AP42 Section: 11.1

Reference Number: 381

Title: Carbon Monoxide Stack Emission Test, Northeast Asphalt, Inc., Control 55 Plant, Horicon, WI,

Environmental Technology and Engineering Corporation, Elm Grove, WI,

May 27, 1998.

C O

Sec. II-I
Ref. 381

Report to

NORTHEAST ASPHALT, INC.

Waukesha, Wisconsin

for

CARBON MONOXIDE STACK EMISSION TEST
CONTROL 55 PLANT
WDNR FID 114007080

May 27, 1998

by

ENVIRONMENTAL TECHNOLOGY & ENGINEERING CORPORATION

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ETE

SUMMARY

On May 27, 1998, Environmental Technology & Engineering Corp. personnel performed stack emissions testing at the Northeast Asphalt, Inc. Control 55 stationary asphalt plant located in Horicon, Wisconsin. The tests were performed in order to establish carbon monoxide (CO) emission factors for specific types of asphalt plants. This plant is a batch plant fired with natural gas. The test results are summarized in the following table:

TEST NO.	CARBON MONOXIDE
1	0.09 lb/ton
2	0.11
3	0.11
AVERAGE	0.10 lb/ton

1.0 GENERAL

On May 27, 1998, Environmental Technology & Engineering Corp. (ETE) personnel performed stack emissions testing at the Northeast Asphalt, Inc. Control 55 stationary asphalt plant located in Horicon, Wisconsin. The purpose of the testing was to determine the carbon monoxide (CO) emissions from the plant as a part of a study to establish emission factors for various types of asphalt plants fired with different types of fuel.

Jody Ustianowski and Pete Tolsma of Payne & Dolan were responsible for assuring proper operating conditions throughout the testing. During the test the plant production rate was approximately 260 tons per hour and included approximately 15 % recycled asphalt. The plant was fired with natural gas. A log of plant activity throughout the test was kept and is included in the APPENDIX. All testing was coordinated with Jody Ustianowski at the plant control room. Jerry Waters of the WDNR was notified of the tests and witnessed the field testing and plant operation. The field tests, corresponding laboratory analysis, and report preparation were performed by ETE personnel; Bill Dick was the test team leader.

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

2.0 RESULTS

Sampling for carbon monoxide (CO) was performed in accordance with the procedures outlined in EPA Method 10. Flow rate and velocity were determined using EPA Methods 1 through 4. A brief summary of the methods 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 velocity test points relative to the stack wall. Detailed results of the testing to determine CO emissions are shown in Tables 2-1 through 2-3. All results were well below the permit limits. The results are summarized below:

TEST NO.	CARBON MONOXIDE
1	0.09 lb/ton
2	0.11
3	0.11
AVERAGE	0.10 lb/ton

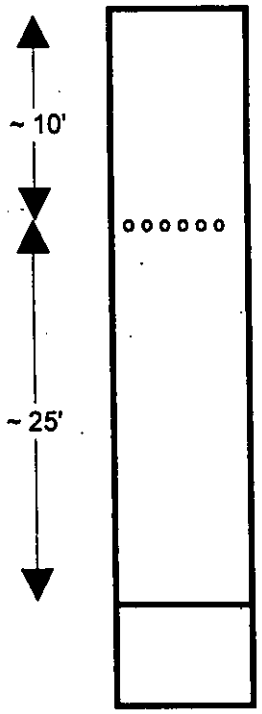
NEA CONTROL 55 PLANT
FIGURE 2-1

SAMPLE POINT LOCATION

Point	Distance in
1	5.75
2	17.25
3	28.75
4	40.25

TEST PORT LOCATION

L	64
W	46



CARBON MONOXIDE EMISSION TEST		METHOD 10	TABLE 2-1
LOCATION		NORTHEAST ASPHALT	
DESCRIPTION		CONTROL 55 PLANT	
DATE		27-May-98	
TEST		1	
DIMENSIOMS		64	46
STACK AREA		20.44	
STACK TEMPERATURE		296	
PITOT COEFFICIENT		0.84	
PERCENT WATER		16.74	
BAR PRESSURE	IN HG	29.35	
STATIC PRESSURE	IN H2O	-0.4	
STACK PRESSURE	IN HG	29.32	
CARBON MONOXIDE	PPM	148	
PRODUCTION RATE	TPH	260	
ORSAT CONSTITUENTS			
O2		16.0	
CO2		3.0	
CO		0.0	
N2		81.0	
MOLECULAR WEIGHT DRY		29.12	
MOLECULAR WEIGHT WET		27.26	
NUMBER OF POINTS		24	

POINT	DELTA P	VELOCITY
1	0.60	54.10
2	0.64	55.87
3	0.64	55.87
4	0.58	53.19
5	0.64	55.87
6	0.56	52.27
7	0.50	49.39
8	0.52	50.36
9	0.56	52.27
10	0.48	48.39
11	0.48	48.39
12	0.44	46.33
13	0.66	56.74
14	0.52	50.36
15	0.46	47.37
16	0.40	44.17
17	0.62	54.99
18	0.58	53.19
19	0.50	49.39
20	0.46	47.37
21	0.52	50.36
22	0.60	54.10
23	0.60	54.10
24	0.40	44.17
AVERAGE VELOCITY, AFPS		51.19

FLOW RATE		
ACFM		62796
DSCFM		35784
M3/HR		60804
CARBON MONOXIDE EMISSIONS	LB/HR	23.01
	LB/TON	0.09

CARBON MONOXIDE EMISSION TEST		METHOD 10	TABLE 2-2
LOCATION		NORTHEAST ASPHALT	
DESCRIPTION		CONTROL 55 PLANT	
DATE		27-May-98	
TEST		2	
DIMENSIONS		64	46
STACK AREA		20.44	
STACK TEMPERATURE		300	
PITOT COEFFICIENT		0.84	
PERCENT WATER		16.32	
BAR PRESSURE	IN HG	29.35	
STATIC PRESSURE	IN H2O	-0.4	
STACK PRESSURE	IN HG	29.32	
CARBON MONOXIDE	PPM	176	
PRODUCTION RATE	TPH	259	
ORSAT CONSTITUENTS			
O2		15.9	
CO2		3.1	
CO		0.0	
N2		81.0	
MOLECULAR WEIGHT DRY		29.13	
MOLECULAR WEIGHT WET		27.32	
NUMBER OF POINTS		24	

POINT	DELTA P	VELOCITY
1	0.58	53.28
2	0.66	56.83
3	0.62	55.08
4	0.60	54.19
5	0.66	56.83
6	0.58	53.28
7	0.52	50.44
8	0.48	48.47
9	0.62	55.08
10	0.46	47.45
11	0.46	47.45
12	0.44	46.40
13	0.62	55.08
14	0.50	49.46
15	0.46	47.45
16	0.40	44.24
17	0.66	56.83
18	0.56	52.35
19	0.52	50.44
20	0.40	44.24
21	0.50	49.46
22	0.64	55.96
23	0.58	53.28
24	0.44	46.40
AVERAGE VELOCITY, AFPS		51.25

FLOW RATE		
ACFM		62865
DSCFM		35815
M3/HR		60857
CARBON MONOXIDE EMISSIONS	LB/HR	27.39
	LB/TON	0.11

CARBON MONOXIDE EMISSION TEST		METHOD 10	TABLE 2-3
LOCATION		NORTHEAST ASPHALT	
DESCRIPTION		CONTROL 55 PLANT	
DATE		27-May-98	
TEST		3	
DIMENSIONS		64	46
STACK AREA		20.44	
STACK TEMPERATURE		298	
PITOT COEFFICIENT		0.84	
PERCENT WATER		16.86	
BAR PRESSURE	IN HG	29.35	
STATIC PRESSURE	IN H2O	-0.4	
STACK PRESSURE	IN HG	29.32	
CARBON MONOXIDE	PPM	189	
PRODUCTION RATE	TPH	260	
ORSAT CONSTITUENTS			
O2		15.9	
CO2		3.1	
CO		0.0	
N2		81.0	
MOLECULAR WEIGHT DRY		29.13	
MOLECULAR WEIGHT WET		27.26	
NUMBER OF POINTS		24	

POINT	DELTA P	VELOCITY
1	0.58	53.26
2	0.60	54.17
3	0.60	54.17
4	0.62	55.07
5	0.64	55.95
6	0.58	53.26
7	0.54	51.39
8	0.48	48.46
9	0.64	55.95
10	0.52	50.43
11	0.44	46.39
12	0.44	46.39
13	0.68	57.67
14	0.54	51.39
15	0.46	47.43
16	0.40	44.23
17	0.66	56.82
18	0.62	55.07
19	0.50	49.45
20	0.40	44.23
21	0.52	50.43
22	0.60	54.17
23	0.54	51.39
24	0.42	45.33
AVERAGE VELOCITY, AFPS		51.36

FLOW RATE		
ACFM		62997
DSCFM		35753
M3/HR		60751
CARBON MONOXIDE EMISSIONS	LB/HR	29.36
	LB/TON	0.11

3.0 METHODS

Sampling for carbon monoxide was performed in accordance with the procedures outlined in EPA Method 10 -"Determination of Carbon Monoxide Emissions from Stationary Sources" - as published in the Federal Register. Time integrated bag samples were extracted from the exhaust gas stream and analyzed for carbon monoxide concentration using a Horiba nondispersive infrared analyzer (NDIR). The analyzer was calibrated with span gas and zero gas prior to and following each hour of testing. The calibration gas was introduced into a Tedlar bag through the sampling apparatus, similar to the exhaust gas sampled. The calibration span gases for the analyzer were 601, 217, and 45 ppm CO in nitrogen.

Carbon monoxide calculations:

CO (mg/m3) = CO (ppm) • 28 (molecular weight)/24.05 (liters/mole)

CO (lb/hr) = CO (mg/m3) • Flow Rate (m3/hr)/453600 (mg/lb)

4.0 CALIBRATIONS

The pitot tubes, dry gas meters, and instruments were calibrated prior to the test according to standard procedures as to procedures published by the EPA. The values obtained were:

Pitot tube coeff.	0.84
Dry Gas Meter	1.065
Low Calibration Gas	45 ppm CO
Mid Calibration Gas	201 ppm CO
High Calibration Gas	601 ppm CO

APPENDIX A

Field and Laboratory Data

FIELD SAMPLING DATA

Facility NORTHERN ASPHALT Contact JODY PETE TOLMA
Address Ixonia Test Date 5-27-95
Witnesses

Process Description CONTROL SS BATCH PLANT
NATURAL GAS

Stack Number CSS Analyte H2O & CO Pump # —

γ = 1.067

SAMPLING DATA

Sample ID	Time	Meter Rdg/ Rotameter	Temp Flow Rate	Gas Minutes	Volume	CO
H2O-1	0950	622.12	80			198 ppm
	1035	626.14	84			
	----	4.02	82	175 ml		
H2O-2	1080	626.23	80			
	1138	631.23	86			
	----	5.00	83	210 ml		17.4
H2O-3	1121	631.25	86			
	1221	635.25	82			
	----	4.00	84	175 ml		189

FLOW DATA

Diam = —
L x W = 4x6
Cp = 0.84
Est Moist MOISTURE

Point	Run 1 Del P	Run 1 Del P	Run 2 Del P	Run 2 Del P	Run 3 Del P	Run 3 Del P
1	.60	.46	.58	.62	.58	.68
2	.64	.52	.66	.50	.60	.54
3	.64	.46	.62	.46	.60	.46
4	.58	.42	.60	.40	.62	.40
5	.64	.62	.64	.46	.64	.66
6	.56	.58	.58	.56	.58	.62
7	.50	.50	.52	.52	.54	.50
8	.52	.42	.48	.40	.54	.40
9	.46	.42	.62	.50	.64	.52
10	.60	.60	.66	.64	.52	.60
11	.60	.60	.64	.50	.64	.54
12	.64	.60	.64	.64	.64	.62

	Run 1	Run 2	Run 3
Ps	-0.4	-0.4	-0.4
T	586	590	598
CO2	3.0	3.1	3.1
O2	16.0	15.9	15.9
N2	81.0	81.0	81.0

COMMENTS

ENVIRONMENTAL TECHNOLOGY & ENGINEERING CORP.
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414-784-2434

NORTHEAST ASPHALT CONTROL 55
27-May-98
METHOD 4 RESULTS

Sample No.	Meter Vol. ft3	Meter Temp deg F	Standard Vol FT3	Water Captured ml	Water Volume ft3	Total Volume ft3	Percent Water % Vol
H2O-1	4.02	82	4.09	17.5	0.82	4.91	16.74
H2O-2	5.00	85	5.06	21	0.99	6.05	16.32
H2O-3	4.00	84	4.06	17.5	0.82	4.88	16.86
							16.64

Meter Gama 1.065
Bar.Pressure 29.35

Calculations Standard Volume = Meter Vol * Meter Gama*Bar.Pressure*528/(29.92*(460+Meter Temp))

Water Volume = .047*Water Captured
Total Volume= Water Volume + Standard Volume
Percent Water = Water Volme/Total Volume

ASPHALT PLANT STACK TEST DATA

Plant Name: NGA 55

Date: May 27, 1998
FID # 114 001 080

Time*	Burner Setting	PSI Fuel Pressure	Production TPH	Aggregate TPH	% Moisture in Aggregate	RAP TPH	Mix Temp	Stack Temp	Photo-helic	Magne-helic	Fuel Flow Rate	CO ppm	CO2 ppm	O2 %
9:00			260	221	4.2 %	39	310	283	.10	3	2.47			
9:15			260	221	4.2 %	39	300	286	.10	3	2.47			
9:30			260	221	4.2 %	39	295	300	.10	3.1	2.47			
9:45			260	221	4.2 %	39	310	300	.10	3	2.47			
10:00			260	221	4.2 %	39	310	300	.10	3	2.47			
10:30			260	221	4.2 %	39	295	293	.10	3.1	2.47			
10:45			258	220	4.2 %	38	295	300	.10	3	2.47			
11:00			260	221	4.2 %	39	300	310	.10	3	2.47			
11:15			259	220	4.2 %	38	310	299	.10	3	2.47			
11:30			260	221	4.1 %	39	310	310	.10	3	2.47			
11:45			260	221	4.1	39	290	300	.10	3	2.47			
12:00			259	220	4.1 %	38	300	310	.10	3	2.47			
10:15			260	220	4.1%	38	300	310	.10	30	2.47			

Fuel Type N.G. Sulfur in Fuel _____ %

Plant Drum Type Batch

* Record data in 15-minute intervals during stack test runs.