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

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

AP42 Section: 11.1

Reference Number: 78

Title: Results Of A Source Emission Compliance Test On An Asphalt Plant Operated By L. C. Kruse & Sons, Inc., Near Adrian, Minnesota,

MMT Environmental Services, Inc., St. Paul, MN,

August 26, 1994.

323B

AP-42 Section 11.1
Reference
Report Sect. 4
Reference 78

MMT Environmental Services, Inc.
4610 North Churchill Street
St. Paul, MN 55126-5892
Phone (612) 483-9595 Fax (612) 483-2699

RESULTS OF A SOURCE EMISSION COMPLIANCE TEST ON AN ASPHALT PLANT OPERATED BY L.C. KRUSE & SONS, INC. NEAR ADRIAN, MINNESOTA

July 19, 1994

Submitted to:

L.C. Kruse & Sons, Inc.
P.O. Box 899
E. Mill Road
Lakefield, MN 56150
Attn: Mr. Darrin L. Kruse

Prepared by:

Ted Gibbons
Sampling Team Leader

Approved by:

Alan L. Trowbridge
Director of Technical Services

MMT Report Number: 10079
MMT Project Number: 9601
Report Issued: August 26, 1994

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REPORT CERTIFICATIONS

1. **Certification of sampling procedures by the sampling team leader:**
I certify under penalty of law that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained in the report.

Name: Ted M. Gibbons Signature: Ted M. Gibbons
Title: Technical Services Technician Date: 8-26-94

2. **Certification of analytical procedures by the responsible sample analyst:**
I certify under penalty of law that the analytical procedures were performed in accordance with the requirements of the test methods and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained in the report.

Name: Ted M. Gibbons Signature: Ted M. Gibbons
Title: Technical Services Technician Date: 8-26-94

3. **Certification of test report by testing department senior staff:**
I certify under penalty of law that this report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed the sampling and analyses relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained in the report.

Name: Alan L. Trowbridge Signature: Alan L. Trowbridge
Title: Director of Technical Services Date: 8-26-94

4. **Certification of test report by the emission facility Owner or Operator:**
I certify under penalty of law that the information submitted in this report accurately reflects the operating conditions at the emission facility during this performance test and describes the date and nature of all operational and maintenance activities that were performed on the process and control equipment during the month prior to the performance test. Based on my inquiry of the person or persons who performed the operational and maintenance activities, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained in the cover letter or attachments submitted with this report.

Name: Darrin L Kruse Signature: Darrin L. Kruse
Title: President Date: 8/29/94

RESULTS OF A SOURCE EMISSION COMPLIANCE TEST ON AN ASPHALT PLANT OPERATED BY L.C. KRUSE & SONS, INC. NEAR ADRIAN, MINNESOTA, JULY 19, 1994

MMT Report Number: 10079
MMT Project Number: 9601
Report Issued: August 26, 1994

1 INTRODUCTION

MMT Environmental Services, Inc. (MMT) was contracted by L.C. Kruse & Sons Inc. to perform a source emission compliance test on a single source at their portable hot-mix asphalt plant operating near Adrian, Minnesota. The source is a Portec, Inc., Pioneer Division, model DM asphalt plant with serial number 113-36-DM-106. Emissions generated by the plant's aggregate/asphalt drum mix operation are controlled by a Dust Eater P-85000 fabric filter baghouse. The baghouse exhaust was tested for particulate and visible emissions on July 19, 1994. The test was performed as a condition of Minnesota Pollution Control Agency (MPCA) air emission permit number 323-B-89-OT-1 which identifies the source as Emission Point #1. This report presents the results of the test program along with all substantiating documentation.

The MMT sampling team consisted of Messrs. Ted Gibbons, Bill Anderson and Alan Trowbridge. Messrs. Darrin Kruse and Daniel D. Schultz represented L.C. Kruse & Sons, Inc. throughout the test period. Mr. Craig Averman (MPCA-St. Paul) and Ms. Janelle Jacobson (MPCA-Marshall) were present and witnessed portions of the test proceedings.

2 TEST RESULTS

The results of the particulate emission test are presented in Table 2.1. The data indicates an average effluent particulate concentration of 0.018 grains per dry standard cubic foot and an average source particulate emission rate of 5.91 pounds per hour.

The visible emission test was performed concurrent with the second particulate test run. The maximum observed plume opacity was zero (0) percent; i.e. no visible emissions were observed during the test period.

MPCA air emission permit number 323-B-89-OT-1 states that the asphalt concrete plant must not exhaust any gases (1) which contain particulate matter in excess of 0.04 grains per dry standard cubic foot or (2) which exhibit 20 percent or greater opacity. The test results indicate that the source, under the conditions tested, was in compliance with these two emission standards.

The average process weight rate (aggregate + asphalt) during the test period was 406 tons per hour.

Sample acqusition during test run #1 was interrupted for approximately 18 minutes due to loss of electrical power caused by a transformer burn-out. The delay should not have had any significant impact on the test results.

No other problems were encountered during sample acquisition or analysis. Based on a review of the entire test proceedings, it is MMT's opinion that the results presented herein are accurate and can be used for compliance status determination.

Table 2.1
Particulate Emission Test Results
L.C. Kruse & Sons, Inc., Adrian, Minnesota
Asphalt Plant Baghouse Exhaust, July 19, 1994

Parameter	Run #1	Run #2	Run #3	Average
Time of Test;				
Start Time, hr	1032	1246	1442	---
Finish Time, hr	1158	1353	1553	---
Effluent Temperature, °F	231	228	221	227
Effluent Moisture Content, % v/v	35.1	33.3	35.6	34.7
Effluent Composition Parameters;				
Carbon Dioxide, % v/v dry	6.4	5.6	6.5	6.2
Oxygen Content, % v/v dry	12.4	13.4	13.0	12.9
Effluent Volumetric Flow Rate;				
Actual Conditions, acfm	82,009	82,389	79,733	81,377
Standard Conditions, scfm	58,129	62,604	57,030	59,254
Dry Standard Conditions, dscfm	37,750	41,756	36,721	38,742
Effluent Particulate Concentration;				
Front Catch Only, gr/dscf	0.0076	0.0062	0.0191	0.0110
Back Catch Only, gr/dscf	0.0065	0.0113	0.0032	0.0070
Total Catch, gr/dscf	0.0141	0.0175	0.0223	**0.0180**
Source Particulate Emission Rate;				
Classical Method, lb/hr	4.56	6.27	7.04	5.96
Ratio of Areas Method, lb/hr	4.36	6.15	7.06	5.86
Average of Two Methods, lb/hr	4.46	6.21	7.05	**5.91**
Test Quality Control Parameters;				
Total Sampling Time, min.	62.5	62.5	62.5	62.5
Total Volume Sampled, dscf	36.429	41.405	37.192	38.342
Total Particulate Mass Collected, g	0.0333	0.0470	0.0539	0.0447
Average Isokinetic Variation, %	95.6	98.2	100.3	98.0

Standard Conditions: 68°F, 29.92 in. Hg 96.6

3 PROCESS DATA

Production data is presented in Appendix E and summarized in Table 3.1.

During the test period the burner on the plant's aggregate drum dryer was fired with used oil. The results of the fuel analysis (as received basis) are as follows:

Gross heating value, Btu/lb.....18,476
Flash point, °F..... 180
pH 6.80
Organic halogen content, ppm..... 1960
Ash content, % wt..... 0.57
Sulfur (S) content, % wt. 0.53
Lead (Pb) content, µg/g 50
PCB content, µg/g ..... <5

Table 3.1
Summary of Process Data
L.C. Kruse & Sons, Inc., Adrian, Minnesota
Asphalt Plant Baghouse Exhaust, July 19, 1994

Parameter	Run #1	Run #2	Run #3	Average
Time of Test, hr				
Start	1032	1246	1442	---
Finish	1158	1353	1553	---
Process Weight Rate;				
Aggregate Usage, ton/hr	380	380	382	381
Asphalt Usage, ton/hr	25.2	25.1	25.2	25.2
Total Process Weight Rate, ton/hr	405	405	407	406
Aggregate Moisture Content, %	—	—	—	
Dryer Gas Temperature, °F	241	241	240	241
Baghouse Pressure Drop, in WC	6.2	6.3	6.3	6.3

4 TEST PROCEDURES

In order to determine the pollutant emission rate from stationary sources, the Environmental Protection Agency (EPA) has established a series of reference methods which specify the manner in which tests must be performed. These reference methods are found in the Code of Federal Regulations (40 CFR 60) under Title 40 "Protection of the Environment"; Chapter 1 "Environmental Protection Agency"; Subchapter C "Air Programs"; Part 60 "Standards of Performance for New Stationary Sources"; Appendix A "Reference Methods". Unless otherwise noted, the tests presented in this report were performed according to the EPA Reference Methods as revised on July 1, 1993. A brief description of the test procedures used follows.

4.1 SAMPLING POINTS

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. Site specific data is presented in Figure 4.1.

4.2 EFFLUENT VOLUMETRIC FLOW RATE

The effluent volumetric flow rate was determined 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), 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.

4.3 EFFLUENT COMPOSITION AND MOLECULAR WEIGHT

The density of the effluent was determined per EPA Method 3 which is entitled "Gas analysis for the determination of dry molecular weight". One gas sample was collected during each EPA Method 5 particulate test run. The gas samples were 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.

4.4 EFFLUENT MOISTURE CONTENT

The effluent moisture content was determined per EPA Method 4 which is entitled "Determination of moisture content in stack gases". Data for making the gas moisture content determinations 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.

Figure 4.1 Site Description Form
L.C. Kruse & Sons, Inc., Adrian, Minnesota
Asphalt Plant Baghouse Exhaust Test, July 19, 1994

SAMPLING LOCATION DATA

Stack Cross-Sectional Dimension;
- Depth (traverse side), inches 47.25
- Width, inches 63.75
- Equivalent diameter, inches 54.27

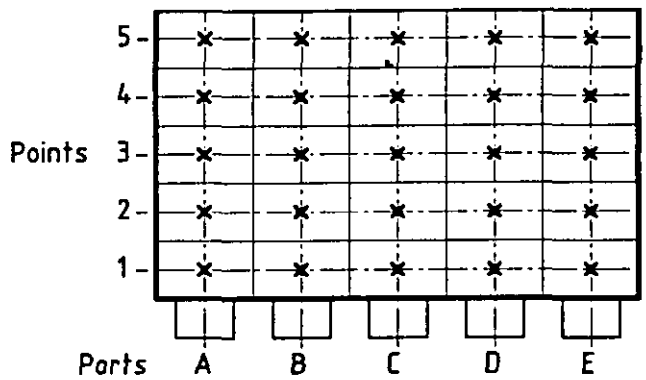
Length of straight, undisturbed flow;
- Before ports, inches 150
- After ports, inches 174
- Before ports, stack diameters 2.8
- After ports, stack diameters 3.2

Number of sampling points;
- Required by EPA Method 1 25
- Actually used 25
  - Number of ports 5
  - Number of points per port 5

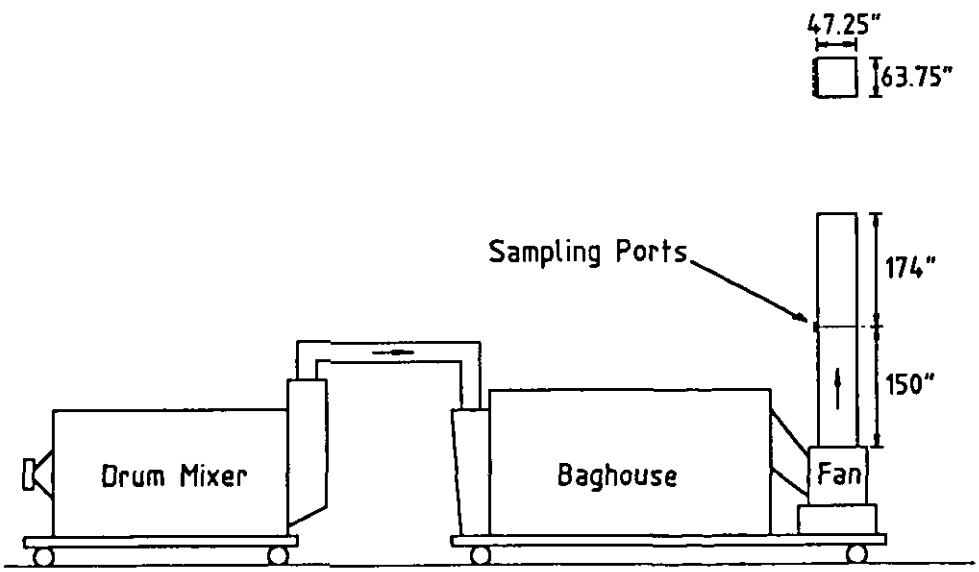
Particulate test sampling time;
- Minutes per point: 2.5
- Minutes per test run: 62.5

SAMPLING POINT LOCATION WITHIN STACK CROSS-SECTION

Point Number	Percent of Traverse	Inches from Wall
1	10.0	4.7
2	30.0	14.2
3	50.0	23.6
4	70.0	33.1
5	90.0	42.5



SAMPLING SITE SCHEMATIC



4.5 EFFLUENT PARTICULATE CONCENTRATION

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 isokinetically withdrawn 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 constant temperature (248±25°F). Water vapor, organic vapors and inorganic vapors which passed through the filter were collected in an impinger trap which was ice-cooled to maintain an exit temperature of not more than 68°F.

The EPA Method 5 sampling train (Figure 4.2) includes a heated sampling probe with attached nozzle, thermocouple and S-type pitot tube. The probe attaches to the front sample case (hot box) which houses a glass cyclone (optional) and an all-glass in-line filter holder in a temperature controlled environment. The front sample case is connected to the back sample case (cold box) which houses a series of glass impingers and a desiccant column in an ice bath. The back sample case is connected to the control unit which contains the sample vacuum pump, gas meter, pressure and temperature indicators and all operating controls.

A representative particulate sample was acquired by sampling for equal periods of time at the center of a number of equal area regions within the stack/duct. At each sampling point the gas velocity head and temperature were measured and the sampling rate rapidly adjusted to isokinetic conditions with the aid of a nomograph or programmable computing device. Sample gas drawn into the nozzle flowed through the probe to the glass fiber filter where the solid particulate matter was collected. The gases then passed through the ice-cooled condenser (impingers and desiccant column) which quantitatively removed all moisture and condensable particulate matter from the gas stream. The gas then passed through the vacuum pump, the dry test gas meter and the calibrated orifice.

Leak checks to detect any dilution air being pulled into the sampling line were performed at the beginning and end of each test run and also when and if any sample line connections were broken.

After completion of each test run, the sampling train was removed to the clean-up area for sample recovery. The filter was removed from the filter holder and placed in Container #1. Particulate matter collected in the nozzle, probe and all connecting glassware in front of the filter was quantitatively transferred to Container #2 by means of a distilled water wash followed by an acetone wash. A stiff brush was used in the probe cleaning step to help dislodge deposits.

The liquid collected in impingers #1, #2 and #3 was measured and transferred to Container #3. These impingers and all connecting pieces between the filter paper and the desiccant column were then rinsed with distilled water and these rinsings were added to Container #3. These same pieces were then rinsed with acetone and these rinsings were placed in Container #4.

The desiccant column was then weighed and its contents transferred to a waste desiccant container. Samples of the rinse solutions (water and acetone) were retained as analytical blanks.

Sample particulate analysis was performed at MMT's laboratory. The filter was dried in a 105°C oven for three hours and then desiccated to a constant weight. The contents of Container #2 were quantitatively transferred to a tared beaker, evaporated at ambient temperature and pressure to near dryness and then desiccated to a constant weight.

Figure 4.2 Particulate Sampling Train Description
L.C. Kruse & Sons, Inc., Adrian, Minnesota
Asphalt Plant Baghouse Exhaust Test
July 19, 1994

PARTICULATE SAMPLING TRAIN IDENTIFICATION

Sampling Train Manufacturer: ..... MMT Environmental Services, Inc.
Sampling Train Model: ..... Universal Stack Sampler, unit #4

Hot Box Set-up and Operating Temperature;
- Cyclone used: ..... No
- Filter Media: ..... Glass Fiber Filter, Whatman GF/C, 11.0 cm diameter
- Filtration Temperature: ..... 248 ± 25 degrees Fahrenheit

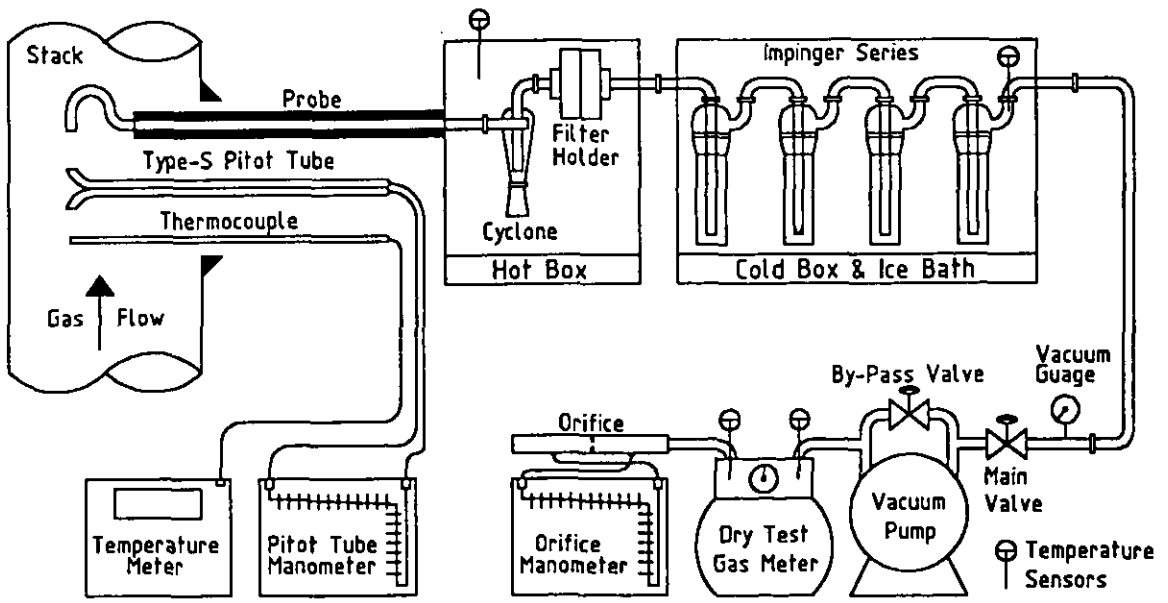
Cold Box Set-up; Impinger Type and Initial Contents
- Impinger #1: ..... Modified Greenburg-Smith design, 100 ml deionized, distilled water
- Impinger #2: ..... Standard Greenburg-Smith design, 100 ml deionized, distilled water
- Impinger #3: ..... Modified Greenburg-Smith design, empty
- Impinger #4: ..... Modified Greenburg-Smith design, ≈ 250 grams silica gel, indicating type

Nozzles Used: ..... MMT #L2, 0.249" diameter, stainless steel

Sampling Probe Used: .... MMT #75, stainless steel liner

Pitot Tube Used: ..... MMT #67, S-type

PARTICULATE SAMPLING TRAIN SCHEMATIC



The contents of Container #3 were analyzed for condensable organic compounds using the chloroform/ethyl ether extraction procedure described in Minnesota Rule 7011.0725. The collected extract was transferred to a tared beaker, evaporated at ambient temperature and pressure to near dryness and then desiccated to a constant weight. The contents of Container #4 were quantitatively transferred to a tared beaker, evaporated at ambient temperature and pressure to near dryness and then desiccated to a constant weight.

The mass of particulate matter collected and the volume of gas sampled were used to calculate the effluent particulate concentration. The source particulate mass emission rate was calculated by multiplying the effluent particulate concentration by the source volumetric flow rate. Separate calculations were performed for total catch, front catch only (Containers 1 & 2) and back catch only (Containers 3 & 4).

4.6 SOURCE PLUME OPACITY

The source visible emissions were determined by the visual observations of a certified visible emissions evaluator per EPA Method 9 which is entitled "Visual determination of the opacity of emissions from stationary sources".

In this procedure, the observer positions himself at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140 degree sector to his back. Consistent with this requirement, the observer's line of site was, as much as possible, perpendicular to the plume's direction.

Opacity observations were made at the point of greatest opacity in that portion of the plume where condensed water vapor was not present. Observations were made at 15-second intervals and recorded to the nearest 5 percent opacity.

5 QUALITY ASSURANCE

The project manager is responsible for implementation of the quality assurance program as applied to any specific project.

5.1 SAMPLING QUALITY ASSURANCE

Source sampling quality assurance procedures are implemented to ensure work is performed:

- by competent, trained individuals experienced on the specific methodologies being used
- using properly calibrated equipment
- using approved procedures for sample handling and documentation

All measuring devices (pitot tubes, dry gas meters, thermocouples, portable gas analyzers, etc.) are uniquely identified and calibrated with documented procedures and acceptance criteria before and after each field effort. Records of all calibration data are maintained in the files. Prior to the test program, MMT provides the following:

- filter numbers and tare weights of all filters available for the test
- results of an acetone residue analysis on the acetone to be used during the test
- calibrations of all pitot tubes, dry gas meters, orifice meters, thermocouples and probes

Specific details of MMT's QA program for stationary air pollution sources may be found in "Quality Assurance Handbook for Air Pollution Measurement Systems", Volume III (EPA-600/4-7-027b).

5.2 ANALYTICAL QUALITY CONTROL

MMT maintains a vigorous quality control program for all sample analyses. This program is based on the general guidelines given in "Handbook for Analytical Quality Control in Water and Waste water Laboratories" (EPA-600/4-79-019); March 1979 . This program suggests guidelines in the areas of:

- Laboratory services
- Glassware
- Solvents
- Analytical performance
- Instrument selection
- Reagents
- Gases
- Laboratory safety

Standards and curves are determined for each analysis using the appropriate standard. Least square linear regression calculations are used in determining "best fit" to the data. Correlation coefficients are also calculated.

5.3 CALIBRATION GASES

MMT uses either EPA Protocol 1 or Acublend Certified Master gases (Scott Specialty Gases) when performing all calibrations in order to ensure tolerances on gas concentrations have been verified and are negligible. Certifications of all calibration gas bottles used during testing are presented in each report.

APPENDIX A: CALCULATIONS

DEFINITION OF UNIT ABBREVIATIONS

ACFM ..... ACTUAL CUBIC FEET PER MINUTE

DEG F ..... DEGREES FAHRENHEIT

DCF ..... DRY CUBIC FEET

DSCF ..... DRY STANDARD CUBIC FEET

DSCFM ..... DRY STANDARD CUBIC FEET PER MINUTE

FPS ..... FEET PER SECOND

G ..... GRAMS

GR/ACF ..... GRAINS PER ACTUAL CUBIC FOOT

GR/DSCF ..... GRAINS PER DRY STANDARD CUBIC FOOT

GR/SCF ..... GRAINS PER STANDARD CUBIC FOOT

IN ..... INCHES

IN HG ..... INCHES OF MERCURY

IN WC ..... INCHES OF WATER

LB/HR ..... POUNDS PER HOUR

LB/LB-MOLE .. POUND PER POUND-MOLE

MIN ..... MINUTES

ML ..... MILLILITERS

SCF ..... STANDARD CUBIC FEET

SCFM ..... STANDARD CUBIC FEET PER MINUTE

SF ..... SQUARE FEET

% V/V DRY ... PERCENT BY VOLUME, DRY BASIS

DEFINITION OF STANDARD CONDITIONS

STANDARD TEMPERATURE ..... 68 DEGREES FAHRENHEIT

STANDARD PRESSURE ..... 29.92 INCHES OF MERCURY

DEFINITION OF VARIABLES

An .... CROSS-SECTIONAL AREA OF NOZZLE, SF
As .... CROSS-SECTIONAL AREA OF STACK, SF
Bwp ... EFFLUENT MOISTURE CONTENT, PERCENT BY VOLUME
Bws ... EFFLUENT MOISTURE CONTENT, PROPORTION BY VOLUME
Ca* ... EFFLUENT PARTICULATE CONCENTRATION AT ACTUAL CONDITIONS, GR/ACF; *=f,b,t; Caf: FRONT CATCH ONLY; Cab: BACK CATCH ONLY; Cat: TOTAL CATCH
CD .... EFFLUENT CARBON DIOXIDE CONCENTRATION, % V/V DRY
CM .... EFFLUENT CARBON MONOXIDE CONCENTRATION, % V/V DRY
Cp .... PITOT TUBE COEFFICIENT, DIMENSIONLESS
Cs* ... EFFLUENT PARTICULATE CONCENTRATION AT DRY STANDARD CONDITIONS, GR/DSCF; *=f,b,t; Csf: FRONT CATCH ONLY; Csb: BACK CATCH ONLY; Cst: TOTAL CATCH
Cw* ... EFFLUENT PARTICULATE CONCENTRATION AT STANDARD CONDITIONS, GR/SCF; *=f,b,t; Cwf: FRONT CATCH ONLY; Cwb: BACK CATCH ONLY; Cwt: TOTAL CATCH
Dn .... NOZZLE DIAMETER, IN
I ..... ISOKINETIC VARIATION, %
Md .... EFFLUENT MOLECULAR WEIGHT, LB/LB-MOLE, DRY BASIS
Ms .... EFFLUENT MOLECULAR WEIGHT, LB/LB-MOLE, WET BASIS
NI .... EFFLUENT NITROGEN CONCENTRATION, % V/V DRY
OX .... EFFLUENT OXYGEN CONCENTRATION, % V/V DRY
Pb .... BAROMETRIC PRESSURE, IN HG
Pg .... STACK STATIC PRESSURE, IN WC
Po .... AVERAGE PRESSURE DROP ACROSS THE METERING ORIFICE, IN WC
Ps .... STACK ABSOLUTE PRESSURE, IN HG
Pv .... AVERAGE SQUARE-ROOT VELOCITY PRESSURE, IN WC
Qa .... EFFLUENT FLOW RATE AT ACTUAL CONDITIONS, ACFM
Qs .... EFFLUENT FLOW RATE AT STANDARD CONDITIONS, SCFM
Qsd ... EFFLUENT FLOW RATE AT STANDARD CONDITIONS, DRY BASIS, DSCFM
Rc* ... SOURCE PARTICULATE EMISSION RATE, CLASSICAL METHOD, LB/HR; *=f,b,t; Rcf: FRONT CATCH ONLY; Rcb: BACK CATCH ONLY; Rct: TOTAL CATCH
Rr* ... SOURCE PARTICULATE EMISSION RATE, RATIO OF AREAS METHOD, LB/HR; *=f,b,t; Rrf: FRONT CATCH ONLY; Rrb: BACK CATCH ONLY; Rrt: TOTAL CATCH
Sl .... STACK DIAMETER OR LENGTH, IN
Sw .... STACK WIDTH, IN
Ti .... TOTAL SAMPLING TIME, MIN
Tm .... AVERAGE DRY GAS METER TEMPERATURE, DEG F
Ts .... AVERAGE EFFLUENT TEMPERATURE, DEG F
Vl .... VOLUME OF LIQUID COLLECTED, ML
Vm .... VOLUME OF GAS SAMPLED AT METER CONDITIONS, DCF
Vms ... VOLUME OF GAS SAMPLED AT STANDARD CONDITIONS, DSCF
Vs .... AVERAGE EFFLUENT VELOCITY, FPS
Vw .... VOLUME OF WATER VAPOR COLLECTED AT STANDARD CONDITIONS, SCF
Wb .... MASS OF PARTICULATE MATTER COLLECTED IN THE BACK (WET) CATCH, G
Wf .... MASS OF PARTICULATE MATTER COLLECTED IN THE FRONT (DRY) CATCH, G
Wt .... TOTAL MASS OF PARTICULATE MATTER COLLECTED, G
Y ..... DRY GAS METER COEFFICIENT, DIMENSIONLESS

EQUATIONS USED TO CALCULATE PARTICULATE EMISSIONS

```
An = 0.005454154 * Dn * Dn

As = 0.005454154 * Sl * Sl      (FOR ROUND STACKS)

As = Sl * Sw / 144.0      (FOR RECTANGULAR STACKS)

Ps = Pb + Pg/13.6

NI = 100.0 - CD - OX - CM

Wt = Wf + Wb

Vms = (528/29.92) * Vm * Y * (Pb + Po/13.6) / (Tm + 460.0)

Vw = 0.04707 * Vl

Bws = Vw / (Vw + Vms)

Bwp = 100.0 * Bws

Md = 0.440 * CD  +  0.320 * OX  + 0.280 * (NI + CM)

Ms = Md * (1.0 - Bws)  +  18.0 * Bws

Vs = 85.49 * Cp * Pv * SQRT( (Ts+460.0)/(Ms*Ps) )

Qa = 60.0 * Vs * As

Qs = Qa * (528/29.92) * Ps / (Ts + 460.0)

Qsd = Qs * (1.0 - Bws)

I = 0.09450 * (Ts+460.0) * Vms / (Ps * Vs * An * Ti * (1.0-Bws) )

Csf = 15.42 * Wf / Vws
Csb = 15.42 * Wb / Vws
Cst = 15.42 * Wt / Vws

Cwf = Csf / (1.0 - Bws)
Cwb = Csb / (1.0 - Bws)
Cwt = Cst / (1.0 - Bws)

Caf = Cwf * (29.92/528.0) * (Ts+460.0) / Ps
Cab = Cwb * (29.92/528.0) * (Ts+460.0) / Ps
Cat = Cwt * (29.92/528.0) * (Ts+460.0) / Ps

Rcf = 0.008578 * Csf * Qsd
Rcb = 0.008578 * Csb * Qsd
Rct = 0.008578 * Cst * Qsd

Rrf = 0.008578 * Csf * (Vms/Ti) * (As/An)
Rrb = 0.008578 * Csb * (Vms/Ti) * (As/An)
Rrt = 0.008578 * Cst * (Vms/Ti) * (As/An)
```

TABLE SUMMARY OF PARTICULATE EMISSION TEST RESULTS

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE

TEST PARAMETER	RUN 1	RUN 2	RUN 3
TEST DATE	7/19/94	7/19/94	7/19/94
TIME OF TEST, HR;			
START	1032	1246	1442
FINISH	1158	1353	1553
EFFLUENT TEMPERATURE, DEGREES F	231	228	221
BAROMETRIC PRESSURE, IN HG	27.77	29.65	27.63
EFFLUENT MOISTURE CONTENT, % V/V	35.1	33.3	35.6
EFFLUENT COMPOSITION, % V/V DRY;			
CARBON DIOXIDE	6.4	5.6	6.5
OXYGEN	12.4	13.4	13.0
CARBON MONOXIDE	0.0	0.0	0.0
EFFLUENT VOLUMETRIC FLOW RATE;			
ACTUAL CONDITIONS, ACFM	82009	82389	79733
STANDARD CONDITIONS, SCFM	58129	62604	57030
DRY STANDARD CONDITIONS, DSCFM	37750	41756	36721
ISOKINETIC VARIATION, %	95.6	98.2	100.3
EFFLUENT PARTICULATE CONCENTRATION;			
EFFLUENT FRONT HALF PARTICULATE CONCENTRATION;			
ACTUAL CONDITIONS, GR/ACF	0.0035	0.0032	0.0088
STANDARD CONDITIONS, GR/SCF	0.0049	0.0041	0.0123
DRY STANDARD CONDITIONS, GR/DSCF	0.0076	0.0062	0.0191
EFFLUENT BACK HALF PARTICULATE CONCENTRATION;			
ACTUAL CONDITIONS, GR/ACF	0.0030	0.0057	0.0015
STANDARD CONDITIONS, GR/SCF	0.0042	0.0075	0.0021
DRY STANDARD CONDITIONS, GR/DSCF	0.0065	0.0113	0.0032
EFFLUENT TOTAL PARTICULATE CONCENTRATION;			
ACTUAL CONDITIONS, GR/ACF	0.0065	0.0089	0.0103
STANDARD CONDITIONS, GR/SCF	0.0092	0.0117	0.0144
DRY STANDARD CONDITIONS, GR/DSCF	0.0141	0.0175	0.0223
SOURCE PARTICULATE EMISSION RATE;			
CLASSICAL METHOD, LB/HR	4.56	6.27	7.04
RATIO OF AREAS METHOD, LB/HR	4.36	6.15	7.06

PARTICULATE CONCENTRATION AND EMISSION RATES BASED ON ANALYSIS OF THE SAMPLING TRAIN FRONT AND BACK CATCHES.

STANDARD CONDITIONS: 68 DEGREES FAHRENHEIT, 29.92 INCHES OF MERCURY.

TRAVERSE POINT DATA SUMMARY AND VELOCITY PROFILE

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE
RUN NUMBER: 1 TIME: 7/19/94 1032-1158

SAMPLING LOCATION PORT	POINT	TRAVERSE POINT DATA: VELOCITY PRESSURE IN WC	ORIFICE PRESSURE IN WC	TEMPERATURE, DEG.F STACK GAS	METER INLET	METER OUTLET	VELOCITY PROFILE: SQRT VELOCITY PRESSURE	GAS VELOCITY FT/SEC
A	1	0.5900	0.840	225	74	74	0.768	54.81
A	2	0.5400	0.770	230	76	74	0.735	52.63
A	3	0.5800	0.830	225	77	74	0.762	54.35
A	4	0.7600	1.100	222	79	74	0.872	62.07
A	5	0.8900	1.300	228	80	74	0.943	67.47
B	1	1.0000	1.400	230	80	75	1.000	71.62
B	2	0.7300	1.000	228	81	75	0.854	61.10
B	3	0.7600	1.100	231	82	75	0.872	62.48
B	4	0.8800	1.300	228	83	75	0.938	67.09
B	5	0.8800	1.300	228	84	75	0.938	67.09
C	1	0.6200	0.890	231	83	76	0.787	56.43
C	2	0.5000	0.720	230	84	76	0.707	50.64
C	3	0.6800	0.970	227	84	76	0.825	58.93
C	4	1.0500	1.500	228	86	76	1.025	73.28
C	5	1.5000	2.200	228	87	77	1.225	87.59
D	1	0.5600	0.790	238	78	78	0.748	53.91
D	2	0.4200	0.600	245	80	78	0.648	46.92
D	3	0.6700	0.960	244	82	78	0.819	59.22
D	4	0.8700	1.240	248	85	78	0.933	67.67
D	5	1.3500	1.900	252	85	78	1.162	84.53
E	1	1.1000	1.500	249	84	79	1.049	76.14
E	2	1.2000	1.700	210	86	74	1.095	77.31
E	3	1.2500	1.700	212	86	79	1.118	79.02
E	4	1.0000	1.400	224	86	80	1.000	71.31
E	5	0.9500	1.300	226	87	80	0.975	69.60
AVERAGE		0.8532	1.212	231	82	76	0.912	65.34

PARTICULATE EMISSION TEST CALCULATIONS

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE
RUN NUMBER: 1 TIME: 7/19/94 1032-1158

TEST DATA

GAS METER COEFFICIENT	0.9930	Y	VOLUME OF LIQUID COLLECTED, ML	417.8	Vl
PITOT TUBE COEFFICIENT	0.848	Cp	GAS COMPOSITION, % V/V DRY;		
NOZZLE DIMENSIONS;			CARBON DIOXIDE	6.43	CD
DIAMETER, IN	0.249	Dn	OXYGEN	12.37	OX
AREA, SF	0.000338	An	CARBON MONOXIDE	0.00	CM
			NITROGEN (BY DIFFERENCE)	81.20	NI
STACK DIMENSIONS;					
DIAMETER/LENGTH, IN	47.25	Sl	AVE. TRAVERSE POINT DATA;		
WIDTH, IN	63.75	Sw	STACK TEMP., DEG F	231	Ts
AREA, SF	20.918	As	METER TEMP., DEG F	79	Tm
			ORIFICE PRESSURE, IN WC	1.212	Po
BAROMETRIC PRESSURE, IN HG	27.77	Pb	SQRT VELOCITY P., IN WC	0.912	Pv
STACK PRESSURES;			MASS OF PARTICULATE MATTER COLLECTED, G;		
STATIC, IN WC	-0.38	Pg	FRONT CATCH (53.8%)	0.0179	Wf
ABSOLUTE, IN HG	27.74	Ps	BACK CATCH (46.2%)	0.0154	Wb
SAMPLING TIME, MIN	62.50	Ti	TOTAL CATCH	0.0333	Wt
VOLUME OF GAS SAMPLED AT METER, DCF	40.246	Vm			

CALCULATED RESULTS

VOLUME OF GAS SAMPLED AT METER, DSCF	36.429	Vms	GAS MOLECULAR WEIGHT;		
			DRY BASIS, LB/LB-MOLE	29.52	Md
			WET BASIS, LB/LB-MOLE	25.48	Ms
EQUIVALENT VOLUME OF WATER VAPOR COLLECTED, SCF	19.666	Vw	AVERAGE GAS VELOCITY, FPS	65.34	Vs
GAS MOISTURE CONTENT;			GAS VOLUMETRIC FLOW RATE;		
VOLUME FRACTION	0.3506	Bws	ACTUAL, ACFM	82009	Qa
PERCENT BY VOLUME	35.06	Bwp	STANDARD, SCFM	58129	Qs
			DRY STANDARD, DSCFM	37750	Qsd
			ISOKINETIC VARIATION, %	95.56	I

PARTICULATE EMISSION PARAMETER	FRONT CATCH	BACK CATCH	TOTAL CATCH
PARTICULATE CONCENTRATION			
ACTUAL, GR/ACF	0.0035 Caf	0.0030 Cab	0.0065 Cat
STANDARD, GR/SCF	0.0049 Cwf	0.0042 Cwb	0.0092 Cwt
DRY STANDARD, GR/DSCF	0.0076 Csf	0.0065 Csb	0.0141 Cst
PARTICULATE EMISSION RATE, LB/HR			
CLASSICAL METHOD	2.45 Rcf	2.11 Rcb	4.56 Rct
RATIO OF AREAS METHOD	2.34 Rrf	2.02 Rrb	4.36 Rrt

STANDARD CONDITIONS: 68 DEG F, 29.92 IN HG * NON-APPLICABLE DATA

TRAVERSE POINT DATA SUMMARY AND VELOCITY PROFILE

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE
RUN NUMBER: 2 TIME: 7/19/94 1246-1353

SAMPLING LOCATION PORT	POINT	TRAVERSE POINT DATA: VELOCITY PRESSURE IN WC	ORIFICE PRESSURE IN WC	TEMPERATURE, DEG.F STACK GAS	METER INLET	METER OUTLET	VELOCITY PROFILE: SQRT VELOCITY PRESSURE	GAS VELOCITY FT/SEC
A	1	0.8300	1.200	218	81	82	0.911	62.42
A	2	0.9200	1.400	221	83	81	0.959	65.87
A	3	0.7900	1.200	221	84	81	0.889	61.04
A	4	0.6600	0.980	223	85	81	0.812	55.87
A	5	0.6700	1.000	221	86	81	0.819	56.21
B	1	0.8000	1.200	221	86	82	0.894	61.42
B	2	0.9700	1.500	225	87	82	0.985	67.83
B	3	0.9200	1.400	225	88	82	0.959	66.06
B	4	0.9000	1.300	229	87	82	0.949	65.53
B	5	1.1000	1.600	230	87	82	1.049	72.50
C	1	0.7100	1.100	228	86	83	0.843	58.16
C	2	0.6600	1.000	228	88	83	0.812	56.07
C	3	0.7600	1.100	231	89	83	0.872	60.30
C	4	1.1000	1.600	236	90	83	1.049	72.81
C	5	1.2500	1.900	233	90	84	1.118	77.45
D	1	0.5600	0.830	229	88	84	0.748	51.69
D	2	0.6400	0.950	228	89	84	0.800	55.22
D	3	0.8300	1.200	234	90	84	0.911	63.16
D	4	1.1100	1.600	235	90	84	1.054	73.09
D	5	1.3000	1.900	233	90	84	1.140	78.98
E	1	1.0500	1.600	227	88	85	1.025	70.68
E	2	1.0000	1.500	230	88	84	1.000	69.12
E	3	0.9800	1.500	229	88	84	0.990	68.38
E	4	1.1000	1.600	234	88	84	1.049	72.71
E	5	1.3000	1.800	231	88	84	1.140	78.87
AVERAGE		0.9164	1.358	228	87	83	0.951	65.64

PARTICULATE EMISSION TEST CALCULATIONS

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE
RUN NUMBER: 2 TIME: 7/19/94 1246-1353

TEST DATA

GAS METER COEFFICIENT	0.9930	Y	VOLUME OF LIQUID COLLECTED, ML	439.2	Vl
PITOT TUBE COEFFICIENT	0.848	Cp			
			GAS COMPOSITION, % V/V DRY;		
NOZZLE DIMENSIONS;			CARBON DIOXIDE	5.55	CD
DIAMETER, IN	0.249	Dn	OXYGEN	13.40	OX
AREA, SF	0.000338	An	CARBON MONOXIDE	0.00	CM
			NITROGEN (BY DIFFERENCE)	81.05	NI
STACK DIMENSIONS;					
DIAMETER/LENGTH, IN	47.25	Sl	AVE. TRAVERSE POINT DATA;		
WIDTH, IN	63.75	Sw	STACK TEMP., DEG F	228	Ts
AREA, SF	20.918	As	METER TEMP., DEG F	85	Tm
			ORIFICE PRESSURE, IN WC	1.358	Po
BAROMETRIC PRESSURE, IN HG	29.65	Pb	SQRT VELOCITY P., IN WC	0.951	Pv
STACK PRESSURES;			MASS OF PARTICULATE MATTER		
STATIC, IN WC	-0.35	Pg	COLLECTED, G;		
ABSOLUTE, IN HG	29.62	Ps	FRONT CATCH (35.5%)	0.0167	Wf
			BACK CATCH (64.5%)	0.0303	Wb
SAMPLING TIME, MIN	62.50	Ti	TOTAL CATCH	0.0470	Wt
VOLUME OF GAS SAMPLED AT METER, DCF	43.297	Vm			

CALCULATED RESULTS

VOLUME OF GAS SAMPLED AT METER, DSCF	41.405	Vms	GAS MOLECULAR WEIGHT;		
			DRY BASIS, LB/LB-MOLE	29.42	Md
			WET BASIS, LB/LB-MOLE	25.62	Ms
EQUIVALENT VOLUME OF WATER VAPOR COLLECTED, SCF	20.673	Vw	AVERAGE GAS VELOCITY, FPS	65.64	Vs
GAS MOISTURE CONTENT;			GAS VOLUMETRIC FLOW RATE;		
VOLUME FRACTION	0.3330	Bws	ACTUAL, ACFM	82389	Qa
PERCENT BY VOLUME	33.30	Bwp	STANDARD, SCFM	62604	Qs
			DRY STANDARD, DSCFM	41756	Qsd
			ISOKINETIC VARIATION, %	98.20	I

PARTICULATE EMISSION PARAMETER	FRONT CATCH	BACK CATCH	TOTAL CATCH
PARTICULATE CONCENTRATION			
ACTUAL, GR/ACF	0.0032 Caf	0.0057 Cab	0.0089 Cat
STANDARD, GR/SCF	0.0041 Cwf	0.0075 Cwb	0.0117 Cwt
DRY STANDARD, GR/DSCF	0.0062 Csf	0.0113 Csb	0.0175 Cst
PARTICULATE EMISSION RATE, LB/HR			
CLASSICAL METHOD	2.23 Rcf	4.04 Rcb	6.27 Rct
RATIO OF AREAS METHOD	2.19 Rrf	3.97 Rrb	6.15 Rrt

STANDARD CONDITIONS: 68 DEG F, 29.92 IN HG * NON-APPLICABLE DATA

TRAVERSE POINT DATA SUMMARY AND VELOCITY PROFILE

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE
RUN NUMBER: 3 TIME: 7/19/94 1442-1553

SAMPLING LOCATION PORT	POINT	TRAVERSE POINT DATA: VELOCITY PRESSURE IN WC	ORIFICE PRESSURE IN WC	TEMPERATURE, DEG.F STACK GAS	METER INLET	METER OUTLET	VELOCITY PROFILE: SQRT VELOCITY PRESSURE	GAS VELOCITY FT/SEC
A	1	0.7700	1.200	219	83	83	0.877	62.55
A	2	0.8900	1.400	218	85	83	0.943	67.20
A	3	0.7200	1.100	229	86	83	0.849	60.93
A	4	0.6200	0.940	229	86	83	0.787	56.54
A	5	0.6600	1.000	227	87	84	0.812	58.25
B	1	0.8700	1.300	230	87	84	0.933	67.03
B	2	0.9300	1.400	232	88	84	0.964	69.40
B	3	0.8900	1.400	228	88	84	0.943	67.69
B	4	0.9000	1.400	223	89	85	0.949	67.83
B	5	1.1000	1.500	222	89	85	1.049	74.93
C	1	0.6100	0.920	212	88	85	0.781	55.39
C	2	0.7000	1.100	213	90	86	0.837	59.38
C	3	0.8800	1.300	212	91	86	0.938	66.53
C	4	1.1000	1.600	214	91	86	1.049	74.49
C	5	1.3000	1.900	216	91	87	1.140	81.10
D	1	0.7400	1.100	214	89	87	0.860	61.09
D	2	0.6000	0.910	215	90	87	0.775	55.05
D	3	0.7900	1.200	212	90	87	0.889	63.03
D	4	0.5700	0.900	209	90	87	0.755	53.42
D	5	0.7700	1.200	212	90	87	0.877	62.23
E	1	0.6400	0.970	219	88	87	0.800	57.03
E	2	0.6800	1.030	223	89	86	0.825	58.96
E	3	0.7000	1.100	228	89	86	0.837	60.03
E	4	0.7500	1.100	236	89	86	0.866	62.50
E	5	0.8300	1.300	234	89	85	0.911	65.66
AVERAGE		0.8004	1.211	221	88	85	0.890	63.53

PARTICULATE EMISSION TEST CALCULATIONS

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE
RUN NUMBER: 3 TIME: 7/19/94 1442-1553

TEST DATA

GAS METER COEFFICIENT	0.9930 Y	VOLUME OF LIQUID COLLECTED, ML	437.0 Vl
PITOT TUBE COEFFICIENT	0.848 Cp		
		GAS COMPOSITION, % V/V DRY;	
NOZZLE DIMENSIONS;		CARBON DIOXIDE	6.48 CD
DIAMETER, IN	0.249 Dn	OXYGEN	13.00 OX
AREA, SF	0.000338 An	CARBON MONOXIDE	0.00 CM
		NITROGEN (BY DIFFERENCE)	80.52 NI
STACK DIMENSIONS;			
DIAMETER/LENGTH, IN	47.25 Sl	AVE. TRAVERSE POINT DATA;	
WIDTH, IN	63.75 Sw	STACK TEMP., DEG F	221 Ts
AREA, SF	20.918 As	METER TEMP., DEG F	87 Tm
		ORIFICE PRESSURE, IN WC	1.211 Po
BAROMETRIC PRESSURE, IN HG	27.63 Pb	SQRT VELOCITY P., IN WC	0.890 Pv
STACK PRESSURES;		MASS OF PARTICULATE MATTER	
STATIC, IN WC	-0.36 Pg	COLLECTED, G;	
ABSOLUTE, IN HG	27.60 Ps	FRONT CATCH (85.5%)	0.0461 Wf
		BACK CATCH (14.5%)	0.0078 Wb
SAMPLING TIME, MIN	62.50 Ti	TOTAL CATCH	0.0539 Wt
VOLUME OF GAS SAMPLED AT METER, DCF	41.875 Vm		

CALCULATED RESULTS

VOLUME OF GAS SAMPLED AT METER, DSCF	37.192 Vms	GAS MOLECULAR WEIGHT;	
		DRY BASIS, LB/LB-MOLE	29.56 Md
		WET BASIS, LB/LB-MOLE	25.44 Ms
EQUIVALENT VOLUME OF WATER VAPOR COLLECTED, SCF	20.570 Vw	AVERAGE GAS VELOCITY, FPS	63.53 Vs
GAS MOISTURE CONTENT;		GAS VOLUMETRIC FLOW RATE;	
VOLUME FRACTION	0.3561 Bws	ACTUAL, ACFM	79733 Qa
PERCENT BY VOLUME	35.61 Bwp	STANDARD, SCFM	57030 Qs
		DRY STANDARD, DSCFM	36721 Qsd
		ISOKINETIC VARIATION, %	100.30 I

PARTICULATE EMISSION PARAMETER	FRONT CATCH	BACK CATCH	TOTAL CATCH
PARTICULATE CONCENTRATION			
ACTUAL, GR/ACF	0.0088 Caf	0.0015 Cab	0.0103 Cat
STANDARD, GR/SCF	0.0123 Cwf	0.0021 Cwb	0.0144 Cwt
DRY STANDARD, GR/DSCF	0.0191 Csf	0.0032 Csb	0.0223 Cst
PARTICULATE EMISSION RATE, LB/HR			
CLASSICAL METHOD	6.02 Rcf	1.02 Rcb	7.04 Rct
RATIO OF AREAS METHOD	6.04 Rrf	1.02 Rrb	7.06 Rrt

STANDARD CONDITIONS: 68 DEG F, 29.92 IN HG • NON-APPLICABLE DATA

VOLUMETRIC FLOW RATE CALCULATION

PROJECT NUMBER: 9601 COMPANY: L.C. KRUSE
TEST DATE: 7-19-94 SOURCE: BAGHOUSE EXHAUST

Preliminary Flow Rate Determination

DUCT DIMENSIONS;		
LENGTH, INCHES	47.25	LN
WIDTH, INCHES	63.75	WD
CROSS-SECTIONAL AREA, SQ FT	20.918	AR
EFFLUENT TEMPERATURE, DEG F	218	TS
MOISTURE CONTENT DETERMINATION:		
EFFLUENT WET BULB TEMPERATURE, DEG F	165	TW
EFFLUENT DEW POINT TEMPERATURE, DEG F	163	TD
EFFLUENT RELATIVE HUMIDITY, %	30.8	RH
EFFLUENT MOISTURE CONTENT, % V/V	37.2	MC
DUCT PRESSURES;		
BAROMETRIC PRESSURE, IN HG	27.80	PB
STATIC PRESSURE, IN WC	-0.87	PS
ABSOLUTE PRESSURE, IN WC	27.74	PA
EFFLUENT COMPOSITION;		
CARBON DIOXIDE CONTENT, % V/V DRY	6.4	CD
OXYGEN CONTENT, % V/V DRY	12.4	OX
EFFLUENT MOLECULAR WEIGHT;		
DRY BASIS, LB/LB-MOLE	29.52	MD
WET BASIS, LB/LB-MOLE	25.23	MS
PITOT TUBE COEFFICIENT	0.848	CP

EFFLUENT VELOCITY PRESSURES, IN WC;

POINT	PORT A	PORT B	PORT C	PORT D	PORT E
1	0.950	0.980	0.560	0.670	1.200
2	0.760	0.970	0.650	0.740	1.300
3	0.630	0.860	0.900	0.950	1.350
4	0.630	0.890	1.400	1.250	1.700
5	0.660	1.000	1.500	1.500	1.900

AVE. SQUARE-ROOT VELOCITY PRESSURE, IN WC ..	1.00	PV
EFFLUENT AVERAGE VELOCITY, FT/SEC	71.569	VS
EFFLUENT VOLUMETRIC FLOW RATE;		
ACTUAL, ACFM	89825	FA
STANDARD, SCFM	64857	FW
DRY STANDARD, DSCFM	40730	FD

EQUATIONS USED TO CALCULATE THE VOLUMETRIC FLOW RATE

```
AR = LN * WD / 144.0

PA = PB + PS/13.6

MD = 0.44*CD + 0.32*OX + 0.28*(100-CD-OX)

MS = MD*(1-MC/100) + 0.18*MC

VS = 85.48 * CP * PV * SQRT( (460+TS)/(MS*PA) )

FA = 60 * VS * AR

FW = 17.65 * FA * PA / (TS+460)

FD = FW * (1-MC/100)
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STANDARD CONDITIONS: 68 DEG F, 29.92 IN HG

TABLE ANALYSIS OF VISIBLE EMISSION TEST DATA

PROJECT NUMBER: 9601
DATE TESTED: 7-19-94
TIME OF TEST: 1250

COMPANY: L.C. KRUSE
SOURCE: BAGHOUSE EXHAUST
OBSERVER: MR. ALAN TROWBRIDGE
RE-CERTIFICATION DATE: 10-6-94

Concurrent with Test-Run # 1-2

PLUME OPACITY OBSERVATIONS

MIN-UTE	** 00	SECONDS 15	30	** 45	MIN-UTE	** 00	SECONDS 15	30	** 45	MIN-UTE	** 00	SECONDS 15	30	** 45
0	0	0	0	0	20	0	0	0	0	40	0	0	0	0
1	0	0	0	0	21	0	0	0	0	41	0	0	0	0
2	0	0	0	0	22	0	0	0	0	42	0	0	0	0
3	0	0	0	0	23	0	0	0	0	43	0	0	0	0
4	0	0	0	0	24	0	0	0	0	44	0	0	0	0
5	0	0	0	0	25	0	0	0	0	45	0	0	0	0
6	0	0	0	0	26	0	0	0	0	46	0	0	0	0
7	0	0	0	0	27	0	0	0	0	47	0	0	0	0
8	0	0	0	0	28	0	0	0	0	48	0	0	0	0
9	0	0	0	0	29	0	0	0	0	49	0	0	0	0
10	0	0	0	0	30	0	0	0	0	50	0	0	0	0
11	0	0	0	0	31	0	0	0	0	51	0	0	0	0
12	0	0	0	0	32	0	0	0	0	52	0	0	0	0
13	0	0	0	0	33	0	0	0	0	53	0	0	0	0
14	0	0	0	0	34	0	0	0	0	54	0	0	0	0
15	0	0	0	0	35	0	0	0	0	55	0	0	0	0
16	0	0	0	0	36	0	0	0	0	56	0	0	0	0
17	0	0	0	0	37	0	0	0	0	57	0	0	0	0
18	0	0	0	0	38	0	0	0	0	58	0	0	0	0
19	0	0	0	0	39	0	0	0	0	59	0	0	0	0

SUMMARY OF TEST DATA

PLUME OPACITY %	PERCENT OF TIME AT OPACITY	PERCENT OF TIME OPACITY EXCEEDED
0	100.00	0.00
5	0.00	0.00
10	0.00	0.00
15	0.00	0.00
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
40	0.00	0.00
45	0.00	0.00
50	0.00	0.00
55	0.00	0.00
60	0.00	0.00
65	0.00	0.00
70	0.00	0.00
75	0.00	0.00
80	0.00	0.00
85	0.00	0.00
90	0.00	0.00
95	0.00	0.00
100	0.00	0.00

OPACITY RANGE,%	TIME OPACITY IN RANGE % OF TIME	MIN/HR
0 - 20	100.00	60.00
25 - 40	0.00	0.00
45 - 60	0.00	0.00
> 60	0.00	0.00

MAXIMUM OBSERVED OPACITY, %: 0
MINIMUM OBSERVED OPACITY, %: 0
ARITHMETIC MEAN OPACITY, %: 0.0

SIX-MINUTE AVERAGE OPACITY, %

MAXIMUM:	0.0	(54:00-59:45)
2nd LARGEST:	0.0	(48:00-53:45)
3rd LARGEST:	0.0	(42:00-47:45)
4th LARGEST:	0.0	(36:00-41:45)
5th LARGEST:	0.0	(30:00-35:45)

APPENDIX B: FIELD DATA FORMS

SOURCE EMISSION TEST
SITE DESCRIPTION DATA SHEET

TRAVERSE POINT LOCATION		
Traverse Point Number	Port Length: 3.5	
	Inches From Wall	Inches From Port
1	4.73	8.2
2	14.18	17.7
3	23.63	27.1
4	33.08	36.6
5	42.53	46.0
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

PRELIMINARY TRAVERSE DATA
Effluent Temperature, °F:
Ave. Velocity Pressure, IN WC:

MMT Job Number: 9601 Date: July 94

Company: L.C. Kruse and Sons, Inc.

Address: P.O. Box 899 Lakefield, MN 561

Source: Asphalt Plant Baghouse Exhaust

Source Cross-sectional Dimensions

Round Duct; diameter: Not Applicable

Rectangular Duct;

Length: 47.25 inch Depth

Width: 63.75 inches

Equivalent diameter: 54.27

$D_e = 2LW/(L+W)$

Distance to Nearest Flow Disturbance;

~~estimate~~ Before Ports: 150" / ~~[illegible]~~ = ~~[illegible]~~ / 2.7 diameters

estimated After Ports: 144" / ~~[illegible]~~ 180 = 3.21 / ~~[illegible]~~ diameters

Number of Sampling Points;

Required by EPA Method 1: 25

Actually Used: 25

Number of ports: 5

Points per port: 5

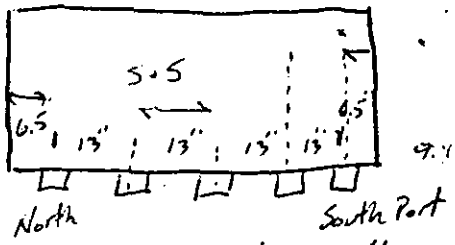
Sampling Time;

Minutes per Point: 2.5

Minutes per Test Run: 62.5

SITE SKETCH AND COMMENTS

(Five) 4 inch Female Ports



9.75 ÷ 2 + (9.45) = x

Port Depth = 2"

With adapter = 3.5"

FORM: S-FD-1c

87-88
67-74
41-44

EPA METHOD 2: VOLUMETRIC FLOW RATE DETERMINATION

Field Data Sheet

MMT Job Number: 9601

Ambient Temperature, °F: 75

Date: Tuesday 7.19.94

Barometric Pressure, in. Hg.: 27.80

Company: L.C. Kruse + Sons, Inc.

Static Pressure, in. WC: -0.87

Source: New Baghouse Exhaust

Dry Bulb Temp., °F: 218

Dimensions, inches: 47.25 + 63.75

Wet Bulb Temp., °F: 165

Test Team Members: AT-BA-TG

Relative Humidity, %:

Test No.: 0 Run No.: Preliminary

Moisture Content, %: 37 %

VELOCITY TRAVERSE: Time: 0933 Pitot Tube No: 67 Coefficient: A = .848

Probe 75"

Traverse Point Number	Inches From Wall	Inches From Port	PORT A ΔP in. H2O	PORT A Temp. °F	PORT B ΔP in. H2O	PORT B Temp. °F	PORT C ΔP in. H2O	PORT C Temp. °F	PORT D ΔP in. H2O	PORT D Temp. °F
1	4.7	8.2	in	.95	.98	.56	.67	1.2		
2	14.2	17.7		.76	.97	.65	.74	1.3		
3	23.6	27.1		.63	.86	.90	.95	1.35		
4	33.1	36.6		.63	.89	1.4	1.25	1.7		
5	42.5	46.0	out	.66	1.0	1.5	1.5	1.9		
				1	2	3	4	5		
Edge of				North				South		
	minimum Velocity Pressure, in. WC =						.56			
	Maximum					=	1.9			
	Average Velocity Pressure					=	1.04			
	Ideal Nozzle diameter in. =						.248			
	Actual Nozzle ID inches =								.249	
32 dscf	required					Nozzle		L2		
			estimates:		Vol/point = 1.87			Vol/test =		46.8
				$\bar{x}$	°H =	1.5		.56 Vp =	.8 °H	
	Nozzle 2.49"			min	°H =	1.87		1.9 Vp =	2.7 °H	
				max	°H =					
		1	8°	12°	7°	6°	14°			
Time 1600		2	11°	10°	5°	7°	12°			
		3	5°	8°	3°	8°	4°			
Cyclonic		4	6°	6°	1°	7	4°			
flow check		5	7°	6°	12°	9	7°			

North 2 3 4 South

$\bar{x}$ Angle = 7.8° Degrees of Rotation

FORM: S-FD-2b

SOURCE EMISSION TEST
FIELD DATA SHEET

TEST: 1	RUN: 1
Page 1 of 2	

1032 HP start

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH PARAMETERS
MMT Job Number: 9100	Control Unit No.: 4	ΔH@ 1.71
Date: Tuesday 7.19.94	Gas Meter Coefficient: .996	TM 80
Company: L.C. Kruse & Sons, Inc.	Sample Box No.: 4	MC 37
Source: Asphalt Plant Baghouse Exhaust	Probe No.: 75 Length: 75 inches	PS/PM = 1.0
Source Dimensions: 47.25 x 63.75"	Pitot No.: 67 Coefficient: A = .848	C .996
Test Team: AT (BA TG)	Nozzle No.: L2 Diameter: .249	TS 218
Test Procedure: EPA 1-5	Filter No.: 8879	R
Ambient Temp., °F: 75	Barometric Pressure, in.Hg: 27.77	Static Pressure, in.WC: -.38

1-1 -0.38

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME min.	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMP. STACK GAS	TEMP. GAS METER IN	TEMP. GAS METER OUT	TEMP. OVEN	TEMP. PROBE	TEMP. LAST IMP.
1032	1 North	0	24.347	.59	.84	.84	7	225	74	74	225	250	78
	2		25.7	.54	.77	.77	7	230	76	74	253	252	73
1037	3	5	27.0	.58	.83	.83	8	225	77	74	233	252	71
	4		28.4	.76	1.09	1.1	9.5	222	79	74	253	242	70
1042	5	10	29.9	.89	1.27	1.3	11	228	80	74	252	245	69
1044.5	End	12.5	31.6										
1045.5	1	12.5		1.0	1.43	1.4	12	230	80	75	247	245	69
1048	2	15	33.2	.73	1.04	1.0	10	228	81	75	251	251	68
1050.5	3		34.8	.76	1.09	1.1	10.5	231	82	75	250	261	68
1053	4	20	36.4	.88	1.26	1.3	11.5	228	83	75	249	243	68
1055.5	5	22.5	38.2	.88	1.26	1.3	11.5	228	84	75	252	256	68
1058	End	25	39.7										
1059	1	25		.62	.89	.89	9	231	83	76	251	252	68
1101.5	2	27.5	41.2	.50	.72	.72	7	230	84	76	251	247	68
1104	3	30	42.6	.68	.97	.97	9.5	227	84	76	250	255	68
1106.5	4		43.9	1.05	1.5	1.5	13	228	86	76	252	252	69
1109	5	35	45.6	1.5	2.14	2.2	14	228	87	77	251	253	70
1129.5	End	37.5	47.6										
1131	1	37.5		.56	.79	.79	12	238	78	78	254	251	68
1133.5	2	40	48.8	.42	.60	.60	6.5	245	80	78	252	253	68
1136	3		50.8	.67	.96	.96	9	244	82	78	252	251	68
1138.5	4	45	52.2	.87	1.24	1.2	12	248	85	78	249	254	68
1141	5		54.0	1.35	1.93	1.9	15	252	85	78	251	260	68
1143.5	End	50	55.8										

(35.5 minutes - 1109.5 stopped) 1-1 Restart @ 1127

MOISTURE DETERMINATION					
IMPINGER	1	2	3	4	5
Final					
Initial	100	100	0	762.9	
Difference					
Total Moisture Collected: 417.8					

SYSTEM LEAK CHECKS		
Time	Rate (cfm)	Vac. (in.Hg)
1012	.001	19

Impinger Catch Description:

DETERMINATION OF GAS COMPOSITION BY ORSAT ANALYSIS								
Sample Id:	Replicate 1		Replicate 2		Replicate 3		Average	
	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Compound	Percent Volume
Initial Reading								
Carbon Dioxide							CO_2	6.43
Oxygen							O_2	12.37
Carbon Monoxide							CO	---

Total Sampling Time, min.: 29

SOURCE EMISSION TEST
FIELD DATA SHEET

TEST:	RUN:
Page 2 of 2	

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH PARAMETERS
MMT Job Number: 9601	Control Unit No.: 4	ΔH@ 1.71
Date: Tue 7.19.94	Gas Meter Coefficient: .996	TM 80
Company: L.C. Kruse + Sons, Inc.	Sample Box No.: 4	MC ≈37
Source: Baghouse Exhaust	Probe No.: 75 Length: 75"	PS/PM ≈ 1.0
Source Dimensions: 47.25 x 63.75 in.	Pitot No.: 67 Coefficient: A=.848	C .996
Test Team: AT BA TG	Nozzle No.: C2 Diameter: .249	TS 220
Test Procedure: EPA 1-5	Filter No.: 8875	R
Ambient Temp., °F: 84	Barometric Pressure, in.Hg: 27.71	Static Pressure, in.WC: -.38

x̄ 27.74

	CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME min.	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, DEG F STACK GAS	GAS METER IN	GAS METER OUT	OVEN	PROBE	LAST IMP.
X	1145	1	50	X	1.1	1.51	1.5	14	249	84	79	248	248	69
58.2		2		58.1	1.2	1.65	1.7	15	210	86	74	252	251	68
60.1	1150	3	55	59.5	1.25	1.71	1.7	15	212	86	79	251	255	69
62.1		4		61.4	1.0	1.37	1.4	15	224	86	80	249	256	68
63.9	1155	5	60	63.1	.95	1.3	1.3	13	226	87	80	250	255	71
65.7	1157.5	End	62.5	64.593										

64.593
24.347
40.246 dcf

pf entered

MOISTURE DETERMINATION					
IMPINGER	1	2	3	4	5
Final	276	210	99	795.7	X
Initial	100	100	0	762.9	
Difference	176	110	99	32.8	
Total Moisture Collected:			417		

SYSTEM LEAK CHECKS		
Time	Rate (cfm)	Vac. (in.Hg)
1159	.004	22

Impinger Catch Description:

DETERMINATION OF GAS COMPOSITION BY ORSAT ANALYSIS								
Sample Id:	Replicate 1		Replicate 2		Replicate 3		Average	
	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Compound	Percent Volume
Initial Reading								
Carbon Dioxide							CO2	
Oxygen							O2	
Carbon Monoxide							CO	

Total Sampling Time, min.:

SOURCE EMISSION TEST
FIELD DATA SHEET

TEST: 1	RUN: 2
Page 1 of 2	

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH PARAMETERS
MMT Job Number: 9601	Control Unit No.: 4	ΔH@ 1.71
Date: Tue 7.19.94	Gas Meter Coefficient: ~~.9960~~ 0.996	TM 83
Company: E.C Kruse + Sons	Sample Box No.: 4	MC 35%
Source: Baghouse Exhaust	Probe No.: 75 Length: 75 inches	PS/PM ≈ 1.0
Source Dimensions: 47.25 * 63.75"	Pitot No.: 67 Coefficient: A = .848	C .996
Test Team: AT BA TG	Nozzle No.: L2 Diameter: .249" ⌀	TS 230
Test Procedure: EPA 1-5	Filter No.: 8880	R
Ambient Temp., °F: 83	Barometric Pressure, in.Hg: 27.65	Static Pressure, in.WC: -.35

	CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME min.	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, DEG F STACK GAS	GAS METER IN	GAS METER OUT	OVEN	PROBE	LAST IMP.
	1246	1 North	0	65.656	.83	1.24	1.2	10.5	218	81	82	247	241	79
4		2		67.3	.92	1.37	1.40	13	221	83	81	246	253	70
6.1	1251	3	5	69.0	.79	1.18	1.2	12	221	84	81	245	258	70
70.8		4		70.6	.66	.98	.98	10.5	223	85	81	249	254	68
72.3	1256	5	10	72.1	.67	.99	1.0	10.5	221	86	81	248	253	67
7.8	1258.5	End	12.5	73.7										
	1259.5	1	12.5	X	.80	1.19	1.2	11	221	86	82	249	258	68
75.5	1302	2	15	75.4	.97	1.45	1.5	14	225	87	82	251	257	68
4	1304.5	3		77.1	.92	1.37	1.4	13	225	88	82	253	255	68
1	1307	4	20	79.0	.90	1.34	1.3	12	229	87	82	252	256	68
80.9	1309.5	5		80.6	1.1	1.64	1.6	15	230	87	82	251	257	68
8.9	1312	End	25	82.5										
	1313	1	25	X	.71	1.06	1.1	10.5	228	86	83	248	255	69
84.4	1315.5	2		84.3	.66	.98	1.0	11	228	88	83	253	251	68
8.0	1318	3	30	86.0	.76	1.13	1.1	10.5	231	89	83	254	250	68
6	1320.5	4		87.5	1.1	1.64	1.6	15	236	90	83	252	255	68
8.5	1323	5	35	89.4	1.25	1.86	1.9	17	233	90	84	241	254	68
91.6	1325.5	End	37.5	91.3										
	1327	1	37.5	X	.56	.83	.83	11	229	88	84	244	255	69
9.0	1329.5	2	40	92.9	.64	.95	.95	11	228	89	84	250	249	67
94.5	1332	3		94.4	.83	1.24	1.2	12.5	234	90	84	246	252	68
9.2	1334.5	4	45	96.2	1.1	1.64	1.6	15.5	235	90	84	240	260	68
9.2	1337	5		98.0	1.3	1.94	1.9	17	233	90	84	238	257	68
100.3	1339.5	End	50	99.9										

1-2

MOISTURE DETERMINATION					
IMPINGER	1	2	3	4	5
Final					X
Initial	100	100	0	752.7	
Difference					
Total Moisture Collected: 439.2					

SYSTEM LEAK CHECKS		
Time	Rate (cfm)	Vac. (in.Hg)
1231	0.001	15

Impinger Catch Description:

DETERMINATION OF GAS COMPOSITION BY ORSAT ANALYSIS								
Sample Id:	Replicate 1		Replicate 2		Replicate 3		Average	
1-2	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Compound	Percent Volume
Initial Reading								
Carbon Dioxide							CO_2	5.55
Oxygen							O_2	13.40
Carbon Monoxide							CO	

Total Sampling Time, min.: _____

SOURCE EMISSION TEST
FIELD DATA SHEET

TEST: 1	RUN: 2
Page 2 of 2	

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH PARAMETERS
MMT Job Number: 9601	Control Unit No.: 4	ΔH@ 1.71
Date: Tue 7.19.84	Gas Meter Coefficient: .996	TM
Company: L.C. Kruse	Sample Box No.: 4	MC
Source: Baghouse Exhaust	Probe No.: 75 Length: 75 inches	PS/PM= 1.0
Source Dimensions: 47.25 x 63.75	Pitot No.: 67 Coefficient: A=.848	C .996
Test Team: AT BA TG	Nozzle No.: C2 Diameter: .249" a	TS
Test Procedure: EPA 1-5	Filter No.: 8880	R
Ambient Temp., °F: 85	Barometric Pressure, in.Hg: 27.65	Static Pressure, in.WC: -.35

	CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME min.	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, DEG F STACK GAS	GAS METER IN	GAS METER OUT	OVEN	PROBE	LAST IMP.
X	1340.5	1	50	X	1.05	1.56	1.6	15.5	227	88	85	252	254	69
102.2	1343	2		101.9	1.0	1.49	1.5	14.5	230	88	84	246	257	68
104.1	1345.5	3	55	103.9	.98	1.46	1.5	14.5	229	88	84	244	256	68
105.9	1348	4		105.5	1.1	1.64	1.6	16	234	88	84	235	256	67
107.9	1350.5	5	60	107.2	1.3	1.94	1.8	17.5	231	88	84	230	261	68
110	1353	End	62.5	108.953										
					43.297	def								

MOISTURE DETERMINATION					
IMPINGER	1	2	3	4	5
Final					X
Initial	100	100	0	752.7	
Difference					
Total Moisture Collected:					

SYSTEM LEAK CHECKS		
Time	Rate (cfm)	Vac. (in.Hg)
1356	.003	21

Impinger Catch Description:

DETERMINATION OF GAS COMPOSITION BY ORSAT ANALYSIS								
Sample Id:	Replicate 1		Replicate 2		Replicate 3		Average	
1-2	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Compound	Percent Volume
Initial Reading								
Carbon Dioxide							CO_2	
Oxygen							O_2	
Carbon Monoxide							CO	

Total Sampling Time, min.:

SOURCE EMISSION TEST
FIELD DATA SHEET

TEST: 1	RUN: 3
Page 1 of 2	

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH PARAMETERS
MMT Job Number: 9601	Control Unit No.: 4	ΔH@ 1.71
Date: Tu 7.19.94	Gas Meter Coefficient: 0.996	TM 86
Company: L.C. Kruse + Sons, Inc.	Sample Box No.: 4	MC 35%
Source: Baghouse Exhaust	Probe No.: 75 Length: 75 inches	PS/PM = 1.0
Source Dimensions: 47.25 + 63.75	Pitot No.: 67 Coefficient: A = .848	C .996
Test Team: AT-BA-TG	Nozzle No.: L2 Diameter: .249" ⌀	TS 230
Test Procedure: EPA 1-5	Filter No.: 8881	R
Ambient Temp., °F: 86	Barometric Pressure, in.Hg: 27.63	Static Pressure, in.WC: –

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME min.	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, DEG F STACK GAS	GAS METER IN	GAS METER OUT	OVEN	PROBE	LAST IMP.
1442	1	0	109.333	.77	1.16	1.2	10	219	83	83	260	233	80
1444.5	2		110.9	.89	1.35	1.4	12	218	85	83	245	236	70
1447	3	5	112.7	.72	1.09	1.1	11	229	86	83	249	259	68
1449.5	4		114.2	.62	.94	.94	9.5	229	86	83	243	256	68
1452	5	10	115.8	.66	1.0	1.0	9	227	87	84	247	253	68
1454.5	End	12.5	117.2										
1457	1	12.5		.87	1.32	1.3	11	230	87	84	251	249	68
	2	15	118.7	.93	1.41	1.4	13.5	232	88	84	251	262	68
1502	3		120.4	.89	1.35	1.4	13.5	228	88	84	246	256	68
	4	20	122.3	.90	1.36	1.4	13.5	223	89	85	242	251	68
1507	5		124.0	1.1	1.66	1.5	14	222	89	85	246	247	68
1509.5	End	25	126.1										
1511	1	25		.61	.92	.92	9	212	88	85	239	257	68
1513.5	2	27.5	127.4	.70	1.06	1.1	10.5	213	90	86	238	259	68
1516	3	30	128.9	.88	1.33	1.3	13	212	91	86	237	252	68
1518.5	4		130.7	1.1	1.66	1.6	13.5	214	91	86	240	252	68
1521	5	35	132.5	1.3	1.97	1.9	16	216	91	87	245	262	68
1523.5	End	37.5	134.5										
1526	1	37.5		.74	1.12	1.1	10.5	214	89	87	248	260	68
1528.5	2	40	136.3	.60	.91	.91	9.5	215	90	87	230	261	68
1531	3		138.0	.79	1.19	1.2	11	212	90	87	217	251	68
1533.5	4	45	139.7	.57	.86	.90	9.5	209	90	87	218	257	68
1536	5		141.4	.77	1.16	1.2	12	212	90	87	222	256	68
1538.5	End	50	143.3										

MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final					
Initial	100	100	0	762.9	
Difference					
Total Moisture Collected: 437.0					

SYSTEM LEAK CHECKS

Time	Rate (cfm)	Vac. (in.Hg)
1420	.004	21

Impinger Catch Description:

DETERMINATION OF GAS COMPOSITION BY ORSAT ANALYSIS

Sample Id: 1-7	Replicate 1 Buret Reading	Replicate 1 Percent Volume	Replicate 2 Buret Reading	Replicate 2 Percent Volume	Replicate 3 Buret Reading	Replicate 3 Percent Volume	Average Compound	Average Percent Volume
Initial Reading								
Carbon Dioxide							CO_2	6.48
Oxygen							O_2	13.00
Carbon Monoxide							CO	

Total Sampling Time, min.: _____
Volume of Gas Sampled, DCF: _____

FORM: S-FD-5

SOURCE EMISSION TEST
FIELD DATA SHEET

TEST: 1	RUN: 3
Page 2 of 2	

TEST IDENTIFICATION	EQUIPMENT IDENTIFICATION	NOMOGRAPH PARAMETERS
MMT Job Number: 9601	Control Unit No.: 4	ΔH@ 1.71
Date: Tue 7.19.94	Gas Meter Coefficient: .996	TM 86
Company: L.C. Kruse	Sample Box No.: 4	MC 35
Source: Baghouse Exhaust	Probe No.: 75 Length: 75 inches	PS/PM=1
Source Dimensions: 47¾ x 63¾"	Pitot No.: 67 Coefficient: A=.848	C .996
Test Team: AT BA TG	Nozzle No.: 62 Diameter: .249"	TS 230
Test Procedure: EPA 1-5	Filter No.: 8881	R
Ambient Temp., °F: 80	Barometric Pressure, in.Hg: 27.60	Static Pressure, in.WC: -.36

	CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME min.	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC REQ.	ORIFICE ΔH, in.WC ACT.	PUMP VAC. inHG	TEMPERATURE, DEG F STACK GAS	GAS METER IN	GAS METER OUT	OVEN	PROBE	LAST IMP.
	1540	1	50	X	.64	.97	.97	10	219	88	87	231	255	69
144.7	1542.5	2 South		144.8	.68	1.03	1.03	10	223	89	86	225	242	68
146.3	1545	3	55	146.3	.70	1.06	1.1	12	228	89	86	222	259	69
147.8	1547.5	4		147.9	.75	1.13	1.1	12	236	89	86	219	255	68
149.5	1550	5	60	149.5	.83	1.25	1.3	13	234	89	85	222	254	68
151.2	1552.5	End	62.5	151.208										

41,875 dcf

MOISTURE DETERMINATION					
IMPINGER	1	2	3	4	5
Final					
Initial	100	100	0	762.9	
Difference					
Total Moisture Collected:					

SYSTEM LEAK CHECKS		
Time	Rate (cfm)	Vac. (in.Hg)
1555	.005	20

Impinger Catch Description:

DETERMINATION OF GAS COMPOSITION BY ORSAT ANALYSIS								
Sample Id: 1-3	Replicate 1		Replicate 2		Replicate 3		Average	
	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Buret Reading	Percent Volume	Compound	Percent Volume
Initial Reading								
Carbon Dioxide							CO_2	
Oxygen							O_2	
Carbon Monoxide							CO	

Total Sampling Time, min.: _____

Volume of Gas Sampled, DCF: _____

FORM: S-FD-5

Concurrent with Particulate test #1-2 Project 9601

Visible Emission Observation Form

SOURCE NAME	L.C. Kruse Portable Asphalt Plant
ADDRESS	4 miles north of Adrian, MN
CITY	—
STATE	—
ZIP	—
PHONE	—
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Asphalt Plant
OPERATING MODE	Normal
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	Normal
DESCRIBE EMISSION POINT START	Rectangular Steel Stack
STOP	same
HEIGHT ABOVE GROUND LEVEL START	≈37'
STOP	Same
HEIGHT RELATIVE TO OBSERVER START	≈37'
STOP	Same
DISTANCE FROM OBSERVER START	≈300'
STOP	Same
DIRECTION FROM OBSERVER START	N
STOP	N
DESCRIBE EMISSIONS START	Steam Plume
STOP	
EMISSION COLOR START	none after dissipation
STOP	same
PLUME TYPE: CONTINUOUS	X
FUGITIVE	☐
INTERMITTENT	☐
WATER DROPLETS PRESENT: NO	☐
YES	X
IF WATER DROPLET PLUME: ATTACHED	X
DETACHED	☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	after dissipation of steam plume ≈250' downwind
STOP	
DESCRIBE BACKGROUND START	Sky
STOP	Sky
BACKGROUND COLOR START	white blue
STOP	white, gray, blue
SKY CONDITIONS START	Hazy
STOP	Mostly cloudy
WIND SPEED START	3-7
STOP	5-10
WIND DIRECTION START	NNW
STOP	N
AMBIENT TEMP. START	
STOP	
WET BULB TEMP.	
RH, percent	High

OBSERVATION DATE	START TIME	STOP TIME
7-19-94	1250	1350

MIN \ SEC	0	15	30	45	MIN \ SEC	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 0 % WERE 0

RANGE OF OPACITY READINGS MINIMUM 0 MAXIMUM 0

OBSERVER'S NAME (PRINT): Alan L. Trowbridge

OBSERVER'S SIGNATURE: Alan L. Trowbridge

DATE: 7/19/94

ORGANIZATION: MPA Environmental Services, Inc.

CERTIFIED BY: ETA

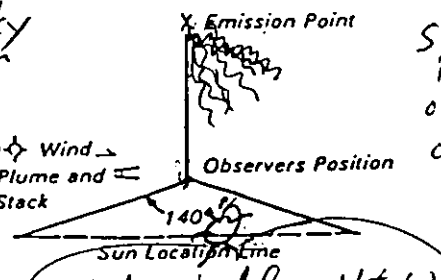
DATE: 4/6/94

VERIFIED BY:

DATE:

Source Layout Sketch

Draw North Arrow.



Sun in and out of clouds

COMMENTS: I'm due south of stack

1310 a few darker clouds in background

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE

DATE

0 ume dissipated ≈ 200-300 feet down wind of stack & 50-100 feet above grade

1312-1320 Steam plume zone

No visible plume at stack outlet - walked up check it out

white clouds with hazy blue sky between them

Wind varied from N to W

Wind had been from south during first particulate test

APPENDIX C: LABORATORY REPORTS

SUMMARY OF PARTICULATE EMISSION TEST LABORATORY DATA

PROJECT NUMBER: 9601 COMPANY: LC KRUSE & SONS, INC.
TEST NUMBER: 1 SOURCE: ASPHALT PLANT BAGHOUSE

	MASS OF PARTICULATE MATTER COLLECTED, GRAMS							
	FRONT CATCH				BACK CATCH			TOTAL PARTICULATE MASS COLLECTED
RUN NUMBER	FRONT WASH	CYCLONE CATCH	FILTER CATCH	FRONT TOTAL	IMPINGER CATCH **	IMPINGER WASH	BACK TOTAL	
1	0.0112	0.0000	0.0067	0.0179	0.0022	0.0132	0.0154	0.0333
2	0.0082	0.0000	0.0085	0.0167	0.0055	0.0248	0.0303	0.0470
3	0.0028	0.0000	0.0433	0.0461	0.0017	0.0061	0.0078	0.0539

* NOT APPLICABLE ** CHLOROFORM/ETHYL ETHER EXTRACTION

LABORATORY REPORT: EPA Method 5

Project Number: 9601 Company: L.C. Kruse + Sons, Inc. Nobles County, MN

Frontwashes all 300 ml Acetone				
Test-Run	1-1	1-2	1-3	Date
Dish #	1124	1127	1130	- - - - -
1	2.3269	2.2986	2.3058	7.27.94
2	2.3271	2.2984	2.3060	7.28.94
3	2.3270	2.2984	2.3061	7.28.94
Tare	2.3156	2.2901	2.3029	4.22.94
Blank	.0001	.0001	.0001	- - - - -
Net	.0112	.0082	.0028	- - - - -

Solvent Blanks				
Solvents	300 ml Acetone	100 ml Chloroform	100 ml Ether	Date
Dish #	1121	1122	1123	- - - - -
1	2.2795	2.2741	2.2889	7.27.94
2	2.2793	2.2741	2.2887	7.28.94
3	2.2796	2.2742	2.2887	7.28.94
Tare	2.2792	2.2738	2.2885	4.22.94
Net	.0001	.0003	.0002	- - - - -

Backwashes all 300 ml Acetone				
Test-Run	1-1	1-2	1-3	Date
Dish #	1125	1128	1131	- - - - -
1	2.3205	2.3476	2.2874	7.27.94
2	2.3203	2.3474	2.2870	7.28.94
3	2.3203	2.3472	2.2871	7.28.94
Tare	2.3070	2.3223	2.2808	4.22.94
Blank	.0001	.0001	.0001	- - - - -
Net	.0132	.0248	.0061	- - - - -

Glass Filters				
Test-Run	1-1	1-2	1-3	Date
Filter #	8879	8880	8881	- - - - -
1	.5005	.5043	.5567	7.27.94
2	.5002	.5046	.5569	7.28.94
3	.5004	.5044	.5568	7.28.94
Tare	.4935	.4958	.5134	2.2.94
Net	.0067	.0085	.0433	- - - - -

Extractions 100 ml Chloroform + 100 ml Ether				
Test-Run	1-1	1-2	1-3	Date
Dish #	1126	1129	1132	- - - - -
1	2.3199	2.3076	2.2972	7.27.94
2	2.3199	2.3075	2.2969	7.28.94
3	2.3202	2.3078	2.2970	7.28.94
Tare	2.3172	2.3015	2.2947	4.22.94
Blank	.0005	.0005	.0005	- - - - -
Net	.0022	.0055	.0017	- - - - -

COMMENTS

Lowest Final Weight
- Tare
- Blank(if applicable)

= Sample Net Gain (grams)

Signature Ted Gibbon Date 7-28-94

Laboratory Report: Moisture Content of Aggregate Samples

Project Number 9601 Company L.C. Kruse + Sons, Inc. Nobles County, MN

Test 1-1

Trial #	1	2	3	Date
Dish #	1145	1146	1147	
Tare	2.3005	2.3254	2.3387	4-22-94
Tare + Wet	40.5239	40.4824	40.3934	7-28-94
Wet	38.2234	38.1570	38.0547	
Dry	35.8504	35.6796	35.5673	
Dry + Tare	38.1509	38.0050	37.9060	7-29-94
% Moisture	6.21	6.49	6.54	

Test 1-2

Trial #	1	2	3	Date
Dish #	1148	1149	1150	
Tare	2.3353	2.3454	2.3276	4.22.94
Tare + Wet	40.5835	40.2988	40.2387	7.28.94
Wet	38.2482	37.9534	37.9111	
Dry	36.0358	35.7476	35.3636	
Dry + Tare	38.3711	38.0903	37.6912	7.29.94
% Moisture	5.78	5.81	6.72	

Test 1-3

Trial #	1	2	3	Date
Dish #	1151	1152	1153	
Tare	2.2959	2.3150	2.2977	
Tare + Wet	40.4777	40.2799	40.4360	
Wet	38.1820	37.9649	38.1383	
Dry	35.5769	34.9895	35.508	
Dry + Tare	37.8728	37.3045	37.8057	
% Moisture	6.82	7.84	6.90	

Summary

	Mean	Deviation	% Error
Test 1-1	6.41	.18	2.77
1-2	6.10	.53	8.8
1-3	7.19	.57	7.9
overall	6.57		

Comments

$\frac{\text{Dry}}{\text{Wet}} * 100 = \%$ Solids

100- % Solids = % Moisture

Signature Ted Gibbons Date 7-29-94

EPA METHOD 4 MOISTURE ANALYSIS

mast environmental services, inc.

Sampling Train* Cold Box Setup		
Impinger	Type**	Initial Contents
1	M	100 ml H_2O
2	S	100 ml H_2O
3	M	empty
4	M	silica gel
5	---	not used
6	---	not used
7	---	not used

* EPA Method 5 sampling train ** S: Standard (with orifice) M: Modified (straight tube)

MMT Project Number: 9601
Company: L.C. Kruse and Sons, Inc.
Source: Asphalt Plant Baghouse Exhaust
Sample Acquisition:
Dates: Tuesday 7.19.94
Technicians: Bill - Ted
Sample Recovery:
Date: 7.25.94 Monday
Technician: Bill Anderson

Test-Run 1-1	Box No: 8		
	Filter No: 8879		
Impinger Number	Mass (g) or Volume (ml)		
	Initial	Final	Net Gain
1	100	276	176
2	100	210	110
3	0	99	99
4	762.9	795.7	32.8
5	---	---	0
6	---	---	0
7	---	---	0
Total mass of liquid collected, g			417.8
Description of liquid collected:	CLEAR		

Test-Run 1-2	Box No: 1		
	Filter No: 8880		
Impinger Number	Mass (g) or Volume (ml)		
	Initial	Final	Net Gain
1	100	318	218
2	100	252	152
3	0	50	50
4	752.7	771.9	19.2
5	---	---	0
6	---	---	0
7	---	---	0
Total mass of liquid collected, g			439.2
Description of liquid collected:	Light cloud Film		

Test-Run 1-3	Box No: 4		
	Filter No: 8881		
Impinger Number	Mass (g) or Volume (ml)		
	Initial	Final	Net Gain
1	100	298	198
2	100	321	221
3	0	5	5
4	762.9	775.9	13.0
5	---	---	0
6	---	---	0
7	---	---	0
Total mass of liquid collected, g			437.0
Description of liquid collected:	Slight cloud Film		

Test-Run	Box No:		
	Filter No:		
Impinger Number	Mass (g) or Volume (ml)		
	Initial	Final	Net Gain
1	100		
2	100		
3	0		
4			
5	---	---	0
6	---	---	0
7	---	---	0
Total mass of liquid collected, g			
Description of liquid collected:			

MMT form: S-LB-4b 5/9/84

mmt environmental services, inc.	EPA METHOD 3 LABORATORY REPORT **ORSAT ANALYSIS**	Project Number: Company: L.C. Kruse + Sons, Inc.

Sample Identification		Gas Parameter Measured	Replicate #1 Buret ml Reading	Replicate #1 Percent Volume	Replicate #2 Buret ml Reading	Replicate #2 Percent Volume	Replicate #3 Buret ml Reading	Replicate #3 Percent Volume	Average Percent Volume	Fuel Factor Fo
Bag Id:	Submitted by: BA	Initial Reading	0.00		0.00		0.00			~~1.35~~
A	Submittal Date: 7.19.94 Time: 1055	Carbon Dioxide	6.40	6.40	6.50	6.50	6.40	6.40	6.43	1.33
	Analyzed by: TG	Oxygen	18.76	12.36	18.85	12.35	18.80	12.40	12.37	
	Analysis Date: 7.19.94 Time: 1113	Carbon Monoxide								
Bag Id:	Submitted by: BA	Initial Reading	0.00		0.00		0.00			
B	Submittal Date: 7.19.94 Time: 1252	Carbon Dioxide	5.54	5.54	5.60	5.60	5.50	5.50	5.55	1.35
	Analyzed by: TG	Oxygen	18.94	13.40	19.00	13.40	18.90	13.40	13.40.	
	Analysis Date: 7.19.94 Time: 1305	Carbon Monoxide								
Bag Id:	Submitted by: BA	Initial Reading	0.00		0.00		0.00			
C	Submittal Date: 7.19.94 Time: 1521	Carbon Dioxide	6.50	6.50	6.45	6.45	6.50	6.50	6.48	1.22
	Analyzed by: TG	Oxygen	19.60	13.00	19.45	13.00	19.50	13.00	13.00	
	Analysis Date: 7.19.94 Time: 1540	Carbon Monoxide								
Bag Id:	Submitted by:	Initial Reading								
	Submittal Date: Time:	Carbon Dioxide								
	Analyzed by:	Oxygen								
	Analysis Date: Time:	Carbon Monoxide								

Percent Volume Calculations:
$\%CO_2 = 100 * (CO_2 - IR) / (100 - IR)$
$\%O_2 = 100 * (O_2 - CO_2) / (100 - IR)$
$\%CO = 100 * (CO - O_2) / (100 - IR)$
where IR, CO_2, O_2 & CO are buret ml values

$Fo = (20.9 - \%O_2 + 0.5*\%CO) / (\%CO_2 + \%CO)$
Fuel factor Fo is a quality control check which is only valid for pure combustion sources. The EPA Method 3B list of acceptable Fo ranges for various fuels is presented to the right.

Anthracite coal:	1.016 - 1.130	Distillate oil:	1.260 - 1.413
Bituminous coal:	1.083 - 1.230	Residual oil:	1.210 - 1.370
Lignite coal:	1.016 - 1.130	Natural gas:	1.600 - 1.836
Wood:	1.000 - 1.120	Propane gas:	1.434 - 1.586
Wood bark:	1.003 - 1.130	Butane gas:	1.405 - 1.553

MMT form: S-LB-3a 5/9/94

Record buret readings to the nearest 0.1 ml.

Record percent volume values to the nearest 0.01 percent.

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 708-953-9300 FAX: 708-953-9306
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
16130 VAN DRUNEN RD., P.O. BOX 127
SOUTH HOLLAND, IL 60473
TEL: (708) 331-2900
FAX: (708) 333-3060

August 24, 1994

MMT ENVIRONMENTAL SERVS, INC.
4610 N. Churchill Street
St. Paul, MN 55126
Attn: Alan TrowBridge

Sample identification by
MMT ENVIRONMENTAL SERVS, INC.

Kind of sample reported to us	#2 Fuel Oil	
Sample taken at	L.C. Kruse and Sons, Inc.	Composite Fuel Sample from L.C. Kruse and Sons, Inc..
Sample taken by	L.C. Kruse Personnel	
Date sampled	July 19, 1994	
Date received	August 2, 1994	P.O. No. 8572

Analysis Report No. 71-79784

	As Received
HEATING VALUE, Btu/lb	18,476
ASH, % Wt.	0.57
SULFUR, % Wt.	0.53
ORGANIC HALOGENS, ppm	1960
FLASH POINT	
P-Martens Closed Cup, °F	180
pH	6.80
LEAD, ug/g	50

METHODS
Heating Value: ASTM D 240; Ash: ASTM D 874; Sulfur: ASTM D 1552
Organic Halogens: SW 846 Module Method 9253; pH: ASTM D 1067; Lead: ASTM D 3683

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, South Holland Laboratory

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES
F-465/071/94
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August 24, 1994

MMT ENVIRONMENTAL SERVS, INC.
4610 N. Churchill Street
St. Paul, MN 55126
Attn: Alan TrowBridge

Sample identification by
MMT ENVIRONMENTAL SERVS, INC.

Kind of sample reported to us	#2 Fuel Oil	Composite Fuel Sample from L.C. Kruse and Sons, Inc..
Sample taken at	L.C. Kruse and Sons, Inc.	
Sample taken by	L.C. Kruse Personnel	
Date sampled	July 19, 1994	
Date received	August 2, 1994	P.O. No. 8572

Analysis Report No. 71-79784

POLYCHORINATED BIPHENYLS (PCB's)

PARAMETER	RESULTS	METHOD
PCB, ug/g	<5	SW8080

ND: Non detected

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, South Holland Laboratory

APPENDIX D: CALIBRATION DATA

CALIBRATION
DRY TEST METER/ORIFICE METER

Date: Monday 7.25.94 Barometric Pressure, in. Hg. (Pb): 28.56

EQUIPMENT IDENTIFICATION			
Control Unit 4	Dry Test Meter	Wet Test Meter	Calibration Type
Mfg: Andersen	Mfg: rockwell	Mfg: GCA Corporation	General: x
Model: Universal	Model: S-175	Model: Precision	Post-test: x
SN: 591-544	SN: 83	SN: 11 AH 12	

EQUIPMENT CALIBRATION											
Orifice Pressure Drop in. WC H	Pump Vac. in.Hg	Wet Test Meter			Dry Test Meter						Elapsed Time, min. Q
		Volume, CF		Temp. °F Tw	Volume, CF		Temperature, °F				
							Inlet		Outlet		
		Initial V_{wi}	Final V_{wf}		Initial V_{di}	Final V_{df}	Initial T_{ii}	Final T_{if}	Initial T_{oi}	Final T_{of}	
1.3	18	2800	5.873	77	286.435	292.335	75	75	75	77	9
1.3	18	5.873	14.357	77	292.335	300.878	77	75	79	75	13
1.3	18	14.357	20.225	77	300.878	306.778	79	75	76	80	9

COMPUTER PRINTOUT

Project # 9601 L.C. Kruse July 94

Average Orifice Pressure = 1.26 in W.C. Max observed Vacuum in Hg. = 17.5

H	Vw	Tw	Vd	Td	Q	C	Hd
1.3	5.873	77	5.900	75.5	9.0	0.9893	1.8247
1.3	8.484	77	8.543	76.5	13.0	0.9889	1.8210
1.3	5.868	77	5.900	77.5	9.0	0.9922	1.8210

AVERAGE CORRECTION FACTOR: C = 0.9901
AVERAGE ORIFICE CONSTANT: Hd = 1.8223

Post Test

EQUATIONS:

```
Vw = Vwf - Vwi
Vd = Vdf - Vdi
Td = ( Tii + Tif + Toi + Tof ) / 4
C = Vw * Pb * (Td+460) / ( Vd * (Pb+H/13.6) * (Tw+460) )
Hd = 0.0317 * H * ((Tw+460)*Q/Vw)^2  / ( Pb * (Td+460) )
```

Calibration Performed by:

(Print) Ted Gibbons Ted Gibbons

CALIBRATION
DRY TEST METER/ORIFICE METER

Page: SSQA-1-66

Date: Friday 6.10.94 Barometric Pressure, in. Hg. (Pb): 28.79

EQUIPMENT IDENTIFICATION			
Control Unit 4	Dry Test Meter	Wet Test Meter	Calibration Type
Mfg: Andersen	Mfg: rockwell	Mfg: GCA Corporation	General: x
Model: Universal	Model: S-175	Model: Precision	Post-test: x
SN: 591-544	SN: 83	SN: II AH 12	

EQUIPMENT CALIBRATION

Orifice Pressure Drop in. WC H	Pump Vac. in.Hg	Wet Test Meter Volume, CF Initial V_{wi}	Wet Test Meter Volume, CF Final V_{wf}	Wet Test Meter Temp. °F T_w	Dry Test Meter Volume, CF Initial V_{di}	Dry Test Meter Volume, CF Final V_{df}	Dry Test Meter Temperature, °F Inlet Initial T_{ii}	Dry Test Meter Temperature, °F Inlet Final T_{if}	Dry Test Meter Temperature, °F Outlet Initial T_{oi}	Dry Test Meter Temperature, °F Outlet Final T_{of}	Elapsed Time, min. Q
0.80	12	0.000	3.686	75	0.555	4.174	66	65	71	67	7
0.80	12	3.686	13.680	75	4.174	14.187	71	67	81	71	19
0.80	12	13.680 / 13.680	20.507	75	14.187	21.051	77	71	83	73	13

COMPUTER PRINTOUT

Average Orifice Pressure = .831 in. W.C

Maximum Vacuum observed = 12 in. Hg.

per M5 section 5.3.2, post test calibration for project # 9576

H	Vw	Tw	Vd	Td	Q	C	Ha
0.8	3.686	75	3.619	67.3	7.0	1.0017	1.7246
0.8	9.994	75	10.013	72.5	19.0	0.9914	1.7113
0.8	6.827	75	6.864	76.0	13.0	0.9944	1.7056

AVERAGE CORRECTION FACTOR: C = 0.9959
AVERAGE ORIFICE CONSTANT: Ha = 1.7138

EQUATIONS:

$V_w = V_{wf} - V_{wi}$
$V_d = V_{df} - V_{di}$
$T_d = (T_{ii} + T_{if} + T_{oi} + T_{of}) / 4$
$C = V_w * P_b * (T_d+460) / (V_d * (P_b+H/13.6) * (T_w+460))$
$H_a = 0.0317 * H * ((T_w+460)*Q/V_w)^2 / (P_b * (T_d+460))$

$\bar{x}$ C = .9930

Calibration Performed by:

(Print) Ted Gibbons Ted Gibbons

CALIBRATION

S-TYPE PITOT TUBE

Probe ID: 75"

Date: 3-29-94 S-Type Pitot Tube ID No.: 67 inches

Ambient Temperature, °F: 67 Standard Pitot Tube ID No.: 1.5"

Barometric Pressure, in. Hg.: 28.83 Standard Pitot Tube Coefficient: .990

Stack thermocouple 61" Inflex + 18" flexible

PITOT TUBE EXAMINATION		
Alignment Check	Pitot Tube Dimensions	Pitot Assembly Intercomponent Spacings
✓ α1<10°	External tubing diameter (D_t): 3/8	Pitot to ____ nozzle (X): NA
✓ α2<10°	Base to Side A opening plane (P_A): .53	Pitot to probe sheath (Y): NA
✓ β1< 5°	Base to Side B opening plane (P_B): .52	Pitot to thermocouple, along probe (W): NA
✓ β2< 5°		Pitot to thermocouple, perpendicular to probe (Z): NA
✓ Q<1/8 in.		
✓ R<1/32 in.		

DAMAGE ON SIDE B

DESIRED CALIBRATION POINT		SIDE A CALIBRATION		SIDE B CALIBRATION	
Velocity ft/sec	P_{std} in. WC	P_{std} in. WC	P_s in. WC	P_{std} in. WC	P_s in. WC
20	0.09	.11	.15	.11	.16
40	0.37	.33	.45	.39	.55
60	0.82	.81	1.1	.84	1.2
80	1.45	1.5	2.05	1.45	2.1
100	2.30				

COMPUTER PRINTOUT

SIDE A CALIBRATION				SIDE B CALIBRATION			
Pstd	Ps	Cp	Cp-Cp(A)	Pstd	Ps	Cp	Cp-Cp(B)
0.110	0.150	0.848	-0.000	0.110	0.160	0.821	-0.005
0.330	0.450	0.848	-0.000	0.390	0.550	0.834	0.007
0.810	1.100	0.850	0.002	0.840	1.200	0.828	0.002
1.500	2.050	0.847	-0.001	1.450	2.100	0.823	-0.004
Cp(A) = 0.848				Cp(B) = 0.826			

Side A σn = .001 Side B σn = .005

Calibration Performed by:

(Print) Bill & Ted

(Signature) Bill & Ted

CALIBRATION
NOZZLE DIAMETER

Nozzle Number	Nominal Diameter, in.	Measured Diameter, in. D1	D2	D3	Nozzle* Diameter, in.
L-1		.174	.175	.175	.175
L-2		.249	.248	.249	.249
L-3		.355	.355	.355	.355
L-4		.489	.488	.489	.489
L-5		.125	.125	.125	.125
L-6		.300	.300	.300	.300
L-7		.175	.175	.176	.175
L-8		.489	.490	.491	.490
L-10		.245	.246	.245	.245
L-11		.250	.250	.250	.250
L-12		.247	.248	.248	.248
L-13		.240	.240	.239	.240
L-14		.199	.199	.199	.199

* Nozzle diameter = (D1 + D2 + D3)/3

Calibration Performed by:

(Print) Bill Anderson

(Signature) Bill Anderson

Date: 3-18-94

FORM: SSQA-3

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Alan Throwbridge

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 Hoare President	243059 Certificate Number
[illegible] Vice President	Minneapolis Location
David B. Savage, Jr. Program Manager	April 6, 1994 Date of Issue

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APPENDIX E: PROCESS DATA

ASPHALT PLANT OPERATING CONDITIONS DURING PERFORMANCE TEST

mmt environmental services, inc.

Project No: _____ Date: 7.19.91

Company: L.C. Kruse + Sons, Inc

Location: Noble County, MN

The Minnesota Pollution Control Agency requires that the following information be included in the performance test report. The agency may reject any report without this completed form duly certified by a company representative.

Asphalt Plant Description

Mfg: Pioneer

Model: 113-36-DM modified

Type: ☒ Drum Mix ☐ Conventional ☐ Other (specify):

Class: ☐ Stationary ☒ Portable

Pollution Control Equipment

Mfg: _____

Model: Dust Eater P-85000

Type: ☒ Baghouse ☐ Cyclone ☐ Multiclone ☐ Venturi Scrubber ☐ Wet Scrubber ☐ Other:

Fuel Description

Itemize all fuels and materials added to the combustion process during the test period (if oil specify type): Waste Oil

Is the above listed fuel the "dirtiest" that the plant is allowed to burn? ☒ Yes ☐ No

Is the above fuel substantially the highest sulfur containing fuel normally burned? ☒ Yes ☐ No

Production specific fuel usage determination method:

☐ Measured _____ cu.ft./ton hot mix

☐ Calculated X gal/ton hot mix

Number of burners in system dryer: One

Burner rating 202 M 10^6Btu = 100% control setting

Control Equipment Operating Parameters

Was control equipment operating normal during the test period? ☒ Yes ☐ No

Normal system pressure drop, in WC: 6.3

Normal system air flow rate, acfm: 85000

For Baghouse systems:	Design	At Test
Cleaning cycles	80	80
Air-to-Cloth Ratio		
For Wet Scrubbing systems:		
% scrubbing water recycled		
Number of spray bars		
Water delivery pressure, psi		
Water flow rate, gpm		

Heat Input Data (specify units)

Test Run Number	Fuel Usage Rate ___/Hr	Fuel Heat Content Btu/___	Total Heat Input Rate 10^6Btu/Hr
1			
2			
3			

Control Equipment Cleaning/Maintenance

Date and procedure of last maintenance or cleaning of the pollution control equipment: 6-13-94 New

Aggregate and Recycle Material Usage / Aggregate & Recycle Moisture Content

Test Number	Virgin Aggregate ton/hr	Recycle Material ton/hr	Liquid Asphalt ton/hr	Process Weight Rate ton/hr*	Recycle Percentage %**	Virgin Aggregate % moisture	Recycle Material % moisture	Combined Material % moisture
1								
2								
3								

* Process Weight Rate = Total of all materials introduced into the process equipment = Aggregate + Recycle + Asphalt

** % Recycle = 100 x Recycle / (Aggregate + Recycle) Asphalt excluded as per Minn. Dept. of Transportation mix basis calculation

Describe location of the thermocouples reading the dryer gas exit temperature: Top of Fan on Base of Exhaust Stack

Affidavit: I certify that the information recorded above is accurate and correctly describes the plant equipment and operating conditions during the indicated performance test period.

By (print): Daniel D. Schulte Position: Operator

Signature: [signature] Phone: 507 472 8749

MMT form. S-PD-1b Rev 5/20/94

mmt environmental services, inc.

ASPHALT PLANT OPERATING DATA LOG

(Record Data at 15 Minute Intervals)

Project No: 801 Date: 7.19.94

Company: L.C. Kruse + Sons, Inc.

Location: Nobles County, Minnesota

Time of Day Hr : Min	Burner Setting %	Material Processing Rate, Tons Per Hour: Aggregate Material	~~Recycle Material~~	~~Total Solid Materials~~	Liquid Asphalt	Total All Materials	Dryer Exhaust Gas Temp. °F	Dust Collector Pressure Drop Inches water	~~Wet Scrubber Water Flow Rate gpm~~	~~Pressure psi~~		
10:25	70	375			25.1		245	6.2				
10:40	70	380			25.3		240	6.4				
10:55	70	383			25.4		240	6.0				
11:10	70	380			25.3		239	6.3				
11:25	70	381			25.2		241	6.2				
11:40	70	381			25.2		242	6.2				
11:55	70	379			25.0		243	6.1				
12:40	70	381			25.1		237	6.3				
12:55	70	379			25.0		240	6.2				
1:10	70	380			25.3		241	6.3				
1:25	70	378			25.0		240	6.2				
1:40	70	381			25.2		242	6.3				
1:55	70	379			25.0		243	6.2				
2:10	70	381			25.1		240	6.0				
2:25	70	379			25.0		242	6.4				
2:40	70	380			25.2		246	6.4				
2:55	70	383			25.3		237	6.4				
3:10	70	385			25.8		235	6.5				

Affidavit: I certify that the information recorded above is accurate and correctly describes plant operating conditions during the indicated period. I also certify that the above data was recorded by myself or by personnel under my direct supervision.

By (print): Daniel D. Schultz Position: Operator

Signature: [signature] Phone: 507 472-8749

MMT form: S-PD-1a Rev.5/20/94

mmt environmental services, inc.

ASPHALT PLANT OPERATING DATA LOG

(Record Data at 15 Minute Intervals)

Project No: 9601 Date: 7.19.94

Company: L.C. Kruse + Sons, Inc.

Location: Nobles County, MN

Time Collection	Time of Day Hr : Min	Burner Setting %	Material Processing Rate, Tons Per Hour: Aggregate Material	Recycle Material	Total Solid Materials	Liquid Asphalt	Total All Materials	Dryer Exhaust Gas Temp. °F	Dust Collector Pressure Drop inches water	Wet Scrubber Water: Flow Rate gpm	Pressure psi		
325	2:25	75	378			24.9		238	6.0				
340	2:40	78	381			25.0		240	6.3				
355	2:55	80	383			25.2		244	6.4				
410	3:10	80	382			25.1		245	6.4				
440	4:40	90	372			24.6		236	6.3				
in Tailer													

Affidavit: I certify that the information recorded above is accurate and correctly describes plant operating conditions during the indicated period. I also certify that the above data was recorded by myself or by personnel under my direct supervision.

By (print): Daniel D Schultz Position:

Signature: Phone:

MMT form: S-PD-1a Rev.5/20/94

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APPENDIX F: TEST PLAN

Janelle Jacobson
MPCA Enforcement
Marshall office
507-537-7146

SOURCE EMISSION COMPLIANCE TEST PLAN
ASPHALT PLANT TEST PLAN #9601

Date Test Plan Written/Revised	MPCA Pre-Test Meeting Date	Scheduled Test Date(s)
July 11, 1994	~~to be determined~~ 7/12/94 0830	July 19, 1994

PART I. GENERAL INFORMATION

1: Emission Facility: ..... L.C. Kruse & Sons, Inc.
P.O. Box 899
Lakefield, MN 56150

2: Facility Contact Person: ..... Darrin Kruse
Phone: (507) 662-5205 Fax: (507) 662-6725

3: MPCA file/permit number: ..... Permit #323-B-89-OT-1

4: Reason For Test: ..... Permit Requirement
Plant failed several tests in 1993 when equipped with a wet scrubber. Plant now equipped with a baghouse.

5: Source to be Tested:..... Emission Point #1
Asphalt Plant Baghouse Exhaust
See Figure 1 for sampling location data

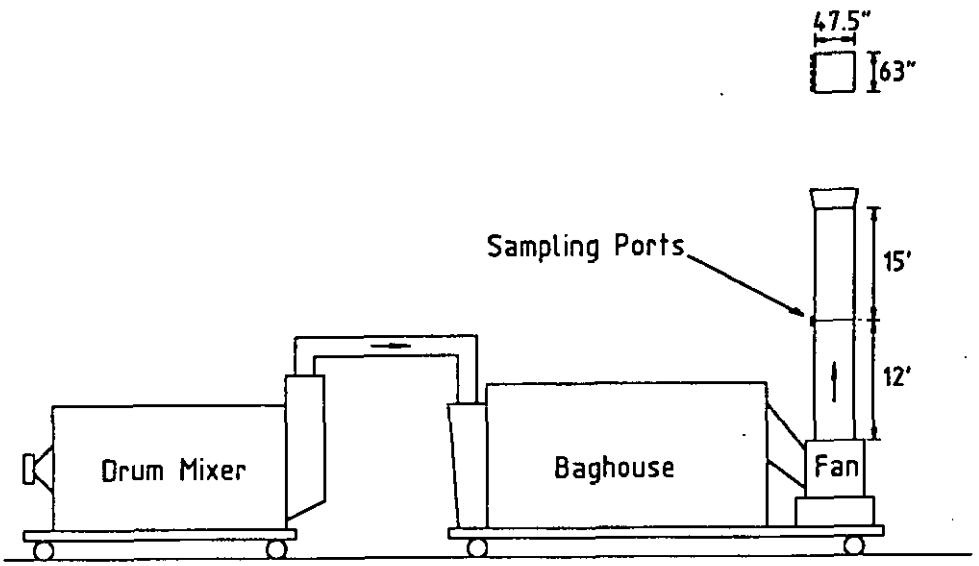
6: Physical Location of Source: ..... Portable;
Location for test is 4 miles North of Adrian, MN on Hwy 91 and 1 mile East on Cty. Rd. 14, ¼ mile North

7: Testing Company: ..... MMT Environmental Services, Inc.
4610 N. Churchill Street, St. Paul, MN 55126-5892
Phone: (612) 483-9595 Fax: (612) 483-2699
Contact: Alan Trowbridge

8: Test Plan Discussions: ..... Pre-test meeting

9: Out-of-State Compliance Test: ..... Not Applicable

Figure 1: Process and sampling site schematic



EPA Method 1 Sampling Location Data:
47.5" cross-sectional depth depth
63.0" cross-sectional width
54.2" equivalent diameter
12' (2.7 diameters) of straight, undisturbed flow before sampling ports
15' (3.3 diameters) of straight, undisturbed flow after sampling ports
25 points required for particulate test
5 sampling ports
5 sampling points per port

PART II. TESTING REQUIREMENTS

1. Pollutants to be tested, applicable emission limits, and governing regulations:

Emission Point	Pollutant	Emission Limit	Applicable Rule or Regulation
1	Particulate Matter	Exhaust gas particulate concentration must not exceed 0.04 gr/dscf	~~Minnesota Rule 7011.0910~~ Federal Regulations 40 CFR 60.90 - 60.93
1	Opacity	Exhaust gases must not exhibit 20% or greater opacity	~~Minnesota Rule 7011.0910~~ Repealed Federal Regulations 40 CFR 60.90 - 60.93

The emission test must be conducted with the asphalt plant's burner operating on the lowest quality (highest emitting) fuel listed in or allowed by the facility's permit. The following fuels are listed by quality (worst to best): Used oil (waste oil, crank oil), #6 fuel oil, #5 fuel oil, #4 fuel oil, #3 fuel oil (clarified oil, industrial fuel oil), #2 fuel oil, #1 fuel oil, liquified petroleum gas (LPG), propane and natural gas.

The fuel to be used during the test on Emission Point #1 is **USED OIL**.

2. Fuel sampling and analysis (Applicable to solid and liquid fuels only):

Required as part of the compliance demonstration. The MPCA will not accept test reports without an analysis of fuel samples collected during the test period.

Sampling and analytical procedures are describe in MPCA Exhibit D which is also known as Part 11 of the MPCA Air Emission Permit.

1) Sampling - One tap sample is collected during each particulate test run. In order to be representative of the fuel burned during the test period, the fuel sampling location must be as close as possible to the burner. The minimum sample size is one pint.
2) Analysis - The individual fuel samples are to be combined together into a single composite sample which is to be analyzed for:
   a) Sulfur content, % by weight
   b) Ash content, % by weight
   c) Moisture content (if applicable), % by weight
   d) Gross heating value, BTU/gal or BTU/lb
   e) The following analyses are required additions when the fuel is USED OIL:
      Flash point, °F
      Lead content, percent by weight
      Polychlorinated biphenyls (PCBs), ppm by weight
      Organic halogens, percent by weight
      Acidity, pH

certificate from supplier will suffice

3. Moisture Content of the Aggregate

   Required as part of the compliance demonstration. The MPCA will not accept test reports without moisture content analyses of aggregate samples collected during the test period.

   1) Sampling - Collect two or more samples of raw material during each particulate test run. In order to be representative of the material processed during the test period, the samples must be collected as close to the drum mixer/dryer as possible. If recycled material is included in the aggregate then , if possible, collect the samples after the virgin and recycled materials have been mixed. Otherwise collect separate samples of the virgin and recycled materials.

      For each particulate test run, mix the individual samples into a single composite. If separate virgin and recycled material samples were collected, then combine the individual samples to obtain one virgin-composite and one recycled-composite for each particulate test run.

   2) Analysis - Each composite sample is to be analyzed for moisture content per ASTM or other recognized methodologies. If separate virgin and recycled samples were collected, then a mass-weighted average aggregate moisture content must be calculated based on the virgin/recycled proportions processed during the test period.

   Note: The facility owner/operator must provide (for inclusion in the test report) a copy of the manufacturer's specifications which define the design capacity of the plant as a function of the aggregate moisture content.

PART III. OPERATING CONDITIONS

1. General operating parameters for each emission point to be tested:

   Note that the asphalt plant, pollution control equipment and all related equipment must be operated by the facilities regular operators using their normal operating procedures.

Emission Point #1	**Process Equipment Description:** Equipment ..... Asphalt Plant Manufacturer/Model ..... Pioneer 113-36-DM modified Rated Capacity ..... 400 ton/hr @ 4 % moisture
	Process Rates and Operating Conditions during Test: Process weight rate: Aggregate, virgin ..... 376 ton/hr Aggregate, recycle ..... 0 ton/hr Asphalt ..... 24 ton/hr Total process weight rate ..... 400 ton/hr Fuel Data: Fuel Type ..... Used Oil Fuel Usage Rate: ..... 2.0 gal/ton
	Control Equipment Description: Equipment ..... Baghouse with DuPont Nomex Bags Manufacturer/Model ..... Dust Eater P-85000
	Control Equipment Operating Parameters: Normal Pressure Drop ..... 5 in. WC Air to Cloth Ratio 5.28:1

2. Explanation of why the proposed test conditions are considered to be the worst case in accordance with Minnesota Rules part 7017.2025, subpart 2:

Emission Point	Rationale For Worst Case
1	Worst case is generally considered to be operation at design capacity with: 1) burning of worst quality fuel ~~2) maximum ratio of recycled to virgin aggregate~~

3. Definition of the normal range of process or operating rates for each emission unit:

Emission Point	Normal Range of Process or Operating Rates
1	Normal production rates vary between 300 and 450 tons per hour. Aggregate moisture content varies between 4 and 9 percent.

4. For each piece of process and control equipment listed in section III.1. above, the following are the descriptions of how air pollution control and process equipment will be monitored:

Emission Point	Process Equipment Description	Description Of Process Monitoring During Test Period
1	Asphalt plant	Process data will be recorded by plant personnel. Aggregate feed rate monitored by belt scales. Asphalt feed rate determined by Brodie meter. Fuel usage determined by manual sticking. Dryer gas temperature monitored by thermocouple and indicating meter.

Emission Point	Control Equipment Description	Description Of Control Equipment Monitoring During Test Period
1	Baghouse	Process data will be recorded by plant personnel. Baghouse pressure drop monitored by computer.

PART IV. TEST METHODS

1. Specific Test Plan

   1) Three (3) replicate particulate emission test runs per EPA Methods 1, 2, 3, 4 and 5.
   2) One (1) hour of plume opacity observations per EPA Method 9. The opacity observations shall be performed concurrent with one (1) of the particulate emission tests.

2. General Test Methodology

   The following is a general listing of test requirements:

A: EPA Method 1 for the location of sampling ports and sampling points.

A check for cyclonic flow must be done whenever there is a cyclonic type of device directly upstream of the sampling location. The check must be performed even if flow straightening vanes have been installed.

If the sampling location does not meet the minimum requirements of EPA Method 1, then the testing firm must conduct flow pattern evaluation and testing according to the alternative procedures in part 2.5 of EPA Method 1. Flow pattern documentation is required.

Previously documented flow pattern tests are acceptable providing that no changes have occurred that would affect the flow pattern.

B: EPA Method 2 for velocity and volumetric flow rate determination. Three (3) test runs are required; one concurrent with each pollutant emission test run.

C: EPA Method 3 for gas analysis (CO_2 & O_2). Three (3) determinations are required; one integrated sample concurrent with each pollutant emission test run.

D: EPA Method 4 for determination of moisture in the flue gases. Three (3) test runs are required; one concurrent with each pollutant emission test run.

E: EPA Method 5 as amended by Minnesota Rules 7017.2060 and 7011.0725 for the determination of particulate matter emissions. Particulate analysis will include back catch condensable organic matter. Three (3) test runs are required and each run must represent a minimum sampling time of 60 minutes and a minimum sample volume of 32 dry standard cubic feet.

F: EPA Method 9 as amended in Minnesota Rule 7017.2060 for the determination of visible emissions. Normally one (1) sixty-minute test is required. However, if this is an initial compliance test subject to NSPS regulations, then three (3) sixty-minute tests are required.

If particulate emission testing is being performed, then the opacity test(s) must be performed concurrent with one or more of the EPA Method 5 test runs. Note: weather conditions may make it impossible to obtain valid opacity observations concurrent with the particulate test. If such circumstances exist, the visible emission test will be rescheduled for a later time/date and will be performed at similar load conditions.

3. Reference to any compliance document, federal regulation, or Minnesota rule or statute requiring use of specific methods or procedures, shall be stated in this section. **NONE**
4. Proposed alternative/equivalent test methods: **NONE**
5. Non-reference test method: For each proposed non-reference test method, include a statement of the detection limit and the degree of accuracy of that method at the expected emission rate and under the conditions of the performance test. **NOT APPLICABLE**

NOTE: Sampling times and rates must be increased if necessary to ensure that the detection limit for each pollutant is below the applicable emission limit, using the equation in Minn. Rules pt. 7017.2045, Subp. 6.

PART V. CEMS RELATIVE ACCURACY TEST

Testing of continuous emission monitoring systems is **not** included in this test program.

PART VI. OTHER

For each process unit to be tested the following are specified:

1. Pollutant(s) emissions must be reported in same terms as the emission limit(s).
2. Special averaging times for emission limits: NOT APPLICABLE
3. Plant personnel must complete the following two forms and give them to the testing firm representative for inclusion in the test report. A copy of each form is included at the end of this test plan.
   1) Asphalt Plant Operating Conditions During Stack Testing
   2) Asphalt Plant Operating Data Log
4. One complete test report (one hard copy) shall be submitted to the MPCA within 45 days after the date on which the on-site testing was completed. The test report **must** be submitted to the agency regardless of the test results. Note that submittal of the report to the MPCA is the responsibility of the owner/operator and not of the testing firm.
5. A microfiche copy of the report shall be submitted to the MPCA within 105 days after the date on which the on-site testing was completed. The microfiche copy **must** be submitted to the agency regardless of the test results. Note that submittal of the microfiche copy to the MPCA is the responsibility of the owner/operator and not of the testing firm.
6. All submittals shall be addressed to:

   Supervisor, Compliance Determination Unit
   Compliance and Enforcement Section
   Air Quality Division
   Minnesota Pollution Control Agency
   520 Lafayette Road
   St. Paul, Minnesota 55155-4194

PART VII. MPCA WARNING TO OWNER/OPERATOR

Given the seriousness of exceeding an emission limit, the Company is hereby provided notice that enforcement action will be taken for a first performance test failure . This enforcement action will not be initiated until the results of the retest have been reviewed by MPCA staff and will require the Company to pay a civil penalty.

Please be advised that upon receiving written notice of a second performance test failure, the Company will be required to either shut down the tested process unit(s) or to submit a compliance plan, subject to MPCA approval, which indicates specific measures-to-be-taken which are expected to make all the unit(s) operate in compliance with the applicable emission limitations . The plan must also include specific measures the facility will take to minimize emissions until compliance is demonstrated. However, if the unit(s) continue to operate, they will be considered to be operating in violation of the applicable limits from the date of the performance test until a retest has been conducted that demonstrates compliance .

Please note that results of a performance test are not final until MPCA staff provides a written compliance determination.