M DGM VOL,METER COND DRY= 39.5787 CFD

B BAR PRESS,STATION= 29 IN HG

L TOTAL VOL OF WATER COLLECTED= 387 ML

CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 5.4 %

O2 % OXYGEN BY VOL,DRY BASIS= 13.6 %

CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

N2 % NITROGEN BY VOL,DRY BASIS= 81 %

P PITOT TUBE COEFFICIENT= .85

S STACK PRESS= 28.97 IN HG

S AREA OF THE SAMPLING SITE= 13.875 SQ FEET

T TOTAL DRY PARTICULATE= .028 GM

TOTAL SAMPLING TIME= 62 MIN

N AREA OF THE NOZZLE= .000341 SQ FEET

'AYNE AND DOLAN CONTROL # 53,ASPHALT PLANT,RUN: 1

CALCULATED RESULTS

'S STACK TEMPERATURE = 273.4 DEG F

MSTD DGM VOL,STD COND DRY= 38.5469 SCFD

'WSTD VOL OF WATER VAPOR,STD COND= 18.21609 SCF

.M % MOISTURE IN STACK GAS BY VOL,STD COND= 32.09149 %

ID MOLE FRACTION OF DRY GAS= .6790851

'WD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.408 LB/LB-MOLE

'WS MOLECULAR WT OF STACK GAS,WET BASIS= 25.747 LB/LB-MOLE

'S AVE STACK GAS VELOCITY,STACK COND= 64.29059 FPS

'ACT ACTUAL STACK GAS FLOW RATE= 53521.91 CFM

'STD AVE STACK GAS FLOW RATE,STD COND DRY= 25335.86 SCFMD

.EA AVE % EXCESS AIR= 174.7174 %

'MRA AVE PMR BY RATIO OF AREAS METHOD= 2.430708 LB/HR

'MRC AVE PMR BY CONC METHOD= 2.434401 LB/HR

'MR(AVE) AVE PMR,STD COND DRY= 2.432554 LB/HR

: EMISSION CONC,STD COND DRY= 1.120816E-02 GR/SCFD

'GR AVE STACK GAS RATE,STD COND DRY= 115938.8 LB/HR

.B/MLB EMISSION CONC,STD COND DRY= 2.098137E-02 LB/MLB OF DRY GAS

'GR AVE STACK GAS RATE,STD COND WET= 149474 LB/HR

.B/MLB EMISSION CONC,STD COND WET= .0162741 LB/MLB OF WET GAS

.IGR % ISOKINETIC RATIO= 99.84831 %

NAME OF SOURCE: PAYNE AND DOLAN #53

LOCATION OF SOURCE: WAUKESHA

PROCESS TESTED: ASPHALT PLANT

DATE OF TEST: 111590

RUN NUMBER: 2

N NUMBER OF SAMPLING POINTS= 25

VM DGM VOL,METER COND DRY= 40.0075 CFD

PB BAR PRESS,STATION= 29 IN HG

VL TOTAL VOL OF WATER COLLECTED= 382 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 5.4 %

%O2 % OXYGEN BY VOL,DRY BASIS= 13.6 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

%N2 % NITROGEN BY VOL,DRY BASIS= 81 %

CP PITOT TUBE COEFFICIENT= .85

PS STACK PRESS= 28.97 IN HG

AS AREA OF THE SAMPLING SITE= 13.875 SQ FEET

MT TOTAL DRY PARTICULATE= .0259 GM

T TOTAL SAMPLING TIME= 62 MIN

AN AREA OF THE NOZZLE= .000341 SQ FEET

PAYNE AND DOLAN,ASPHALT PLANT,RUN: 2

CALCULATED RESULTS

TS STACK TEMPERATURE = 268.8 DEG F

VMSTD DGM VOL,STD COND DRY= 38.95861 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= 17.98074 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 31.57876 %

MD MOLE FRACTION OF DRY GAS= .6842125

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.408 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 25.8055 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 63.93782 FPS

QACT ACTUAL STACK GAS FLOW RATE= 53229.23 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 25547.33 SCFMD

%EA AVE % EXCESS AIR= 174.7174 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= 2.239724 LB/HR

PMRC AVE PMR BY CONC METHOD= 2.237946 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 2.238835 LB/HR

C EMISSION CONC,STD COND DRY= 1.021838E-02 GR/SCFD

QSR AVE STACK GAS RATE,STD COND DRY= 116906.5 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 1.915065E-02 LB/MLB OF DRY GAS

QWR AVE STACK GAS RATE,STD COND WET= 149932 LB/HR

LB/MLB EMISSION CONC,STD COND WET=.1.493234E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 100.0795 %

AME OF SOURCE: PAYNE AND DOLAN CONTROL # 53

OCATION OF SOURCE: WAUKESHA - PORTABLE

ROCESS TESTED: ASPHALT PLANT

ATE OF TEST: 111590

UN NUMBER: 3

NUMBER OF SAMPLING POINTS= 25

M DGM VOL,METER COND DRY= 40.1 CFD

B BAR PRESS,STATION= 29 IN HG

L TOTAL VOL OF WATER COLLECTED= 292 ML

CO2 % CARBON DIOXIDE BY VOL,DRY BASIS= 5.4 %

O2 % OXYGEN BY VOL,DRY BASIS= 13.6 %

CO % CARBON MONOXIDE BY VOL, DRY BASIS= 0 %

N2 % NITROGEN BY VOL,DRY BASIS= 81 %

P PITOT TUBE COEFFICIENT= .85

S STACK PRESS= 28.97 IN HG

S AREA OF THE SAMPLING SITE= 13.875 SQ FEET

T TOTAL DRY PARTICULATE= .0348 GM

TOTAL SAMPLING TIME= 62 MIN

N AREA OF THE NOZZLE= .000341 SQ FEET

'AYNE AND DOLAN CONTROL # 53,ASPHALT PLANT,RUN: 3

CALCULATED RESULTS

'S STACK TEMPERATURE = 270.2 DEG F

/MSTD DGM VOL,STD COND DRY= 39.04113 SCFD

/WSTD VOL OF WATER VAPOR,STD COND= 13.74444 SCF

'M % MOISTURE IN STACK GAS BY VOL,STD COND= 26.03825 %

ID MOLE FRACTION OF DRY GAS= .7396175

'WD MOLECULAR WT OF STACK GAS,DRY BASIS= 29.408 LB/LB-MOLE

'WS MOLECULAR WT OF STACK GAS,WET BASIS= 26.43756 LB/LB-MOLE

'S AVE STACK GAS VELOCITY,STACK COND= 61.97629 FPS

'ACT ACTUAL STACK GAS FLOW RATE= 51595.26 CFM

'STD AVE STACK GAS FLOW RATE,STD COND DRY= 26717.51 SCFMD

'EA AVE % EXCESS AIR= 174.7174 %

'MPA AVE PMR BY RATIO OF AREAS METHOD= 3.021023 LB/HR

'MRC AVE PMR BY CONC METHOD= 3.150219 LB/HR

'MR(AVE) AVE PMR,STD COND DRY= 3.03562 LB/HR

: EMISSION CONC,STD COND DRY= .0137538 GR/SCFD

'GR' AVE STACK GAS RATE,STD COND DRY= 122261.3 LB/HR

.B/MLB EMISSION CONC,STD COND DRY= 2.523792E-02 LB/MLB OF DRY GAS

'GR AVE STACK GAS RATE,STD COND WET= 148606.4 LB/HR

.B/MLB EMISSION CONC,STD COND WET= 2.076371E-02 LB/MLB OF WET GAS

'ISR % ISOKINETIC RATIO= 95.89883 %

AVG	49	TO	54 =	9.4
AVG	50	TO	55 =	9.8
AVG	51	TO	56 =	9.6
AVG	52	TO	57 =	10.0
AVG	53	TO	58 =	9.6
AVG	54	TO	59 =	10.0

VISIBLE EMISSIONS READINGS
P & D CTR #53
11/15/90 Run 1

SIX LARGEST SIX MINUTE AVERAGES

AVG	52	TO	57 =	10.0
AVG	41	TO	46 =	9.0
AVG	17	TO	22 =	7.9
AVG	24	TO	29 =	7.7
AVG	33	TO	38 =	7.7
AVG	10	TO	15 =	7.3

AVG 50 TO 55 = 12.1
AVG 51 TO 56 = 11.3
AVG 52 TO 57 = 11.3
AVG 53 TO 58 = 11.9
AVG 54 TO 59 = 11.5

VISIBLE EMISSIONS READINGS
P & D CTR #53
11/15/90 Run 2

SIX LARGEST SIX MINUTE AVERAGES

AVG 49 TO 54 = 12.7
AVG 19 TO 24 = 12.1
AVG 6 TO 11 = 11.0
AVG 36 TO 41 = 11.0
AVG 25 TO 30 = 8.8
AVG 43 TO 48 = 8.8

AVG	49	TO	54	= 8.8
AVG	50	TO	55	= 9.4
AVG	51	TO	56	= 9.6
AVG	52	TO	57	= 10.4
AVG	53	TO	58	= 10.4
AVG	54	TO	59	= 11.5

VISIBLE EMISSIONS READINGS
P & D CTR #53
11/15/90 Run 3

SIX LARGEST SIX MINUTE AVERAGES

AVG	41	TO	46	= 15.8
AVG	32	TO	37	= 14.4
AVG	22	TO	27	= 14.2
AVG	10	TO	15	= 11.9
AVG	54	TO	59	= 11.5
AVG	16	TO	21	= 10.0

PAYNE & DOLAN CONTROL 53

FORMALDEHYDE CALCULATIONS $\gamma = 1.017$

Q = 25567.17 = 43403.74 m^3/hr

TEST 1 $V_m = 4.00\ ft^3$ $T_m = 78F\ (538R)$ **811 mg**

269 TPH $P_B = 29.40$

$V_{M\,std} = 4.00 * 1.017 * \frac{528}{538} * \frac{29.40}{29.92} * .02832\ \frac{m^3}{ft^3}$

$= 3.92\ scf = 0.111\ std\ m^3$

$C = \frac{0.811\ mg}{0.111\ m^3} = 7.31\ mg/m^3$

ER = **0.70 #/hr** | **0.0026 #/ton** |

TEST 2 $V_m = 3.00\ ft^3$ $T_m = 80F\ (540R)$ **517 mg**

270 TPH Q = 25773.87 = 43796.96 m^3/hr

$V_{M\,std} = 3.00 * 1.017 * \frac{528}{540} * \frac{29.4}{29.92} * .02832$

$= 2.93\ scf = 0.083\ std\ m^3$

$C = \frac{.517\ mg}{.083\ m^3} = 6.23\ mg/m^3$

ER = **0.60 #/hr** | **0.0022 #/ton** |

TEST 3 $V_m = 3.00\ ft^3$ $T_m = 75F\ (535R)$ **1630 mg**

269 TPH

$V_{M\,std} = 3.00 * 1.017 * \frac{528}{535} * \frac{29.4}{29.92} * .02832$

Q = 26912.47 = 45729.67 m^3/hr

$= 2.96\ scf = 0.084\ std\ m^3$

$C = \frac{1.63\ mg}{.084\ m^3} = 19.40\ mg/m^3$

ER = **1.96 #/hr** | **0.0072 #/ton** |

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 3-23-92 File Code: 4530

PRELIMINARY STACK TEST REVIEW Received: 12/26/91

By: A. Seibin Test Date: 11-12-91

Name of Source: Payne & Dolan - #15 FID #: 999 905 280

Address: Lakeland Rd. Stack #: 501

City: Sauville, WI Process #: P01

Permit #: 91-DAA-204 Date Issued: 3-13-91

Description of Source Tested: ~~R~~ drum mix asphalt plant

Description of Control Equipment: Baghouse

Test Firm: ETE

Crew Chief & Phone#: Bill Dick (414) 784-2434

Pollutant Tested: Particulate Test Method: 17

Pollutant Tested: HCHO Test Method: NIOSH 3500

Pollutant Tested: Test Method:

Test Production Level: 230 TPH (80% virgin + 20% recycle)

Rated Production Level: 250 TPH - 275 TPH

Discussion of Results:

Poll. Test Ave. = 0.085 Limit = 0.04 gr PM/DSCF

In Compliance? Y (N)

Poll. Test Ave. = 0.29 Limit = 0.029 # HCHO/Hr or 250 #/Hr

In Compliance? Y (N)

Poll. Test Ave. = Limit =

In Compliance? Y N

Poll. Test Ave. = Limit =

In Compliance? Y N

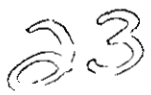
Is This a Valid Test? Y N If answer is no, please indicate the reason.

Test may be reviewed in depth later, if necessary.

→ CC Joe Perez-AM/10
US EPA Region V
Mike Griffin - SED

Partic. Method 17?

No Process Description



PARTICULATE CHECKLIST

Name of Source: P & D #15 Test Date: 11-12-91

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES__ NO ✓
   (NSPS) sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

✓ Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 $Lb/10^6$ BTU = (Lb/Hr)/(10^6 BTU/Hr)

Eq. 9 $Lb/10^6$ BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or $Lb/10^6$ BTU, solve the needed Eq. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES__ NO ✓
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES ✓ NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

GASEOUS TEST CHECKLIST

Name of Source: Payne Dillon #5 Gas Tested: HCHO Test Date: 11-12-91

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ Moisture\ as\ Decimal)$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-Stack\ O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/Stack\ CO_2$

---

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*Molecular\ Weight\ of\ Gas/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*Molecular\ Weight\ of\ Gas$

Eq. 6 $Lb/DSCF = 6.243*10^{-8}*(mg/DSCM)$

✓ Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$ Eq. 8 $Lb/10^6\ BTU = (Lb/Hr)*(10^6\ BTU/Hr)$

250 #/yr

Eq. 9 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-Stack\ O_2)$

---

3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-9. Eq. 1-3 may also be needed. Do your results match the consultant's? YES ✓ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 10 $\%\ Capture\ Eff. = \frac{(Lb\ VOC/Hr\ to\ Control\ Equip.)*100}{(Lb\ VOC/Hr\ Input\ to\ Process)}$

Eq. 11 $\%\ Destruction\ Eff. = \frac{(Inlet\ Lb\ VOC/Hr - Outlet\ Lb\ VOC/Hr)*100}{(Inlet\ Lb\ VOC/Hr)}$

Eq. 12 $\%\ Overall\ Eff. = (\%\ Cap.\ Eff./100)*(\%\ Dest.\ Eff./100)*100$

---

4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-12. Eq. 1-8 may also be needed. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

6. Is the average result in compliance? YES__ NO ✓
   If no, the District should issue an NOV.

7. Was the source operating at a level representative of full capacity? YES ✓ NO__
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On November 12, 1991, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Payne & Dolan, Inc. Control no. 15 asphalt plant located in Saukville, Wisconsin. The average of the three particulate tests show the emissions to be above the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	LB/HR	Emissions	% of Allowable	Isokinetic Ratio
1	14.89	0.067 gr/dscf	167 %	98
2	13.80	0.063	158	101
3	7.62	0.035	88	103
		---	---	
AVG	12.10	0.055 gr/dscf	138 %	Ave 101

In addition, the permit also required testing for formaldehyde emissions. The following table presents the numerical results:

Test	LB/HR	LB/TON
1	0.23 lb/hr	0.0010 lb/ton
2	0.22	0.0010
3	0.42	0.0018
	---	---
AVG	0.29 lb/hr	0.0013 lb/ton

The permit also required that opacity observations be performed concurrently with the particulate test. All individual readings were either 0 % or 5 % and thus the six minute average opacities were all well below the permit limit of 20 %.

2.2 Formaldehyde Emissions

The formaldehyde emissions were determined concurrently with the particulate and opacity observations using NIOSH Method 3500. A brief description of the method is included in section 3.0 of this report. The numerical results are presented below:

Test	mg/m^3	LB/HR	LB/TON
1	2.36	0.23 lb/hr	0.0010 lb/ton
2	2.31	0.22	0.0010
3	4.39	0.42	0.0018
AVG		0.29 lb/hr	0.0013 lb/ton

2.3 Visible Emissions (Opacity)

The visible emissions (opacity) was observed for three sixty minute periods which coincided with the particulate emission tests. The opacity was observed in accordance with the procedures outlined in EPA Method 9 -Visible Determination of the Opacity of Emissions from Stationary Sources. All individual opacity readings were either 0 % or 5 % and thus the six minute average opacities were well below the permit limit of 20 %. Copies of the field data observation sheets are included in the APPENDIX to this report.

PAYNE & DOLAN CONTROL 15 TEST 1 TABLE 2-1 11-12-91

BAROMETRIC PRESSURE, in Hg = 29.150
TIP DIAMETER, in .2500
STACK AREA, sq ft = 13.500
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 39.32
WATER COLLECTED, ml = 283.00
PARTICULATE COLLECTED, grams = 0.1692
CO2 = 7.20 O2 = 11.60 CO = 0.00 N2 = 81.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	290	1.000	1.60	52	71.29
2	290	0.920	1.45	53	68.38
3	290	0.840	1.35	54	65.34
4	295	0.700	1.12	55	59.84
5	290	1.000	1.60	55	71.29
6	295	0.980	1.56	55	70.81
7	295	0.840	1.35	55	65.56
8	290	0.700	1.12	56	59.65
9	290	0.960	1.55	56	69.85
10	290	0.860	1.40	56	66.11
11	295	0.740	1.20	57	61.53
12	290	0.620	1.00	57	56.13
13	295	0.860	1.40	58	66.33
14	290	0.740	1.20	58	61.33
15	290	0.720	1.15	58	60.49
16	290	0.600	0.96	58	55.22
17	290	0.740	1.20	58	61.33
18	295	0.700	1.12	59	59.84
19	290	0.660	1.05	59	57.92
20	290	0.540	0.86	60	52.39
AVG VALUES	292		1.262	56	63.03

TOTAL GAS WITHDRAWN, scf = 52.07
DRY GAS WITHDRAWN, scf = 38.75
WATER VAPOR WITHDRAWN, scf = 13.32
PERCENT WATER VAPOR = 25.58
ACTUAL WET FLOW RATE, acfm = 51,055.64
STANDARD DRY FLOW RATE, scfm = 25,975.28
, m3/hr = 44,137.19
PARTICULATE CONCENTRATION, grains/dscf = 0.067
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.103
PARTICULATE EMISSION RATE, lb/hr = 14.89
PERCENT OF ISOKINETIC SAMPLING = 98.49

PAYNE & DOLAN CONTROL 15 TEST 2 TABLE 2-2 11-12-91

BAROMETRIC PRESSURE, in Hg = 29.150
TIP DIAMETER, in .2500
STACK AREA, sq ft = 13.500
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 39.70
WATER COLLECTED, ml = 320.00
PARTICULATE COLLECTED, grams = 0.1587
CO2 = 7.20 O2 = 11.60 CO = 0.00 N2 = 81.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	290	0.760	1.20	59	62.45
2	295	0.720	1.15	60	60.99
3	295	0.700	1.12	60	60.14
4	295	0.560	0.90	60	53.79
5	290	0.840	1.35	60	65.66
6	290	0.740	1.18	60	61.63
7	295	0.720	1.15	60	60.99
8	290	0.620	1.00	60	56.41
9	295	0.860	1.40	60	66.66
10	290	0.800	1.30	60	64.08
11	290	0.740	1.20	60	61.63
12	295	0.700	1.12	61	60.14
13	295	1.000	1.60	61	71.88
14	290	0.960	1.55	61	70.19
15	295	0.900	1.45	62	68.19
16	290	0.800	1.30	63	64.08
17	290	1.000	1.60	64	71.64
18	295	0.960	1.55	65	70.42
19	295	0.920	1.47	66	68.94
20	290	0.800	1.30	67	64.08
AVG VALUES	293		1.294	61	64.20

TOTAL GAS WITHDRAWN, scf = 54.22
DRY GAS WITHDRAWN, scf = 39.15
WATER VAPOR WITHDRAWN, scf = 15.06
PERCENT WATER VAPOR = 27.78
ACTUAL WET FLOW RATE, acfm = 52,000.22
STANDARD DRY FLOW RATE, scfm = 25,639.13
, m3/hr = 43,566.01
PARTICULATE CONCENTRATION, grains/dscf = 0.063
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.095
PARTICULATE EMISSION RATE, lb/hr = 13.80
PERCENT OF ISOKINETIC SAMPLING = 100.81

PAYNE & DOLAN CONTROL 15 TEST 3 TABLE 2-3 11-12-91

BAROMETRIC PRESSURE, in Hg = 29.150
TIP DIAMETER, in .2500
STACK AREA, sq ft = 13.500
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 40.00
WATER COLLECTED, ml = 330.00
PARTICULATE COLLECTED, grams = 0.0885
CO2 = 7.40 O2 = 11.40 CO = 0.00 N2 = 81.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	265	1.020	1.65	50	71.19
2	275	0.940	1.50	50	68.81
3	280	0.900	1.45	50	67.56
4	285	0.740	1.20	50	61.47
5	290	1.000	1.60	50	71.69
6	290	0.960	1.55	50	70.25
7	290	0.880	1.42	50	67.26
8	290	0.760	1.22	50	62.50
9	295	0.880	1.42	49	67.48
10	290	0.820	1.32	49	64.92
11	295	0.720	1.15	49	61.04
12	290	0.580	0.94	49	54.60
13	295	0.840	1.35	50	65.93
14	290	0.740	1.20	50	61.67
15	295	0.700	1.12	51	60.18
16	290	0.600	0.96	52	55.53
17	295	0.760	1.22	53	62.71
18	295	0.700	1.12	53	60.18
19	290	0.700	1.12	54	59.98
20	290	0.580	0.94	55	54.60
AVG VALUES	289		1.273	51	63.48

TOTAL GAS WITHDRAWN, scf = 54.93
DRY GAS WITHDRAWN, scf = 39.40
WATER VAPOR WITHDRAWN, scf = 15.53
PERCENT WATER VAPOR = 28.28
ACTUAL WET FLOW RATE, acfm = 51,417.31
STANDARD DRY FLOW RATE, scfm = 25,303.77
, m3/hr = 42,996.17
PARTICULATE CONCENTRATION, grains/dscf = 0.035
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.053
PARTICULATE EMISSION RATE, lb/hr = 7.62
PERCENT OF ISOKINETIC SAMPLING = 102.78

Project & Dokan Control #15
JOHN Pacocha

Nov 12, 1991
9:00 AM

		TPH % Recycle	TPH Virgin	TPH ASPHALT	BAGHOUSE ΔP inH2O	MIX TEMP
∞		39	161	8.0	6.2	300°
5	TPH	52	182	11.5	6.1	280°
30	236	50	177	10.8	6.1	285°
45	225	45	165	8.5	5.9	280°
:00	220	44	164	8.6	5.9	285°
:15	223	47	168	8.6	5.8	280°
:30	231	48	170	8.6	6.0	279°
:45	228	44	168	8.6	6.2	275°
100	223	43	167	8.5	6.1	280°
:15	227	45	170	8.7	6.2	275°
:30	222	42	166	8.7	6.1	275°
:45						
:00						
:15						
:30						
:45						
1:00	225	43	169	8.8	4.2	280°
:15	229	41	178	9.0	4.4	289°
30	225	39	176	8.7	4.2	285°
:45	228	40	176	9.0	5.0	287°
:00	227	42	178	8.9	5.2	285°
:15	223	41	165	8.8	5.4	280°
:30						
:45						

PAYNE & POLAN SAKVILLE
FORMALDEHYDE CALCULATIONS

$\gamma = 1.020$
$P_b = 29.15$

TEST 1

230 FPH

$V_M = 2.00 \quad T_M = 56$

$V_{Mstd} = V_m * 1.020 * \frac{528}{516} * \frac{29.15}{29.92}$

$= 2.03 \text{ SCF} = .058 \text{ m}^3$

$C = \frac{0.137 \text{ mg}}{.058 \text{ m}^3} = 2.36 \text{ mg/m}^3$

ER: $0.230 \#/\text{hr.} = .0010 \#/\text{tm}$

TEST 2

$V_M = 2.00 \quad T_M = 55$

$V_{Mstd} = 2.04 \text{ SCF} = .058 \text{ m}^3$

$C = \frac{0.134 \text{ mg}}{.058 \text{ m}^3} = 2.31 \text{ mg/m}^3$

ER: $0.022 \#/\text{hr} = .0010 \#/\text{tm}$

TEST 3

$V_m = 2.00 \quad T_m = 97$

$V_{Mstd} = 2.07 \text{ SCF} = .059 \text{ m}^3$

$C = \frac{0.259 \text{ mg}}{.059 \text{ m}^3} = 4.39 \text{ mg/m}^3$

ER: $0.416 \#/\text{hr.} = .0018 \#/\text{tm}$

Date: May 11, 1990 4530

To: Files

From: Joe Perez - AM/3 JP

Subject: Review of stack test performed at Payne & Dolan
Received 12/6/89
Control #29

I. Source

Payne & Dolan Control #29 - FID # 999792090, Stack # S10, Process # P30
P.O. Box 781
Waukesha, WI 53187
Test Date: October 31, 1989 Permit #: 89-POY-077
Test Firm: Environmental Technology & Eng. Corp.
13020 W. Bluemound Rd.
Elm Grove, WI 53122
Crew Chief: Mr Bill Dick (414) 784-2434
Plant Location: Saukville, WI

Control 29 is a CMI drum mix asphalt plant rated at 450 T/Hr. During the test, it was producing about 325 T/Hr with a mix composition of 60% Virgin and 40% recycle. The plant was fired with waste oil. The emissions are controlled by a baghouse.

The test for particulates and chromium was performed using the EPA Metals Train. The

- Test Method for particulate is suspect. "EPA Metals Train"

- No Process Description

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Formaldehyde test was done using NIOSH Method 3500. Opacity was done with EPA Method 9.

II Discussion of Results

The results are shown in Table 1. The average particulate concentration of 0.005 gr/dscf was under the limit of 0.04 gr/dscf. All the six minute average opacity values were under 20%. The average Formaldehyde emission rate of 1.21 Lb/Hr was over the permit limit of 0.0675 Lb/Hr.

I checked over the results and found them to be correct. The report contained calibration data for the sampling equipment and production data for the plant.

CC Jim Chou - SED
U.S. EPA Region V

TABLE 1

SUMMARY

On October 31, 1989, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Payne & Dolan control 29 CMI drum mix asphalt plant located in Saukville, Wisconsin. The average of the three particulate tests show the emissions to be <u>below</u> the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) in permit no. 89-POY-077. The numerical test results are summarized below:

Test	Lb/Hr	Emissions	% of Allowable	Isokinetic Ratio
1	0.994	0.004 gr/dscf	10 %	100
2	0.982	0.004	10	99
3	1.726	0.006	15	99
AVG	1.234	0.005 gr/dscf	12 %	99%

Limit = 0.04 gr/dscf

The opacity of the stack was also observed by a certified observer throughout a three (3) hour test period. The highest 6 minute average opacities for each of the three tests were all <u>less</u> than the permit limit of 20 %.

In addition, the formaldehyde and total chromium emissions were also determined as a permit condition. These numerical results follow:

Test	Formaldehyde	Chromium
1	1.19 lb/hr	<0.00028 lb/hr
2	1.27	<0.00023
3	1.18	<0.00017
AVG	1.21 lb/hr	<0.00023 lb/hr

Permit Limit = 0.0675 Lb/Hr

The formaldehyde emissions exceed the guideline permit limit of 0.0675 pounds per hour while there is no permit limit for total chromium.

FIGURE 2-1

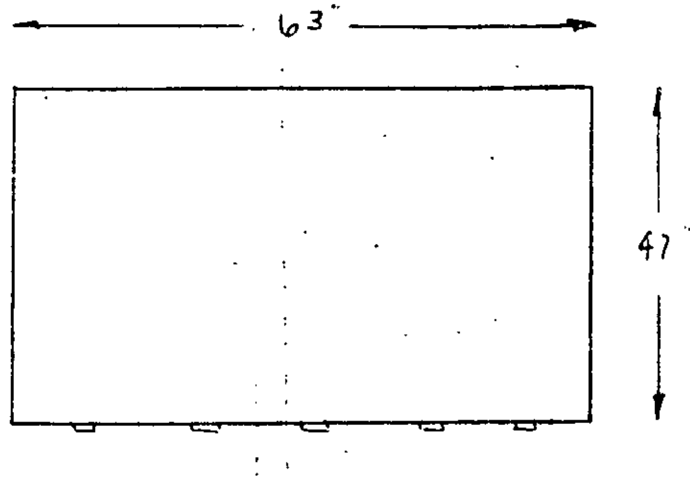
PLANT Payne & Dolan

LOCATION Saukville

PROCESS CMI Drum Plant

DIMENSIONS 63" x 47"

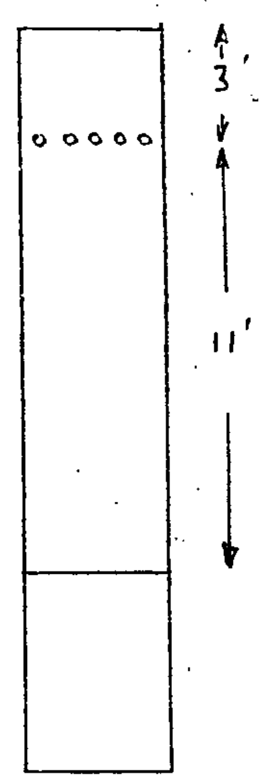
COMMENTS Control 29



TEST SECTION

POINT	DISTANCE FROM STACK WALL
1	4.7"
2	14.1
3	23.5
4	32.9
5	42.3

SAMPLING LOCATION



WYNE & DOLAN SAUKVILLE TEST 1 TABLE 2-1 10-31-89

BAROMETRIC PRESSURE, in Hg = 29.200
TIP DIAMETER, in .3040
STACK AREA, sq ft = 20.563
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 46.98
WATER COLLECTED, ml = 316.00
PARTICULATE COLLECTED, grams = 0.0115
FORMALDEHYDE CONCENTRATION, mg/m3 = 10.1
CO2 = 6.40 O2 = 11.60 CO = 0.00 N2 = 82.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	275	0.560	0.90	52	52.62
2	270	0.480	0.78	55	48.55
3	270	0.480	0.78	57	48.55
4	270	0.500	0.81	58	49.55
5	270	0.500	0.81	59	49.55
6	260	0.480	0.78	60	48.22
7	265	0.420	0.68	61	45.26
8	270	0.440	0.71	61	46.49
9	270	0.400	0.66	62	44.32
10	270	0.400	0.66	62	44.32
11	270	0.460	0.75	62	47.53
12	275	0.420	0.68	63	45.57
13	280	0.420	0.68	65	45.73
14	285	0.480	0.78	66	49.05
15	285	0.560	0.90	67	52.98
16	285	0.400	0.66	68	44.77
17	290	0.360	0.59	69	42.62
18	295	0.300	0.50	70	39.04
19	295	0.300	0.50	70	39.04
20	295	0.500	0.81	71	50.39
21	295	0.650	1.05	72	57.46
22	295	0.460	0.75	74	48.34
23	295	0.520	0.85	75	51.39
24	290	0.520	0.85	76	51.22
25	285	0.660	1.06	77	57.51
AVG VALUES	280		0.759	65	48.00

TOTAL GAS WITHDRAWN, scf = 62.99
DRY GAS WITHDRAWN, scf = 48.12
WATER VAPOR WITHDRAWN, scf = 14.87
PERCENT WATER VAPOR = 23.61
ACTUAL WET FLOW RATE, acfm = 59,225.39
STANDARD DRY FLOW RATE, scfm = 31,470.46
PARTICULATE CONCENTRATION, grains/dscf = 0.004
PARTICULATE EMISSION RATE, lb/hr = 0.994
FORMALDEHYE EMISSION RATE, lb/hr = 1.19
PERCENT OF ISOKINETIC SAMPLING = 99.81

PAYNE & DOLAN SAUKVILLE TEST 2 TABLE 2-2 10-31-89

BAROMETRIC PRESSURE, in Hg = 29.200
TIP DIAMETER, in .3040
STACK AREA, sq ft = 20.563
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 47.75
WATER COLLECTED, ml = 299.00
PARTICULATE COLLECTED, grams = 0.0113
FORMALDEHYDE CONCENTRATION, mg/m3 = 10.5
CO2 = 6.20 O2 = 11.80 CO = 0.00 N2 = 82.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	280	0.420	0.68	72	45.61
2	285	0.420	0.68	73	45.77
3	280	0.460	0.75	73	47.74
4	280	0.460	0.75	74	47.74
5	285	0.420	0.68	75	45.77
6	285	0.460	0.75	76	47.90
7	285	0.460	0.75	76	47.90
8	280	0.520	0.85	77	50.75
9	280	0.520	0.85	78	50.75
10	285	0.480	0.79	79	48.93
11	290	0.440	0.73	80	47.00
12	290	0.400	0.66	80	44.81
13	290	0.440	0.73	80	47.00
14	285	0.560	0.92	81	52.85
15	285	0.600	0.98	82	54.70
16	285	0.360	0.59	82	42.37
17	285	0.400	0.66	83	44.67
18	285	0.400	0.66	83	44.67
19	285	0.440	0.73	84	46.85
20	290	0.660	1.06	85	57.57
21	285	0.500	0.83	86	49.94
22	285	0.560	0.91	86	52.85
23	285	0.480	0.79	86	48.93
24	285	0.520	0.85	86	50.93
25	280	0.680	1.10	86	58.04
AVG VALUES	285		0.789	80	48.88

TOTAL GAS WITHDRAWN, scf = 63.07
DRY GAS WITHDRAWN, scf = 48.99
WATER VAPOR WITHDRAWN, scf = 14.07
PERCENT WATER VAPOR = 22.32
ACTUAL WET FLOW RATE, acfm = 60,308.20
STANDARD DRY FLOW RATE, scfm = 32,397.37
PARTICULATE CONCENTRATION, grains/dscf = 0.004
PARTICULATE EMISSION RATE, lb/hr = 0.982
FORMALDEHYE EMISSION RATE, lb/hr = 1.27
PERCENT OF ISOKINETIC SAMPLING = 98.72

FAYNE & DOLAN SAUKVILLE TEST 3 TABLE 2-3 10-31-89

BAROMETRIC PRESSURE, in Hg = 29.200
TIP DIAMETER, in .3040
STACK AREA, sq ft = 20.563
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 47.60
WATER COLLECTED, ml = 306.00
PARTICULATE COLLECTED, grams = 0.0199
FORMALDEHYDE CONCENTRATION, mg/m3 = 9.8
CO2 = 6.20 O2 = 11.80 CO = 0.00 N2 = 82.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	285	0.420	0.68	78	45.81
2	285	0.400	0.66	78	44.71
3	280	0.420	0.68	78	45.66
4	285	0.460	0.75	78	47.95
5	285	0.460	0.75	78	47.95
6	285	0.440	0.73	79	46.89
7	285	0.480	0.79	79	48.98
8	285	0.500	0.83	80	49.99
9	285	0.520	0.85	80	50.98
10	280	0.560	0.91	80	52.72
11	285	0.420	0.68	81	45.81
12	285	0.420	0.68	81	45.81
13	285	0.420	0.68	81	45.81
14	285	0.500	0.83	81	49.99
15	285	0.520	0.85	81	50.98
16	285	0.360	0.59	82	42.41
17	285	0.360	0.59	82	42.41
18	285	0.420	0.68	82	45.81
19	290	0.460	0.75	82	48.11
20	285	0.620	1.00	82	55.66
21	285	0.520	0.85	82	50.98
22	285	0.520	0.85	83	50.98
23	285	0.560	0.91	83	52.90
24	280	0.560	0.91	83	52.72
25	280	0.680	1.10	83	58.10
AVG VALUES	284		0.783	81	48.80

TOTAL GAS WITHDRAWN, scf = 63.24
DRY GAS WITHDRAWN, scf = 48.84
WATER VAPOR WITHDRAWN, scf = 14.40
PERCENT WATER VAPOR = 22.77
ACTUAL WET FLOW RATE, acfm = 60,213.93
STANDARD DRY FLOW RATE, scfm = 32,164.58
PARTICULATE CONCENTRATION, grains/dscf = 0.006
PARTICULATE EMISSION RATE, lb/hr = 1.726
FORMALDEHYE EMISSION RATE, lb/hr = 1.18
PERCENT OF ISOKINETIC SAMPLING = 99.13

P & D SAUKVILLE (CONTROL 29) 89-1193

FORMALDEHYDE CALCULATIONS

TEST 1

$$V_a = 2.40 * 1.015 * \frac{29.2}{29.92} * \frac{528}{498}\ T_M$$

$$= 2.52\ scf * .02832 = .0714\ stl\ m^3$$

$$C = \frac{0.719\ mg}{.0714\ m^3} = 10.07\ mg/m^3$$

$$ER = 1.19\ \#/M.$$

TEST 2

$$V_{OL} = 2.32 * 1.015 * \frac{29.2}{29.92} * \frac{528}{498}$$

$$= 2.44\ scf * .02832 = .0691\ stl\ m^3$$

$$C = \frac{0.724\ mg}{.0691\ m^3} = 10.48\ mg/m^3$$

$$ER = 1.22\ \#/M.$$

TEST 3

$$V_{OL} = 2.30 * 1.015 * \frac{29.2}{29.92} * \frac{528}{498}$$

$$= 2.41\ scf * .02832 = .0683\ stl\ m^3$$

$$C = \frac{.667\ mg}{.0683\ m^3} = 9.77\ mg/m^3$$

$$ER = 1.18\ \#/M$$

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: 3-31-92

File Code: 4530

Received: 11/13/91

PRELIMINARY STACK TEST REVIEW

By: A Seeber

Test Date: 9-26-91

Name of Source: Pitlick & Wick

FID #: 999 397 960

Address: 4827 Sand Beach Dr.

Stack #: 310

City: Eagle River, WI

Process #: P30

Permit #: 91-DCF-069

Date Issued: 8-1-91

Description of Source Tested: CMI drum mix asphalt plant. Emissions are controlled by a baghouse. The plant was firing w/ waste oil.

Description of Control Equipment: Baghouse

Test Firm: ETE

Crew Chief & Phone#: Mr. Lowell Huening (414) 784-2434

Pollutant Tested: Part. Test Method: 17

Pollutant Tested: HCHO Test Method: NIOSH 3500

Pollutant Tested: VE Test Method: 9

Test Production Level: 218 TPH

Rated Production Level: 250 TPH

Discussion of Results:

Poll. Test Ave. = 0.022 Limit = 0.039 gr/dscf PM

In Compliance? (Y) N

Poll. Test Ave. = 1279 Limit = 250 # HCHO/hr

In Compliance? Y (N)

Poll. Test Ave. = _____ Limit = _____

In Compliance? Y N

Poll. Test Ave. = _____ Limit = _____

In Compliance? Y N

Is This a Valid Test? (Y) N If answer is no, please indicate the reason.

Test may be reviewed in depth later, if necessary.

→ CC Joe Perez-AM/10
US EPA Region V
Neal Baudhuin - NCD

Partic. Method 17 ?

No Process Description.

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PARTICULATE CHECKLIST

Name of Source: Pitlick + Wick Test Date: 9-26-91

1. Are the isokinetics per run between 90 and 110%? YES✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES✓ NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES__ NO✓
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

✓ Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 $Lb/10^6$ BTU = (Lb/Hr)/(10^6 BTU/Hr)

Eq. 9 $Lb/10^6$ BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

---

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or $Lb/10^6$ BTU, solve the needed Eq. Do your results match the consultant's? YES✓ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES✓ NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES✓ NO__
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES✓ NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

GASEOUS TEST CHECKLIST

Name of Source: Pitlik/Wick Gas Tested: HCHO Test Date: 9-26-91

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET}/(1-\%\ Moisture\ as\ Decimal)$

Eq. 2 $PPM_{DRY}@\ 7\%\ O_2 = PPM_{DRY}*(20.9-7)/(20.9-Stack\ O_2)$

Eq. 3 $PPM_{DRY}@\ 12\%\ CO_2 = PPM_{DRY}*12/Stack\ CO_2$

---

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES__ NO__ ____
   If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY}*Molecular\ Weight\ of\ Gas/24.06$

Eq. 5 $Lb/DSCF = 2.595*10^{-9}*PPM_{DRY}*Molecular\ Weight\ of\ Gas$

Eq. 6 $Lb/DSCF = 6.243*10^{-8}*(mg/DSCM)$

Eq. 7 $Lb/Hr = 60*DSCFM*(Lb/DSCF)$ ✓ Eq. 8 $Lb/10^6\ BTU = (Lb/Hr)*(10^6\ BTU/Hr)$

Eq. 9 $Lb/10^6\ BTU = (Lb/DSCF)*F\ Factor*20.9/(20.9-Stack\ O_2)$

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3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or $Lb/10^6$ BTU, solve Eq. 4-9. Eq. 1-3 may also be needed. Do your results match the consultant's? YES✓ NO__
   If no, fix the problem or call the consultant for a correction.

Eq. 10 $\%\ Capture\ Eff. = \frac{(Lb\ VOC/Hr\ to\ Control\ Equip.)*100}{(Lb\ VOC/Hr\ Input\ to\ Process)}$

Eq. 11 $\%\ Destruction\ Eff. = \frac{(Inlet\ Lb\ VOC/Hr - Outlet\ Lb\ VOC/Hr)*100}{(Inlet\ Lb\ VOC/Hr)}$

Eq. 12 $\%\ Overall\ Eff. = (\%\ Cap.\ Eff./100)*(\%\ Dest.\ Eff./100)*100$

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4. If the limit is in terms of % Capture Eff., % Dest. Eff., or Overall Eff., solve Eq. 9-12. Eq. 1-8 may also be needed. Do your results match the consultant's? YES__ NO__
   If no, fix the problem or call the consultant for a correction.

5. Is the three run(or two run) average correct? YES✓ NO__
   If no, write in the correct average.

6. Is the average result in compliance? 250 # HCHO/yr YES__ NO✓
   If no, the District should issue an NOV.

7. Was the source operating at a level representative of full capacity? YES✓ NO__
   If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

SUMMARY

On September 26, 1991, Environmental Technology & Engineering Corp personnel performed stack emissions testing on the asphalt plant located on Highway 45 north of Eagle River, Wisconsin. The purpose of the testing was to demonstrate compliance with the particulate, visible emissions, and formaldehyde limits set forth in Wisconsin DNR Air Pollution Control Permit No. 91-DCF-069 (issued 5/1/91). The emissions from the operations were controlled with a baghouse. F.I.D = 999 397960 Firing waste oil.

Testing to determine total particulate matter emissions were performed using EPA Method 17. The results were well below the DNR permit limitation and are shown below:

Test	Particulate Emission Concentration
1	0.0221 grains/dscf
2	0.0270 grains/dscf
3	0.0176 grains/dscf
AVG	0.0222 grains/dscf
DNR Permit Limitation	0.039 grains/dscf

Formaldehyde emissions were determined using modified NIOSH Method 3500 sampling and analytical methods. The results indicated the following emission rates:

Test	Formaldehyde Emission Rate
1	0.163 lb/hr
2	0.126 lb/hr
3	0.150 lb/hr
AVG	0.146 lb/hr
DNR Permit Limitation	250 pounds per year

RECEIVED NOV 13 1991 AIR MANAGEMENT

Visible emissions were determined using EPA Method 9. All readings indicated an opacity level of zero.

PITLICK & WICK CONOVER-BAGHOUSE TEST 1 TABLE 2-1 9-26-91

BAROMETRIC PRESSURE, in Hg = 28.300
TIP DIAMETER, in .3120
STACK AREA, sq ft = 11.750
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 47.00
WATER COLLECTED, ml = 391.00
PARTICULATE COLLECTED, grams = 0.0640
CO2 = 7.00 O2 = 12.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	240	0.340	1.45	40	41.07
2	240	0.360	1.55	40	42.27
3	245	0.360	1.55	40	42.42
4	245	0.380	1.60	42	43.58
5	245	0.390	1.65	42	44.15
6	245	0.380	1.60	42	43.58
7	240	0.380	1.60	44	43.42
8	240	0.420	1.80	44	45.65
9	240	0.420	1.80	46	45.65
10	245	0.420	1.80	46	45.81
11	240	0.380	1.60	48	43.42
12	240	0.380	1.60	48	43.42
13	240	0.430	1.82	50	46.19
14	240	0.430	1.82	52	46.19
15	240	0.380	1.60	54	43.42
16	240	0.400	1.70	56	44.55
17	240	0.360	1.55	58	42.27
18	240	0.400	1.70	60	44.55
19	235	0.400	1.70	60	44.39
20	235	0.420	1.80	60	45.49
AVG VALUES	241		1.665	49	44.08

TOTAL GAS WITHDRAWN, scf = 63.03
DRY GAS WITHDRAWN, scf = 44.62
WATER VAPOR WITHDRAWN, scf = 18.40
PERCENT WATER VAPOR = 29.20
ACTUAL WET FLOW RATE, acfm = 31,072.97
STANDARD DRY FLOW RATE, scfm = 15,675.27
PARTICULATE CONCENTRATION, grains/dscf = 0.0221
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.034
PARTICULATE EMISSION RATE, lb/hr = 3.05
PERCENT OF ISOKINETIC SAMPLING = 105.02

PITLICK & WICK CONOVER-BAGHOUSE TEST 2 TABLE 2-2 9-26-91

BAROMETRIC PRESSURE, in Hg = 28.300
TIP DIAMETER, in .3120
STACK AREA, sq ft = 11.750
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 45.84
WATER COLLECTED, ml = 417.00
PARTICULATE COLLECTED, grams = 0.0763
CO2 = 7.00 O2 = 12.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	240	0.360	1.55	54	42.44
2	240	0.380	1.60	54	43.61
3	235	0.400	1.70	54	44.58
4	235	0.420	1.80	54	45.68
5	230	0.420	1.80	56	45.51
6	230	0.420	1.80	56	45.51
7	230	0.400	1.70	56	44.42
8	230	0.400	1.70	56	44.42
9	230	0.420	1.80	56	45.51
10	230	0.400	1.70	58	44.42
11	230	0.400	1.70	60	44.42
12	230	0.400	1.70	60	44.42
13	230	0.380	1.60	60	43.29
14	230	0.380	1.60	60	43.29
15	230	0.400	1.70	60	44.42
16	230	0.420	1.80	60	45.51
17	230	0.380	1.60	60	43.29
18	230	0.380	1.60	60	43.29
19	230	0.380	1.60	60	43.29
20	230	0.400	1.70	60	44.42
AVG VALUES	232		1.688	58	44.29

TOTAL GAS WITHDRAWN, scf = 63.20
DRY GAS WITHDRAWN, scf = 43.57
WATER VAPOR WITHDRAWN, scf = 19.63
PERCENT WATER VAPOR = 31.06
ACTUAL WET FLOW RATE, acfm = 31,222.86
STANDARD DRY FLOW RATE, scfm = 15,542.19
PARTICULATE CONCENTRATION, grains/dscf = 0.0270
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.040
PARTICULATE EMISSION RATE, lb/hr = 3.66
PERCENT OF ISOKINETIC SAMPLING = 103.42

PITLICK & WICK CONOVER-BAGHOUSE TEST 3 TABLE 2-3 9-26-91

BAROMETRIC PRESSURE, in Hg = 28.300
TIP DIAMETER, in .3120
STACK AREA, sq ft = 11.750
SAMPLING TIME PER POINT, min = 3.00
NUMBER OF POINTS = 20
GAS METER VOLUME, acf = 46.51
WATER COLLECTED, ml = 395.00
PARTICULATE COLLECTED, grams = 0.0503
CO2 = 7.00 O2 = 12.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	230	0.360	1.55	56	42.00
2	230	0.380	1.60	54	43.15
3	230	0.400	1.70	54	44.27
4	230	0.400	1.70	54	44.27
5	230	0.380	1.60	56	43.15
6	230	0.400	1.70	56	44.27
7	230	0.400	1.70	56	44.27
8	230	0.400	1.70	58	44.27
9	230	0.420	1.80	56	45.37
10	230	0.420	1.80	56	45.37
11	230	0.420	1.80	56	45.37
12	230	0.400	1.70	56	44.27
13	230	0.420	1.80	58	45.37
14	230	0.420	1.80	60	45.37
15	230	0.420	1.80	60	45.37
16	230	0.420	1.80	60	45.37
17	230	0.380	1.60	60	43.15
18	230	0.380	1.60	60	43.15
19	230	0.400	1.70	60	44.27
20	230	0.400	1.70	60	44.27
AVG VALUES	230		1.707	57	44.32

TOTAL GAS WITHDRAWN, scf = 62.80
DRY GAS WITHDRAWN, scf = 44.21
WATER VAPOR WITHDRAWN, scf = 18.59
PERCENT WATER VAPOR = 29.61
ACTUAL WET FLOW RATE, acfm = 31,244.27
STANDARD DRY FLOW RATE, scfm = 15,914.89
PARTICULATE CONCENTRATION, grains/dscf = 0.0176
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.026
PARTICULATE EMISSION RATE, lb/hr = 2.42
PERCENT OF ISOKINETIC SAMPLING = 102.47

Pitlick + Wick — HCOH Analysis — 10/3/91

SAMPLE ID	SAMPLE VOL (mL)	ALIQ VOL	C. ACID mL	RDG	RDG − BLANK	mg/ALIQ	µg/SAMP		TOTAL
Pitlick + Wick		1	1.0						µg
9/26 Condor 1A	29.0	0.50		.262	.226	2.76	160		160
26,635 m³/hr									0.163 #/hr.
1B	12.8	1.0		037	.001	—	—		2.78 mg/m³
			↓						
2A	30.8	0.50		.202	.166	2.02	124		124
26,409 m³/hr.									0.126 #/hr.
2B	13.0	1.0		.036	—				2.156 mg/m³
3A	29.0	0.50		.245	.209	2.55	148		148
27,043 m³/hr.									0.150 #/hr.
3B	10 9	1.0		.036	—				2.513 mg/m³

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

DATE: October 12, 1990

TO: File

FROM: Marty Burkholder MB

SUBJECT: Stack Test Review - Rock Road of WI Bituma 400
Received 9/4/90

I. SOURCE

Rock Road of Wisconsin
Bituma 400 Portable Asphalt Plant
P.O. Box 1779
Janesville, WI 53547
(608) 752-8944
Contact: Stephen Kennedy, Vice President

Location At Time Of Testing: Hwy 81 west of Beloit, WI
FID # 999010320, Stack S01, Process P01
Permit # MIA-10-KJC-82-54-130A

Test Date: August 7, 1990

Test Firm: Environmental Technology & Engineering Corporation
13020 W. Bluemound Road
Elm Grove, WI 53122
(414) 784-2434
Crew Chief: Bill Dick

The source tested was a Bituma 400 drum mix asphalt plant equipped with a baghouse. Rock Road of Wisconsin had requested on 6/22/90 that their permit be altered in order to change from a wet scrubber to a baghouse. During the test, the plant production rate was at approximately 400 tons/hr with 40 % recycle. The plant was fired with #2 fuel oil. Mary Oleson and Martin Burkholder of the DNR Southern District Office witnessed the test.

II. DISCUSSION OF RESULTS

The test results are shown on the Results page. The average emission concentration of 0.010 gr/dscf is below the limit of 0.04 gr/dscf as stated in Section NR 440.25 Wis. Adm. Code.

The test method used by ETE was EPA Method 17. I made some calculations (stack area, vol. condensed H2O, etc.) and ran the data for Run #1 on the Department computer program. The values were similar to those of ETE. The calculated results are attached. Isokinetic ratios, sample volume, and stack temperatures were within the Department guidelines.

cc: Joe Perez - AM/3
U.S. EPA Region V

No Production capacity.
Partic. Method 17?
No process description.

SUMMARY

On August 7, 1990, Environmental Technology & Engineering Corporation personnel performed a stack emission test on the Rock Road of Wisconsin, Inc. drum mix asphalt plant located on Highway 81 west of Beloit, Wisconsin. The average of the three particulate tests show the emissions to be well below the limit of 0.04 grains of particulate matter per dry standard cubic foot (gr/dscf) as specified by the State of Wisconsin Department of Natural Resources (DNR) by permit. The numerical test results are summarized below:

Test	Emissions	% of Allowable
1	0.013 gr/dscf	32
2	0.009	22
3	0.007	17
AVG	0.010 gr/dscf	25 %

The opacity of the stack was also observed by a certified observer throughout a three (3) hour test period. The highest 6 minute average opacities for each of the three tests were all less than the permit limit of 20 %. The following table presents the highest 6 minute average for each test:

Test	Highest 6 Min Average Opacity
1	16.5 %
2	10.6 %
3	9.4 %

Formaldehyde Emissions

The formaldehyde emissions were determined concurrently with the particulate and opacity observations using NIOSH Method 3500. A brief description of this method is included. The numerical results are presented below:

Test	TPH	LB/HR	LB/TON
1	388	0.22 lb/hr	0.00057
2	416	0.35	0.00084
3	416	0.20	0.00048
AVG	407	0.26 lb/hr	0.00064

ROCK ROAD OF WISCONSIN TEST 1 TABLE 2-1 8-7-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.668
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 37.42
WATER COLLECTED, ml = 331.00
PARTICULATE COLLECTED, grams = 0.0307
CO2 = 7.70 O2 = 11.80 CO = 0.00 N2 = 80.50

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	300	0.460	0.90	84	48.79
2	300	0.600	1.20	84	55.73
3	310	0.820	1.60	86	65.57
4	310	0.940	1.85	88	70.21
5	310	1.000	1.95	90	72.41
6	310	0.480	0.95	92	50.17
7	310	0.700	1.40	94	60.58
8	310	0.920	1.95	96	69.46
9	310	0.800	1.60	98	64.77
10	310	0.720	1.45	100	61.44
11	310	0.460	0.90	102	49.11
12	310	0.660	1.30	104	58.83
13	310	0.760	1.50	104	63.13
14	310	0.680	1.35	106	59.71
15	310	0.600	1.20	108	56.09
16	310	0.420	0.85	110	46.93
17	310	0.600	1.20	112	56.09
18	310	0.800	1.60	114	64.77
19	310	0.900	1.80	116	68.70
20	310	0.720	1.45	118	61.44
21	290	0.420	0.85	120	46.32
22	290	0.460	0.90	120	48.47
23	290	0.600	1.20	122	55.36
24	280	0.760	1.50	124	61.89
25	270	0.700	1.40	124	58.99
AVG VALUES	304		1.354	105	59.00

TOTAL GAS WITHDRAWN, scf = 52.96
DRY GAS WITHDRAWN, scf = 37.38
WATER VAPOR WITHDRAWN, scf = 15.58
PERCENT WATER VAPOR = 29.42
ACTUAL WET FLOW RATE, acfm = 55,462.85
STANDARD DRY FLOW RATE, scfm = 26,583.80
PARTICULATE CONCENTRATION, grains/dscf = 0.013
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.019
PARTICULATE EMISSION RATE, lb/hr = 2.94
PERCENT OF ISOKINETIC SAMPLING = 103.42

ROCK ROAD OF WISCONSIN TEST 2 TABLE 2-2 8-7-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.668
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 33.92
WATER COLLECTED, ml = 301.00
PARTICULATE COLLECTED, grams = 0.0208
CO2 = 9.00 O2 = 10.50 CO = 0.00 N2 = 80.50

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	270	0.400	0.80	128	44.50
2	270	0.640	1.30	128	56.29
3	270	0.880	1.75	128	66.01
4	270	0.900	1.80	128	66.75
5	270	0.750	1.50	130	60.94
6	270	0.420	0.85	130	45.60
7	270	0.740	1.50	132	60.53
8	270	0.800	1.60	132	62.93
9	270	0.670	1.35	132	57.59
10	270	0.670	1.35	132	57.59
11	270	0.400	0.80	134	44.50
12	270	0.560	1.10	134	52.65
13	270	0.620	1.25	134	55.40
14	270	0.520	1.05	134	50.74
15	270	0.400	0.80	134	44.50
16	270	0.420	0.85	136	45.60
17	270	0.540	1.10	138	51.71
18	285	0.560	1.10	124	53.19
19	280	0.640	1.30	126	56.67
20	280	0.540	1.10	126	52.06
21	280	0.400	0.80	126	44.80
22	280	0.450	0.90	126	47.52
23	280	0.450	0.90	126	47.52
24	280	0.420	0.85	126	45.91
25	280	0.420	0.85	126	45.91
AVG VALUES	273		1.142	130	52.70

TOTAL GAS WITHDRAWN, scf = 48.14
DRY GAS WITHDRAWN, scf = 33.97
WATER VAPOR WITHDRAWN, scf = 14.17
PERCENT WATER VAPOR = 29.43
ACTUAL WET FLOW RATE, acfm = 49,539.83
STANDARD DRY FLOW RATE, scfm = 24,730.30
PARTICULATE CONCENTRATION, grains/dscf = 0.009
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.014
PARTICULATE EMISSION RATE, lb/hr = 2.01
PERCENT OF ISOKINETIC SAMPLING = 101.02

ROCK ROAD OF WISCONSIN TEST 3 TABLE 2-3 8-7-90

BAROMETRIC PRESSURE, in Hg = 29.400
TIP DIAMETER, in .2500
STACK AREA, sq ft = 15.668
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 25
GAS METER VOLUME, acf = 34.35
WATER COLLECTED, ml = 333.00
PARTICULATE COLLECTED, grams = 0.0163
CO2 = 8.80 O2 = 11.00 CO = 0.00 N2 = 80.20

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	270	0.440	0.88	124	46.88
2	270	0.720	1.45	122	59.97
3	270	0.920	1.85	122	67.79
4	270	0.860	1.70	122	65.54
5	270	0.720	1.45	124	59.97
6	270	0.420	0.84	124	45.80
7	270	0.630	1.25	124	56.10
8	270	0.770	1.55	124	62.02
9	270	0.700	1.40	124	59.13
10	270	0.520	1.05	126	50.96
11	270	0.400	0.80	128	44.70
12	270	0.520	1.05	128	50.96
13	270	0.540	1.10	128	51.94
14	270	0.500	1.00	128	49.97
15	270	0.330	0.66	130	40.60
16	270	0.500	1.00	132	49.97
17	270	0.580	1.15	132	53.82
18	270	0.640	1.30	132	56.54
19	270	0.640	1.30	132	56.54
20	270	0.600	1.20	134	54.74
21	270	0.350	0.70	134	41.81
22	270	0.420	0.84	134	45.80
23	270	0.500	1.00	134	49.97
24	270	0.580	1.15	134	53.82
25	270	0.560	1.15	134	52.89
AVG VALUES	270		1.153	128	53.13

TOTAL GAS WITHDRAWN, scf = 50.07
DRY GAS WITHDRAWN, scf = 34.39
WATER VAPOR WITHDRAWN, scf = 15.67
PERCENT WATER VAPOR = 31.31
ACTUAL WET FLOW RATE, acfm = 49,946.91
STANDARD DRY FLOW RATE, scfm = 24,384.73
PARTICULATE CONCENTRATION, grains/dscf = 0.007
PARTICULATE EMISSIONS, lb/1000 lb wet gas = 0.011
PARTICULATE EMISSION RATE, lb/hr = 1.56
PERCENT OF ISOKINETIC SAMPLING = 103.74