STACK EMISSIONS SURVEY
CHESTER BROSS CONSTRUCTION COMPANY
ASPHALT CONCRETE DRUM-MIX PLANT
PLATTSBURG, MISSOURI

AUGUST 1992

FILE NUMBER 92-1138

Prepared By:

Western Environmental Services and Testing, Inc.
6756 West Uranium Road
Casper, Wyoming 82604
(307) 234-5511

MEL CARNAHAN
Governor

DAVID A. SHORR
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102

CERTIFIED MAIL

February 16, 1993

RE: PORT-0007

Chester Bross, President
Chester Bross Construction Company
P. O. Box 430
Hannibal, MO 63401

Dear Mr. Bross:

My staff has reviewed the report of testing conducted by Western Environmental Services and Testing, Inc. on the drum-mix asphalt plant located at your facility near Plattsburg. Particulate emissions over three runs averaged 0.1724 grains per dry standard cubic foot (gr/DSCF). This emission level exceeds the limit of 0.04 gr/DSCF established by New Source Performance Standards (NSPS), Subpart I (40 CFR 60.90), referenced in conditon 7 of your permit, number 0690-014. Emission of particulate matter in excess of .04 gr/DSCF violates Missouri Regulation 10 CSR 10-6.070 which adopts the New Source Performance Standards by reference.

Notice of Violation #3102 is hereby issued for this excess emission. The facility described may not be operated for purposes other than testing until it demonstrates compliance with the previously cited regulations and standards. Operation of this plant in violation of the above cited regulation is subject to penalties of up to $10,000 per day. Please contact this office immediately at (314) 751-4817 to discuss a settlement of this violation and to schedule a test of the equipment after necessary modifications to bring it into compliance have been made.

APCP records show that this plant is currently located in Ralls county. Relocation without proper notification to the Air Pollution Control program will be treated as an additional violation of Missouri Reguations.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Steven Feeler
Compliance Unit Chief

SF/py
cc: KCRO, NERO
Ruth Wallace, APCP portable source permits

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
AIR POLLUTION CONTROL PROGRAM

NOTICE OF VIOLATION/EXCESS EMISSIONS

P.O. BOX 176
JEFFERSON CITY, MO 65102

CENTRAL OFFICE
NO. 3102

☒ NOTICE OF VIOLATION ☐ NOTICE OF EXCESS EMISSIONS

DATE AND TIME: August 24, 1992 ☒ AM ☒ PM

SOURCE (NAME, ADDRESS, LOCATION)

Chester Bross Construction Company dba CB Asphalt, Inc.

Plattsburg, MO

MAILING ADDRESS	CITY	STATE	ZIP CODE
P. O. Box 430	Hannibal	MO	63401

NAME OF OWNER OR MANAGER

Chester Bross, President

IN VIOLATION OF MISSOURI AIR CONSERVATION COMMISSION REGULATION 10CSR 10- 6.070

New Source Performance Regulations Patticulate emissions from asphaltic concrete plants

40 CFR 60.90 (Subpart I) Standards for performance for Hot Mix Asphalt Facilities Adopted by reference

REMARKS ON NATURE OF VIOLATION

Emissions measured during emissions testing were .1724 gr/DSCF
NSPS limit is .04 gr/DSCF

SIGNATURE (PERSON RECEIVING NOTICE)	SIGNATURE (PERSON ISSUING NOTICE)
	Peter Yronwode
TITLE OR POSITION	TITLE OR POSITION/DNR REGION
	ES II MO DNR APCP

MO 780-0179 (3-88) **DISTRIBUTION:** **WHITE** - AIR POLLUTION CONTROL PROGRAM; **CANARY** - REGIONAL OFFICE; **PINK** - SOURCE

PLANT NAME: C5 Asphalt — TEST UNIT: Asphalt Plant
LOCATION: Plattsburg, MO — DATE: 8/24-25/92 — RUN NO: 1

USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK

NUMBER OF POINTS	25	PERCENT OXYGEN	12.80
TIME, MINUTE/POINT	3.00	PERCENT CARBON DIOXIDE	6.40
LEAK RATE, FT3/MIN	0.000	PERCENT CARBON MONOXIDE	0.00
BAR PRESS, INCH Hg	28.99	Cp (PITOT COEFFICIENT)	0.833
STATIC PRESS (in H2O)	0.18	NOZZLE DIAMETER, INCHES	0.188
STACK EXIT LENGTH IN	30.75	INITIAL METER VOL, FT3	309.902
STACK EXIT WIDTH IN	29.25	FINAL METER VOL, FT3	350.132
IMPINGER H2O, ML	213.7	METER CORR FACT, Y	0.988
SILICA GEL H2O, GM	12.2	PARTIC COLLECTED, MG	291.50

PT NO	STACK TEMP (Ts)	VELOC PRESS (dPs)	ORIFICE PRESS (dH)	METER TEMP INLET (Tmi)	METER TEMP OUTLET (Tmo)	SQR ROOT VELOC PRESS
1	171	0.40	0.28	95	95	0.632
2	173	0.42	0.29	95	95	0.648
3	174	0.42	0.29	95	95	0.648
4	173	0.39	0.27	95	95	0.624
5	173	0.25	0.18	97	95	0.500
6	167	0.60	0.42	95	95	0.775
7	167	0.68	0.47	97	95	0.825
8	167	0.67	0.47	97	95	0.819
9	169	0.58	0.41	99	97	0.762
10	170	0.47	0.33	99	95	0.686
11	169	0.90	0.63	99	99	0.949
12	169	0.90	0.63	99	99	0.949
13	169	1.00	0.70	100	99	1.000
14	169	0.80	0.56	100	99	0.894
15	169	0.69	0.48	100	99	0.831
16	170	1.20	0.84	100	99	1.095
17	167	1.30	0.91	100	99	1.140
18	169	1.30	0.91	101	99	1.140
19	168	1.90	1.33	102	99	1.378
20	167	1.50	1.00	102	99	1.225
21	171	2.50	1.80	102	100	1.581
22	171	2.40	1.70	103	100	1.549
23	170	2.40	1.70	103	100	1.549
24	170	2.20	1.50	103	100	1.483
25	169	1.800	1.30	104.0	100	1.342
26						
27						
28						
29						
30						
AVG	169.6	1.107	0.78	99.3	97.7	1.0010

STACK GAS MOL WT. WET	26.93	AVG ABS STACK TEMP (deg R)	629.6
STACK VELOCITY (ft/sec)	64.00	AVG ABS METER TEMP (deg R)	558.5
STD VOL SAMPLED (std ft2)	36.47	METER LEAK RATE (ft3/min)	0.000
AVG METER TEMP (deg F)	98.48	SAMPLE VOL LK CORR'D (ft3)	40.23
PERCENT MOISTURE (%)	22.58	AVG ABS STACK PRESS (in Hg)	29.00
STD STACK FLOW RATE (DSCFM)	15094.60	VOL H2O IN METER GAS (std ft3)	10.63
		H2O IN GAS STREAM (vol frac)	0.226
ISOKINETIC VARIATION (%)	104.32	NOZZLE AREA (ft2)	0.00019
PARTIC EMISSION RATE (lb/hr)	15.9602	STACK AREA (ft2)	6.246
PARTICULATE CONC (gr/DSCF)	0.123356	STACK EQUIV DIAMETER (in)	29.98
FUEL F FACTOR DRY (Fd)			
POUNDS PER MILLION BTU	0	STACK GAS MOL WT. DRY	29.536

PLANT NAME:CB Asphalt TEST UNIT:Asphalt Plant
LOCATION: Plattsburg, MO DATE: 8/24-25/92 RUN NO: 2

USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK

NUMBER OF POINTS	25	PERCENT OXYGEN	11.60
TIME, MINUTE/POINT	3.00	PERCENT CARBON DIOXIDE	6.80
LEAK RATE, FT3/MIN	0.000	PERCENT CARBON MONOXIDE	0.00
BAR PRESS, INCH Hg	28.99	Cp (PITOT COEFFICIENT)	0.833
STATIC PRESS (in H2O)	0.18	NOZZLE DIAMETER, INCHES	0.188
STACK EXIT LENGTH IN	30.75	INITIAL METER VOL, FT3	350.470
STACK EXIT WIDTH IN	29.25	FINAL METER VOL, FT3	395.021
IMPINGER H2O, ML	256.0	METER CORR FACT, Y	0.988
SILICA GEL H2O, GM	4.4	PARTIC COLLECTED, MG	302.40

PT NO	STACK TEMP (Ts)	VELOC PRESS (dPs)	ORIFICE PRESS (dH)	METER TEMP INLET (Tmi	METER TEMP OUTLET (Tmo)	SQR ROOT VELOC PRESS
1	173	2.50	1.75	104	104	1.581
2	717	2.70	1.90	103	104	1.643
3	167	3.20	2.20	103	104	1.789
4	165	2.90	2.00	103	104	1.703
5	165	2.90	2.00	104	104	1.703
6	161	2.00	1.40	105	105	1.414
7	159	2.00	1.40	105	105	1.414
8	162	2.00	1.40	105	105	1.414
9	163	1.40	0.98	105	105	1.183
10	162	1.40	0.98	105	105	1.183
11	161	1.10	0.77	106	106	1.049
12	167	1.50	1.00	108	108	1.225
13	175	1.40	0.98	109	109	1.183
14	173	1.00	0.70	109	109	1.000
15	172	0.78	0.55	109	109	0.883
16	174	0.91	0.64	109	110	0.954
17	174	0.98	0.69	109	109	0.990
18	171	0.98	0.69	109	109	0.990
19	170	0.86	0.60	109	109	0.927
20	169	0.52	0.36	109	109	0.721
21	174	0.75	0.53	107	109	0.866
22	170	0.30	0.21	107	109	0.548
23	171	0.30	0.21	109	109	0.548
24	170	0.29	0.20	109	109	0.539
25	171	0.09	0.07	105	107	0.300
26						
27						
28						
29						
30						
AVG	190.2	1.390	0.97	106.6	107.0	1.1100

STACK GAS MOL WT. WET	26.83	AVG ABS STACK TEMP (deg R)	650.2
STACK VELOCITY (ft/sec)	72.26	AVG ABS METER TEMP (deg R)	566.8
STD VOL SAMPLED (std ft2)	39.81	METER LEAK RATE (ft3/min)	0.000
AVG METER TEMP (deg F)	106.80	SAMPLE VOL LK CORR'D (ft3)	44.55
PERCENT MOISTURE (%)	23.54	AVG ABS STACK PRESS (in Hg)	29.00
STD STACK FLOW RATE (DSCFM)	16296.87	VOL H20 IN METER GAS (std ft3)	12.26
		H20 IN GAS STREAM (vol frac)	0.235
ISOKINETIC VARIATION (%)	105.49	NOZZLE AREA (ft2)	0.00019
PARTIC EMISSION RATE (lb/hr)	16.3745	STACK AREA (ft2)	6.246
PARTICULATE CONC (gr/DSCF)	0.117221	STACK EQUIV DIAMETER (in)	29.98
FUEL F FACTOR DRY (Fd)			
POUNDS PER MILLION BTU	0	STACK GAS MOL WT. DRY	29.552

PLANT NAME: CB Asphalt — WEST UNIT Asphalt Plant
LOCATION: Plattsburg, MO DATE: 8/24-25/92 RUN NO: 3

USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK

NUMBER OF POINTS	25	PERCENT OXYGEN	12.20
TIME, MINUTE/POINT	3.00	PERCENT CARBON DIOXIDE	6.60
LEAK RATE, FT3/MIN	0.000	PERCENT CARBON MONOXIDE	0.00
BAR PRESS, INCH Hg	29.00	Cp (PITOT COEFFICIENT)	0.833
STATIC PRESS (in H2O)	0.18	NOZZLE DIAMETER, INCHES	0.188
STACK EXIT LENGTH IN	30.75	INITIAL METER VOL, FT3	395.362
STACK EXIT WIDTH IN	29.25	FINAL METER VOL, FT3	437.583
IMPINGER H2O, ML	303.0	METER CORR FACT, Y	0.988
SILICA GEL H2O, GM	8.9	PARTIC COLLECTED, MG	701.90

PT NO	STACK TEMP (Ts)	VELOC PRESS (dPs)	ORIFICE PRESS (dH)	METER TEMP INLET (Tmi)	METER TEMP OUTLET (Tmo)	SQR ROOT VELOC PRESS	
1	164	0.57	0.37	95	97	0.755	0.65
2	163	0.97	0.63	95	94	0.985	0.65
3	168	0.65	0.42	89	92	0.806	0.65
4	171	0.64	0.42	89	91	0.800	0.66
5	170	0.40	0.26	89	91	0.632	0.65
6	173	0.86	0.52	90	91	0.927	0.60
7	170	0.90	0.54	89	90	0.949	0.60
8	168	0.92	0.55	89	90	0.959	0.60
9	171	0.57	0.34	89	90	0.755	0.60
10	170	0.48	0.29	89	90	0.693	0.60
11	168	1.30	0.78	87	89	1.140	0.60
12	167	1.20	0.72	87	89	1.095	0.60
13	167	1.50	0.95	87	88	1.225	0.63
14	168	1.10	0.69	87	88	1.049	0.63
15	164	0.90	0.57	88	89	0.949	0.63
16	168	2.20	1.40	86	87	1.483	0.64
17	171	1.80	1.10	87	87	1.342	0.61
18	173	2.10	1.30	87	87	1.449	0.62
19	170	1.90	1.20	87	87	1.378	0.63
20	168	1.10	0.69	89	87	1.049	0.63
21	169	2.30	1.50	89	87	1.517	0.65
22	170	2.40	1.50	89	87	1.549	0.63
23	168	2.60	1.60	87	86	1.612	0.62
24	169	2.00	1.30	89	85	1.414	0.65
25	163	1.50	0.95	89	85	1.225	0.63
26							ERR
27							ERR
28							ERR
29							ERR
30							ERR
AVG	168.4	1.314	0.82	88.7	89.0	1.1095	

STACK GAS MOL WT. WET	26.38	AVG ABS STACK TEMP (deg R)	628.4
STACK VELOCITY (ft/sec)	71.59	AVG ABS METER TEMP (deg R)	548.8
STD VOL SAMPLED (std ft2)	38.96	METER LEAK RATE (ft3/min)	0.000
AVG METER TEMP (deg F)	88.84	SAMPLE VOL LK CORR'D (ft3)	42.22
PERCENT MOISTURE (%)	27.37	AVG ABS STACK PRESS (in Hg)	29.01
STD STACK FLOW RATE (DSCFM)	15875.89	VOL H2O IN METER GAS (std ft3)	14.68
		H2O IN GAS STREAM (vol frac)	0.274
ISOKINETIC VARIATION (%)	105.98	NOZZLE AREA (ft2)	0.00019
PARTIC EMISSION RATE (lb/hr)	37.8311	STACK AREA (ft2)	6.246
PARTICULATE CONC (gr/DSCF)	0.278007	STACK EQUIV DIAMETER (in)	29.98
FUEL F FACTOR DRY (Fd)			
POUNDS PER MILLION BTU	0	STACK GAS MOL WT. DRY	29.544

February 1, 1993

Dear Mr. Ironwood:

Please accept our apologies on the late transmittal of these results. We were mistakenly led to believe that the testing company sent copies to everyone. Once again we apologize for the confusion.

Sincerely,

Chester Bross

Chester Bross

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STACK EMISSIONS SURVEY
CHESTER BROSS CONSTRUCTION COMPANY
ASPHALT CONCRETE DRUM-MIX PLANT
PLATTSBURG, MISSOURI

INTRODUCTION

Western Environmental Services and Testing, Inc. (WEST, Inc.) of Casper, Wyoming, conducted a Stack Emissions Survey at Chester Bross Construction Company's asphalt concrete drum-mix plant located near Plattsburg, Missouri on August 24 and 25, 1992. The purpose of this survey was to determine emissions of particulate matter from the Scrubber stack of the rotary drying kiln.

Sampling followed the procedures set forth by the Missouri Department of Natural Resources, Air Pollution Control Program; and the Federal Register, Volume 39, Number 47, Friday, March 8, 1978, with current revisions.

SUMMARY OF RESULTS

The principal conclusions are:

1. The emissions of particulate matter from the stack were 23.458 pounds per hour (0.1724 grains per dry standard cubic foot), based on averaging the three tests using the "front-half" collections of the EPA-type sampling train.

2. The allowable particulate emission rate is 0.04 grains per dry standard cubic foot, as stated in the "New Source Performance Standards" for asphalt concrete plants, outlined in the Code of Federal Regulations, Title 40, Part 60, Subpart I, July 1, 1989. The actual emissions were 431.0 percent of the permitted emissions, based on the "front-half" collections.

SUMMARY OF RESULTS

Run Number		1	2	3
Stack Flow Rate - ACFM		23964	26578	26795
Stack Flow Rate - DSCFM*		15130	16607	15897
% Water Vapor - % Volume		22.61	23.58	27.42
% CO_2 - % Volume		6.4	6.8	6.6
% O_2 - % Volume		12.8	11.6	12.2
% Excess Air At Sampling Point		149	116	131
Particulates				
Probe, Cyclone & Filter Catch grains/dscf*	(C_{an})	0.1230	0.1169	0.2773
grains/cf at Stack Conditions	(C_{at})	0.0774	0.0728	0.1640
lbs/hr	(C_{aw})	15.951	16.636	37.786
Total Catch grains/dscf*	(C_{ao})			
grains/cf at Stack Conditions	(C_{au})			
lbs/hr	(C_{ax})			
Opacity %		6.9	9.6	---
Plant Production Rate	Tons/Hour	209.6	198.0	287.5

* 68 Deg. F., 29.92 "Hg (20 Deg. C., 760 mm Hg)

DISCUSSION OF RESULTS

The three tests for particulates taken on the stack appeared to be valid representations of the actual emissions during the testing. The indicative parameters calculated from the field data were in close agreement. The moisture percentages were within 11.8 percent of the mean value. The measured flow rates (Qs) were within 4.7 percent of the mean value. The rate of sampling for the three tests were within the specified limits of the isokinetic rate, the greatest deviation being 6.3 percent.

The calculated "front-half" emissions (pounds per hour) of particulates from the three tests showed a range of +61.1 percent to +32.0 percent variation from the mean value.

DESCRIPTION OF PROCESS OPERATION

Chester Bross Construction Company's asphalt concrete drum-mix plant is a CMI with a venturi wet scrubber.

In an asphalt concrete drum-mix plant, sand, gravel, and coarse aggregate are conveyed into a rotary drying kiln. The kiln is heated with a continuous flame. Asphalt is added in the rotary kiln where it is mixed with the hot, dry aggregate. Any dust and fine particles that are not entrained in the asphalt mix are channeled along with the dryer exhaust by an induced draft fan through the Scrubber. After passing through the Scrubber, the exhaust is emitted into the atmosphere via a stack. The asphalt is conveyed to a bin where it is stored until the asphalt can be transported to the paving site by truck.

DESCRIPTION OF SAMPLING LOCATION

The sampling ports are located on the rectangular dryer exhaust stack approximately 25 feet above the ground. The sampling was done from five ports on the rectangular stack located 8 feet 10 inches (3.54 equivalent stack diameters) downstream of the stack inlet, and 1 foot (0.40 equivalent stack diameters) upstream of the stack outlet. The area of the stack is 899 square inches. Port and wall thickness is 3 inches.

SAMPLING AND ANALYTICAL PROCEDURES

The sampling and analytical procedures used followed the procedures outlined by the Missouri Department of Natural Resources, Air Pollution Control Program; and the Federal Register, Volume 39, Number 47, Friday, March 8, 1978.

A preliminary velocity traverse was performed at each of the five ports in order to determine the uniformity of flow in the stack. Particulate samples of 3 minutes duration at each of the five traverse points were taken from each of the five ports using an EPA-type, heated, glass-lined probe. A total of 25 points were sampled.

Before each test, the sampling train was leak-checked at 15 inches of mercury at the nozzle. After each test, the train was again leak-checked at the highest recorded vacuum reading during the test. Final leak-checking was performed in order to predetermine the possibility of a diluted sample.

Before and after each test period, the pitot tubes were checked for leaks under both a vacuum and pressure. Also, the lines were checked for clearance and the zero manometer reading verified before and after each test.

The emissions were calculated from gravimetric analysis using the front-half collections of the EPA-type sampling train in accordance with the EPA "New Source Performance Standards".

Orsat analysis were provided for each test using a grab-type sample.

DESCRIPTION OF TESTS

Personnel from WEST, Inc. arrived at the plant at 0730 hours on Monday, August 24, 1992. After meeting with plant personnel, WEST, Inc. personnel were on standby waiting for a manlift. The equipment was set up and readied for testing by 1400 hours. Testing began at 1402 hours and continued until the completion of Run 2 at 1853 hours. The equipment was secured for the night at 1930 hours.

On Tuesday, August 25, personnel from WEST, Inc. arrived at the plant at 0700 hours. The equipment was set up and the sampling crew was on standby due to rain and plant problems until 1630 hours. Testing began at 1640 hours and continued until the completion of run 3 at 1847 hours.

The equipment was moved off the stack and loaded into the mobile laboratory. All of the samples, which were recovered immediately after each test, were taken to WEST, Inc.'s laboratory in Casper, Wyoming, for further analyses and evaluation.

Testing at Chester Bross Construction Company's asphalt concrete drum-mix plant located near Plattsburg, Missouri was completed at 2000 hours on Tuesday, August 25, 1992.

James E. Meador, Jr.
Vice President

Alan D. Roylance
Manager of Operations

APPENDICES

A. Location of Sampling Points

B. Source Emission Calculations

C. Calibration of Equipment

D. Field Testing Data

E. Analytical Data

F. Plant Production Data

G. Chain of Custody and Analysis Request

H. Resumes of Test Personnel

APPENDIX A

Location of Sampling Points

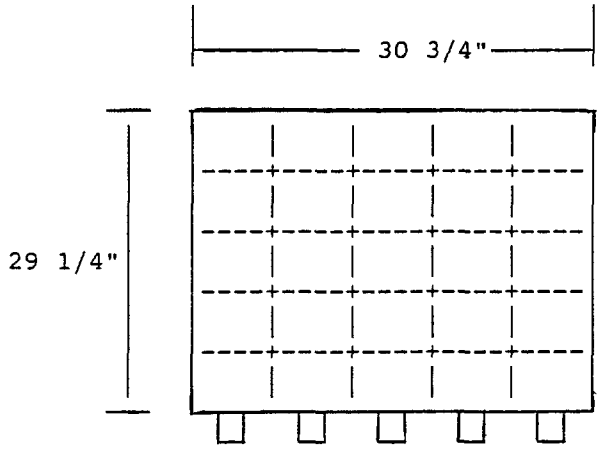
APPENDIX A

Location of Sampling Points
Drum Kiln Exhaust Stack

The sampling ports are located on the rectangular stack 8 feet 10 inches (3.54 equivalent stack diameters) downstream of the stack inlet, and 1 foot (0.40 equivalent stack diameters) upstream of the stack outlet. Sampling was done using a 5 x 5 matrix.

Area of the Stack = 853 square inches

Port and Wall Thickness = 3-1/4 inches



APPENDIX B

Source Emission Calculations

Nomenclature for Particulate Calculations

Symbol	English Units	Metric Units	Description
A_s	$in.^2$	m^2	Stack Area
C_{an}	gr/dscf	g/dscm	Particulate - Probe, Cyclone and Filter
C_{ao}	gr/dscf	g/dscm	Particulate - Total
C_{at}	gr/CF @ Stack Conditions	g/m^3	Particulate - Probe, Cyclone and Filter
C_{au}	gr/CF @ Stack Conditions	g/m^3	Particulate - Total
C_{aw}	lbs/hr	kg/hr	Particulate - Probe, Cyclone and Filter
C_{ax}	lbs/hr	kg/hr	Particulate - Total
C_p			Pitot Tube Calibration Factor
D_n	in.	m	Sampling Nozzle Diameter
%EA			Percent Excess Air At Sampling Point
g	32.2 ft/sec^2		Acceleration of Gravity
%I			Percent Isokinetic
%M			Percent Moisture in the Stack Gas by Volume

* 528° R, 29.92 "Hg (20°C, 760 mm Hg)

Symbol	English Units	Metric Units	Description
M_d			Mole Fraction of Dry Gas
mf	mg	mg	Particulate - Probe, Cyclone and Filter
M_{H_2O}	18 lb/lb-mole		Molecular Weight of Water
m_t	mg	mg	Particulate - Total
MW_{air}	lb/lb-mole	g/g-mole	Molecular Weight Of Stack Gas
MW	28.95 lb/ lb-mole		Molecular Weight Of Air
MW_d	lb/lb-mole	g/g-mole	Molecular Weight Of Dry Stack Gas
P_b	"Hg Absolute	mm Hg	Barometric Pressure
P_m	"H_2O	mm H_2O	Orifice Pressure Drop
P_s	"Hg Absolute	mm Hg	Stack Pressure
ΔP_s	"H_2O	mm H_2O	Velocity Head of Stack Gas
P_{std}	29.92 "Hg	760 mm Hg	Standard Barometric Pressure
Q_a	ACFM	m^3/hr	Stack Gas Volume At Actual Stack Conditions
Q_s	DSCFM	dscm/hr	Stack Gas Volume At 29.92 "Hg, 528°R, Dry
R	21.83 "Hg ft^3/lb-mole-°R		Universal Gas Constant

* 528°R, 29.92 "Hg (20°C, 760 mm Hg)

Symbol	English Units	Metric Units	Description
T_m	°F	°C	Average Gas Meter Temperature
T_t	min	min	Net Time of Test
T_s	°F	°C	Stack Temperature
T_{std}	528°R	293°K	Standard Temperature
V_m	ft^3	m^3	Volume of Dry Gas Sampled @ Meter Conditions
$V_{m_{std}}$	dscf	dscm	Volume of Dry Gas Sampled @ Standard Conditions
V_s	fpm	m/sec	Stack Velocity @ Stack Conditions
V_w	ml	ml	Total water Collected in Impingers And Silica Gel
$V_{w_{gas}}$	scf	scm	Volume of Water Vapor Collected @ Standard Conditions
ρ_{air}	0.0748 lbs/ft^3		Density of Air
ρ_{H_2O}	1 g/ml		Density of Water
ρ_{man}	51.63 lbs/ft^3		Density of Manometer Oil

Standard Conditions: 68°F, 29.92 "Hg (20°C, 760 mm Hg)

Example Particulate Calculations

1. Volume of Dry Gas Sampled At Standard Conditions.*

$$V_{m_{std}} = V_m \left[\frac{T_{std}}{T_m + 460} \right] \left[\frac{P_b + \frac{P_m}{13.6}}{P_{std}} \right]$$

$$V_{m_{std}} = 17.65\ V_m \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460} \right] = \text{dscf}$$

$$V_{m_{std}} = \text{dscf} \times 0.028317 = \text{dscm}$$

2. Volume of Water Vapor Collected At Standard Conditions.*

$$V_{w_{gas}} = \frac{(V_w - \text{gms } SO_2 - \text{gms } H_2S)\ \rho_{H_2O}\ R\ T_{std}}{P_{std}\ M_{H_2O}\ 453.6}$$

$$V_{w_{gas}} = 0.0472\ (V_w - \text{gms } SO_2 - \text{gms } H_2S) = \text{scf}$$

$$V_{w_{gas}} = \text{scf} \times 0.028317 = \text{scm}$$

3. Percent Moisture in Stack Gas.

$$\%M = \frac{V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} \times 100 = \%$$

* 528°R, 29.92 "Hg (20°C, 760 mm Hg)

4. Mole Fraction of Dry Gas.

$$M_d = \frac{100 - \%M}{100}$$

5. Average Molecular Weight of Dry Stack Gas.

$$MW_d = \left(\%CO_2 \times \frac{44}{100}\right) + \left(\%O_2 \times \frac{32}{100}\right) + \left(\%N_2 \times \frac{28}{100}\right) + \left(\%CO \times \frac{28}{100}\right) = \text{lb/lb-mole}$$

$$= \text{g/g-mole}$$

6. Molecular Weight of Stack Gas.

$$MW = MW_d \times M_d + 18\ (1-M_d) = \frac{\text{lb}}{\text{lb-mole}} = \text{g/g-mole}$$

7. Percent Excess Air At Sampling Point.

$$\%EA = \frac{100\ (\%O_2 - 0.5\%\ CO)}{0.265\ (\%N_2) - (\%O_2) + 0.5\ (\%CO)}$$

8. Stack Pressure.

$$P_s = P_b + \frac{\text{stack pressure } "H_2O}{13.6} = "\text{Hg Absolute}$$

$$P_s = "\text{Hg Abs.} \times 25.4 = \text{mm Hg}$$

* 528°R, 29.92 "Hg (20°C, 760 mm Hg)

9. Stack Velocity At Stack Conditions.

$$V_s = C_p\ 60 \left[\frac{2g \times \rho_{man} \times P_{std} \times MW_{air} \times (T_s + 460) \times \Delta P_s}{12 \times \rho_{air} \times P_s \times MW \times T_{std}} \right]^{1/2}$$

$$V_s = 5123.8\ C_p \left[\frac{(T_s + 460)}{P_s \times MW} \right]^{\frac{1}{2}} \times \text{Average} \left[(\Delta P)^{\frac{1}{2}} \right] = \text{fpm}$$

$$V_s = \text{fpm} \times 0.00508 = \text{m/sec}$$

10. Dry Stack Gas Volume At Standard Conditions.*

$$Q_s = \frac{1}{144} V_s \times A_s \times M_d \times \frac{T_{std}}{T_s + 460} \times \frac{P_s}{P_{std}}$$

$$Q_s = \frac{0.123\ V_s \times A_s \times M_d \times P_s}{T_s + 460} = \text{DSCFM}$$

$$Q_s = \text{DSCFM} \times 1.6990 = \text{dscm/hr}$$

11. Actual Stack Gas Volume At Stack Conditions.

$$Q_a = \frac{V_s \times A_s}{144} = \text{ACFM}$$

$$Q_a = \text{ACFM} \times 1.6990 = \text{m}^3\text{/hr}$$

* 528°R, 29.92 "Hg (20°C, 760 mm Hg)

12. Percent Isokinetic

$$\%I = \frac{V_{m_{std}} \times (T_s + 460) \times P_{std} \times 100 \times 144}{M_d \times T_{std} \times P_s \times T_t \times V_s \times \frac{\pi D_n^2}{4}}$$

$$\%I = \frac{1039\ V_{m_{std}} \times (T_s + 460)}{M_d \times P_s \times T_t \times V_s\ D_n^2}$$

13. Particulate - Probe, Cyclone, and Filter.

$$C_{an} = \frac{m_f}{V_{m_{std}}} \times \frac{1\ gr}{64.8\ mg}$$

$$C_{an} = 0.0154\ \frac{m_f}{V_{m_{std}}} = gr/dscf$$

$$C_{an} = gr/dscf \times 2.290 = g/dscm$$

14. Particulate - Total.

$$C_{ao} = 0.0154 \times \frac{m_t}{V_{m_{std}}} = gr/dscf$$

$$C_{ao} = gr/dscf \times 2.290 = g/dscm$$

* 528°R, 29.92 "Hg (20°C, 760 mm Hg)

15. Particulate - Probe, Cyclone, and Filter At Stack Conditions.

$$C_{at} = C_{an} \times \frac{P_s}{P_{std}} \times \frac{(T_{std})}{(T_s + 460)} \times M_d$$

$$C_{at} = \frac{17.65 \times C_{an} \times P_s \times M_d}{T_s + 460} = gr/CF$$

$$C_{at} = gr/CF \times 2.290 = g/m^3$$

16. Particulate - Total, At Stack Conditions.

$$C_{au} = \frac{17.65 \times C_{ao} \times P_s \times M_d}{T_s + 460} = gr/CF$$

$$C_{au} = gr/CF \times 2.290 = g/m^3$$

17. Particulate - Probe, Cyclone, and Filter.

$$C_{aw} = C_{an} \times Q_s \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}}$$

$$C_{aw} = 0.00857 \times C_{an} \times Q_s = lbs/hr$$

$$C_{aw} = lbs/hr \times 0.4536 = kg/hr$$

18. Particulate - Total.

$$C_{ax} = 0.00857 \times C_{ao} \times Q_s = lbs/hr$$

$$C_{ax} = lbs/hr \times 0.4536 = kg/hr$$

* 528°R, 29.92 "Hg (20°C, 760 mm Hg)

BROSS CONSTRUCTION
PLATTSBURG, MISSOURI
STACK EMISSIONS SURVEY

AUGUST 1992

FILE NUMBER 92-1138

SOURCE EMISSION CALCULATIONS

Symbol	Description	Units	SCRUBBER	SCRUBBER	SCRUBBER
Run No.			1	2	3
Date			08/24/92	08/24/92	08/25/92
Begin			1402 CDT	1723 CDT	1640 CDT
End			1548 CDT	1853 CDT	1847 CDT
Pb	barometric pressure	"Hg Abs. (mm Hg)	28.99 736.35	28.99 736.35	29.00 736.60
Pm	orifice pressure drop	"H2O (mm H2O)	.75 19.16	1.01 25.55	.82 20.79
Vm	volume dry gas sampled @ meter conditions	cu. ft. (cu. m.)	39.747 1.126	44.016 1.246	41.714 1.181
Tm	avg. gas meter temp	deg. F (deg. C)	98 37	107 42	89 32
Vmstd	volume dry gas sampled @ standard conditions*	dscf (dscm)	36.490 1.033	39.840 1.128	38.974 1.104
Vw	total H2O collected, impingers & silica gel	ml	225.9	260.4	311.9
Vwgas	volume water vapor collected @ standard conditions*	scf (scm)	10.662 .302	12.291 .348	14.722 .417
%M	moisture in stack gas by volume	%	22.61	23.58	27.42

* 68 deg. F., 29.92 "Hg (20 deg. C., 760 mm Hg)

Source Emission Calculations

BROSS CONSTRUCTION
FILE NUMBER 92-1138

Symbol	Description	Units	SCRUBBER	SCRUBBER	SCRUBBER
Run No.			1	2	3
Md	mole fraction of dry gas	-------	.7739	.7642	.7258
CO2		%	6.4	6.8	6.6
O2		%	12.8	11.6	12.2
N2		%	80.8	81.6	81.2
%EA	excess air @ sampling point	%	149	116	131
MWd	molecular weight of dry stack gas	lb/lb-mole (g/g-mole)	29.54 29.54	29.55 29.55	29.54 29.54
MW	molecular weight of stack gas	lb/lb-mole (g/g-mole)	26.93 26.93	26.83 26.83	26.38 26.38
dP's	velocity head of stack gas	"H2O (mm H2O)	1.080 27.43	1.445 36.69	1.307 33.19
Ts	stack temperature	deg. F (deg. C)	170 76	168 76	169 76
Ps	stack pressure	"Hg Abs. (mm Hg)	29.00 736.68	29.00 736.68	29.01 736.94
Vs	stack velocity @ stack conditions	fpm (m/sec)	3838 19.50	4257 21.63	4292 21.80
As	stack area	sq. in. (sq. met.)	899 .58	899 .58	899 .58
Qs	dry stack volume @ standard conditions*	DSCFM (dscm/hr)	15130 25705.22	16607 28215.91	15897 27009.82
Qa	actual stack gas volume @ stack conditions	ACFM (cu.m./hr)	23964 40714.51	26578 45156.08	26795 45524.31

* 68 deg. F., 29.92 "Hg (20 deg. C., 760 mm Hg)

Source Emission Calculations

BROSS CONSTRUCTION
FILE NUMBER 92-1138

Av

Symbol	Description	Units	SCRUBBER	SCRUBBER	SCRUBBER
Run No.			1	2	3
Tt	net time of test	min.	75	75	75
Dn	sampling nozzle diameter	in. (m)	.188 .005	.188 .005	.188 .005
%I	percent isokinetic	%	104.53	103.97	106.25
mf	particulate - probe, cyclone and filter	mg	291.5	302.4	701.9
mt	particulate - total	mg	.0	.0	.0
Can	particulate - probe, cyclone and filter	gr/dscf* (g/dscm)	.1230 .2817	.1169 .2677	.2773 .1724 .6351
Cao	particulate - total	gr/dscf* (g/dscm)	.0000 .0000	.0000 .0000	.0000 .0000
Cat	particulate - probe, cyclone and filter @ stack conditions	gr/cf (g/cu.m.)	.0774 .1772	.0728 .1667	.1640 .3755
Cau	particulate - total @ stack conditions	gr/cf (g/cu.m.)	.0000 .0000	.0000 .0000	.0000 .0000
Caw	particulate - probe, cyclone and filter	lbs/hr (kg/hr)	15.951 7.236	16.636 7.546	37.786 17.140
Cax	particulate - total	lbs/hr (kg/hr)	.000 .000	.000 .000	.000 .000

* 68 deg. F., 29.92 "Hg (20 deg. C., 760 mm Hg)

APPENDIX C

Calibration of Equipment

APPENDIX C

Calibration Data

May 20, 1992

NOZZLES

Set A

Nozzle No.	Diameter (inches)
1A	0.211
2A	0.197
3A	0.270
4A	0.329
5A	0.373
6A	0.399
7A	0.461
8A	0.510
9A	0.505
10A	0.573

Set B

Nozzle No.	Diameter (inches)
1B	0.135
2B	0.188
3B	0.262
4B	0.312
5B	0.374
6B	0.371
7B	0.513

Set C

Nozzle No.	Diameter (inches)
1C	0.130
2C	0.193
3C	0.252
4C	0.378
5C	0.502

Set I

Nozzle No.	Diameter (inches)
I-1	0.133
I-2	0.212
I-3	0.250
I-4	0.330
I-5	0.390
I-6	0.446
I-7	0.500
I-8	0.581
I-9	0.626

Set II

Nozzle No.	Diameter (inches)
II-1	0.131
II-2	0.204
II-3	0.263
II-4	0.331
II-5	0.390
II-6	0.456
II-7	0.509
II-8	0.565
II-9	0.619

Set III

Nozzle No.	Diameter (inches)
III-1	0.136
III-2	0.258
III-3	0.267
III-4	0.386
III-5	0.388
III-6	0.447
III-7	0.509
III-8	0.573
III-9	0.611

Calibration Data

May 29, 1992

PITOT TUBES

Pitot Length (effective length)	Calibration Factor		Pitot Length (effective length)	Calibration Factor	
32-2	High	0.817	76-1	High	0.833
	Low	0.820		Low	0.831
40-1	High	0.829	76-2	High	0.855
	Low	0.823		Low	0.851
40-2	High	0.839	77-1	High	0.829
	Low	0.836		Low	0.822
40-3	High	0.821	83-1	High	0.827
	Low	0.823		Low	0.825
47-1	High	0.833	83-2	High	0.847
	Low	0.830		Low	0.839
47-2	High	0.841	122-1	High	0.830
	Low	0.839		Low	0.836
48-1	High	0.851	124-1	High	0.836
	Low	0.859		Low	0.838
59-1	High	0.827	128-1	High	0.842
	Low	0.832		Low	0.841
59-2	High	0.832	132-1	High	0.860
	Low	0.837		Low	0.863
60-1	High	0.851	132-2	High	0.853
	Low	0.856		Low	0.855
74-1	High	0.835	156-1	High	0.840
	Low	0.836		Low	0.836
			V-1	High	0.827
				Low	0.825

APPENDIX C

Calibration Data

May 20, 1992

DRY GAS METERS

Unit Number	Calibration Factor
1	1.052
2	1.030
4	0.988

APPENDIX D

Field Testing Data

Job No. 92-1138
Job Name Bross Constr.
Run No. 1
Location Scrubber Stack

Date 8-24-92

Operator Hunter / Mortimer

Sample Box No. 14 Meter Box No. 4
ΔPs Pm Ts Tm

Part. FIELD DATA

Read and Record at the Start of Each Test Point

K Factor .699
Ambient Temp. °F 75°
Assumed Moisture % 20%
Probe Length 5' glass

	Before	After
Pitot Tube Leak Check	OK	OK

Initial Leak @ 15.0 "Hg = 0.000 cfm

Final Leak @ 10.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	Pitot In. H_2O	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Pump Vac In. Hg Gauge	Stack Temp. °F	Probe Temp. °F	Oven Temp. °F	Effluent Temp. °F	Dry Gas Temp °F Inlet	Dry Gas Temp °F Outlet	Remarks
A-5	1402	309.902	0.40	0.28	0.28	1.0	171	269	252	54	95	95	
4	1405	310.95	0.42	0.29	0.29	0.5	173	276	284	51	95	95	
3	1408	312.00	0.42	0.29	0.29	0.5	174	271	281	45	95	95	
2	1411	313.02	0.39	0.27	0.27	0.5	173	265	284	55	95	95	
1	1414	314.02	0.25	0.18	0.18	0.5	173	265	289	58	97	95	
END	1417	314.835	—	—	—	—	—	—	—	—	—	—	Leak Check
B-5	1423	314.835	0.60	0.42	0.42	0.5	167	255	273	59	95	95	314.937
4	1426	316.18	0.68	0.47	0.47	1.0	167	255	265	59	97	95	
3	1429	317.48	0.67	0.47	0.47	1.0	167	256	271	59	97	95	
2	1432	318.97	0.58	0.41	0.41	1.0	169	255	275	60	99	97	
1	1435	320.01	0.47	0.33	0.33	1.0	170	258	276	60	99	95	
END	1438	321.103	—	—	—	—	—	—	—	—	—	—	
C-5	1450	321.103	0.90	0.63	0.63	2.0	169	263	278	65	99	99	
4	1453	322.61	0.90	0.63	0.63	2.0	169	262	269	65	99	99	
3	1456	324.13	1.00	~~1.00~~ 0.70	0.70	2.0	169	265	269	64	100	99	
2	1459	325.70	0.80	0.56	0.56	2.0	169	263	269	64	100	99	
1	1502	327.15	0.69	0.48	0.48	2.0	169	259	268	65	100	99	
END	1505	328.516	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.833 Pitot Tube No. 47-1

Volume Collected V_m 39.747 ft³ %CO_2 6.4 %CO 0.0

Water Collected V_w 225.9 ml %O_2 12.8 %N_2 80.8

Time of Test T_t 75 min Area Stack A_2 899 in²

Baro. Press. P_b 28.99 "Hg Stack Press. +0.18 in. H_2O

Sample Purge: Initial — Final —

Probe Tip No. 2B Probe Tip Dia. 0.188 in.

V_m=Dry Gas Meter Calibration Factor 0.988 x 40.230

Dry Gas Meter _____ ft³ - (T_t ____ min x Leak Rate _____ cfm) = _____

M_F = 291.5 M_T = _____

Run . 1

Location Scrubber Stack

Date 8-24-82

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O	Orifice ΔH in. H_2O		Pump Vacuum In. Hg Gauge	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp. °F	Dry Gas Temp °F		Remarks
				Desired	Actual						Inlet	Outlet	
D-5	1511	328.516	1.20	0.84	0.84	2.5	170	263	274	62	100	99	
4	1514	330.20	1.30	0.91	0.91	2.5	167	258	272	60	100	99	
3	1517	332.03	1.30	0.91	0.91	2.1	169	263	272	58	101	99	
2	1520	333.85	1.90	1.33	1.33	3.0	168	270	270	59	102	99	
1	1523	336.07	1.50	1.05	1.00	3.0	167	265	269	57	102	99	
END	1526	338.058	—	—	—	—	—	—	—	—	—	—	
E-5	1533	338.058	~~2.50~~ ~~2.26~~	1.75	1.80	3.5	171	258	263	63	102	100	
4	1536	340.63	2.40	1.68	1.70	4.0	171	252	261	59	103	100	
3	1539	343.14	2.40	1.68	1.70	4.0	170	254	263	60	103	100	
2	1542	345.62	2.20	1.54	1.50	4.5	170	256	261	62	103	100	
1	1545	348.00	1.80	1.26	1.30	4.0	169	255	264	67	104	100	
END ALL	1548	350.234	—	—	—	—	—	—	—	—	—	—	

revised 4/85

Run #1
30X14

Impinger 1	Final Weight 718.5 Initial Weight 564.1 Increase	Water Weight Gain	Impinger #1 154.4
Impinger 2	Final Weight 609.5 Initial Weight 559.8 Increase		Impinger #2 49.7
Impinger 3	Final Weight 488.4 Initial Weight 479.8 Increase		Impinger #3 9.6
Impinger 4	Final Weight 729.8 Initial Weight ~~717~~ 717.6 Increase		Impinger #4 12.2
Impinger 5	Final Weight _____ Initial Weight _____ Increase		Impinger #5 _____
Impinger 6	Final Weight _____ Initial Weight _____ Increase		Impinger #6 _____
			Total 225.9 = V_w

P_b = _____ $\%CO_2$ = _____

V_m = _____ $\%O_2$ = _____

V_w = _____ %CO = _____

P_m = 0.78 $\%N_2$ = _____

Avg ΔP = _____ A_s = _____

Avg $\sqrt{\Delta P}$ = 1.001 D_n = _____

C_p = _____ T_t = _____

Filter # _____ Final Weight _____ P_s = +0.18 "H_2O 29.00 "Hg

Initial Weight _____ T_m = 98 °F _____ °R

Increase _____ T_s = _____ °F _____ °R

Moisture Content: %M = 22.6 M_d = .774 MW_d = 29.54 MW = 26.93

$$V_{mstd} = 17.65\ V_m \left[\frac{\frac{P_m}{P_b + 13.6}}{T_m + 460}\right] = 17.65 \times \_\_\_\_ \left[\frac{\_\_\_\_ + 13.6}{+ 460}\right] = 36.519\ sft^3$$

$$V_{wgas} = 0.0472 \times V_w = 0.0472 \times \_\_\_\_ = 10.662\ sft^3$$

$$\%\ Moisture = \frac{V_{wgas}}{V_{mstd} + V_{wgas}} \times 100 = \frac{\_\_\_\_}{\quad + \quad} \times 100 = 22.6\ \%$$

$$V = 5123.8 \times \_\_\_\_ \times \sqrt{\frac{\quad}{\quad x \quad}} \times \_\_\_\_ = 3834\ fpm \quad \_\_\_\_ scfm$$

_____ acfm

$$\% = \frac{1039 \times \quad x \quad}{x \quad x \quad x \quad x(\quad)^2} = 104.61\ \%$$

_____ % EA

Job No. 92-1138
Job Name Bross Constr.
Run No. 2
Location Scrubber Stack

Date 8-24-82

Operator Hunter / Mortimer

Sample Box No. 15 Meter Box No. 4
ΔPs Pm Ts Tm

Part FIELD DATA

Read and Record at the Start of Each Test Point

K Factor 0.70
Ambient Temp. °F 85°
Assumed Moisture % 22%
Probe Length 5 9/16"

	Before	After
Pitot Tube Leak Check	OK	OK

Initial Leak @ 15.0 "Hg = 0.000 cfm

Final Leak @ 7.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	Pitot In. H_2O	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Pump Vac In. Hg Gauge	Stack Temp. °F	Probe Temp. °F	Oven Temp. °F	Effluent Temp. °F	Dry Gas Temp °F Inlet	Dry Gas Temp °F Outlet	Remarks
E-5	1723	350.470	2.50	1.75	1.75	3.0	173	242	243	68	104	104	
4	1726	353.05	2.70	1.89	1.90	3.5	171	253	250	65	103	104	
3	1729	355.68	3.20	2.24	2.20	4.0	167	254	257	64	103	104	
2	1732	358.56	2.90	2.03	2.00	4.0	165	250	263	65	103	104	
1	1735	361.31	2.90	2.03	2.00	4.0	165	253	267	69	104	104	
END	1738	364.024	—	—	—	—	—	—	—	—	—	—	
D-5	1742	364.024	2.00	1.40	1.40	3.0	161	258	270	68	105	105	
4	1745	366.35	2.00	1.40	1.40	3.0	159	265	273	70	105	105	
3	1748	368.65	2.00	1.40	1.40	3.0	162	263	270	70	105	105	
2	1751	370.92	1.40	0.98	0.98	2.5	163	263	270	70	105	105	
1	1754	372.80	1.40	0.98	0.98	3.0	162	264	270	70	105	105	
END	1757	374.697	—	—	—	—	—	—	—	—	—	—	
C-5	1802	374.697	1.10	0.77	0.77	2.0	161	267	271	71	106	106	
4	1805	376.38	1.50	1.05	1.00	2.5	167	259	265	68	108	108	
3	1808	378.27	1.40	0.98	0.98	2.5	175	256	259	67	109	109	
2	1811	380.16	1.00	0.70	0.70	2.5	173	258	260	63	109	109	
1	1814	381.76	0.78	0.55	0.55	2.0	172	253	263	62	109	109	
END	1817	383.195	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.833 Pitot Tube No. 42-1

Volume Collected V_m 44.~~313~~ 016 ft^3 %CO_2 6.8 %CO 0.0

Water Collected V_w 260.4 ml %O_2 11.6 %N_2 81.6

Time of Test T_t 75 min Area Stack A_2 899 in^2

Baro. Press. P_b 28.99 "Hg Stack Press. +0.18 in. H_2O

Sample Purge: Initial — Final —

Probe Tip No. 2B Probe Tip Dia. 0.188 in.

V_m=Dry Gas Meter Calibration Factor 0.988 X 44.~~854~~ 551

Dry Gas Meter ____ ft^3 - (T_t ____ min x Leak Rate ____ cfm = ____

M_F = 302.4 M_T = ____

Run No. 2

Location Scrubber stack

Date 8-24-92

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O	Orifice ΔH in. H_2O		Pump Vacuum In. Hg Gauge	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp. °F	Dry Gas Temp °F		Remarks
				Desired	Actual						Inlet	Outlet	
B-5	1821	383.195	0.91	0.64	0.64	2.0	174	263	257	68	109	110	
4	1824	384.74	0.98	0.69	0.69	2.0	174	257	260	67	109	109	
3	1827	386.34	0.98	0.69	0.69	2.0	171	261	264	68	109	109	
2	1830	387.95	0.86	0.60	0.60	2.0	170	259	262	69	109	109	
1	1835	389.43	0.52	0.36	0.36	1.5	169	259	267	68	109	109	
END	1836	390.568	—	—	—	—	—	—	—	—	—	—	
A-5	1838	390.568	0.75	0.53	0.53	2.0	174	269	270	69	107	109	
4	1841	391.89	0.30	0.21	0.21	1.0	170	261	269	64	107	109	
3	1844	392.81	0.30	0.21	0.21	1.0	171	258	261	63	109	108	
2	1847	393.69	0.29	0.20	0.20	1.0	170	258	261	62	109	109	
1	1850	394.55	0.09	0.033	0.03	0.5	171	225	263	95	105	107	
END ALL	1853	395.821	—	—	—	—	—	—	—	—	—	—	

revised 4/85

Run 2
Box 15

Impinger 1	Final Weight 756.8 Initial Weight 562.6 Increase	Water Weight Gain	Impinger #1 194.2
Impinger 2	Final Weight 632.5 Initial Weight 574.6 Increase		Impinger #2 57.9
Impinger 3	Final Weight 492.2 Initial Weight 488.3 Increase		Impinger #3 3.9
Impinger 4	Final Weight 737.8 Initial Weight 733.4 Increase		Impinger #4 4.4
Impinger 5	Final Weight ____ Initial Weight ____ Increase		Impinger #5 ____
Impinger 6	Final Weight ____ Initial Weight ____ Increase		Impinger #6 ____
			Total 260.4 = V_w

P_b = ____ %CO_2 = ____

V_m = ____ %O_2 = ____

V_w = ____ %CO = ____

P_m = .97 %N_2 = ____

Avg ΔP = ____ A_n = ____

Avg $\sqrt{\Delta P}$ = 1.11 D_n = ____

C_p = ____ T_t = ____

Filter # U-303 Final Weight ____ P_s = +0.18 "H_2O 29.00 "Hg

Initial Weight ____ T_m = 106 °F ____ °R

Increase ____ T_s = 170 °F ____ °R

Moisture Content: %M = 23.55 M_d = .7645 MW_d = 29.55 MW = 26.83

$$V_{mstd} = 17.65\ V_m \left[\frac{\frac{P_m}{P_b + 13.6}}{T_m + 460}\right] = 17.65 \times \text{____} \left[\frac{\text{____} + 13.6}{\text{____} + 460}\right] = 39.889\ sft^3$$

$$V_{wgas} = 0.0472 \times V_w = 0.0472 \times \text{____} = 12.291\ sft^3$$

$$\%\ Moisture = \frac{V_{wgas}}{V_{mstd} + V_{wgas}} \times 100 = \frac{\text{____}}{\text{____} + \text{____}} \times 100 = 23.55\ \%$$

$$V_s = 5123.8 \times \text{____} \times \sqrt{\frac{\text{____}}{\text{____}}} \times \text{____} = 4263\ fpm \quad \text{____}\ scfm \quad \text{____}\ acfm$$

$$\%I = \frac{1039 \times \text{____} \times \text{____}}{\text{____} \times \text{____} \times \text{____} \times \text{____} \times (\text{____})^2} = 104.22\ \% \quad \text{____}\ \%\ EA$$

Job No. 92-1136 | Part. FIELD DATA

Job Name Bross Constr

Run No. 3

Location Scrubber Stack

Read and Record at the Start of Each Test Point

Date 8-25-92

Operator Hunter / Mortimer

Sample Box No. 14 Meter Box No. 4

K Factor 0.65

Ambient Temp. °F 70°

Assumed Moisture % 22%

Probe Length 5' glass

	Before	After
Pitot Tube Leak Check	OK	OK

Initial Leak @ 15.0 "Hg = 0.000 cfm

Final Leak @ 15.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	Pitot In. H_2O ΔPs	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Pump Vac In. Hg Gauge	Stack Temp. °F Ts	Probe Temp. °F Tm	Oven Temp. °F	Effluent Temp. °F	Dry Gas Temp °F Inlet	Dry Gas Temp °F Outlet	Remarks
A-5	1640	395.362	0.57	0.37	0.37	1.5	164	259	265	59	95	97	
4	1823	396.58	0.97	0.63	0.63	2.0	163	263	272	58	95	94	Stop @ 1643.30
3	1828	398.13	0.65	0.42	0.42	1.5	168	258	267	52	89	92	Start @ 1726
2	1732	399.40	0.64	0.42	0.42	1.5	171	256	270	54	89	91	
1	1735	400.65	0.40	0.26	0.26	1.0	170	253	273	54	89	91	K = 0.6
END	1738	401.644	—	—	—	—	—	—	—	—	—	—	
B-5	1740	401.644	0.86	0.52	0.52	2.0	173	256	269	56	90	91	
4	1743	403.05	0.90	0.54	0.54	2.0	170	253	265	56	89	90	
3	1746	404.47	0.92	0.55	0.55	2.0	168	255	262	53	89	90	
2	1749	405.90	0.57	0.34	0.34	1.5	171	254	263	54	89	90	
1	1752	407.04	0.48	0.29	0.29		170	256	267	55	88	90	
END	1755	408.087	—	—	—	—	—	—	—	—	—	—	
B-5	1757	408.087	1.30	0.78	0.78	2.5	168	253	264	58	87	89	
4	1800	409.78	1.20	0.72	0.72	2.5	167	260	261	56	87	89	K = .63
3	1803	411.40	1.50	0.95	0.95	2.5	167	257	262	57	87	88	
2	1806	413.25	1.10	0.69	0.69	2.0	168	256	264	58	87	88	
1	1809	414.84	0.90	0.57	0.57		164	260	263	60	88	89	
END	1812	416.276	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.833 Pitot Tube No. 42-1

Volume Collected V_m 41.714 ft^3 %CO_2 6.6 %CO 0.0

Water Collected V_w 31.9 ml %O_2 12.2 %N_2 81.2

Time of Test T_t 75 min Area Stack A_2 899 in^2

Baro. Press. P_b ~~28.99~~ 29.00 "Hg Stack Press. +0.18 in. H_2O

Sample Purge: Initial — Final —

Probe Tip No. 2B Probe Tip Dia. 0.188 in.

V_m=Dry Gas Meter Calibration Factor 0.988 X *42.22/

Dry Gas Meter _____ ft^3 - (T_t ____ min x Leak Rate _____ cfm) = _____

M_F = 701.9 M_T = —

Ru . 3 TIC CE I D D.

Location Scrubber Stack

Date 8-25-92

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O	Orifice ΔH in. H_2O		Pump Vacuum In. Hg Gauge	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp. °F	Dry Gas Temp °F		Remarks
				Desired	Actual						Inlet	Outlet	
O-5	1815	416.276	2.20	1.40	1.40	4.5	168	256	253	59	86	87	
4	1818	418.55	1.80	1.10	1.10	4.0	171	259	249	56	87	87	
3	1821	420.59	2.10	1.30	1.30	4.5	173	259	254	59	87	87	
2	1824	422.76	1.90	1.20	1.20	4.0	170	260	263	59	87	87	
1	1827	424.90	1.10	0.69	0.69	3.0	168	258	264	57	89	87	
END	1830	426.490	—	—	—	—	—	—	—	—	—	—	
E-5	1832	426.490	2.30	1.50	1.50	5.0	169	254	263	59	89	87	
4	1835	428.84	2.40	1.50	1.50	5.0	170	258	264	60	89	87	
3	1838	431.14	2.60	1.60	1.60	5.5	168	255	263	64	87	86	
2	1841	433.52	2.00	1.30	1.30	5.0	169	259	264	64	89	85	
1	1844	435.73	1.50	0.95	0.95	4.0	163	254	265	69	89	85	
END Acc	1847	437.583	—	—	—	—	—	—	—	—	—	—	

revised 4/85

A-30
Run #3
Box #14

Impinger 1	Final Weight 771.4 Initial Weight 552.6 Increase	Water Weight Gain	Impinger #1 228.8	
			Impinger #2 64.5	
Impinger 2	Final Weight 620.0 Initial Weight 555.5 Increase		Impinger #3 9.7	
			Impinger #4 8.9	
Impinger 3	Final Weight 489.8 Initial Weight 480.1 Increase		Impinger #5 _____	
			Impinger #6 _____	
Impinger 4	Final Weight 774.9 Initial Weight 766.0 Increase		Total 311.9 = V_w	
		P_b = _____	$\%CO_2$ = _____	
Impinger 5	Final Weight _____ Initial Weight _____ Increase	V_m = _____	$\%O_2$ = _____	
		V_w = _____	%CO = _____	
Impinger 6	Final Weight _____ Initial Weight _____ Increase	P_m = _____	$\%N_2$ = _____	
		Avg $\triangle P$ = _____	A_s = _____	
		Avg $\sqrt{\triangle P}$ = _____	D_n = _____	
		C_p = _____	T_t = _____	

Filter # H-302 Final Weight _____ P_s = _____ "H_2O _____ "Hg

Initial Weight _____ T_m = _____ °F _____ °R

Increase _____ T_s = _____ °F _____ °R

Moisture Content: %M = _____ M_d = _____ MW_d = _____ MW = _____

$$V_{mstd} = 17.65\ V_m \left[\frac{\frac{P_m}{P_b + 13.6}}{T_m + 460}\right] = 17.65 \times \_\_\_\_ \left[\frac{\_\_\_\_ + 13.6}{\_\_\_\_ + 460}\right] = \_\_\_\_ sft^3$$

$$V_{wgas} = 0.0472 \times V_w = 0.0472 \times \_\_\_\_ = \_\_\_\_ sft^3$$

$$\% \text{ Moisture} = \frac{V_{wgas}}{V_{mstd} + V_{wgas}} \times 100 = \frac{\_\_\_\_}{\_\_\_\_ + \_\_\_\_} \times 100 = \_\_\_\_ \%$$

$$V = 5123.8 \times \_\_\_\_ \times \sqrt{\frac{\_\_\_\_}{\_\_\_\_}} \times \_\_\_\_ = \_\_\_\_ fpm \_\_\_\_ scfm$$

_____ acfm

$$\% = \frac{1039 \times \_\_\_\_ \times \_\_\_\_}{\_\_\_\_ \times \_\_\_\_ \times \_\_\_\_ \times \_\_\_\_ \times (\_\_\_\_)^2} = \_\_\_\_ \%$$

_____ % EA

APPENDIX E

Analytical Data

WESTERN ENVIRONMENTAL
SERVICES & TESTING, INC.

PARTICULATE ANALYSIS

Job No. 92-1138

Name Bross Construction

Source Name Scrubber

Run No 1

Filter No 4-305 Front Wash 400 ml Impinger Catch - Backhalf _____ ml

Final	0.8637	108.4082	
Initial	0.6868	108.2907	
	0.1769 = 176.9	0.1175 = 117.5	
		-2.9 Blank	
		114.6	

MF 291.5 mg MT — mg

Run No 2

Filter No 4-303 Front Wash 450 ml Impinger Catch - Backhalf _____ ml

Final	0.8222	109.8880	
Initial	0.6907	109.7138	
	0.1315 = 131.5	0.1742 = 174.2	
		- 3.3 Blank	
		170.9	

MF 302.4 mg MT — mg

Run No 3

Filter No 4-302 Front Wash 450 ml Impinger Catch - Backhalf _____ ml

Final	0.8283	100.0151	
Initial	0.6813	99.5069	
	0.1970 = 197.0	0.5082 = 508.2	
		- 3.3 Blank	
		504.9	

MF 701.9 mg MT — mg

Acetone Blank:

Volume 150 ml

Final 110.7127
Initial 110.7116
0.0011

Blank: 0.0073 mg/ml

Total Weight 1.1 mg

D.I. Blank:

Volume _____ ml

Final
Initial _____

Blank: _____ mg/ml

Total Weight _____ mg

#1 Run 1

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME: Scrubber Stack

ADDRESS:

CITY: | STATE: | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: | OPERATING MODE:

CONTROL EQUIPMENT: | OPERATING MODE:

DESCRIBE EMISSION POINT: Top of Wet Scrubber Stack

HEIGHT ABOVE GROUND LEVEL: 20' | HEIGHT RELATIVE TO OBSERVER: 15'

DISTANCE FROM OBSERVER: 75' | DIRECTION FROM OBSERVER: North / East

DESCRIBE EMISSIONS: Steam Plume

EMISSION COLOR: White | PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☒ YES ☐ | IS WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: End of Steam trail

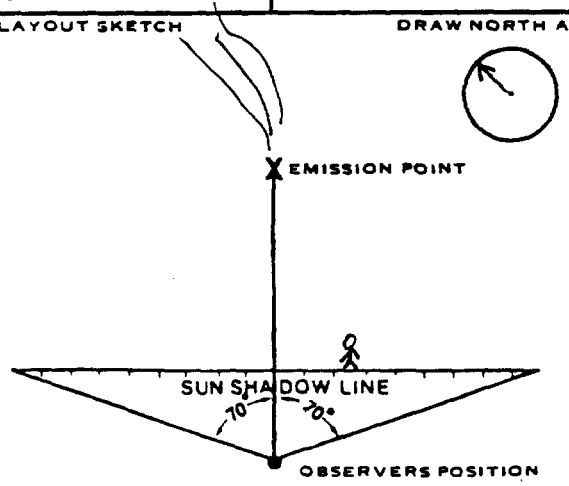
DESCRIBE BACKGROUND: Blue sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Clear

WIND SPEED: 5 mph | WIND DIRECTION: North

AMBIENT TEMPERATURE: 75° | RELATIVE HUMIDITY:

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 9-24-92 | START TIME: 1351 | STOP TIME: 1357

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

BEFORE TEST

AVERAGE OPACITY FOR HIGHEST PERIOD: | NUMBER OF READINGS ABOVE ____ % WERE

RANGE OF OPACITY READINGS: MINIMUM | MAXIMUM

COMMENTS

OBSERVER'S NAME (PRINT)

OBSERVER'S SIGNATURE | DATE

ORGANIZATION

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TITLE | DATE

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VERIFIED BY | DATE

#2 Run 1 VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME

ADDRESS

CITY | STATE | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT | OPERATING MODE

CONTROL EQUIPMENT | OPERATING MODE

DESCRIBE EMISSION POINT: Top of Wet Scrubber

HEIGHT ABOVE GROUND LEVEL: 20' | HEIGHT RELATIVE TO OBSERVER: 15'

DISTANCE FROM OBSERVER: 75' | DIRECTION FROM OBSERVER: NE

DESCRIBE EMISSIONS: Steam Plume

EMISSION COLOR: White | PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]

WATER DROPLETS PRESENT: NO [X] YES [ ] | IS WATER DROPLET PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: End of Steam Trail

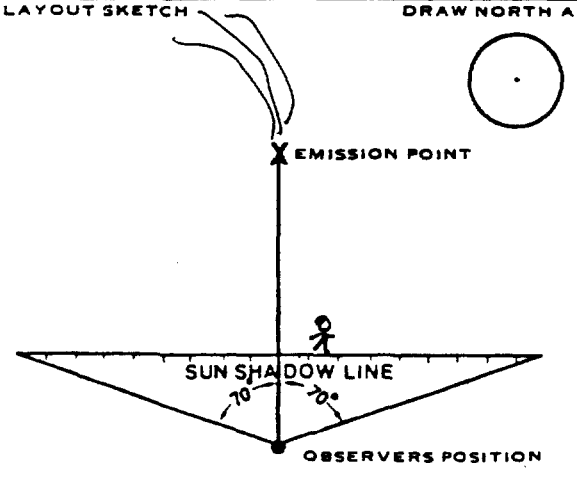
DESCRIBE BACKGROUND: Blue Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Pt. Cloudy

WIND SPEED: 5 mph | WIND DIRECTION: North

AMBIENT TEMPERATURE: 75° | RELATIVE HUMIDITY:

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 8-24-92 | START TIME: 1442 | STOP TIME: 1448

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

AVERAGE OPACITY FOR HIGHEST PERIOD | NUMBER OF READINGS ABOVE ____ % WERE

RANGE OF OPACITY READINGS: MINIMUM ____ MAXIMUM ____

COMMENTS

OBSERVER'S NAME (PRINT)

OBSERVER'S SIGNATURE | DATE

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3 Run 1

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME

ADDRESS

CITY | STATE | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT | OPERATING MODE

CONTROL EQUIPMENT | OPERATING MODE

DESCRIBE EMISSION POINT: Top of Wet Scrubber

HEIGHT ABOVE GROUND LEVEL: 20' | HEIGHT RELATIVE TO OBSERVER: 15'

DISTANCE FROM OBSERVER: 75' | DIRECTION FROM OBSERVER: NE

DESCRIBE EMISSIONS: Steam Plume

EMISSION COLOR: White | PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]

WATER DROPLETS PRESENT: NO [X] YES [ ] | IS WATER DROPLET PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: End of Plume

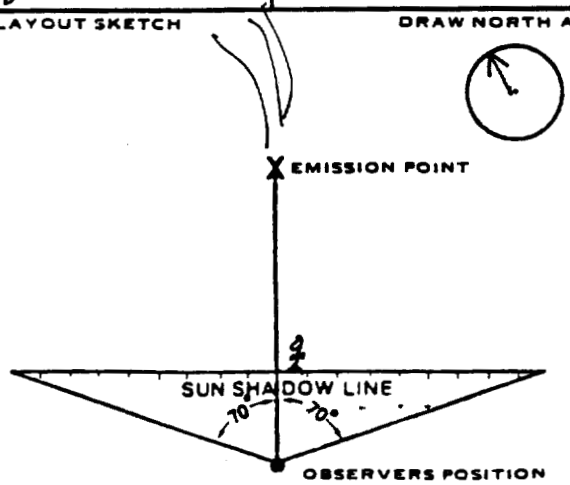
DESCRIBE BACKGROUND: Blue Sky

BACKGROUND COLOR: Blue | SKY CONDITIONS: Clear

WIND SPEED: 5 mph | WIND DIRECTION: N

AMBIENT TEMPERATURE: 80° | RELATIVE HUMIDITY:

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 7-24-92 | START TIME: 1554 | STOP TIME: 1600

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

AVERAGE OPACITY FOR HIGHEST PERIOD | NUMBER OF READINGS ABOVE ____ % WERE

COMMENTS

RANGE OF OPACITY READINGS: MINIMUM ____ MAXIMUM ____

OBSERVER'S NAME (PRINT)

OBSERVER'S SIGNATURE | DATE

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VERIFIED BY | DATE

E1 Run 2

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME

ADDRESS

CITY | STATE | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT | OPERATING MODE

CONTROL EQUIPMENT | OPERATING MODE

DESCRIBE EMISSION POINT: Top of Scrubber Stack

HEIGHT ABOVE GROUND LEVEL: 20'

HEIGHT RELATIVE TO OBSERVER: 15'

DISTANCE FROM OBSERVER: 75'

DIRECTION FROM OBSERVER: East

DESCRIBE EMISSIONS: Steam Plume

EMISSION COLOR: White

PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☒ YES ☐

IS WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: End of Plume

DESCRIBE BACKGROUND: Partly Cloudy

BACKGROUND COLOR: Blue/Grey

SKY CONDITIONS: Prt. Cloudy

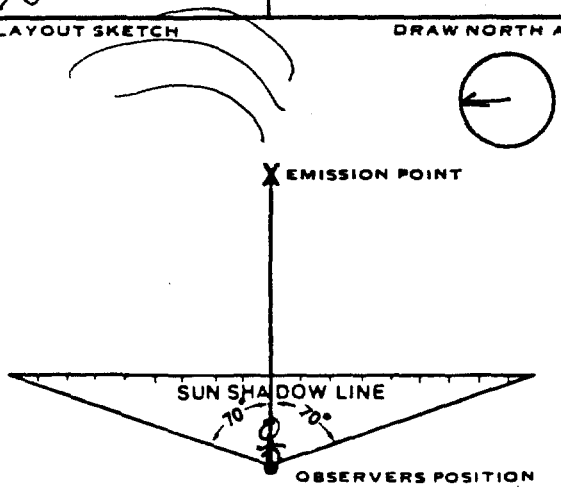
WIND SPEED: 5 mph

WIND DIRECTION: N

AMBIENT TEMPERATURE: 70°

RELATIVE HUMIDITY:

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVATION DATE: 8-24-92

START TIME: 1714

STOP TIME: 1720

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

AVERAGE OPACITY FOR HIGHEST PERIOD

NUMBER OF READINGS ABOVE ____ % WERE

RANGE OF OPACITY READINGS: MINIMUM ____ MAXIMUM ____

COMMENTS

OBSERVER'S NAME (PRINT)

OBSERVER'S SIGNATURE | DATE

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CERTIFIED BY | DATE

TITLE | DATE

VERIFIED BY | DATE

APPENDIX F

Plant Operational Data

OPERATIONAL LOG FOR ASPHALT PLANT SOURCE EMISSIONS TEST

TIME	AGG. TPH	AGG. % MOISTURE	REC. TPH	REC. % MOISTURE	FIL. TPH	ASPHALT TPH	TOTAL TPH	MIX TEMP °F	VENTURI PRESSURE DROP	WATER PRESSURE	HIGH STACK TEMP.	FAN RPM	FUEL PRESSURE
1:00	201	3.5%				13.22	213	285°	.09			1800	30 psi
1:15	200					13.17	213	290°	.09				
1:30	261					13.25	214	285°	.09				
1:45	206					13.65	220	290°	.09				
2:00	197					13.05	210	290°	.08				
2:15	207					13.71	220	295	.06				
2:30	208					13.85	220	290	.06				
2:45	207					13.75	220	295	.07				
3:00	205					13.64	219	300	.06				
3:15	158					10.00	165	300	.06				
3:30	193					12.62	203	280	.06				
3:45	202					13.40	218	290	.06				
END RUN 1													
5:30	186					12.34	197	300	.10				
5:45	187					11.87	199	300	.11				
6:00	186					11.75	198	300	.08				
6:15	182					11.89	199	295	.06				
6:30	186					11.79	198	295	.09				
6:45	185					11.80	197	280	.11				

Run 1

Run 2

Burner Fuel Type: _____

Recorded By: _____

C ATIC LO OR A...ALT ...HT ...CE ...SSIO... TEST

TIME	AGG. TPH	AGG. % MOISTURE	REC. TPH	REC. % MOISTURE	FIL. TPH	ASPHALT TPH	TOTAL TPH	MIX TEMP °F	VENTURI PRESSURE DROP	WATER PRESSURE	HIGH STACK TEMP.	FAN RPM	FUEL PRESSURE
5:30	114	7.1%				8.25	150	290	.11	60 PSI		1600	30 PSI
5:45	177.4	7.1%				13.00	190	285	.09	60 PSI		1600	30 PSI
6:00	179					13.25	191	290	.09				
6:15	187					13.29	200	285	.10				
6:30	178					12.6	190	290	.09				
6:40	177					12.55	189	285	.09				
TOO													

Burner Fuel Type: _____

Recorded By: _____

APPENDIX G

Chain of Custody
and
Analyses Request

WESTERN ENVIRONMENTAL SERVICES AND TESTING, INC.

Chain of Custody and Analysis Request

Job Number 92-1138 Date(s) Sampled 8-24&25-92

Job Name Chester Bross Construction Number of Runs 3

Source Location Plattsburg, MO

Unit Tested Scrubber

Absorbing Solution/Analysis For

Run	Filter Number	Imp 1	Imp 2	Imp 3	Imp 4	Probe Wash
1	4-305	D.I. / Moist	D.I. / Moist.	Dry / Moist.	Silicagel / Moist.	Acetone / Particulate
2	4-303	"	"	"	"	"
3	4-302	"	"	"	"	"
4						

No_x: _____

Other _____

Total Number of Sample Bottles: 7

Total Number of Filters: 3

Comments: _____

Person Responsible for Samples: Joe K. Hunter

Sample No.	Recovered by	Date	Time	Location
1	Joe K. Hunter	8-24-92	1600	On site
2	Joe K. Hunter	8-24-92	1900	On site
3	Joe K. Hunter	8-25-92	1900	On site
4				

Samples Received By Joe K. Hunter for transport Date: 8-25-92 Time: 2000

Samples Received at Lab by Alan D. Kaylance Date: 9-8-92 Time: 0800

Samples Analyzed by Alan D. Kaylance Date: 9-16-92 Time: —

4/85

APPENDIX H

Resumes of Test Personnel

ALAN D. ROYLANCE

CURRENT: 04/18/86 to present	Manager of Operations, Western Environmental Services and Testing, Inc., Casper, WY, and Evanston, WY; an environmental monitoring and consulting firm.
PROFESSIONAL: 10/24/86 to 04/17/86	Air Quality Supervisor, Western Environmental Services Western Environmental Services and Testing, Inc.
03/04/85 to 10/23/86	Laboratory Supervisor, Western Environmental Services and Testing, Inc.
06/08/84 to 03/03/85	Field Testing Supervisor, Western Environmental Services and Testing, Inc.
02/01/83 to 06/07/84	Senior Technician, Western Environmental Services and Testing, Inc.
10/01/78 to 06/07/81	Surveyor, Pioneer Nuclear, Inc., Casper, WY; a uranium exploration firm
EDUCATION:	Bachelor of Science in Wildlife Science - Utah State University, Logan, UT, 1977
TECHNICAL EXPERIENCE:	Assisted in over 700 source emission surveys in the western and southwestern United States; assisted in the set up and maintenance of over 30 ambient air networks.
CERTIFICATIONS:	Visible Emissions Evaluator
PROFESSIONAL MEMBERSHIPS:	Air and Waste Management Association Society of Mining Engineers of A.I.M.E.

J. SCOTT MORTIMER

CURRENT: 02/92 to Present	Field Testing Supervisor, Western Environmental Services and Testing, Inc., Casper, WY, and Evanston, WY, an environmental monitoring and consulting firm.
05/87 to 02/92	Technician, Western Environmental Services and Testing, Inc.
EDUCATION	Graduate of Natrona County High School, Casper, WY (1985). Casper College, Associates of Applied Science Degree in Business Administration, May 1987
TECHNICAL EXPERIENCE	Assisted in over 50 source emissions surveys; run various methods for soil and water analysis in the laboratory.

JOSEPH K. HUNTER

CURRENT: 1/92 to present	Region Supervisor, Western Environmental Services and Testing, Inc., Austin, Texas; an environmental monitoring and consulting firm.
1/91 to 1/92	Technician, Western Environmental Services and Testing, Inc., Casper, Wyoming, Evanston, Wyoming, and Austin, Texas.
EDUCATION:	University of Wyoming, B.S. Secondary Education, Laramie, Wyoming; December 1990
TECHNICAL EXPERIENCE:	Assisted in over 50 source emissions surveys in the western and southwestern United States.
CERTIFICATIONS:	Texas Visible Emission Evaluator Course