AP42 Section: 11.1

Reference Number: 52

Title: Air Emission Test Report, Results Of A Source Emission Compliance Test Performed On A Asphalt Batch Plant Wet Scrubber System,

Tri-City Paving, Inc., Little Falls, Minnesota, May 11, 1993,

Twin City Testing Corporation, St. Paul, MN,

June 7, 1993.

AQD FILE # 108B

CDU Staff YH

Foxpro ✓ / /

Received 6 / 14 / 93

Acknowledged ~~7~~ 6 / 6 / 93

Quick-Checked 6 / 29 / 93

Priority = 1 (2) 3 4 5

Reviewed / /

Final letter draft / /

Final letter sent / /

Report Number: 4232-93-2590

Report Issued: June 7, 1993

AIR EMISSION TEST REPORT

RESULTS OF SOURCE
EMISSION COMPLIANCE TEST
PERFORMED ON A ASPHALT BATCH PLANT
WET SCRUBBER SYSTEM
TRI-CITY PAVING, INC.
LITTLE FALLS, MINNESOTA
MAY 11, 1993

Submitted to:

TRI-CITY PAVING, INC.
P.O.Box 326
Little Falls, MN 56345

Submitted by:

TWIN CITY TESTING CORPORATION
Air Quality Services Department
737 Pelham Blvd.
St. Paul, Minnesota 55114

Prepared by:

James Tryba, Manager
Source and Ambient Testing
Air Quality Services

Approved by:

Ahto Niemioja
Director
Air Quality Services

FILE# _____ CP
OTHER: _____

twin city testing
corporation

662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-3601

June 7, 1993

Mr. Jack Surma
Tri-City Paving, Inc.
P.O.Box 326
Little Falls, MN 56345

Re: Source Emission Compliance Test Report

Dear Mr. Surma:

Enclosed are two copies of Twin City Testing Corporation's report #4232-93-2590 concerning the particulate and opacity emission compliance tests performed on the wet scrubber system at your asphalt batch plant facility located in Little Falls, Minnesota. Please note that the fuel analysis per Minnesota Exhibit D is not included with this report. Please forward the fuel anlysis to us when it becomes available so we can include it in the final report. Please forward a copy of this report to the Minnesota Pollution Control Agency at your earliest convenience.

Thank you for allowing TCT the opportunity of working with you on this project. If you have any questions regarding this report please call me at (612) 659-7574.

Sincerely,

Ahto Niemioja
Director, Air Quality Services

TABLE OF CONTENTS

INTRODUCTION

Twin City Testing Corporation (TCT) was contracted by Tri-City Paving, Inc. to perform a source emission compliance test on the wet scrubber system at their asphalt batch plant facility located near Little Falls, Minnesota. The exhaust gasses from the scrubber unit were tested for particulate and opacity emissions on May 11, 1993. This report presents the results of the test program along with all substantiating documentation.

Tri-City Paving, Inc. was represented throughout the test period by Mr. Jack Surma. The TCT sampling team consisted of Messrs. Jim Tryba, Dave Christian, and Jerry Wallerius. The test proceedings were witnessed by Ms. Annette Elliott, Air Emissions Compliance Specialist for the Minnesota Pollution Control Agency.

TEST RESULTS

The results of the particulate and opacity emission tests are summarized in Table 1. The data indicates an average particulate emission rate of 11.33 pounds per hour for test Runs 1-1 thru 1-3 and a rate of 7.58 pounds per hour for test runs 1-2 thru 1-4. A 60 minute visible emissions test was performed concurrent with each test run. The highest average opacity achieved during the four test runs was 11.7%.

There were no sampling problems encountered during the test.

Table 1
Summary of Emission Test Results
Tri-City Paving, Inc., Little Falls, Minnesota
Wet Scrubber Unit
May 11, 1993

Parameter	Run #1	Run #2	Run #3	Run #4
Time of Test;				
Start	10:10	11:58	13:43	15:35
Finish	11:20	13:08	14:52	16:40
Effluent Temperature, °F	136	145	149	146
Effluent Moisture Content, % v/v	14.12	13.74	13.40	12.52
Effluent Composition, % v/v dry;				
Carbon Dioxide	3.47	4.00	4.27	3.20
Oxygen	16.40	15.80	15.53	17.00
Effluent Flow Rate;				
Actual Conditions, acfm	27,890	27,169	27,238	28,036
Dry Standard Conditions, dscfm	20,985	20,234	20,232	21,126
Isokinetic Variation, %	107.9	107.4	106.9	106.3
Effluent Particulate Concentration;				
Actual conditions, gr/acf	0.1247	0.0214	0.0404	0.0609
Standard conditions, gr/dscf	0.1269	0.0221	0.0422	0.0640
Effluent Particulate Emission Rate;				
Particle Mass Rate, lb./hr.	22.83	3.83	7.32	11.59

Standard Conditions: 68°F, 29.92 in. Hg. Particulate concentration and emission rates are based on analysis of the sampling train front and back catches.

PROCESS DATA

Tri-City Paving, Inc. operates a Barber-Greene Model 848A asphalt batch plant utilizing a wet scrubber unit for controlling particulate emissions. Process data is included in Appendix E. The maximum hourly plant hot mix asphalt output rate was 210 tons per hour. The maximum fuel usage was 400 gallons per hour. A fourth test run was performed at the request of the facility operator as they were having problems with the plant during the first test run.

TEST PROCEDURES

The EPA Methods referenced below are described in Appendix A of the Code of Federal Regulations, Title 40, Part 60 (40 CFR 60).

The number of sampling points and their location with in the source stack/duct was determined per EPA Method 1 which is entitled "Sample and velocity traverses for stationary sources". In this method the number of sampling points is based on the length of straight, undisturbed flow both before and after the sampling port location. The following data is specific to the source tested:

Stack cross-sectional dimensions, inches:	59.25" x 59.50"
Minimum required number of sampling points:	25
Number of sampling points used:	30
Sampling point distribution;	
Number of sampling ports:	5
Number of sampling points per port:	6
Particulate test sampling time;	
Time at each sampling point, minutes:	2.0
Test run total sampling time, minutes:	60.0

Effluent flow measurements were made per EPA Method 2 which is entitled "Determination of stack gas velocity and volumetric flow rate (Type S pitot tube)". Gas velocity pressure (head) and temperature data were obtained during each EPA Method 5 particulate test run by traversing each of the sampling points defined by EPA Method 1. This data along with gas density (EPA Method 3) and moisture content (EPA Method 4) data was used to calculate the gas velocity at each sampling point. The source volumetric flow rate was calculated by multiplying the average gas velocity by the stack/duct cross-sectional area at the point of measurement. Velocity pressure (head) measurements were made using a Type S pitot tube constructed to the design specifications detailed in EPA Method 2. Such pitot tubes have a base line coefficient of 0.84.

The density of the effluent was determined per EPA Method 3 which is entitled "Gas analysis for the determination of dry molecular weight". A multi-point, integrated gas sample was collected simultaneously with each EPA Method 5 particulate test run. The gas sample was analyzed for carbon dioxide and oxygen concentrations with a standard Orsat analyzer using commercially prepared solutions. For calculations of gas density the balance of the gas was assumed to be nitrogen and carbon monoxide.

The effluent moisture content was determined per EPA Method 4 which is entitled "Determination of moisture content in stack gases". Data for making a gas moisture content determination was collected simultaneously with each EPA Method 5 particulate test run. The gas moisture content was calculated from the mass and/or volume of liquid collected in the Method 5 sampling train cold box impingers and the volume of gas sampled.

The effluent particulate concentration was determined per EPA Method 5 which is entitled "Determination of particulate emissions from stationary sources". For each test run, particulate matter was with drawn from the gas stream at each of the EPA Method 1 defined sampling points and collected on a glass fiber filter which was maintained at 248±25°F. Water vapor, organic vapors and other matter in vapor form which passed through the filter was collected in an ice-cooled impinger trap who's exit temperature was maintained at less than 68°F. Sampling was performed using a Grasby-Nutech Model 2010 Method 5 stack sampling system which employed a five foot inconel lined probe and a 0.344 inch nominal diameter nozzle. Particulate emissions included analyses of both the front and back (condensible organics) catches as required by Minnesota Rule 7005.0500.

Source visible emissions were determined by plume opacity observations made by a certified opacity reader per EPA Method 9 which is entitled "Visual determination of the opacity of emissions from stationary sources".

APPENDIX A

CALCULATIONS

* SUMMARY OF TEST DATA •

SAMPLING TRAIN DATA		Run 1-1	Run 1-2	Run 1-3	Run 1-4
Sampling time, minutes		60	60	60	60
Sampling nozzle diameter, inches	Dn	0.344	0.344	0.344	0.344
Sampling nozzle area, sq.ft.	An	0.000645	0.000645	0.000645	0.000645
Isokinetic variation, %	I	107.9	107.4	106.9	106.3
Sample gas volume, acf	Vm	36.507	35.767	35.834	37.408
Sample gas volume, dscf	Vmstd	35.884	34.515	34.265	35.627
Avg.meter temperature, deg R	Tm	535	545	550	552
Avg.oriface pressure drop, in.H2O	dH	1.35	1.26	1.25	1.37
Total particulate collected, mg	Mn	295.71	49.59	93.95	148.02
VELOCITY TRAVERSE DATA					
Stack Area, sq.ft.	A	24.4818	24.4818	24.4818	24.4818
Abs.stack gas pressure, in.Hg.	Ps	29.59	29.60	29.60	29.58
Barometric pressure, in.Hg.	Pbar	29.59	29.60	29.60	29.58
Avg.stack temperature, deg R	Ts	596	605	609	606
Avg. sq.rt. velocity head (Cp=.84)		0.31	0.30	0.30	0.31
Avg.stack gas velocity, ft./sec.	Vs	18.987	18.496	18.543	19.086
STACK GAS MOISTURE CONTENT					
Total water collected, ml	Vic	126	116	114	108
Moisture in stack gas, %	Bws	14.12	13.74	13.40	12.52
STACK GAS FLOW RATE					
Stack gas flow rate, dscf/hr.	Qsd	1259115	1214065	1213921	1267557
Stack gas flow rate, acfm		27,890	27,169	27,238	28,036
Stack gas flow rate, dscfm		20,985	20,234	20,232	21,126
PARTICULATE CONCENTRATION					
Particulate concentration, gr/acf		0.1247	0.0214	0.0404	0.0609
Particulate concentration, gr/dscf	Cs	0.1269	0.0221	0.0422	0.0640
PARTICULATE EMISSION RATE					
Particle mass rate, lb./hr.	E	22.83	3.83	7.32	11.59
Particle mass rate, lb./1000 lb.gas		0.2168	0.0378	0.0725	0.1107
ORSAT DATA					
Percent CO2 by volume	CO2	3.47	4.00	4.27	3.20
Percent O2 by volume	O2	16.40	15.80	15.53	17.00
Percent CO by volume	CO	0.00	0.00	0.00	0.00
Percent N2 by volume	N2	80.13	80.20	80.20	79.80

Plant # & Location	=	TRI–CITY PAVING, Little Falls, MN			
Date of Test	=	May 11, 1993			
Process Tested	=	Asphalt Plant Wet Scrubber			
Number of Sampling Points	=	30			
Pitot Tube Coefficient	=	0.84			
Stack Area, sq.ft.	=	24.4818			
Y Factor	=	1.0041			
		Run 1–1	Run 1–2	Run 1–3	Run 1–4
Dry Gas Meter Volume, cfd.	=	36.507	35.767	35.834	37.408
Barometric Pressure, in.Hg.	=	29.59	29.60	29.60	29.58
Stack Pressure, in.Hg.	=	29.59	29.60	29.60	29.58
Total Water Collected, ml.	=	126.2	115.8	113.8	108.2
% Carbon Dioxide	=	3.47	4.00	4.27	3.20
% Oxygen	=	16.40	15.80	15.53	17.00
% Carbon Monoxide	=	0.00	0.00	0.00	0.00
% Nitrogen	=	80.13	80.20	80.20	79.80
Total Particulate, gr.(see Lab Data)	=	0.29571	0.04959	0.09395	0.14802
Total Sampling Time, min.	=	60	60	60	60
Nozzle Diameter, inches	=	0.344	0.344	0.344	0.344
Nozzle Area, sq.ft.	=	0.0006454	0.0006454	0.0006454	0.0006454

Laboratory Data:

Front Catch :		Run 1–1	Run 1–2	Run 1–3	Run 1–4
Front Wash	=	0.07435	0.00646	0.02244	0.02498
Filter Catch	=	0.21105	0.03370	0.06011	0.11607
Front Half Total	=	0.28540	0.04016	0.08255	0.14105
Back Catch :					
** Impinger Catch	=	0.00830	0.00565	0.00825	0.00532
Impinger Wash	=	0.00201	0.00378	0.00315	0.00165
Back Half Total	=	0.01031	0.00943	0.01140	0.00697
TOTAL PARTICULATE COLLECTED	=	0.29571	0.04959	0.09395	0.14802

** Chloroform/Ethyl Ether Extraction

Run 1–1

Ts =	596	dH =	1.35	Impinger Water =	120 ml
Tm =	535	SR dP =	0.31	Silica Gel =	6.2 gr

Run 1–1 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
A1	127	0.22	2.83	65	65	0.46904
2	128	0.16	2.06	67	66	0.40000
3	129	0.12	1.54	67	66	0.34641
4	126	0.05	0.64	69	67	0.22361
5	131	0.05	0.64	69	67	0.22361
6	128	0.05	0.64	70	67	0.22361
B1	129	0.21	2.7	72	68	0.45826
2	131	0.16	2.06	73	69	0.40000
3	142	0.11	1.41	75	69	0.33166
4	133	0.06	0.77	75	70	0.24495
5	132	0.05	0.64	75	70	0.22361
6	133	0.05	0.64	76	71	0.22361
C1	134	0.22	2.83	77	72	0.46904
2	137	0.16	2.06	79	72	0.40000
3	139	0.11	1.41	80	73	0.33166
4	140	0.08	1.03	80	74	0.28284
5	138	0.05	0.64	80	74	0.22361
6	139	0.05	0.64	80	74	0.22361
D1	136	0.16	2.06	85	75	0.40000
2	140	0.14	1.8	82	76	0.37417
3	141	0.1	1.29	83	76	0.31623
4	141	0.07	0.9	83	76	0.26458
5	141	0.05	0.64	83	77	0.22361
6	140	0.06	0.77	83	77	0.24495
E1	136	0.15	1.93	82	78	0.38730
2	142	0.14	1.8	84	78	0.37417
3	143	0.11	1.41	85	79	0.33166
4	144	0.09	1.16	86	79	0.30000
5	143	0.06	0.77	86	79	0.24495
6	142	0.06	0.77	86	80	0.24495

Run 1–2

Ts =	605	dH =	1.26	Impinger Water =	112 ml
Tm =	545	SR dP =	0.30	Silica Gel =	3.8 gr

Run 1–2 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Meter Temperature Outlet	Sq.Root Velocity Pressure
A1	129	0.22	2.83	81	81	0.46904
2	131	0.16	2.06	82	80	0.40000
3	138	0.1	1.29	82	80	0.31623
4	141	0.07	0.9	82	80	0.26458
5	142	0.05	0.64	83	80	0.22361
6	140	0.04	0.51	83	81	0.20000
B1	140	0.21	2.7	84	81	0.45826
2	145	0.18	2.31	86	81	0.42426
3	147	0.07	0.9	86	81	0.26458
4	147	0.05	0.64	86	82	0.22361
5	147	0.05	0.64	87	82	0.22361
6	145	0.04	0.51	87	82	0.20000
C1	143	0.18	2.31	87	83	0.42426
2	148	0.16	2.06	88	83	0.40000
3	149	0.07	0.9	89	83	0.26458
4	150	0.05	0.64	88	83	0.22361
5	149	0.04	0.51	88	84	0.20000
6	148	0.04	0.51	89	84	0.20000
D1	147	0.18	2.31	89	85	0.42426
2	150	0.12	1.54	90	85	0.34641
3	150	0.09	1.16	90	85	0.30000
4	150	0.07	0.9	90	85	0.26458
5	151	0.04	0.51	90	85	0.20000
6	150	0.04	0.51	90	85	0.20000
E1	144	0.16	2.06	90	86	0.40000
2	148	0.14	1.8	91	87	0.37417
3	148	0.12	1.54	92	87	0.34641
4	150	0.08	1.03	92	87	0.28284
5	150	0.07	0.90	92	87	0.26458
6	147	0.05	0.64	92	87	0.22361

Run 1–3

Ts =	609	dH =	1.25	Impinger Water =	109 ml
Tm =	550	SR dP =	0.30	Silica Gel =	4.8 gr

Run 1–3 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Meter Temperature Outlet	Sq.Root Velocity Pressure
A1	131	0.23	3.01	87	87	0.47958
2	134	0.16	2.1	88	87	0.40000
3	138	0.07	0.92	88	87	0.26458
4	145	0.07	0.92	88	87	0.26458
5	145	0.05	0.65	89	87	0.22361
6	145	0.04	0.52	89	87	0.20000
B1	143	0.2	2.62	89	87	0.44721
2	150	0.14	1.83	90	87	0.37417
3	151	0.09	1.18	91	87	0.30000
4	152	0.05	0.65	91	87	0.22361
5	152	0.05	0.65	91	87	0.22361
6	152	0.04	0.52	91	88	0.20000
C1	145	0.18	2.36	91	88	0.42426
2	153	0.12	1.57	92	88	0.34641
3	154	0.09	1.18	93	88	0.30000
4	155	0.05	0.65	92	88	0.22361
5	156	0.04	0.52	92	88	0.20000
6	153	0.04	0.52	92	89	0.20000
D1	145	0.18	2.36	93	89	0.42426
2	154	0.12	1.57	94	89	0.34641
3	154	0.09	1.18	94	89	0.30000
4	154	0.05	0.65	94	89	0.22361
5	153	0.05	0.65	93	89	0.22361
6	154	0.04	0.52	93	90	0.20000
E1	145	0.19	2.49	93	90	0.43589
2	152	0.15	1.96	95	90	0.38730
3	154	0.1	1.31	95	90	0.31623
4	154	0.08	1.05	95	91	0.28284
5	154	0.05	0.65	95	91	0.22361
6	152	0.06	0.79	95	91	0.24495

Run 1–4

Ts =	606	dH =	1.37	Impinger Water =	102 ml
Tm =	552	SR dP =	0.31	Silica Gel =	6.2 gr

Run 1–4 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
A1	129	0.22	2.88	89	88	0.46904
2	140	0.18	2.36	88	88	0.42426
3	141	0.1	1.31	89	88	0.31623
4	143	0.05	0.65	89	88	0.22361
5	150	0.04	0.52	89	88	0.20000
6	150	0.04	0.52	89	88	0.20000
B1	148	0.18	2.36	90	88	0.42426
2	150	0.16	2.1	92	88	0.40000
3	149	0.11	1.44	92	89	0.33166
4	150	0.06	0.79	93	89	0.24495
5	149	0.04	0.52	92	89	0.20000
6	150	0.04	0.52	92	89	0.20000
C1	148	0.19	2.49	93	89	0.43589
2	149	0.16	2.1	94	90	0.40000
3	150	0.11	1.44	94	90	0.33166
4	150	0.06	0.79	95	90	0.24495
5	151	0.04	0.52	95	90	0.20000
6	152	0.04	0.52	94	90	0.20000
D1	150	0.19	2.49	95	90	0.43589
2	148	0.15	1.96	96	91	0.38730
3	147	0.11	1.44	96	91	0.33166
4	146	0.06	0.79	96	91	0.24495
5	144	0.05	0.65	95	91	0.22361
6	144	0.05	0.65	95	91	0.22361
E1	139	0.18	2.36	96	92	0.42426
2	141	0.16	2.1	97	92	0.40000
3	143	0.13	1.7	98	92	0.36056
4	143	0.1	1.31	98	93	0.31623
5	142	0.07	0.92	97	92	0.26458
6	142	0.06	0.79	98	93	0.24495

* DRY GAS VOLUME *

Vm(std) = Vm [T(std) / Tm] [(Pbar + (dH/13.6)) / P(std)]

= 17.64 x [degR / in.Hg.] x Y x Vm [(Pbar + (dH/13.6))/Tm]

Where:

Vm(std) = Dry Gas Volume through meter at standard conditions
Vm = Dry Gas Volume measured by meter
Pbar = Barometric pressure at oriface meter
Pstd = Standard absolute pressure
Tm = Absolute temperature at meter degR.
Tstd = Standard absolute temperature (528 degR).
dH = Average pressure drop across oriface meter
Y = Dry gas meter calibration factor.
13.6 = Inches water per inches Hg.

Run 1-1

Vm(std)=17.64 x 1.0041 x 36.507 [(29.59 +(1.35 / 13.6))/ 535] = 35.884 dscf

Run 1-2

Vm(std)=17.64 x 1.0041 x 35.767 [(29.60 +(1.26 / 13.6))/ 545] = 34.515 dscf

Run 1-3

Vm(std)=17.64 x 1.0041 x 35.834 [(29.60 +(1.25 / 13.6))/ 550] = 34.265 dscf

Run 1-4

Vm(std)=17.64 x 1.0041 x 37.408 [(29.58 +(1.37 / 13.6))/ 552] = 35.627 dscf

* TOTAL CONTAMINANTS by WEIGHT: GRAIN LOADING *

C's = [0.0154 gr/mg] [Mn/Vm(std)]

Where:
C's = Concentration of particulate matter in stack gas corrected to standard conditions
Mn = Total amount of particulate matter collected
Vm(std) = Dry gas volume through meter at standard conditions

Run 1-1

C's = 0.0154 x [0.29571 x 1000] / 35.884 = 0.1269 gr/dscf

Run 1-2

C's = 0.0154 x [0.04959 x 1000] / 34.515 = 0.0221 gr/dscf

Run 1-3

C's = 0.0154 x [0.09395 x 1000] / 34.265 = 0.0422 gr/dscf

Run 1-4

C's = 0.0154 x [0.14802 x 1000] / 35.627 = 0.0640 gr/dscf

* DRY MOLECULAR WEIGHT *

Md = 0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO + % N2)

Where:
Md = Dry molecular weight
% CO2 = Percent carbon dioxide by volume (dry basis).
% O2 = Percent oxygen by volume (dry basis).
% N2 = Percent nitrogen by volume (dry basis).
% CO = Percent carbon monoxide by volume (dry basis).
0.264 = Ratio of O2 to N2 in air
0.28 = Molecular wieght of N2 or CO
0.32 = Molecular wieght of O2 divided by 100.
0.44 = Molecular weight of CO2 divided by 100.

Run 1-1

Md = 0.44 (3.47) + 0.32 (16.40) + 0.28 (80.13) = 29.211 lb/lb-mole

Run 1-2

Md = 0.44 (4.00) + 0.32 (15.80) + 0.28 (80.20) = 29.272 lb/lb-mole

Run 1-3

Md = 0.44 (4.27) + 0.32 (15.53) + 0.28 (80.20) = 29.304 lb/lb-mole

Run 1-4

Md = 0.44 (3.20) + 0.32 (17.00) + 0.28 (79.80) = 29.192 lb/lb-mole

• WATER VAPOR CONDENSED •

$V_{wc(std)} = (V_f - V_i)\ [P_w R T_{(std)} / M_w P_{(std)}] = 0.04707 (V_f - V_i)$

$V_{wsg(std)} = (W_f - W_i)\ [R\ T_{(std)} / M_w P_{(std)}] = 0.04715 (W_f - W_i)$

Where:
0.04707 = Conversion factor
0.04715 = Conversion factor
$V_{wc(std)}$ = Volume of water vapor condensed (standard conditions)
$V_{wsg(std)}$ = Volume of water vapor collected in silica gel (standard conditions)
$V_f - V_i$ = Final volume of impinger contents less initial volume
$W_f - W_i$ = Final weight of silica gel less initial weight
P_w = Density of water
R = Ideal gas constant
M_w = Molecular weight of water vapor
$T_{(std)}$ = Absolute temperature at standard conditions
$P_{(std)}$ = Absolute pressure at standard conditions

Run 1–1

$V_{wc(std)} = 0.04707 \times 120$ ml = 5.6 cu.ft.

$V_{wsg(std)} = 0.04715 \times 6.2$ gr = 0.3 cu.ft.

Run 1–2

$V_{wc(std)} = 0.04707 \times 112$ ml = 5.3 cu.ft.

$V_{wsg(std)} = 0.04715 \times 3.8$ gr = 0.2 cu.ft.

Run 1–3

$V_{wc(std)} = 0.04707 \times 109$ ml = 5.1 cu.ft.

$V_{wsg(std)} = 0.04715 \times 4.8$ gr = 0.2 cu.ft.

Run 1–4

$V_{wc(std)} = 0.04707 \times 102$ ml = 4.8 cu.ft.

$V_{wsg(std)} = 0.04715 \times 6.2$ gr = 0.3 cu.ft.

• MOISTURE CONTENT OF STACK GASES *

Bws = [Vwc(std) + Vwsg(std)] / [Vwc(std) + Vwsg(std) + Vm(std)] x 100

Where:
Bws = Proportion of water vapor
Vm = Dry gas volume measured by dry gas meter
Vwc(std) = Volume of water vapor condensed corrected to standard conditions
Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions

Run 1–1

Bws = (5.6 + 0.3) / (5.6 + 0.3 + 35.884) x 100 = 14.12 %

Run 1–2

Bws = (5.3 + 0.2) / (5.3 + 0.2 + 34.515) x 100 = 13.74 %

Run 1–3

Bws = (5.1 + 0.2) / (5.1 + 0.2 + 34.265) x 100 = 13.40 %

Run 1–4

Bws = (4.8 + 0.3) / (4.8 + 0.3 + 35.627) x 100 = 12.52 %

* MOLECULAR WEIGHT of STACK GASES *

Ms = Md (1− Bws) + 18 (Bws)

Where:
Ms = Molecular weight of stack gas
Md = Molecular weight of stack gas
Bws = Proportion of water vapor

Run 1−1

Ms = 29.28 (1 − 14.12 %) + 18 (14.12 %) = 27.69 lb/lb−mole

Run 1−2

Ms = 29.28 (1 − 13.74 %) + 18 (13.74 %) = 27.73 lb/lb−mole

Run 1−3

Ms = 29.28 (1 − 13.4 %) + 18 (13.4 %) = 27.77 lb/lb−mole

Run 1−4

Ms = 29.28 (1 − 12.52 %) + 18 (12.52 %) = 27.87 lb/lb−mole

* STACK GAS VELOCITY *

Vs = Kp Cp [sq.rt.dP] x avg. [sq.rt.(Ts(avg.)/Ps Ms)]

Where :
Vs = Average velocity of gas stream in stack

Kp = 85.49 ft/sec [(g/g−mole) − (mm Hg) / (degK) (mm H2O)] 1/2
Cp = Pitot tube coefficient
dP = Velocity head of stack gas
Pbar = Barometric pressure at measurement site
Pg = Stack static pressure
Ps = Absolute stack gas pressure
Pstd = Standard absolute pressure
ts = stack temperature
Ts = Absolute stack temperature
Ms = Molecular weight of stack gas

Run 1−1

Vs = 85.49 x	0.84 x	0.310 x Sq.Rt.[	596 /(	29.59 x	27.69) =	18.987 ft/sec.
						==========

Run 1−2

Vs = 85.49 x	0.84 x	0.300 x Sq.Rt.[	605 /(	29.6 x	27.73) =	18.496 ft/sec.
						==========

Run 1−3

Vs = 85.49 x	0.84 x	0.300 x Sq.Rt.[	609 /(	29.6 x	27.77) =	18.543 ft/sec.
						==========

Run 1−4

Vs = 85.49 x	0.84 x	0.310 x Sq.Rt.[	606 /(	29.58 x	27.87) =	19.086 ft/sec.
						==========

* STACK GAS FLOW RATE *

Qstd = 3600 (1 – Bws) Vs A (Tstd / Ts) (Ps / Pstd)

Where :
Qstd = Dry volumetric stack gas flow rate corrected to std.conditions.
A = Cross sectional area of stack
3600 = Conversion factor
ts = Stack temperature
Ts = Absolute stack temperature
Tstd = Standard absolute temperature
Pbar = Barometric pressure at measurement site
Pg = Stack static pressure
Ps = Absolute stack gas pressure
Pstd = Standard absolute pressure

Run 1–1

Q (std) = 3600(1– 0.1412)(18.987)(24.4818)(528/ 596)(29.59 /29.92)

Q (std) = 1,259,115 dscf/hr

Run 1–2

Q(std) = 3600(1– 0.1374)(18.496)(24.4818)(528/ 605)(29.6 /29.92)

Q (std) = 1,214,065 dscf/hr

Run 1–3

Q(std) = 3600(1– 0.134)(18.543)(24.4818)(528/ 609)(29.6 /29.92)

Q (std) = 1,213,921 dscf/hr

Run 1–4

Q(std) = 3600(1– 0.1252)(19.086)(24.4818)(528/ 606)(29.58 /29.92)

Q (std) = 1,267,557 dscf/hr

• EMISSIONS RATE FROM STACK *

E = [Cs Qstd] / 7000 gr./lb. = lb. / hr.

Where :
E = Emissions rate
Cs = Concentration of particulate matter corrected to std.conditions.
Qstd = Dry volumetric stack gas flow rate corrected to std.conditions.

Run 1–1

E = [0.1269 x 1,259,115] / 7000 = 22.83 lb./hr.

Run 1–2

E = [0.0221 x 1,214,065] / 7000 = 3.83 lb./hr.

Run 1–3

E = [0.0422 x 1,213,921] / 7000 = 7.32 lb./hr.

Run 1–4

E = [0.064 x 1,267,557] / 7000 = 11.59 lb./hr.

* ALLOWABLE EMISSIONS: LBS./1000 LBS. GAS *

$$\text{Lbs./Mlbs.Gas} = E \times 1000 \Big/ \frac{Qstd \times Ms \times 29.92}{Md \times 528dF \times 21.85}$$

Where:
Ms = Wet molecular weight
Mdry = Dry molecular weight of stack gas = 1 – % moisture/100.
Qstd = Dry volumetric stack gas flow rate corrected to std.conditions.
E = Emissions in pounds per hour.
528 dF = Standard Temperature
29.92 = Standard Pressure
21.85 = Unit Conversion

Run 1–1

$$\text{Lb./Mlb.} = 22.83 \times 1000 \Big/ \frac{1{,}259{,}115 \times 27.69 \times 29.92}{(1 - 0.1412) \times 528 \times 21.85}$$

= 0.2168 lbs./ 1000 lbs. of stack gas

Run 1–2

$$\text{Lb./Mlb.} = 3.83 \times 1000 \Big/ \frac{1{,}214{,}065 \times 27.73 \times 29.92}{(1 - 0.1374) \times 528 \times 21.85}$$

= 0.0378 lbs./ 1000 lbs. of stack gas

Run 1–3

$$\text{Lb./Mlb.} = 7.32 \times 1000 \Big/ \frac{1{,}213{,}921 \times 27.77 \times 29.92}{(1 - 0.134) \times 528 \times 21.85}$$

= 0.0725 lbs./ 1000 lbs. of stack gas

Run 1–4

$$\text{Lb./Mlb.} = 11.59 \times 1000 \Big/ \frac{1{,}267{,}557 \times 27.87 \times 29.92}{(1 - 0.1252) \times 528 \times 21.85}$$

= 0.1107 lbs./ 1000 lbs. of stack gas

* ISOKINETIC VARIATION *

I = 100 Ts [0.002669 Vic + (Vm / Tm) (Pbar + dH / 13.6)] / 60 e Vs Ps An

Where :
I = Percent isokinetic sampling.
100 = Conversion to percent.
Ts = Absolute average stack gas temperature
0.002669 = Conversion factor
Vic = Total volume of liquid collected in impingers and silica gel
Tm = Absolute average dry gas meter temperature
Pbar = Barometric pressure at sampling site
dH = Average pressure differential across the oriface meter
13.6 = Specific gravity of mercury.
60 = Conversion seconds to minutes.
e = Total sampling time
Vs = Stack gas velocity
Ps = Absolute stack gas pressure
An = Cross sectional area of nozzle

Run 1-1

$$I = 100 \times \frac{596}{60 \times 60 \times} \frac{[(\ 0.002669 \times 126.\ ) + (\ 36.507 / 535\ )[\ 29.59 + (\ 1.35 / 13.6)]}{18.987 \times 29.59 \times 0.000645}$$

I = 107.9 %

Run 1-2

$$I = 100 \times \frac{605}{60 \times 60 \times} \frac{[(\ 0.002669 \times 115.\ ) + (\ 35.767 / 545\ )[\ 29.6 + (\ 1.26 / 13.6)]}{18.496 \times 29.6 \times 0.000645}$$

I = 107.4 %

Run 1-3

$$I = 100 \times \frac{609}{60 \times 60 \times} \frac{[(\ 0.002669 \times 113.\ ) + (\ 35.834 / 550\ )[\ 29.6 + (\ 1.25 / 13.6)]}{18.543 \times 29.6 \times 0.000645}$$

I = 106.9 %

Run 1-4

$$I = 100 \times \frac{606}{60 \times 60 \times} \frac{[(\ 0.002669 \times 108.\ ) + (\ 37.408 / 552\ )[\ 29.58 + (\ 1.37 / 13.6)]}{19.086 \times 29.58 \times 0.000645}$$

I = 106.3 %

APPENDIX B

FIELD DATA FORMS

SOURCE EMISSION TEST FIELD DATA SHEET — TEST: 1 RUN: 1 — PAGE: 1 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH SETTINGS
TCT Project Number: 4232-93-2590	Control Unit Number: 1	ehø 2.1903
Date: May 11, 1993	Gas Meter Coefficient: 1.0041	Tm 70
Company: Tri-City Paving	Sample Box Number: 1	MC 16
Source: Asphalt Plant Wet Scrubber	Probe No: S Length: 5'	Ps/Pm 1.00
Source Dimensions: 59¼"D x 59½"W	Pitot No: S Coefficient: 0.84	C -
Test Team: JT / DC / JW	Nozzle No: 11 Diameter: .344	Ts 125
Test Procedures: EPA 1-5 & EPA 9	Filter No: 83	R -
Ambient Temp., °F: 60	Barometric Pressure, in.Hg: 29.59	Static Pressure, in.WC: -.02

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE øH, in.WC REQ.	ORIFICE øH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, °F STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN	GAS METER OUT
10.10	A1	0	887.900	.22	2.83	2.83	4.0	127	255	255	63	-	65	65
	2	2	889.4	.16	2.06	2.06	3.0	128	251	252	58	-	67	66
	3	4	891.0	.12	1.54	1.54	3.0	129	255	250	54	-	67	66
	4	6	892.4	.05	.64	.64	2.0	126	256	251	55	-	69	67
	5	8	893.3	.05	.64	.64	2.0	131	258	252	56	-	69	67
	6	10	894.2	.05	.64	.64	2.0	130	251	251	56	-	70	67
	END A	12	895.0	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	B1	0	895.0	.21	2.70	2.70	4.0	129	257	251	56	-	72	69
	2	2	896.7	.16	2.06	2.06	3.0	131	256	252	53	-	73	69
	3	4	898.3	.11	1.41	1.41	3.0	142	256	253	54	-	75	69
	4	6	899.6	.06	.77	.77	2.5	133	257	253	56	-	75	70
	5	8	900.6	.05	.64	.64	2.0	132	257	253	58	-	75	70
	6	10	901.5	.05	.64	.64	2.0	133	259	254	57	-	76	71
	END B	12	902.3	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	C1	0	902.3	.22	2.83	2.83	4.0	134	256	254	57	-	77	72
	2	2	904.1	.16	2.06	2.06	4.0	137	257	253	54	-	79	72
	3	4	905.6	.11	1.41	1.41	3.0	139	257	254	54	-	80	73
	4	6	906.9	.08	1.03	1.03	3.0	140	257	254	55	-	80	74
	5	8	908.2	.05	.64	.64	2.5	138	258	254	56	-	80	74
	6	10	909.0	.05	.64	.64	2.5	139	257	240	59	-	80	74
	END C	12	909.9	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final	202	118	0	210.5	
Initial	100	100	0	204.3	
Net	102	18	0	6.2	

Total Moisture Collected: 126.2

Impinger Catch Description: WHITE / CLOUDY

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
9:34	0.006	15
11:13	0.000	6

Total Volume of Gas Sampled, DCF: 36.507

Total Sampling Time, Min: 60

Filter Catch Description: BROWN COATING

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading									
Carbon Dioxide	3.6	3.6	3.4	3.4	3.4	3.4			3.47
Oxygen	20.0	16.4	19.8	16.4	19.8	16.4			16.40
Carbon Monoxide	0	0	0	0	0	0			0

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader: [signature]

twin city testing corporation

SOURCE EMISSION TEST FIELD DATA SHEET TEST: 1 RUN: 1 PAGE: 2 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH SETTINGS
TCT Project Number: 4232-93-2590	Control Unit Number: 1	ΔH@ 2.190
Date: May 11, 1993	Gas Meter Coefficient: 1.0041	Tm 70
Company: Tri-City Paving	Sample Box Number: 1	MC 16
Source: Asphalt Plant Wet Scrubber	Probe No: S Length: 5'	Ps/Pm 1.00
Source Dimensions:	Pitot No: S Coefficient: 0.84	C -
Test Team: JT / DC / JW	Nozzle No: 11 Diameter: .344	Ts 125
Test Procedures: EPA 1-5 & EPA 9	Filter No: 83	R -
Ambient Temp., °F: 68	Barometric Pressure, in.Hg: 29.59	Static Pressure, in.WC: -.02

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, °F STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN	GAS METER OUT
	D1	0	909.9	.16	2.06	2.06	4.0	136	258	255	60	—	85	75
	2	2	911.4	.14	1.80	1.80	4.0	140	258	255	56	—	82	76
	3	4	912.9	.10	1.29	1.29	3.5	141	254	254	56	—	83	76
	4	6	914.1	.07	.90	.90	3.0	141	257	254	56	—	83	76
	5	8	915.2	.05	.64	.64	2.5	141	256	254	57	—	83	77
	6	10	916.1	.06	.77	.77	3.0	140	257	251	58	—	83	77
	END D	12	917.1	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	E1	0	917.1	.15	1.93	1.93	4.0	136	259	254	58	—	82	78
	2	2	918.6	.14	1.80	1.80	4.0	142	258	254	57	—	84	78
	3	4	920.0	.11	1.41	1.41	4.0	143	258	254	57	—	85	79
	4	6	921.3	.09	1.16	1.16	3.5	144	259	255	57	—	86	79
	5	8	922.4	.06	.77	.77	3.0	143	259	254	58	—	86	79
	6	10	923.5	.06	.77	.77	3.0	142	259	254	59	—	86	80
11:20	END E	12	924.707	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final					
Initial					
Net					

Total Moisture Collected:

Impinger Catch Description: CLOUDY / WHITE

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
9:34	0.006	15
11:23	0.000	6

Total Volume of Gas Sampled, DCF: 36.507

Total Sampling Time, Min: 60

Filter Catch Description: BROWN COATED

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading									
Carbon Dioxide									
Oxygen									
Carbon Monoxide									

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader:

SOURCE EMISSION TEST FIELD DATA SHEET TEST: 1 RUN: 2 PAGE: 1 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION			NOMOGRAPH SETTINGS	
TCT Project Number: 4232-93-2590	Control Unit Number:	1		ΔHa	2.1803
Date: May 11, 1993	Gas Meter Coefficient:	1.0041		Tm	80
Company: Tri-City Paving	Sample Box Number:	2		MC	16
Source: Asphalt Plant Wet Scrubber	Probe No:	S	Length: 5'	Ps/Pm	1.00
Source Dimensions: 59¼"D x 59½"D	Pitot No:	S	Coefficient: 0.84	C	-
Test Team: JT / DC / JW	Nozzle No:	11	Diameter: .344	Ts	130
Test Procedures: EPA 1-5 & EPA 9	Filter No:	84		R	-
Ambient Temp., °F: 80	Barometric Pressure, in.Hg: 29.60		Static Pressure, in.WC: -.02		

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, °F STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN	GAS METER OUT
11:58	A1	0	924.700	.22	2.33	2.33	4.0	119	254	260	62	-	81	81
	2	2	926.6	.16	2.06	2.06	3.0	131	254	257	56	-	82	80
	3	4	928.1	.10	1.29	1.29	2.5	138	257	256	54	-	82	80
	4	6	929.4	.07	.90	.90	2.0	141	257	254	55	-	82	80
	5	8	930.5	.05	.64	.64	2.0	142	256	253	56	-	83	80
	6	10	931.4	.04	.51	.51	1.5	140	256	253	56	-	83	81
	END A	12	932.2	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	B1	0	932.2	.21	2.70	2.70	4.0	140	258	253	58	-	84	81
	2	2	933.9	.18	2.31	2.31	3.5	145	257	252	56	-	86	81
	3	4	935.6	.07	.90	.90	2.5	147	258	253	56	-	86	81
	4	6	936.7	.05	.64	.64	2.0	147	259	253	57	-	86	82
	5	8	937.6	.05	.64	.64	2.0	147	257	254	58	-	87	82
	6	10	938.5	.04	.51	.51	2.0	145	258	254	59	-	87	82
	END B	12	939.4	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	C1	0	939.4	.18	2.31	2.31	3.5	143	259	255	59	-	87	83
	2	2	941.0	.16	2.06	2.06	3.0	148	259	253	57	-	88	83
	3	4	942.5	.07	.90	.90	2.5	149	259	254	56	-	89	83
	4	6	943.6	.05	.64	.64	2.0	150	259	255	57	-	88	85
	5	8	944.5	.04	.51	.51	1.5	149	257	254	59	-	88	84
	6	10	945.4	.04	.51	.51	1.5	148	261	254	60	-	89	84
	END C	12	946.1	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final	198	114	0	209.1	
Initial	100	100	0	205.3	
Net	98	14	0	3.8	

Total Moisture Collected: 115.8

Impinger Catch Description: WHITE / CLOUDY

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
11:50	0.001	15
13:09	0.000	4

Total Volume of Gas Sampled, DCF: 35.767

Total Sampling Time, Min: 60

Filter Catch Description: BROWN COATING

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading									
Carbon Dioxide	4.0	4.0	4.0	4.0	4.0	4.0			4.00
Oxygen	20.0	16.0	19.6	15.6	19.8	15.8			15.80
Carbon Monoxide	0	0	0	0	0	0			0

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader:

twin city testing corporation

SOURCE EMISSION TEST FIELD DATA SHEET TEST: 1 RUN: 2 PAGE: 2 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH SETTINGS
TCT Project Number: 4232-93-2590	Control Unit Number:	ΔH@ 2.1403
Date: May 11, 1993	Gas Meter Coefficient: 1.0041	Tm 90
Company: Tri-City Paving	Sample Box Number: 2	MC 16
Source: Asphalt Plant Wet Scrubber	Probe No: S Length: 5'	Ps/Pm 1.00
Source Dimensions:	Pitot No: S Coefficient: 0.84	C -
Test Team: JT / DC / JW	Nozzle No: 11 Diameter: .344	Ts 130
Test Procedures: EPA 1-5 & EPA 9	Filter No: 84	R -
Ambient Temp., °F: 86	Barometric Pressure, in.Hg: 29.60	Static Pressure, in.WC: -.02

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, °F STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN	GAS METER OUT
	D1	0	946.1	.18	2.31	2.31	3.5	147	260	255	60	—	89	95
	2	2	947.7	.12	1.54	1.54	3.0	150	260	254	56	—	90	95
	3	4	949.2	.09	1.16	1.16	2.5	150	258	253	56	—	90	95
	4	6	950.4	.07	.90	.90	2.5	150	258	254	57	—	90	95
	5	8	951.4	.04	.51	.51	2.0	151	258	254	58	—	90	85
	6	10	952.3	.04	.51	.51	2.0	150	258	254	58	—	90	85
	END D	12	953.1	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	E1	0	953.1	.16	2.06	2.06	3.5	144	254	253	60	—	90	86
	2	2	954.6	.14	1.80	1.80	3.0	148	258	254	58	—	91	87
	3	4	956.0	.12	1.54	1.54	3.0	148	259	255	57	—	92	87
	4	6	957.3	.08	1.03	1.03	2.5	150	258	254	57	—	92	87
	5	8	958.5	.05	.90	.90	2.5	150	258	254	58	—	92	87
	6	10	959.6	.05	.64	.64		147	258	255	58	—	92	87
13:08	END E	12	960.46)	↓	X	X	X	X	X	X	X	—	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final					
Initial					
Net					

Total Moisture Collected:

Impinger Catch Description:

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
11:50	0.001	15
13:09	0.000	4

Total Volume of Gas Sampled, DCF: 35.767

Total Sampling Time, Min: 60

Filter Catch Description:

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading									
Carbon Dioxide									
Oxygen									
Carbon Monoxide									

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader:

SOURCE EMISSION TEST FIELD DATA SHEET TEST: 1 RUN: 3 PAGE: 1 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH SETTINGS
TCT Project Number: 4232-93-2590	Control Unit Number: 1	ΔHa 2.1903
Date: May 11, 1993	Gas Meter Coefficient: 1.0041	Tm 90
Company: Tri-City Paving	Sample Box Number: 3	MC 16
Source: Asphalt Plant Wet Scrubber	Probe No: S Length: 5'	Ps/Pm 1.00
Source Dimensions: 59 1/4"D x 59 1/2"W	Pitot No: S Coefficient: 0.84	C -
Test Team: JT / DC / JW	Nozzle No: 11 Diameter: .344	Ts 135
Test Procedures: EPA 1-5 & EPA 9	Filter No: 85	R -
Ambient Temp., °F: 78	Barometric Pressure, in.Hg: 29.60	Static Pressure, in.WC: -.02

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, °F STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN	GAS METER OUT
13:43	A1	0	960.800	.23	3.01	3.01	4.0	131	256	264	62	-	87	87
	2	2	962.7	.16	2.10	2.10	3.0	134	255	261	57	-	88	87
	3	4	964.2	.07	.92	.92	2.0	138	257	259	54	-	88	87
	4	6	965.4	.07	.92	.92	2.0	145	257	256	56	-	88	87
	5	8	966.4	.05	.65	.65	1.5	145	257	253	57	-	89	87
	6	10	967.3	.04	.52	.52	1.5	145	257	251	58	-	89	87
	END A	12	968.2	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	B1	0	968.2	.20	2.62	2.62	4.0	143	259	253	60	-	89	87
	2	2	969.9	.14	1.83	1.83	3.0	150	258	253	56	-	90	87
	3	4	971.4	.09	1.18	1.18	3.0	151	259	253	56	-	91	87
	4	6	972.7	.05	.65	.65	2.0	152	257	253	57	-	91	87
	5	8	973.5	.05	.65	.65	2.0	152	259	254	58	-	91	87
	6	10	974.5	.04	.52	.52	2.0	152	259	252	59	-	91	87
	END B	12	975.3	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	C1	0	975.3	.18	2.36	2.36	3.5	145	258	254	61	-	91	88
	2	2	976.9	.12	1.57	1.57	3.0	153	258	253	58	-	92	88
	3	4	978.3	.09	1.18	1.18	2.5	154	258	254	59	-	93	90
	4	6	979.5	.05	.65	.65	2.0	155	257	254	59	-	92	88
	5	8	980.5	.04	.52	.52	2.0	156	259	254	60	-	92	88
	6	10	981.3	.04	.52	.52	2.0	153	260	253	60	-	92	89
	END C	12	982.1	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final	201	107	1	214.4	
Initial	100	100	0	209.6	
Net	101	7	1	4.8	

Total Moisture Collected: 113.8

Impinger Catch Description: White / cloudy

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
13:39	0.000	15
14:53	0.000	5

Total Volume of Gas Sampled, DCF: 35.834

Total Sampling Time, Min: 60

Filter Catch Description: Brown Coarse

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading									
Carbon Dioxide	4.2	4.2	4.4	4.4	4.2	4.2			4.27
Oxygen	19.8	15.6	19.8	15.4	19.8	15.6			15.53
Carbon Monoxide	0	0	0	0	0	0			0

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader:

twin city testing corporation

SOURCE EMISSION TEST FIELD DATA SHEET TEST: 1 RUN: 3 PAGE: 2 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH SETTINGS
TCT Project Number: 4232-93-2590	Control Unit Number: 1	ΔH@ 2.1403
Date: May 11, 1993	Gas Meter Coefficient: 1.0041	Tm 90
Company: Tri-City Paving	Sample Box Number: 3	MC 16
Source: Asphalt Plant Wet Scrubber	Probe No: 5 Length: 5'	Ps/Pm 1.00
Source Dimensions:	Pitot No: 5 Coefficient: 0.84	C -
Test Team: JT / DC / JW	Nozzle No: 11 Diameter: .344	Ts 135
Test Procedures: EPA 1-5 & EPA 9	Filter No: 85	R -
Ambient Temp., °F: 78	Barometric Pressure, in.Hg: 29.60	Static Pressure, in.WC: -.02

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, °F STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN	GAS METER OUT
	D1	0	982.1	.18	2.36	2.36	4.0	145	258	254	60	—	93	89
	2	2	983.8	.12	1.57	1.57	3.0	154	256	253	59	—	94	89
	3	4	985.2	.09	1.18	1.18	3.0	154	259	255	59	—	94	89
	4	6	986.4	.05	.65	.65	2.0	154	259	255	60	—	94	89
	5	8	987.3	.05	.65	.65	2.0	153	258	253	61	—	93	89
	6	10	988.2	.04	.52	.52	2.0	154	259	254	61	—	93	90
	END D	12	989.0	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	E1	0	989.0	.19	2.49	2.49	4.0	145	259	255	61	—	93	90
	2	2	990.8	.15	1.96	1.96	3.5	152	260	255	57	—	95	90
	3	4	992.2	.10	1.31	1.31	3.0	154	258	255	57	—	95	90
	4	6	993.5	.08	1.05	1.05	3.0	154	258	254	58	—	95	91
	5	8	994.7	.05	.65	.65	2.0	154	258	253	60	—	95	91
	6	10	995.60	.06	.79	.79	2.5	152	258	254	61	—	95	91
14:52	END E	12	996.64	X	X	X	X	X	X	X	X	—	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final					
Initial					
Net					

Total Moisture Collected:

Impinger Catch Description:

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
13:39	0.000	15
14:53	0.000	5

Total Volume of Gas Sampled, DCF: 35,834

Total Sampling Time, Min: 60

Filter Catch Description:

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading									
Carbon Dioxide									
Oxygen									
Carbon Monoxide									

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader:

twin city testing corporation

SOURCE EMISSION TEST FIELD DATA SHEET TEST: 1 RUN: 4 PAGE: 1 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION		NOMOGRAPH SETTINGS
TCT Project Number: 4232-93-2590	Control Unit Number: 1		ΔH@ 2.1903
Date: May 11, 1993	Gas Meter Coefficient: 1.0041		Tm 90
Company: Tri-City Paving	Sample Box Number: 4		MC 16
Source: Asphalt Plant Wet Scrubber	Probe No: 5	Length: 5'	Ps/Pm 1.00
Source Dimensions: 59¾"D x 59½"W	Pitot No: 5	Coefficient: 0.84	C –
Test Team: JT / DC / JW	Nozzle No: i1	Diameter: .544	Ts 135
Test Procedures: EPA 1-5 & EPA 9	Filter No: 86		R –
Ambient Temp., °F: 80	Barometric Pressure, in.Hg: 29.58	Static Pressure, in.WC: -.02	

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	STACK GAS °F	PROBE LINER °F	FILTER OVEN °F	IMPINGER EXIT °F	AUXILIARY °F	GAS METER IN °F	GAS METER OUT °F
15:35	A1	0	997.000	.22	2.88	2.88	4.0	129	255	255	66	–	89	88
	2	2	998.9	.18	2.36	2.36	4.0	140	255	257	60	–	88	88
	3	4	1000.6	.10	1.31	1.31	2.5	141	257	256	59	–	89	88
	4	6	2.0	.05	.65	.65	2.0	143	258	256	60	–	89	88
	5	8	2.9	.04	.52	.52	2.0	150	258	254	60	–	89	88
	6	10	3.8	.04	.52	.52	2.0	150	259	251	60	–	89	88
	END A	12	4.6	X	X	X	X	X	X	X	X	X	X	X
X	*	X	X	X	X	X	X	X	X	X	X	X	X	X
	B1	0	4.6	.18	2.36	2.36	4.0	148	257	256	61	–	90	88
	2	2	6.2	.16	2.10	2.10	3.5	150	257	254	58	–	92	88
	3	4	7.7	.11	1.44	1.44	3.0	149	259	254	56	–	92	88
	4	6	9.0	.06	.79	.79	2.5	150	260	254	57	–	93	89
	5	8	10.1	.04	.52	.52	2.0	149	254	252	59	–	92	89
	6	10	11.0	.04	.52	.52	2.0	150	260	253	60	–	92	89
	END B	12	11.8	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	C1	0	11.8	.19	2.49	2.49	4.0	148	257	256	60	–	93	89
	2	2	13.4	.16	2.10	2.10	4.0	149	261	256	58	–	94	89
	3	4	15.0	.11	1.44	1.44	3.0	150	257	254	58	–	94	90
	4	6	16.3	.06	.79	.79	2.5	150	259	254	57	–	95	90
	5	8	17.4	.04	.52	.52	2.0	151	260	254	60	–	95	90
	6	10	18.2	.04	.52	.52	2.0	152	259	254	60	–	94	90
	END C	12	19.0	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final	199	103	0	212.4	X
Initial	100	100	0	206.2	X
Net	99	3	0	6.2	X

Total Moisture Collected: 108.2

Impinger Catch Description: White / Cloudy

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
15:25	0.000	15
16:42	0.000	5

Total Volume of Gas Sampled, DCF: 37.408

Total Sampling Time, Min: 60

Filter Catch Description: Brown Coating

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading							X	X	
Carbon Dioxide	3.4	3.4	3.0	3.0	3.2	3.2	X	X	3.20
Oxygen	20.4	17.0	20.2	17.2	20.0	16.8	X	X	17.00
Carbon Monoxide	0	0	0	0	0	0	X	X	0

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader: [signature]

twin city testing corporation

SOURCE EMISSION TEST FIELD DATA SHEET TEST:____ RUN:____ PAGE: 2 of 2

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH SETTINGS
TCT Project Number: 4232-93-2590	Control Unit Number: 1	oh@ 2.1903
Date: May 11, 1993	Gas Meter Coefficient: 1.0041	Tm 90
Company: Tri-City Paving	Sample Box Number: 4	MC 16
Source: Asphalt Plant Wet Scrubber	Probe No: 5 Length: 5'	Ps/Pm 1.00
Source Dimensions:	Pitot No: 5 Coefficient: 0.84	C -
Test Team: JT / DC / JW	Nozzle No: 11 Diameter: .344	Ts 135
Test Procedures: EPA 1-5 & EPA 9	Filter No: 86	R -
Ambient Temp., °F: 80	Barometric Pressure, in.Hg: 29.58	Static Pressure, in.WC: -.02

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, °F STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN	GAS METER OUT
	D1	0	19.0	.19	2.49	2.49	4.0	150	260	255	61	—	95	90
	2	2	20.6	.15	1.96	1.96	4.0	148	258	255	60	—	96	91
	3	4	22.2	.11	1.44	1.44	3.0	147	259	254	59	—	96	91
	4	6	23.5	.06	.79	.79	2.5	146	261	255	60	—	96	91
	5	8	24.6	.05	.65	.65	2.0	144	261	255	60	—	95	91
	6	10	25.5	.05	.65	.65	2.0	144	258	254	60	—	95	91
	END D	12	26.4	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	E1	0	26.4	.18	2.36	2.36	4.0	139	259	255	60	—	96	92
	2	2	28.0	.16	2.10	2.10	4.0	141	260	254	58	—	93	92
	3	4	29.7	.13	1.70	1.70	3.5	143	260	255	57	—	98	92
	4	6	31.0	.10	1.31	1.31	3.0	143	259	255	58	—	98	93
	5	8	32.3	.07	.92	.92	3.0	142	259	256	59	—	97	92
	6	10	33.4	.06	.79	.79	2.5	142	259	254	60	—	98	93
16:40	END E	12	34.408	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final					
Initial					
Net					

Total Moisture Collected:

Impinger Catch Description:

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
15:25	0.000	15
16:42	0.000	5

Total Volume of Gas Sampled, DCF: 37.408

Total Sampling Time, Min: 60

Filter Catch Description:

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Replicate 4 Buret Reading	Replicate 4 Percent Volume	Compound Average Percent Volume
Initial Reading									
Carbon Dioxide									
Oxygen									
Carbon Monoxide									

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader: [signature]

Date: 5/11/93 Project:

Technician: J.T. Client: Tri-City Paving

Source/Process: Wet Scrubber

Point	From Stack Wall	From Port	Max. Flow °	A	C	E
1	4.9	9.1		.16 5° / 119	.11 5° / 121	.10 0° / 124
2	14.8	19.0		.15 0° / 120	.12 5° / 123	.10 5° / 124
3	24.7	28.9		.10 5° / 121	.10 0° / 123	.11 0° / 125
4	34.6	38.8		.06 0° / 122	.06 0° / 123	.05 5° / 125
5	44.4	48.6		.06 5° / 122	.05 5° / 123	.04 0° / 125
6	54.3	58.5		.06 0° / 122	.04 5° / 123	.03 0° / 125

Comments:

Stack Dimensions
59 1/4" x 59 1/2"
Deep Wide

Port Length - 4 1/4"

Wet Bulb -

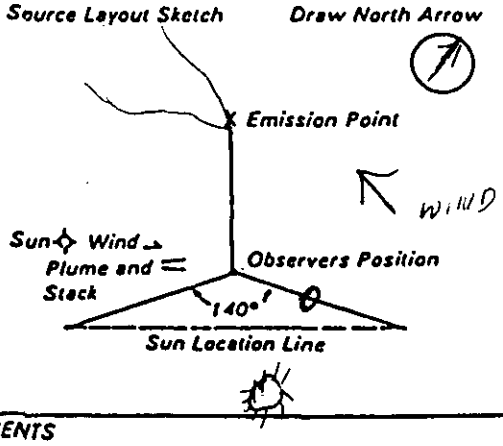
Nozzle -11 - .344

Form SST00001, General Data, Revised 10/21/92

Visible Emission Observation Form

SOURCE NAME: TRI-CITY PAVING	OBSERVATION DATE: 5-11-93
ADDRESS: P.O. Box 366	START TIME: 10:15
CITY: LITTLE FALLS	STATE: MINN ZIP: 56345
PHONE	SOURCE ID NUMBER: 681-B
PROCESS EQUIPMENT: ASPHALT PLANT	OPERATING MODE: 200 TPH
CONTROL EQUIPMENT: WET SCRUBBER	OPERATING MODE: 100%
DESCRIBE EMISSION POINT: START TOP OF STACK STOP SAME	STOP TIME: 11:15
HEIGHT ABOVE GROUND LEVEL: START 20' STOP 20'	HEIGHT RELATIVE TO OBSERVER: START 15' STOP 15'
DISTANCE FROM OBSERVER: START 200' STOP 200'	DIRECTION FROM OBSERVER: START W-320 STOP "
DESCRIBE EMISSIONS: START SCRUBBER EMISSION STOP "	
EMISSION COLOR: START WHITE STOP WHITE	PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT: NO ☒ YES ☐	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START END OF PLUME STOP "	
DESCRIBE BACKGROUND: START SKY STOP "	
BACKGROUND COLOR: START BLUE STOP	SKY CONDITIONS: START MOSTLY CLEAR STOP SAME
WIND SPEED: START 5-10 STOP 5-10	WIND DIRECTION: START SOUTH STOP
AMBIENT TEMP. START 75 STOP	WET BULB TEMP. 59 RH, percent 37

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	5	10	10	5	31	0	0	0	0
2	10	10	15	10	32	0	0	0	0
3	5	10	10	10	33	0	0	0	0
4	10	10	10	5	34	0	0	0	5
5	5	5	5	10	35	0	5	5	0
6	10	10	10	10	36	0	0	0	0
7	15	10	10	15	37	5	0	0	0
8	15	10	10	5	38	0	0	0	0
9	10	10	10	10	39	0	0	0	0
10	15	10	10	10	40	0	5	0	5
11	10	10	15	15	41	0	0	0	0
12	15	10	10	15	42	0	0	0	0
13	15	15	15	10	43	0	0	0	0
14	10	10	10	10	44	0	0	0	0
15	10	10	10	5	45	0	0	0	0
16	10	10	10	10	46	0	0	0	0
17	10	10	10	10	47	0	0	0	0
18	5	10	15	10	48	0	0	0	0
19	5	5	10	10	49	0	0	0	0
20	10	5	10	10	50	0	0	0	0
21	5	10	10	10	51	0	0	0	0
22	10	5	5	5	52	0	0	0	0
23	5	5	5	5	53	0	0	0	0
24	5	10	5	5	54	0	0	0	0
25	5	5	5	5	55	0	0	0	0
26	5	5	5	0	56	0	0	0	0
27	0	0	0	5	57	0	0	0	0
28	0	5	0	0	58	0	0	0	0
29	0	0	0	5	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0



AVERAGE OPACITY FOR HIGHEST PERIOD: 11.7%	NUMBER OF READINGS ABOVE 20 % WERE 0
RANGE OF OPACITY READINGS: 0% MINIMUM	15% MAXIMUM
OBSERVER'S NAME (PRINT): DAVID CHRISTIAN	
COMMENTS	OBSERVER'S SIGNATURE: [signature] DATE: 5-11-93
	ORGANIZATION: TWIN CITY TESTING
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE	CERTIFIED BY: E.T.A. DATE: 5-1-93
TITLE / DATE	VERIFIED BY / DATE

EPA METHOD 9 OPACITY CALCULATIONS

Facility: TRI-CITY PAVING, INC., Little Falls, MN
Process Tested: Wet Scrubber
Date: 5/11/93
Time: 10:15 a.m.

Results:

Average Opacity --> 11.7% for Highest 6 Minute Period

Average Opacity --> 4.1% for Test Period

Minimum Reading - 0 %

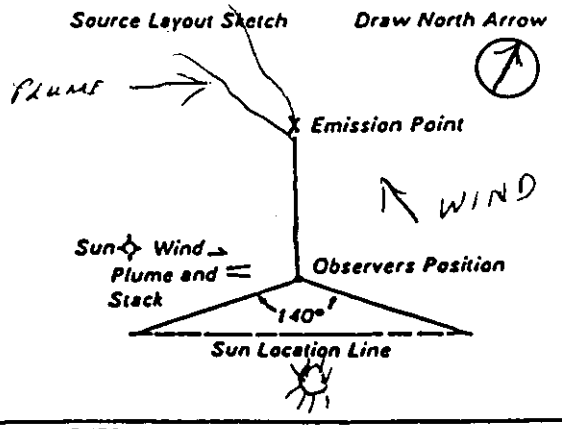
Maximum Reading - 15 %

	0	15	30	45	6 Minute Average
1	5	10	10	5	
2	10	10	15	10	
3	5	10	10	10	
4	10	10	10	5	
5	5	5	5	10	
6	10	10	10	10	8.8%
7	15	10	10	15	9.6%
8	15	10	10	5	9.4%
9	10	10	10	10	9.6%
10	15	10	10	10	10.0%
11	10	10	15	15	11.0%
12	15	10	10	15	11.5%
13	15	15	15	10	11.7%
14	10	10	10	10	11.7%
15	10	10	10	5	11.5%
16	10	10	10	10	11.3%
17	10	10	10	10	10.8%
18	5	10	15	10	10.4%
19	5	5	10	10	9.4%
20	10	5	10	10	9.2%
21	5	10	10	10	9.2%
22	10	5	5	5	8.5%
23	5	5	5	5	7.7%
24	5	10	5	5	7.1%
25	5	5	5	5	6.7%
26	5	5	5	0	5.8%
27	0	0	0	5	4.6%
28	0	5	0	0	3.8%
29	0	0	0	5	3.1%
30	0	0	0	0	2.1%

	0	15	30	45	6 Minute Average
31	0	0	0	0	1.3%
32	0	0	0	0	0.6%
33	0	0	0	0	0.4%
34	0	0	0	5	0.4%
35	0	5	5	0	0.6%
36	0	0	0	0	0.6%
37	5	0	0	0	0.8%
38	0	0	0	0	0.8%
39	0	0	0	0	0.8%
40	0	5	0	5	1.0%
41	0	0	0	0	0.6%
42	0	0	0	0	0.6%
43	0	0	0	0	0.4%
44	0	0	0	0	0.4%
45	0	0	0	0	0.4%
46	0	0	0	0	0.0%
47	0	0	0	0	0.0%
48	0	0	0	0	0.0%
49	0	0	0	0	0.0%
50	0	0	0	0	0.0%
51	0	0	0	0	0.0%
52	0	0	0	0	0.0%
53	0	0	0	0	0.0%
54	0	0	0	0	0.0%
55	0	0	0	0	0.0%
56	0	0	0	0	0.0%
57	0	0	0	0	0.0%
58	0	0	0	0	0.0%
59	0	0	0	0	0.0%
60	0	0	0	0	0.0%

Visible Emission Observation Form

SOURCE NAME: TRI-CITY PAVING	OBSERVATION DATE: 5-11-93
ADDRESS: PO Box 326	START TIME: 12:00
CITY: LITTLE FALLS	STATE: MINN
ZIP: 56345	STOP TIME: 1:00
PHONE	SOURCE ID NUMBER: 181-B
PROCESS EQUIPMENT: ASPHALT PLANT WET SCRUBBER	OPERATING MODE: 200 + TPH
CONTROL EQUIPMENT: WET SCRUBBER	OPERATING MODE: 100 %
DESCRIBE EMISSION POINT: START Top of STACK STOP "	
HEIGHT ABOVE GROUND LEVEL: START 24' STOP 20	HEIGHT RELATIVE TO OBSERVER: START 14' STOP 14'
DISTANCE FROM OBSERVER: START 200' STOP	DIRECTION FROM OBSERVER: START W. 320 STOP
DESCRIBE EMISSIONS: START Scrubber Exhaust STOP "	
EMISSION COLOR: START WHITE STOP	PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☒
WATER DROPLETS PRESENT: NO ☒ YES ☐	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START END OF PLUME STOP "	
DESCRIBE BACKGROUND: START SKY STOP SKY	
BACKGROUND COLOR: START BLUE STOP	SKY CONDITIONS: START CLEAR STOP
WIND SPEED: START 5-10 STOP 5-10	WIND DIRECTION: START SOUTH STOP SOUTH
AMBIENT TEMP.: START 76 STOP 78	WET BULB TEMP.: 59 — RH.percent: 37



SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 0 %	NUMBER OF READINGS ABOVE 20 % WERE 0
RANGE OF OPACITY READINGS: 0 % MINIMUM	0 % MAXIMUM
OBSERVER'S NAME (PRINT): DAVID CHRISTIAN	
COMMENTS	OBSERVER'S SIGNATURE: David Christian — DATE: 5-11-93
	ORGANIZATION: TWIN CITY TESTING
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS — SIGNATURE	CERTIFIED BY: E.T.A. — DATE: 7-1-93
TITLE — DATE	VERIFIED BY — DATE

EPA METHOD 9 OPACITY CALCULATIONS

Facility: TRI-CITY PAVING, INC., Little Falls, MN
Process Tested: Wet Scrubber
Date: 5/11/93
Time: 12:00

Results:

Average Opacity --> 0.0% for Highest 6 Minute Period

Average Opacity --> 0.0% for Test Period

Minimum Reading - 0 %

Maximum Reading - 0 %

	0	15	30	45	6 Minute Average		0	15	30	45	6 Minute Average
1	0	0	0	0		31	0	0	0	0	0.0%
2	0	0	0	0		32	0	0	0	0	0.0%
3	0	0	0	0		33	0	0	0	0	0.0%
4	0	0	0	0		34	0	0	0	0	0.0%
5	0	0	0	0		35	0	0	0	0	0.0%
6	0	0	0	0	0.0%	36	0	0	0	0	0.0%
7	0	0	0	0	0.0%	37	0	0	0	0	0.0%
8	0	0	0	0	0.0%	38	0	0	0	0	0.0%
9	0	0	0	0	0.0%	39	0	0	0	0	0.0%
10	0	0	0	0	0.0%	40	0	0	0	0	0.0%
11	0	0	0	0	0.0%	41	0	0	0	0	0.0%
12	0	0	0	0	0.0%	42	0	0	0	0	0.0%
13	0	0	0	0	0.0%	43	0	0	0	0	0.0%
14	0	0	0	0	0.0%	44	0	0	0	0	0.0%
15	0	0	0	0	0.0%	45	0	0	0	0	0.0%
16	0	0	0	0	0.0%	46	0	0	0	0	0.0%
17	0	0	0	0	0.0%	47	0	0	0	0	0.0%
18	0	0	0	0	0.0%	48	0	0	0	0	0.0%
19	0	0	0	0	0.0%	49	0	0	0	0	0.0%
20	0	0	0	0	0.0%	50	0	0	0	0	0.0%
21	0	0	0	0	0.0%	51	0	0	0	0	0.0%
22	0	0	0	0	0.0%	52	0	0	0	0	0.0%
23	0	0	0	0	0.0%	53	0	0	0	0	0.0%
24	0	0	0	0	0.0%	54	0	0	0	0	0.0%
25	0	0	0	0	0.0%	55	0	0	0	0	0.0%
26	0	0	0	0	0.0%	56	0	0	0	0	0.0%
27	0	0	0	0	0.0%	57	0	0	0	0	0.0%
28	0	0	0	0	0.0%	58	0	0	0	0	0.0%
29	0	0	0	0	0.0%	59	0	0	0	0	0.0%
30	0	0	0	0	0.0%	60	0	0	0	0	0.0%

Visible Emission Observation Form

SOURCE NAME: TRI-CITY PAVING	OBSERVATION DATE: 5-11-93	START TIME: 1:42
ADDRESS: P.O. Box 326		STOP TIME: 2:42
CITY: LITTLE FALLS	STATE: MINN	ZIP: 56345
PHONE:	SOURCE ID NUMBER: 681-B	
PROCESS EQUIPMENT: ASPHALT PLANT ~~WET SCRUBBER~~	OPERATING MODE: 200 + TPH	
CONTROL EQUIPMENT: WET SCRUBBER	OPERATING MODE: 100 %	
DESCRIBE EMISSION POINT: START Top of STACK	STOP Top of STACK	
HEIGHT ABOVE GROUND LEVEL: START 20' STOP 20	HEIGHT RELATIVE TO OBSERVER: START 17' STOP 17'	
DISTANCE FROM OBSERVER: START 200' STOP 200'	DIRECTION FROM OBSERVER: START W-320 STOP SAME	
DESCRIBE EMISSIONS: START WHITE	STOP SAME	
EMISSION COLOR: START WHITE STOP	PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☒	
WATER DROPLETS PRESENT: NO ☒ YES ☐	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START END OF PLUME	STOP SAME	
DESCRIBE BACKGROUND: START SKY	STOP SAME	
BACKGROUND COLOR: START BLUE STOP BLUE	SKY CONDITIONS: START CLEAR STOP CLEAR	
WIND SPEED: START 10-15 STOP 10-15	WIND DIRECTION: START SOUTH STOP SOUTH	
AMBIENT TEMP.: START 78 STOP 81	WET BULB TEMP.: 60	RH, percent: 27

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	5	5	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	5	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	5	5	5	38	0	0	0	0
9	0	0	0	0	39	0	5	5	5
10	5	5	5	5	40	5	5	5	0
11	5	5	5	0	41	0	0	0	0
12	0	5	5	5	42	0	0	0	0
13	5	5	5	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	5	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 3.5 %

NUMBER OF READINGS ABOVE: 20 % WERE 0

RANGE OF OPACITY READINGS: 0 % MINIMUM — 5 % MAXIMUM

OBSERVER'S NAME (PRINT): DAVID CHRISTIAN

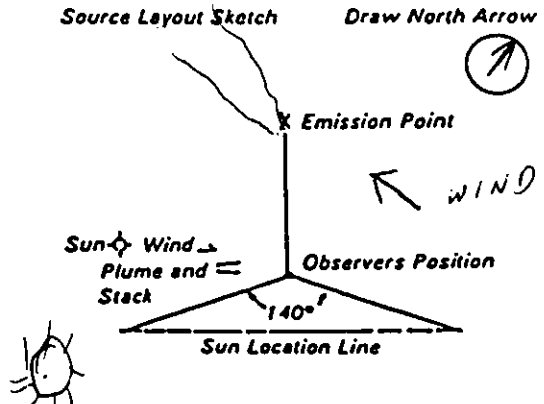
OBSERVER'S SIGNATURE: David Christian — DATE: 5-11-93

ORGANIZATION: TWIN CITY TESTING

CERTIFIED BY: E.T.A. — DATE: 4-1-93

VERIFIED BY: — DATE:

Source Layout Sketch — Draw North Arrow



COMMENTS:

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE: — TITLE: — DATE:

twin city testing corporation

EPA METHOD 9 OPACITY CALCULATIONS

Facility: TRI-CITY PAVING, INC., Little Falls, MN
Process Tested: Wet Scrubber
Date: 5/11/93
Time: 1:42 P.M.

Results:

Average Opacity --> 3.3% for Highest 6 Minute Period

Average Opacity --> 0.5% for Test Period

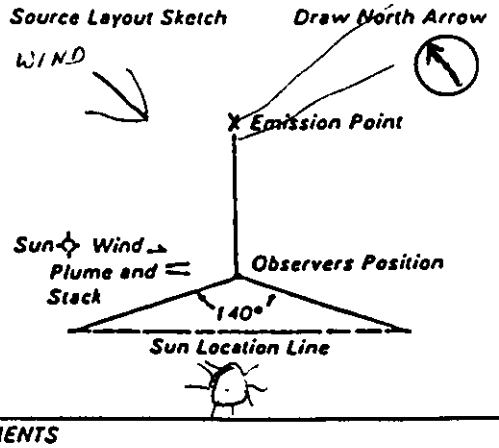
Minimum Reading - 0 %

Maximum Reading - 5 %

	0	15	30	45	6 Minute Average		0	15	30	45	6 Minute Average
1	0	0	5	5		31	0	0	0	0	0.0%
2	0	0	0	0		32	0	0	0	0	0.0%
3	0	5	0	0		33	0	0	0	0	0.0%
4	0	0	0	0		34	0	0	0	0	0.0%
5	0	0	0	0		35	0	0	0	0	0.0%
6	0	0	0	0	0.6%	36	0	0	0	0	0.0%
7	0	0	0	0	0.2%	37	0	0	0	0	0.0%
8	0	5	5	5	0.8%	38	0	0	0	0	0.0%
9	0	0	0	0	0.6%	39	0	5	5	5	0.6%
10	5	5	5	5	1.5%	40	5	5	5	0	1.3%
11	5	5	5	0	2.1%	41	0	0	0	0	1.3%
12	0	5	5	5	2.7%	42	0	0	0	0	1.3%
13	5	5	5	0	3.3%	43	0	0	0	0	1.3%
14	0	0	0	0	2.7%	44	0	0	0	0	1.3%
15	0	0	0	0	2.7%	45	0	0	0	0	0.6%
16	0	0	0	0	1.9%	46	0	0	0	0	0.0%
17	0	0	0	0	1.3%	47	0	0	0	0	0.0%
18	0	0	0	0	0.6%	48	0	0	0	0	0.0%
19	0	0	5	0	0.2%	49	0	0	0	0	0.0%
20	0	0	0	0	0.2%	50	0	0	0	0	0.0%
21	0	0	0	0	0.2%	51	0	0	0	0	0.0%
22	0	0	0	0	0.2%	52	0	0	0	0	0.0%
23	0	0	0	0	0.2%	53	0	0	0	0	0.0%
24	0	0	0	0	0.2%	54	0	0	0	0	0.0%
25	0	0	0	0	0.0%	55	0	0	0	0	0.0%
26	0	0	0	0	0.0%	56	0	0	0	0	0.0%
27	0	0	0	0	0.0%	57	0	0	0	0	0.0%
28	0	0	0	0	0.0%	58	0	0	0	0	0.0%
29	0	0	0	0	0.0%	59	0	0	0	0	0.0%
30	0	0	0	0	0.0%	60	0	0	0	0	0.0%

Visible Emission Observation Form

SOURCE NAME: TRI-CITY PAVING	OBSERVATION DATE: 5-11-93	START TIME: 3:42 / STOP TIME: 4:42
ADDRESS: P.O. Box 326		
CITY: LITTLE FALLS / STATE: MINN / ZIP: 56345		
PHONE / SOURCE ID NUMBER: 631-8		
PROCESS EQUIPMENT: ASPHALT WET SCRUBBER PLANT / OPERATING MODE: 200 + TPH		
CONTROL EQUIPMENT: WET SCRUBBER / OPERATING MODE: 100%		
DESCRIBE EMISSION POINT: START TOP OF STACK STOP SAME		
HEIGHT ABOVE GROUND LEVEL: START 20' STOP 20' / HEIGHT RELATIVE TO OBSERVER: START 17' STOP 17'		
DISTANCE FROM OBSERVER: START 100' STOP 100' / DIRECTION FROM OBSERVER: START EAST STOP		
DESCRIBE EMISSIONS: START WHITE SMOKE STOP WHITE SMOKE		
EMISSION COLOR: START WHITE STOP / PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐		
WATER DROPLETS PRESENT: NO ☒ YES ☐ / IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐		
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START END OF PLUME STOP "		
DESCRIBE BACKGROUND: START SKY STOP SKY		
BACKGROUND COLOR: START BLUE STOP / SKY CONDITIONS: START CLEAR STOP CL		
WIND SPEED: START 0-5 STOP 5-10 / WIND DIRECTION: START N.W STOP N.W		
AMBIENT TEMP.: START 40 STOP / WET BULB TEMP.: 58 / RH,percent: 25		



SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31	5	5	5	0
2	0	0	0	0	32	0	0	0	5
3	0	0	0	0	33	5	0	5	5
4	0	0	0	0	34	5	5	5	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	5	5	5
7	0	0	0	0	37	5	0	0	0
8	0	0	0	0	38	0	5	5	0
9	0	0	0	0	39	0	0	5	5
10	0	0	0	0	40	5	5	5	5
11	0	0	0	0	41	5	5	5	5
12	0	0	0	0	42	5	5	5	5
13	0	0	0	0	43	5	5	5	5
14	0	0	0	0	44	5	5	5	5
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	5	5
17	0	0	0	0	47	0	5	5	5
18	5	5	0	0	48	5	5	5	5
19	0	0	0	0	49	5	5	5	5
20	0	0	0	0	50	5	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	5	5	5	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	5	5	0	0
27	0	0	0	0	57	0	0	0	5
28	0	0	0	0	58	5	5	0	0
29	5	5	5	5	59	0	0	0	0
30	5	5	0	5	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 4.6 %	NUMBER OF READINGS ABOVE: 20 % WERE 0
RANGE OF OPACITY READINGS: 0 % MINIMUM	5 % MAXIMUM
OBSERVER'S NAME (PRINT): DAVID CHRISTIAN	
COMMENTS	OBSERVER'S SIGNATURE: David Christian / DATE: 5-11-93
	ORGANIZATION: TWIN CITY TESTING
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS / SIGNATURE	CERTIFIED BY: E.T.A. / DATE: 9-1-93
TITLE / DATE	VERIFIED BY / DATE

EPA METHOD 9 OPACITY CALCULATIONS

Facility: TRI–CITY PAVING, INC., Little Falls, MN
Process Tested: Wet Scrubber
Date: 5/11/93
Time: 3:42 P.M.

Results:

Average Opacity ––> 4.6%
for Highest 6 Minute Period

Average Opacity ––> 1.4%
for Test Period

Minimum Reading – 0 %

Maximum Reading – 5 %

	0	15	30	45	6 Minute Average
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	0.0%
7	0	0	0	0	0.0%
8	0	0	0	0	0.0%
9	0	0	0	0	0.0%
10	0	0	0	0	0.0%
11	0	0	0	0	0.0%
12	0	0	0	0	0.0%
13	0	0	0	0	0.0%
14	0	0	0	0	0.0%
15	0	0	0	0	0.0%
16	0	0	0	0	0.0%
17	0	0	0	0	0.0%
18	5	5	0	0	0.4%
19	0	0	0	0	0.4%
20	0	0	0	0	0.4%
21	0	0	0	0	0.4%
22	0	0	0	0	0.4%
23	0	5	5	5	1.0%
24	0	0	0	0	0.6%
25	0	0	0	0	0.6%
26	0	0	0	0	0.6%
27	0	0	0	0	0.6%
28	0	0	0	0	0.6%
29	5	5	5	5	0.8%
30	5	5	0	5	1.5%
31	5	5	5	0	2.1%
32	0	0	0	5	2.3%
33	5	0	5	5	2.9%
34	5	5	5	0	3.5%
35	0	0	0	0	2.7%
36	0	5	5	5	2.7%
37	5	0	0	0	2.3%
38	0	5	5	0	2.5%
39	0	0	5	5	2.3%
40	5	5	5	5	2.5%
41	5	5	5	5	3.3%
42	5	5	5	5	3.5%
43	5	5	5	5	4.2%
44	5	5	5	5	4.6%
45	0	0	0	0	4.2%
46	0	0	5	5	3.8%
47	0	5	5	5	3.5%
48	5	5	5	5	3.5%
49	5	5	5	5	3.5%
50	5	0	0	0	2.9%
51	0	0	0	0	2.9%
52	0	0	0	0	2.5%
53	0	0	0	0	1.9%
54	0	0	0	0	1.0%
55	0	0	0	0	0.2%
56	5	5	0	0	0.4%
57	0	0	0	5	0.6%
58	5	5	0	0	1.0%
59	0	0	0	0	1.0%
60	0	0	0	0	1.0%

APPENDIX C

LABORATORY REPORTS

LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS

Project Number: 4232-93-2590	TEST	RUN
Client: Tri City	1	1

FILTER CATCH				
Sample Number: 317186		Filter Number: 83		
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	2:50	MKC	0.56389
Weight #1	5-19-93	12:15	MKC	0.56269
Filter Tare Weight				0.35184
Net Sample Weight				0.21105

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME	
Measured Sample Volume, ml:	435
Estimated Volume Lost, ml:	

FRONT WASH				
Sample Number: 317190		Measured Sample Volume, ml 118		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3	5-21-93	8:00	MKC	2.70445
Weight #2	5-20-93	3:00	MKC	2.70452
Weight #1	5-19-93	12:40	MKC	2.70229
Dish Tare	5-14-93	4:30	MKC	2.62497
Weight of collected matter				0.07948
Water Blank based on 59 ml				0.00383
Acetone Blank based on 59 ml				0.00130
Net Sample Weight				0.07435

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number: 317192				
	Date	Time	By	grams
Weight #4	5-24-93	11:05	MKC	2.61519
Weight #3	5-21-93	8:00	MKC	2.61898
Weight #2	5-20-93	3:00	MKC	2.62022
Weight #1	5-19-93	12:20	MKC	2.62427
Dish Tare	5-14-93	4:30	MKC	2.60529
Weight of collected matter				0.00861
Less Solvent Blanks				
Ethyl Ether based on 75 ml				0.00024
Chloroform based on 75 ml				0.00007
based on ml				
Net Sample Weight				0.00830

5-26-93 4:35 MKC 2.61398
5-27-93 8:15 MKC 2.61390

IMPINGER ACETONE RINSE				
Sample Number: 317191		Measured Sample Volume, ml 138		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #3				
Weight #2	5-20-93	3:00	MKC	2.61559
Weight #1	5-19-93	12:20	MKC	2.61542
Dish Tare	5-14-93	4:30	MKC	2.61054
Weight of collected matter				0.00505
Acetone Blank based on 138 ml				0.00304
Net Sample Weight				0.00201

IMPINGER CATCH MASS RESIDUE				
Sample Number:				
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of collected matter				
Water Blank based on ml				
Net Sample Weight				

Form: SST-LAB52C

LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS

Project Number: 4232-93-2590	TEST	RUN
Client: Tri City	1	2

FILTER CATCH

Sample Number: 317187 — Filter Number: 84

	Date	Time	By	grams
Weight #4	5-24-93	11:10	MKC	0.38404
Weight #3	5-21-93	8:00	MKC	0.38396
Weight #2	5-20-93	2:50	MKC	0.38293
Weight #1	5-19-93	12:15	MKC	0.38382
Filter Tare Weight				0.35034
Net Sample Weight				0.03370

5-26-93 4:40 MKC

WEIGHING PROCEDURE

Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME

Measured Sample Volume, ml:	427
Estimated Volume Lost, ml:	

FRONT WASH

Sample Number: 317193 — Measured Sample Volume, ml: 98 — Estimated Volume Lost, ml:

	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:05	MKC	2.61415
Weight #1	5-19-93	12:25	MKC	2.61386
Dish Tare	5-14-93	4:35	MKC	2.60286
Weight of collected matter				0.01129
Water Blank based on 49 ml				0.00375
Acetone Blank based on 49 ml				0.00108
Net Sample Weight				0.00646

IMPINGER CATCH ORGANIC EXTRACTION

Sample Number: 317195

	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:05	MKC	2.62530
Weight #1	5-19-93	12:30	MKC	2.62546
Dish Tare	5-14-93	4:35	MKC	2.61934
Weight of collected matter				0.00596
Less Solvent Blanks				
Ethyl Ether based on 75 ml				0.00024
Chloroform based on 75 ml				0.00007
based on ml				
Net Sample Weight				0.00565

IMPINGER ACETONE RINSE

Sample Number: 317194 — Measured Sample Volume, ml: 80 — Estimated Volume Lost, ml:

	Date	Time	By	grams
Weight #3	5-21-93	8:00	MKC	2.65784
Weight #2	5-20-93	3:05	MKC	2.66045
Weight #1	5-19-93	12:25	MKC	2.67179
Dish Tare	5-14-93	4:35	MKC	2.64733
Weight of collected matter				0.00554
Acetone Blank based on 80 ml				0.00176
Net Sample Weight				0.00378

IMPINGER CATCH MASS RESIDUE

Sample Number:

	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of collected matter				
Water Blank based on ml				
Net Sample Weight				

Form: SST-LAB52C

wt #4 5-24-93 11:10 MKC 2.65369 → 5-27-93 8:15 MKC 2.65287

5-26-93 4:35 MKC 2.65259

LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS

Project Number: 4232-93-2590	TEST	RUN
Client: Tri City	1	3

FILTER CATCH				
Sample Number: 317188		Filter Number: 85		
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:55	MKC	0.41067
Weight #1	5-19-93	12:20	MKC	0.41068
Filter Tare Weight				0.35056
Net Sample Weight				0.06011

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME	
Measured Sample Volume, ml:	422
Estimated Volume Lost, ml:	

FRONT WASH				
Sample Number: 317196		Measured Sample Volume, ml 73		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:10	MKC	2.68200
Weight #1	5-19-93	12:30	MKC	2.68176
Dish Tare	5-14-93	4:40	MKC	2.65596
Weight of collected matter				0.02604
Water Blank based on 36.5 ml				0.00280
Acetone Blank based on 36.5 ml				0.00080
Net Sample Weight				0.02244

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number: 317198				
	Date	Time	By	grams
Weight #4				
Weight #3	5-21-93	8:00	MKC	2.63541
Weight #2	5-20-93	3:10	MKC	2.63591
Weight #1	5-19-93	12:30	MKC	2.63659
Dish Tare	5-14-93	4:40	MKC	2.62685
Weight of collected matter				0.00856
Less Solvent Blanks				
Ethyl Ether based on 75 ml				0.00024
Chloroform based on 75 ml				0.00007
based on ml				
Net Sample Weight				0.00825

IMPINGER ACETONE RINSE				
Sample Number: 317197		Measured Sample Volume, ml 96		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #3	5-21-93	8:00	MKC	2.64413
Weight #2	5-20-93	3:10	MKC	2.64518
Weight #1	5-19-93	12:30	MKC	2.64940
Dish Tare	5-14-93	4:40	MKC	2.63637
Weight of collected matter				0.00526
Acetone Blank based on 96 ml				0.00211
Net Sample Weight				0.00315

IMPINGER CATCH MASS RESIDUE				
Sample Number:				
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of collected matter				
Water Blank based on ml				
Net Sample Weight				

Form: SST-LAB52C

wt #4 5-24-93 MKC 11:10 2.64211

5-26-93 MKC 4:40 2.64163

twin city testing corporation

LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS

Project Number: 4232-93-2590	TEST	RUN
Client: Tri City	1	4

FILTER CATCH				
Sample Number: 317189		Filter Number: 86		
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	2:55	MKC	0.46607
Weight #1	5-19-93	12:20	MKC	0.46584
Filter Tare Weight				0.35000
Net Sample Weight				0.11607

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME	
Measured Sample Volume, ml:	431
Estimated Volume Lost, ml:	

FRONT WASH				
Sample Number: 317199		Measured Sample Volume, ml: 83		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:10	MKC	2.65715
Weight #1	5-19-93	12:30	MKC	2.65708
Dish Tare	5-14-93	4:40	MKC	2.62808
Weight of collected matter				0.02907
Water Blank based on 41.5 ml				0.00318
Acetone Blank based on 41.5 ml				0.00091
Net Sample Weight				0.02498

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number: 317201				
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:15	MKC	2.63311
Weight #1	5-19-93	12:35	MKC	2.63330
Dish Tare	5-14-93	4:40	MKC	2.62768
Weight of collected matter				0.00563
Less Solvent Blanks				
Ethyl Ether based on 75 ml				0.00026
Chloroform based on 75 ml				0.00007
based on ml				
Net Sample Weight				0.00530

IMPINGER ACETONE RINSE				
Sample Number: 317200		Measured Sample Volume, ml: 113		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #3				
Weight #2	5-20-93	3:15	MKC	2.64772
Weight #1	5-19-93	12:35	MKC	2.64770
Dish Tare	5-14-93	4:40	MKC	2.64358
Weight of collected matter				0.00414
Acetone Blank based on 113 ml				0.00249
Net Sample Weight				0.00165

IMPINGER CATCH MASS RESIDUE				
Sample Number:				
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of collected matter				
Water Blank based on ml				
Net Sample Weight				

Form: SST-LAB52C

LABORATORY REPORT: EPA METHOD 5 PARTICULATE TEST SOLVENT BLANKS

Project Number: 4232-93-2590	TEST
Client: Tri City	1

DISTILLED, DEIONIZED WATER

Sample Number: 317203		Measured Sample Volume, ml 200		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4	5-26-93	4:40	MKC	2.68895
Weight #3	5-24-93	11:15	MKC	2.68915
Weight #2	5-21-93	8:00	MKC	2.68827
Weight #1	5/10/93	7:25	MKC	2.63707
Dish Tare	5-14-93	4:45	MKC	2.64744
Weight of residual matter				
Mass Concentration:				mg/ml

ACETONE

Sample Number: 317202		Measured Sample Volume, ml 200		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:15	MKC	2.64755
Weight #1	5-19-93	12:35	MKC	2.64796
Dish Tare	5-14-93	4:45	MKC	2.64315
Weight of residual matter				0.00440
Mass Concentration:				2.2^{-5} mg/ml

CHLOROFORM

Sample Number: 317205		Measured Sample Volume, ml 75		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:20	MKC	2.65412
Weight #1	5-19-93	12:40	MKC	2.65421
Dish Tare	5-14-93	4:45	MKC	2.65405
Weight of residual matter				0.00007
Mass Concentration:				9^{-7} mg/ml

ETHYL ETHER

Sample Number: 317204		Measured Sample Volume, ml 75		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-20-93	3:20	MKC	2.63295
Weight #1	5-19-93	12:40	MKC	2.63295
Dish Tare	5-14-93	4:45	MKC	2.63271
Weight of residual matter				0.00024
Mass Concentration:				3.2^{-6} mg/ml

Sample Number:		Measured Sample Volume, ml		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

Sample Number:		Measured Sample Volume, ml		Estimated Volume Lost, ml
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

Form: SST-LAB53C

LABORATORY REPORT: EPA METHOD 5 PARTICULATE TEST SOLVENT BLANKS

Project Number: 4232-	TEST
Client:	

DISTILLED, DEIONIZED WATER

Sample Number: Biossay	Measured Sample Volume, ml	Estimated Volume Lost, ml

	Date	Time	By	grams
Weight #4				
Weight #3	5-26-93	4:30	MKC	2.63993
Weight #2	5-24-93	11:05	MKC	2.63995
Weight #1	5-21-93	9:00	MKC	2.63942
Dish Tare	5/20/93	11:15	pfc	2.62758
Weight of residual matter				
Mass Concentration:				mg/ml

ACETONE

Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml

	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

CHLOROFORM

Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml

	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

ETHYL ETHER

Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml

	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

DI water

Sample Number: DI 317203	Measured Sample Volume, ml: 100	Estimated Volume Lost, ml

	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	5-24-93	11:05	MKC	2.61943
Weight #1	5-21-93	9:00	MKC	2.61901
Dish Tare	5-20-93	3:00	MKC	2.61177
Weight of residual matter				0.00766
Mass Concentration:				7.66^{-5} mg/ml

Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml

	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

Form: SST-LAB53C

APPENDIX D

CALIBRATION DATA

GAS METER AND ORIFICE CALIBRATION

Pretest calibration of TCT control unit #1 generated a gas meter coefficient of 1.0041. Post test calibration yielded a coefficient of 1.0130. Both sets of calibration data are included on the following pages. All calculations for tests performed using unit #1 were made using the lower (1.0041) calibration factor which produces worst case emission data.

PITOT TUBE CALIBRATION DATA

Pitot tube #5 is a Type S pitot tube which meets the design specifications described in EPA Method 2 and the base line coefficient of 0.84 was assumed.

ORIFICE and DRY GAS METER CALIBRATION FORM

Date: Apr 6, 1993 Meter # 1 Barometric Pressure, Pb: 29.67

Orifice manometer setting dH, in.H2O	Gas Volume Wet test meter Vw, ft3	Dry gas meter Vd, ft3	Temperature Wet test meter tw, dF	Dry gas meter Inlet tdi, dF	Outlet tdo, dF	Average td, dF	Time e, min.
0.5	5.000	5.017	69	72	67	69.5	13.75
1.0	5.000	4.994	69	74	69	71.5	9.70
2.0	10.000	10.005	69	78	71	74.5	14.00
4.0	10.000	9.966	67.5	80	71	75.5	9.95
6.0	10.000	9.960	67	81	71	76.0	8.10
8.0	10.000	9.950	66.5	83	71	77.0	7.08

Y	dH@
$\frac{Vw\ Pb\ (td + 460)}{Vd\ [Pb + (dH/13.6)]\ (tw + 460)}$	$\frac{0.0317\ dH}{Pb\ (to + 460)} \left[\frac{(tw + 460)\ e}{Vw} \right]^2$
Yi 1 = 0.9963	dH@i 1 = 2.1452
Yi 2 = 1.0034	dH@i 2 = 2.1272
Yi 3 = 1.0049	dH@i 3 = 2.2072
Yi 4 = 1.0086	dH@i 4 = 2.2172
Yi 5 = 1.0062	dH@i 5 = 2.2082
Yi 6 = 1.0051	dh@i 6 = 2.2367
Y = 1.0041	dH@ = 2.1903

Definitions:

Vw = Gas volume passing through the wet test meter, ft3.
Vd = Gas volume passing through the dry gas meter, ft3.
tw = Temperature of the gas in the wet test meter, dF.
tdi = Temperature of the inlet gas of the dry gas meter, dF.
tdo = Temperature of the outlet gas of the dry gas meter, dF.
td = Average temperature of the gas in the dry gas meter, dF.
dH = Pressure differential across orifice, in. H2O.
Yi = Ratio of accuracy of wet test meter to dry gas meter for each run.
Y = Average of Yi. Tolerance = +/- 0.02
Pb = Barometric pressure, in Hg.
e = Time of calibration run, min.
dH@i = Orifice pressure differential for each run.
dH@ = Average oriface pressure differential. Tolerance = +/- 0.20

Calibrator - James Tryba

Apr 6, 1993
Date

twin city testing corporation

ORIFICE and DRY GAS METER POST TEST FORM

Client: TRI-CITY PAVING, INC., Little Falls, MN
Date: May 12, 1993 Meter # 1 Barometric Pressure,Pb: 29.60
Max. Vacuum Achieved (in.Hg.): 6.0 Intermediate Orifice Setting: 1.35
dH@ Factor Used: 2.1903 Y Factor Used: 1.0041

Orifice manometer setting dH,in.H2O	Gas Volume Wet test meter Vw, ft3	Dry gas meter Vd, ft3	Temperature Wet test meter tw, dF	Dry gas meter Inlet tdi, dF	Outlet tdo, dF	Average td, dF	Time e,min.
1.35	10.000	10.174	76	87	79	83.0	17.00
1.35	10.000	10.026	76.5	89	82	85.5	16.85
1.35	10.000	9.809	77	91	84	87.5	17.00

Y	dH@
$\frac{Vw\ Pb\ (td + 460)}{Vd\ [Pb + (dH/13.6)]\ (tw + 460)}$	$\frac{0.0317\ dH}{Pb\ (to + 460)} \left[\frac{(tw + 460)\ e}{Vw} \right]^2$
Yi 1 = 0.9924	dH@i 1 = 2.2271
Yi 2 = 1.0107	dH@i 2 = 2.1799
Yi 3 = 1.0359	dH@i 3 = 2.2149
Y = 1.0130	dH@ = 2.2073
Difference = 0.89 % *	Difference = 0.78 % *

* Tolerance must be within +/- 5% of calibrated factors.

Definitions:

Vw = Gas volume passing through the wet test meter, ft3.
Vd = Gas volume passing through the dry gas meter, ft3.
tw = Temperature of the gas in the wet test meter, dF.
tdi = Temperature of the inlet gas of the dry gas meter, dF.
tdo = Temperature of the outlet gas of the dry gas meter, dF.
td = Average temperature of the gas in the dry gas meter, dF.
dH = Pressure differential across orifice, in. H2O.
Yi = Ratio of accuracy of wet test meter to dry gas meter for each run.
Y = Average of Yi.
Pb = Barometric pressure, in Hg.
e = Time of calibration run, min.
dH@i = Orifice pressure differential for each run.
dH@ = Average oriface pressure differential.

Calibrator - James Tryba

May 12, 1993
Date

twin city testing corporation

VISIBLE EMISSIONS EVALUATOR

This is to certify that

David Christian

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

Thomas Lorie
President

238374
Certificate Number

Vice President

Minneapolis
Location

David B. Savage, Jr.
Program Manager

April 1, 1993
Date of Issue

APPENDIX E

PROCESS DATA

Asphalt Plant Operating Conditions During Stack Testing

Rev/YH/93

Test Date(s) 5-11-93

Plant Mfr. & Model BARBER GREENE 818

Type (circle one): Drum Mix (Conventional)
Other (list): _____

Pollution Control Equipment: Baghouse Venturi Scrubber (wet scrubber) cyclone multiclone
(circle one)

If wet scrubbing: 100 % scrubber water recycled

List model: _____

Normal pressure drop across control equipment: 12 inches water

Air flow through control equipment: 28200 acfm at 140 F

Was control equipment operating normally during testing? Yes

Date & procedures of last maintenance/cleaning of control equipment _____

Fuel:

Itemize all fuels and materials added to the combustion process during the test period. List fuel type used during testing (if oil, specify grade) #2. If other units of measure are used, specify and calculate appropriate heat input.

Test No. 1	Fuel Input (Gal/hr)	BTU/GAL (as received)	Heat Input (BTU/HR)	%Moisture (as received in aggregate) Virgin	recycle	combined
Run 1	170			1.42	(	(
Run 2	170			1.60	)	)
Run 3	200			1.03		

Is the above fuel substantially the highest sulfur containing fuel normally burned? Yes

Production specific fuel usage: (circle one) measured or calculated: _____ cubic foot/ ton hot mix
7 gal/ton hot mix

No. of Burners: 1 Burner(s) rating: _____ MMBTU/HR = 100% setting

Operation:

time 15 min. intervals	burner setting %	aggregate tons per hour	recycle tons per hour	asphalt tons per hour	Drum Mix temp. F	dust collector pressure drop inches water	scrubber water flow rate gpm	Other (list)
10:10	6	205	0	11.89	220	13	205	
	6	205	0	11.89	220	13	205	
	6	205	0	11.89	218	13	205	
	6	210	0	11.95	220	13	205	
11:55	6	210	0	11.95	220	13	205	
	6	210	0	11.95	220	13	205	
	6	210	0	11.95	220	13	205	
	6	210	0	11.95	220	13	205	
13:43	6	210	0	11.95	220	13	205	
	6	210	0	11.95	220	13	205	
	6	210	0	11.95	220	13	205	
	6	210	0	11.95	220	13	205	

Plant Operator's Certification: I certify that the information submitted herein is accurate and correct and that no information requested was withheld from the Division Manager.

By: Mark Jewett, Phone: (___) _____

Position: Plant

Note: All information required must be completed and submitted as part of the performance test. Failure to submit the required information will result in an incomplete performance test report.

Asphalt Plant Operating Conditions During Stack Testing

Rev/YH/93

Test Date(s) 5-11-93

Plant Mfr. & Model BARBER-GREENE 8984 Type (circle one): Drum Mix Conventional

Other (list): _____

Pollution Control Equipment: Baghouse Venturi Scrubber wet scrubber cyclone multicione

(circle one)

If wet scrubbing: 100 % scrubber water recycled

List model: _____ Normal pressure drop across control equipment: _____ inches water

Air flow through control equipment: Facio acfm at 140 °F Was control equipment operating normally during testing? Yes

Date & procedures of last maintenance/cleaning of control equipment _____

Fuel:

Itemize all fuels and materials added to the combustion process during the test period. List fuel type used during testing (if oil, specify grade) #2. If other units of measure are used, specify and calculate appropriate heat input.

Test No.	Fuel Input (Gal/hr)	BTU/GAL (as received)	Heat Input (BTU/HR)	%Moisture (as received in aggregate) Virgin	recycle	combined
Run 1	200			1.23	(	(
Run 2					)	)
Run 3						

Is the above fuel substantially the highest sulfur containing fuel normally burned? Yes

Production specific fuel usage: (circle one) measured or calculated: _____ cubic foot/ ton hot mix

2 gal/ton hot mix

No. of Burners: 1 Burner(s) rating: _____ MMBTU/HR = 100% setting

Operation:

time 15 min. intervals	burner setting %	aggregate tons per hour	recycle tons per hour	asphalt tons per hour	Drum Mix temp. F	dust collector pressure drop inches water	scrubber water flow rate gpm	Other (list)
3:30	6	205	-0-	11.89	220	12	220	—
3:45	6	209	-0-	11.89	220	12	225	
4:00	6	205	-0-	11.89	215	12	218	
4:15	6	205	-0-	11.89	215	12	210	

Plant Operator's Certification: I certify that the information submitted herein is accurate and correct and that no information requested was withheld from the Division Manager.

By: Mark Dennett, Phone: (____) _____

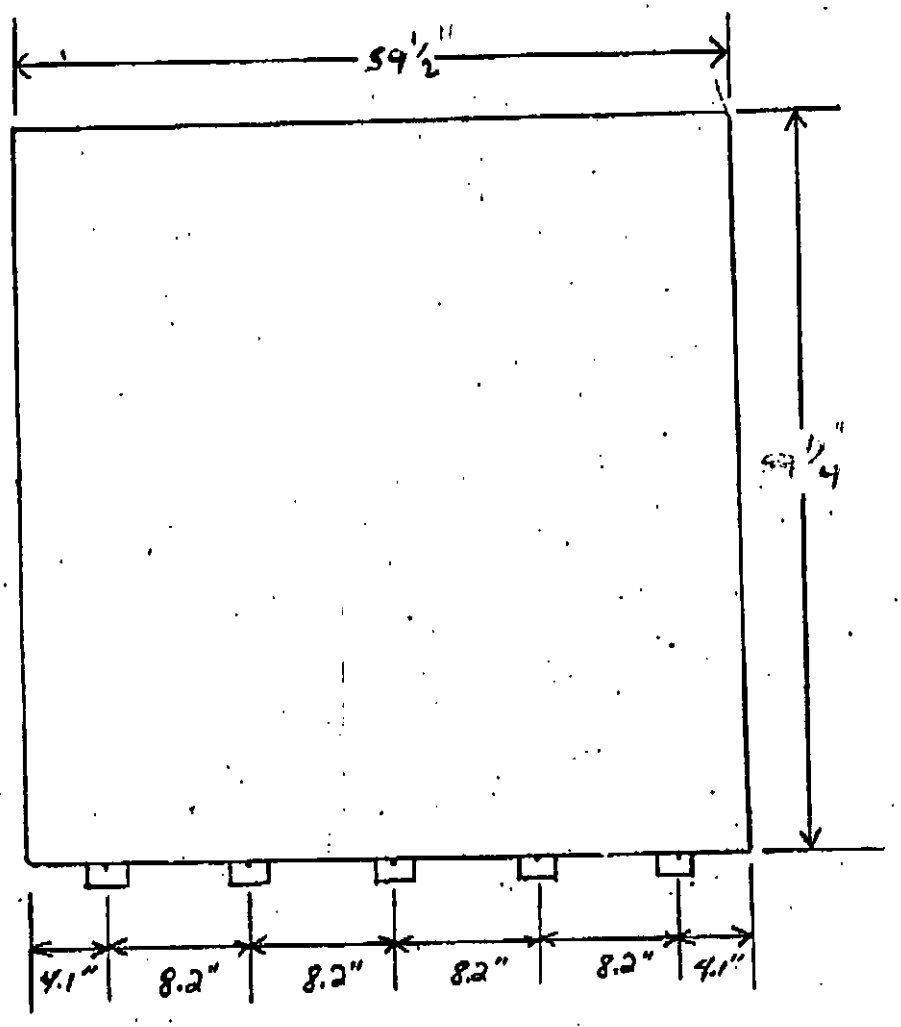
Position: Plant

Note: All information required must be completed and submitted as part of the performance test. Failure to submit the required information will result in an incomplete performance test report.

pg 2 of 2

TRI-CITY PAVING INC.

PLANT #3 BARBER GREENE 84P



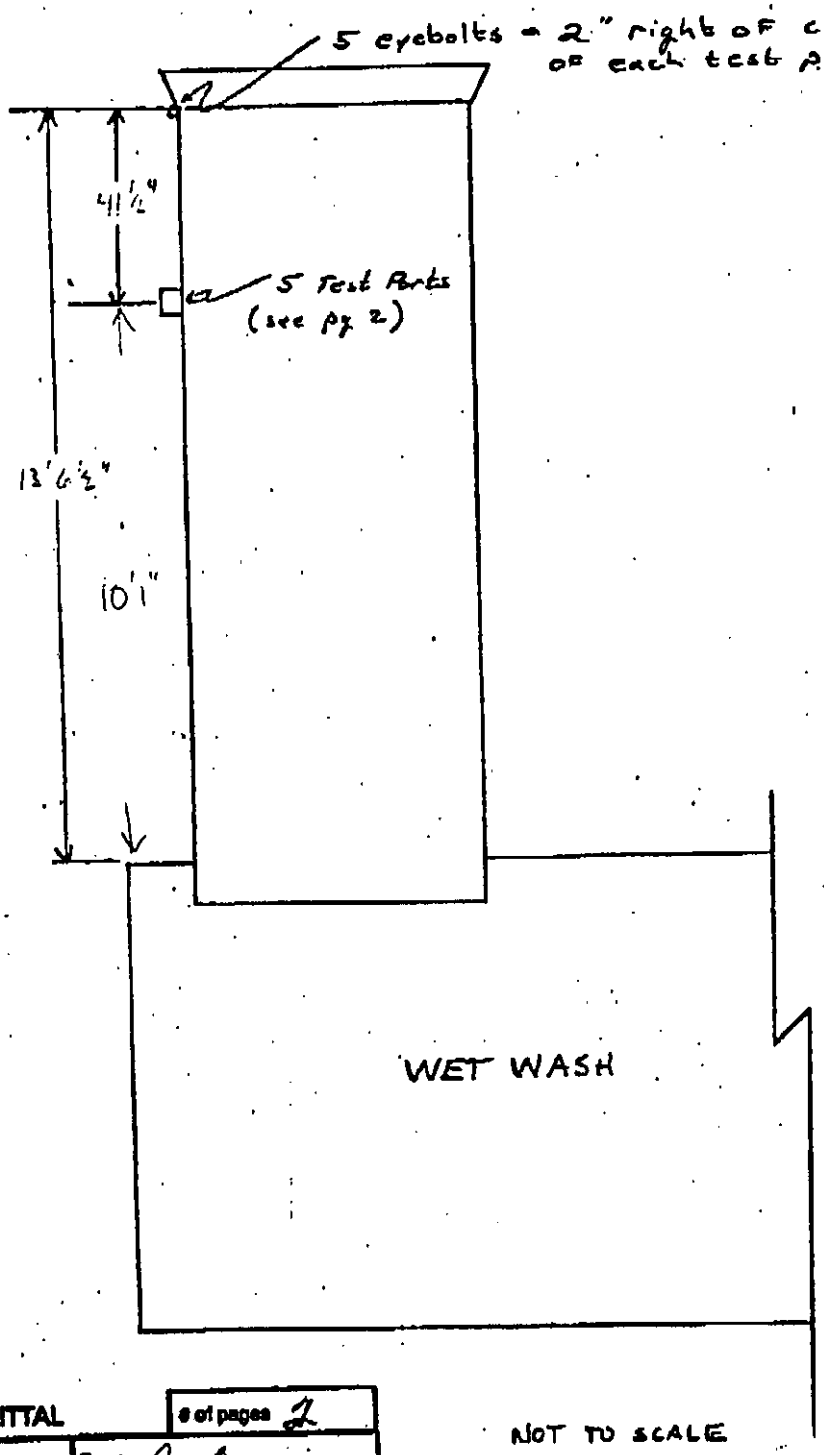
Test ports - 4" schedule 40 pipe threaded on exterior end.

Not to scale

4/91 DJD

TRI-CITY PAVING, INC.

PLANT #3 BARBER GREENE STP



NOT TO SCALE
DJD 4/91

FAX TRANSMITTAL	# of pages 2
To: Jim Trefka	From: Jack
Co. Twin City Testing	Co. Tri-City Paving, Inc.
Dept.	Phone # (612) 632-5435
Fax #	Fax # (612) 632-5436

APPENDIX F

MINNESOTA EXHIBIT C

REQUIRED DATA
for
COMBUSTION SOURCES

Company Name Twin City Printing Plant #3

C. Fuel Input

1. Itemize all fuels and materials that are added to the combustion process during the test period. Attach ultimate analysis of the fuel.

FUEL DESCRIPTION Coal: State, City, Mine Oil: Specify Grade	INPUT (LBS/HR) (GAL/~~HR~~)	& MOISTURE As Rec'd	As Rec'd (BTU/LB) (BTU/GAL)	HEAT INPUT (BTU/HR)
No 2	2.00			
~~No. 1~~ No. 2	2.00			
~~No. 2~~ No. 2	2.00			
~~No. 3~~ No 2	2.00			
			TOTAL	

2. Are the above fuels substantially the same as those normally burned? Yes. If not, explain _____.

3. Are the above fuels normally burned in the proportions shown above? Yes. If not, explain _____.

4. Describe any changes anticipated for procurement of fuels within the next twelve (12) months.

None.

D. Equipment & Operating Data

1. Furnace No. _____.
2. Furnace Mfg. Hauck.
3. Type of Firing Oil.
4. Furnace operating under normal operating conditions: No _____;
   Yes X.

5. Specify normal soot blowing frequency:

   a) source operating time blowing soot: ____ minutes/shift

   b) number of shifts per day 1

6. Specify soot blowing time during the test: start N/A end ____. When was the last time before the test that you blew soot: (date & time) ____.

7. Specify normal ash pulling frequency:

   a) source operating time pulling ashes: N/A minutes/shift

   b) number of shifts per day 1

8. Specify ash pulling time during the test: start N/A end ____. When was the last time before the test that you pulled ashes: (date & time) ____.

9. Date and procedures of last maintenance/cleaning of the boiler (please attach) ____.

E. Instrument Data

1. Include a copy of chart records during test for the combustion efficiency indices (CO, O_2, CO_2, combustibles, steam flow, air flow, etc.)

F. Air Pollution Control Equipment

1. Type/model control equipment BG wet wash.
2. Air pressure drop across the control equipment 12.
3. Air flow through the control equipment 30,000 CFM.
4. Was the control equipment operating normally? yes.
5. Date and procedures of last maintenance/cleaning of control equipment.

   5-10-93

Plant Operator's Certification

I certify that the information submitted herein is accurate and correct and that no information requested was withheld from the Division Manager.

By Mark Dunedle, Position Plant Operator

APPENDIX G

MPCA TEST PLAN

TEST PLAN
for
TRI CITY PAVING

I. GENERAL INFORMATION

Permittee: Tri-City Paving

Permittee's contact person and telephone number: Jack Surma

Permittee's mailing address: P.O. Box 326
Little Falls, MN 56345

DAQ File No.: 681B

MPCA permitting engineer: Bernadette Halverson

Applicable regulations for each source tested: Minn. Rules. 7005.2020, subp. A and B for TSP aand opacity

Reason for testing: This is a retest for compliance purposes.

Is this test for initial compliance demonstration: Yes, initial compliance will be while processing aggregate.

Drawings showing location of sampling ports included: must be sent to Yolanda Hernandez of the Compliance Determination Unit for approval prior to the test. They may be faxed to Yolanda at (612) 297-7709.

Location of the plant at the time of the test: Notify the Compliance Determination Unit prior to the test

Date when test plan was discussed and agreed upon with the permittee: to be determined

II. NOTIFICATION REQUIREMENTS

The permittee must contact the Agency at least two weeks before the scheduled test to obtain all necessary approvals.

It is very important to allow at least two weeks before the test to review the testing requirements in order to avoid last minute cancellations due to inadequate testing conditions.

Among the potential problems that may need to be solved before the test are:

1. Unsuitable location of sampling ports. The stack may need to be

extended and/or straightening vanes be installed.

2. Permittee must schedule the test at a time when the plant can be operated at 100% of rated capacity, and at maximum recycle rate if applicable.

3. Permitte must be ready to burn specified fuel.

4. Permittee may have to install pressure drop taps and gauges, as well as water flow rate measuring devices.

5. Permittee may have to install sampling taps on the fuel feeding line to the burner.

III. TEST PLAN

The following is the test plan developed for emission point no. 1 at Tri-City Paving plant in Little falls, MN.

A. Emission point(s) to be tested:
Barber-Greene 848A asphalt concrete plant
MFR Rated Drying Capacity 240 tons/hour @ 5% moisture
Control equipment: Barber Greene CA 48 wet scrubber

B. Parameters to be tested at each emission point: TSP (front and back catch reported separately) and opacity

C. Fuel sampling and analysis. (Fuel oils and used oil)

This is part of the compliance demonstration requirements. Please note that the test report will not be accepted without complete submittal of fuel analysis results of samples taken at the time of the test.

1. Sampling. One tap sample per particulate test run must be taken. The sample must be taken as close as possible to the burner, (somewhere in feeding line) to be representative of the fuel burned at the time of the test. The sample may be taken in a pint-size clean container, and according to the procedures listed in Exhibit D. Mix the three samples taken into a composite.

2. Analysis. The composite must be analyzed according to Exhibit D.

D. Moisture content in the virgin and recycle aggregate.

1. Take two samples of each: the virgin and recycle aggregate per test run of particulates. Sample must be taken as close as possible to the feeding conveyor and during the corresponding run. Mix samples of virgin aggregate with the samples of recycle material in the same proportion as they enter the dryer, this will give one

composite recycle/virgin sample per test run.

2. Perform one analysis of moisture content in each composite recycle/virgin aggregate sample as per ASTM or other recognized methodologies. A total of three analysis shall be performed, one per test run for particulates.

E. Moisture content in the virgin aggregate

1. Take two samples the virgin aggregate per test run of particulates. Sample must be taken as close as possible to the feeding conveyor and during the corresponding run. Mix the two samples of virgin aggregate, this will give one composite sample per test run.

2. Perform one analysis of moisture content in each composite sample as per ASTM or other recognized methodologies. A total of three analysis shall be performed, one per test run for particulates.

F. Operating Conditions during the Test

1. Operation must be at 100% of design capacity at the existing aggregate moisture content - no deliberate reduction of feed rate or fan speed during testing, except for nominal damper adjustment for proper combustion. - The test report must include copies of the manufacturer's specifications that define the design capacity of the plant as a function of the moisture content of the aggregate.

2. Must burn 100% of the highest emitting fuel to be listed in and allowed by the permit: used oil or fuel oil not to exceed 0.7% sulfur.

3. If the permit is to authorize recycling, then testing must be conducted while recycling and at the maximum ratio of recycle to virgin aggregate to be allowed by the permit: Maximum recycle percent to be determined during stack test.

4. The test must be conducted under normal operating conditions. If normal operation includes recycling of scrubber water, the test must be done under the same conditions.

G. Operating Data to Be Recorded during the Test

Operating data must be recorded during the test in its entirety i.e., particulates and visible emission observations. Operating data must be recorded every fifteen minutes. Please use the attached data sheet or equivalent.

Note: No test report will be accepted without a complete data sheet included.

1. During testing the following measurements must be made:

a) Pressure drop across the baghouse

c) Scrubber water flow rate. If the measurement is done indirectly from a pump pressure gauge, the test report must include calculations, nomograms or calibration data used to compute gallons per minute of water.

c) Virgin and recycle aggregate input (ton per hour) as well as asphalt input (ton per hour). Provide the manufacturer's rating of the asphalt plant at different moisture contents in the aggregate.

d) Moisture content of the aggregate, and if applicable, the recycling material.

2. Please provide the following data:

a) Average fuel consumption rate (calculated or measured)

b) Quality of the scrubber water: percent recycled

c) Cleaning cycles of the baghouse

d) Operating data sheet enclosed

H. Testing schedules and testing firm: Tentative date May 26, 1993

I. Permitting engineer to witness the test: To be determined.

Minnesota Pollution Control Agency

April 22, 1993

Mr. Jack Surma
Tri-City Paving
P.O. Box 326
Little Falls, Minnesota 56345

Dear Mr. Surma:

RE: Performance Stack Testing Protocol, Test Plan, Exhibit C and D

This letter is written as the result of a your notice of April 7, 1993, by phone of your upcoming performance test on the Barber-Greene/848A portable asphalt concrete plant. The test is tentatively set for the first week of May.

Enclosed are copies of the test plan, protocol, Exhibit C, and Exhibit D, which must be included in the test report. It is the responsibility of the Permittee to submit one copy of the test report on or before the due date. Please discuss the enclosures with your consultant.

At this time, the Company must submit a schematic of port locations for the proposed testing site. Dimensions must be clearly marked and labeled. Distances above and below port locations should be included. Once the Company has submitted this information and reviewed the enclosed test plan, protocol, and exhibits, the Company should contact Tom Kosevich at (612)296-7513 to schedule the pretest meeting. Meetings should be scheduled at least two weeks before the actual test date.

If you have questions or corrections regarding the contents of this letter, please contact me at (612)296-8374.

Sincerely,

Yolanda Hernandez

Yolanda Hernandez
Compliance Determination Unit
Compliance and Enforcement Section
Air Quality Division

YOH:mlp3888

Enclosures

cc: Annette Elliott, AQD Brainerd Regional Office
Bernadette Halverson, AQD
AQD File No. 681B