RAMCON
ENVIRONMENTAL CORPORATION

Source Sampling for
Particulate Emissions

CMI Drum-Mix Baghouse
Permit No. 0487-012

N.B. WEST CONTRACTING COMPANY
BRENTWOOD, MISSOURI
September 21, 1993

Larry West
N.B. West Contracting Company

William Joseph Sewell, II
Vice President
RAMCON Environmental Corporation

RAMCON BUILDING, 6707 FLETCHER CREEK COVE, MEMPHIS, TENNESSEE 38133
TELEPHONE 800/458-4567 IN TENNESSEE 901/387-0500 FAX 901/387-0400

RAMCON

ENVIRONMENTAL CORPORATION

August 26, 1993

Mr. Larry West
N.B. West Contractors, Inc.
2780 Mary Avenue
Brentwood, MO 63144
314/962-3145

Dear Mr. West:

Confirming our telephone conversation, we will reschedule the stack test at your facility located in Brentwood, Missouri. We will now test on September 14, 1993.

Again, should anything come up to alter this schedule, please let me know. We look forward to working with you.

Sincerely,

G. Sumner Buck, III
President

GSBIII:djb

cc: Mr. Peter Ironwood
Missouri DNR - Air Quality
P.O. Box 176
Jefferson City, MO 65102
314/751-4817

RAMCON BUILDING, 6707 FLETCHER CREEK COVE, MEMPHIS, TENNESSEE 38133
TELEPHONE 800/458-4567 IN TENNESSEE 901/387-0500 FAX 901/387-0400

N.B. WEST CONTRACTING COMPANY

ASPHALT PAVING CONTRACTORS
COMMERCIAL • RESIDENTIAL • INDUSTRIAL
ASPHALTIC CONCRETE • HOT SEAL • SLURRY SEAL

2780 Mary Avenue — Saint Louis, MO 63144-2796

(314) 962-3145
FAX (314) 962-8650

Serial #'s

August 20, 1993

Missouri DNR - Air Quality
P. O. box 176
Jefferson City, Missouri 65102

Attention: Mr. Peter Yronwode

Re: Stack test on
new bag house
Permit #0487-012

Dear Mr. Yronwode,

I apologize for the inconvience I may have caused you by postponing the stack test again but the current situation is out of my control.

The only job I have to run the stack test is for the Highway Department. The river sand required for the Mix Design has been unavailable for the last six weeks due to the flooding. As soon as I can obtain the sand I will notify Ramcon to set up a new date.

Again I apologize for the inconvenience.

Sincerely,

N. B. WEST CONTRACTING CO., INC.

Larry West

Larry West
Vice President

LW/df

CC: Ramcon

RAMCON

ENVIRONMENTAL CORPORATION

August 16, 1993

Mr. Larry West
N.B. West Contractors, Inc.
2780 Mary Avenue
Brentwood, MO 63144
314/962-3145

Dear Mr. West:

Confirming our telephone conversation, we will postpone the stack test which was scheduled for August 16, 1993 at your facility located in Brentwood, Missouri. We will confirm a new test date at a later time.

We look forward to working with you.

Sincerely,

G. Sumner Buck, III
President

GSBIII:djb

cc: Mr. Peter Ironwood
Missouri DNR - Air Quality
P.O. Box 176
Jefferson City, MO 65102
314/751-4817

RAMCON
ENVIRONMENTAL CORPORATION

July 15, 1993

Mr. Larry West
N.B. West Contractors, Inc.
2780 Mary Avenue
Brentwood, MO 63144
314/962-3145

Dear Mr. West:

Confirming our conversation, weather permitting, RAMCON Environmental Corporation will reschedule the particulate emissions test to be conducted at your facility located in Brentwood, Missouri. The test will now be conducted on August 17, 1993, with August 18, 1993 as a backup date.

Should anything come up to alter this schedule, please contact me and I will notify all parties involved. We look forward to working with you.

Sincerely,

G. Sumner Buck, III
President

GSBIII:djb
Enclosures

cc: Mr. Peter Ironwood
Missouri DNR - Air Quality
P.O. Box 176
Jefferson City, MO 65102
314/751-4817

RAMCON

ENVIRONMENTAL CORPORATION

July 13, 1993

Mr. Larry West
N.B. West Contractors, Inc.
2780 Mary Avenue
Brentwood, MO 63144
314/962-3145

Dear Mr. West:

Confirming our conversation, weather permitting, RAMCON Environmental Corporation will reschedule the particulate emissions test to be conducted at your facility located in Brentwood, Missouri. The test will now be conducted on July 22, 1993, with July 23, 1993 as a backup date.

Should anything come up to alter this schedule, please contact me and I will notify all parties involved. We look forward to working with you.

Sincerely,

G. Sumner Buck, III
President

GSBIII:djb
Enclosures

cc: Mr. Doug Elley
Missouri DNR - Air Quality
P.O. Box 176
Jefferson City, MO 65102
314/751-4817

RAMCON BUILDING, 6707 FLETCHER CREEK COVE, MEMPHIS, TENNESSEE 38133
TELEPHONE 800/458-4567 IN TENNESSEE 901/387-0500 FAX 901/387-0400

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MEMORANDUM

DATE: October 15, 1993

TO: Jefferson County File, SLRO

FROM: Peter Yronwode

SUBJECT: N. B. West asphalt plant test
Permit # 0487-012

RAMCON tested this facility on September 21, 1993 near House Springs. Emissions averaged 0.0103 gr/DSCF and opacity was reported to be less than 5%. The plant was found at the time of the test to be in compliance with permit # 0487-012 and Federal NSPS standards of 0.040 gr/DSCF and 20% opacity. Production rate during testing averaged 209.7 tons/hour. The maximum production rate permitted at this facility is set by permit at 209 T/hr. Baghouse pressure drop during the test ranged from 3 to 6 inches of water. No more than 100,000 tons of aggregate may be processed at this facility annually.

STATE OF MISSOURI Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

October 15, 1993

Re: permit # 0487-012

Mr. Larry West
N. B. West Contracting Company
2780 Mary Avenue
St. Louis, MO 63144

Dear Mr. West:

My staff has reviewed the report of testing conducted by RAMCON Environmental on the CMI drum-mix asphalt plant (8828 ADM) located at your facility near House Springs on September 21, 1993. Particulate emissions, controlled by baghouse RA2205 #102, averaged 0.0103 grains per dry standard cubic foot (gr/DSCF) over three runs, and opacity never exceeded 5%. This emission level meets the limits of 0.04 gr/DSCF and <20% opacity established by New Source Performance Standards (NSPS), Subpart I (40 CFR 60.90) and your permit, #0487-012.

Average production during the test was 209.7 tons/hour, within 10% of the maximum level of 209 TPH set by your permit. No more than 100,000 tons of aggregate shall be handled annually at this facility. Pressure drop across the baghouse ranged from 2 to 6 inches of water. A comparable level of control device function must be maintained during operations.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Steven Feeler
Acting Chief of Enforcement

SF:py

c: DNR St. Louis regional office

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MEMORANDUM

DATE: October 15, 1993

TO: Jefferson County File, SLRO

FROM: Peter Yronwode P.Y.

SUBJECT: N. B. West asphalt plant test
Permit # 0487-012

RAMCON tested this facility on September 21, 1993 near House Springs. Emissions averaged 0.0103 gr/DSCF and opacity was reported to be less than 5%. The plant was found at the time of the test to be in compliance with permit # 0487-012 and Federal NSPS standards of 0.040 gr/DSCF and 20% opacity. Production rate during testing averaged 209.7 tons/hour. The maximum production rate permitted at this facility is set by permit at 209 T/hr. Baghouse pressure drop during the test ranged from 3 to 6 inches of water. No more than 100,000 tons of aggregate may be processed at this facility annually.

RAMCON

ENVIRONMENTAL CORPORATION

September 30, 1993

Mr. Larry West
N.B. West Contracting Company
2780 Mary Avenue
Saint Louis, Missouri 63144

RE: Particulate Emissions Test: September 21, 1993

Dear Mr. West:

Enclosed you will find four (4) copies of our report on the particulate emissions test we conducted pursuant to permit no. 0487-012 at your asphalt plant located in Brentwood, Missouri. Based on our test results, the average grain loading of the three test runs do pass the standards set by the State of Missouri. Therefore, the plant is operating in compliance with State standards.

You will want to sign the report covers and send two copies to:

Mr. Doug Elley
Missouri Department of Natural Resources
Division of Environmental Quality
P. O. Box 176
Jefferson City, Missouri 65102

You will need to keep one copy of the report at the plant.

We certainly have enjoyed working with you. Please let us know if we can be of further assistance.

Sincerely,

William Joseph Sewell, II
Vice President

WJSii:wpc
Enclosures

RAMCON BUILDING, 6707 FLETCHER CREEK COVE, MEMPHIS, TENNESSEE 38133
TELEPHONE 800/458-4567 IN TENNESSEE 901/387-0500 FAX 901/387-0400

TABLE OF CONTENTS

SECTION A:
1. INTRODUCTION
2. TEST RESULTS
3. TEST PROCEDURES

SECTION B:
THE SOURCE

SECTION C:
EQUIPMENT USED

SECTION D:
LABORATORY PROCEDURES AND RESULTS

SECTION E:
CALCULATIONS

SECTION F:
FIELD DATA

SECTION G:
CALIBRATIONS

SECTION H:
RAMCON PERSONNEL

SECTION I:
VISIBLE EMISSIONS

SECTION A:

1. INTRODUCTION
2. TEST RESULTS
3. TEST PROCEDURES

PLANT NAME:N. B. West TEST UNIT:CMI drum-mix asphalt plant
LOCATION: House Spring, MO DATE: 9/21/93 RUN NO: 1

USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK

NUMBER OF POINTS	30	PERCENT OXYGEN	14.20
TIME, MINUTE/POINT	2.00	PERCENT CARBON DIOXIDE	4.50
LEAK RATE, FT3/MIN	0.011	PERCENT CARBON MONOXIDE	0.00
BAR PRESS, INCH Hg	30.10	Cp (PITOT COEFFICIENT)	0.840
STATIC PRESS (in H2O)	0.01	NOZZLE DIAMETER, INCHES	0.300
STACK EXIT LENGTH IN	52.00	INITIAL METER VOL, FT3	188.100
STACK EXIT WIDTH IN	39.00	FINAL METER VOL, FT3	238.565
IMPINGER H2O, ML	270.0	METER CORR FACT, Y	0.979
SILICA GEL H2O, GM	8.2	PARTIC COLLECTED, MG	26.20

PT NO	STACK TEMP (Ts)	VELOC PRESS (dPs)	ORIFICE PRESS (dH)	METER TEMP INLET (Tmi	METER TEMP OUTLET (Tmo)	STACK VEL ft/sec	"K" "FACTOR" dPs/dH	SQR RO VELOC
1	260	0.40	1.9	69	69	42.8	4.75	0.632
2	260	0.32	1.5	69	69	38.3	4.69	0.566
3	260	0.32	1.5	70	69	38.3	4.69	0.566
4	260	0.25	1.2	70	69	33.8	4.80	0.500
5	258	0.25	1.2	70	69	33.8	4.80	0.500
6	255	0.45	2.2	70	69	45.3	4.89	0.671
7	255	0.25	1.2	73	69	33.7	4.80	0.500
8	255	0.25	1.2	73	69	33.7	4.80	0.500
9	255	0.30	1.4	73	69	36.9	4.67	0.548
10	255	0.43	2.0	74	69	44.2	4.65	0.656
11	255	0.43	2.0	74	69	44.2	4.65	0.656
12	255	0.40	1.9	74	69	42.7	4.75	0.632
13	255	0.45	2.2	72	69	45.3	4.89	0.671
14	260	0.40	1.9	75	72	42.8	4.75	0.632
15	260	0.50	2.4	75	72	47.9	4.80	0.707
16	260	0.50	2.4	77	74	47.9	4.80	0.707
17	259	0.60	2.9	78	75	52.4	4.83	0.775
18	258	0.65	3.1	81	74	54.5	4.77	0.806
19	259	0.50	2.4	81	74	47.8	4.80	0.707
20	257	0.90	4.3	83	75	64.1	4.78	0.949
21	257	0.75	3.6	86	76	58.5	4.80	0.866
22	257	0.75	3.6	86	76	58.5	4.80	0.866
23	257	0.75	3.6	88	76	58.5	4.80	0.866
24	257	0.63	3.0	88	76	53.6	4.76	0.794
25	258	0.51	2.4	88	75	48.3	4.71	0.714
26	258	0.51	2.4	88	75	48.3	4.71	0.714
27	258	0.98	4.7	90	81	66.9	4.80	0.990
28	261	0.90	4.3	92	78	64.3	4.78	0.949
29	260	0.90	4.3	92	78	64.2	4.78	0.949
30	259	0.90	4.3	92	78	64.2	4.78	0.949
AVG	257.8	0.538	2.57	79.0	72.7	48.52		0.7179

STACK GAS MOL WT. WET	26.92	AVG ABS STACK TEMP (deg R)	717.8
STACK VELOCITY (ft/sec)	48.52	AVG ABS METER TEMP (deg R)	535.9
STD VOL SAMPLED (std ft2)	49.26	METER LEAK RATE (ft3/min)	0.000
AVG METER TEMP (deg F)	75.88	SAMPLE VOL LK CORR'D (ft3)	50.47
PERCENT MOISTURE (%)	21.00	AVG ABS STACK PRESS (in Hg)	30.10
STD STACK FLOW RATE (DSCFM)	23970.41	VOL H20 IN METER GAS (std ft3)	13.10
		H20 IN GAS STREAM (vol frac)	0.210
ISOKINETIC VARIATION (%)	98.22	NOZZLE AREA (ft2)	0.00049
PARTIC EMISSION RATE (lb/hr)	1.6864	STACK AREA (ft2)	14.083
PARTICULATE CONC (gr/DSCF)	0.008208	STACK EQUIV DIAMETER (in)	44.57

AV, 0103

PLANT NAME:N. B. West TEST UNIT:CMI drum-mix asphalt plant
LOCATION: House Spring, MO DATE: 9/21/93 RUN NO: 2

USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK

NUMBER OF POINTS	30	PERCENT OXYGEN	13.90
TIME, MINUTE/POINT	2.00	PERCENT CARBON DIOXIDE	4.00
LEAK RATE, FT3/MIN	0.000	PERCENT CARBON MONOXIDE	0.00
BAR PRESS, INCH Hg	30.10	Cp (PITOT COEFFICIENT)	0.840
STATIC PRESS (in H2O)	0.01	NOZZLE DIAMETER, INCHES	0.300
STACK EXIT LENGTH IN	52.00	INITIAL METER VOL, FT3	239.100
STACK EXIT WIDTH IN	39.00	FINAL METER VOL, FT3	293.782
IMPINGER H2O, ML	310.0	METER CORR FACT, Y	0.979
SILICA GEL H2O, GM	7.7	PARTIC COLLECTED, MG	29.50

PT NO	STACK TEMP (Ts)	VELOC PRESS (dPs)	ORIFICE PRESS (dH)	METER TEMP INLET (Tmi	METER TEMP OUTLET (Tmo)	STACK VEL ft/sec	"K" "FACTOR" dPs/dH	SQR RO VELOC
1	256	0.51	2.4	77	77	48.4	4.71	0.714
2	256	0.45	2.2	77	77	45.4	4.89	0.671
3	260	0.50	2.4	79	77	48.0	4.80	0.707
4	260	0.40	1.9	80	77	43.0	4.75	0.632
5	261	0.54	2.6	81	77	50.0	4.81	0.735
6	261	0.42	2.0	83	77	44.1	4.76	0.648
7	257	0.43	2.2	82	77	44.5	5.12	0.656
8	257	0.55	2.6	82	77	50.3	4.73	0.742
9	257	0.60	2.9	83	77	52.5	4.83	0.775
10	261	0.52	2.5	83	77	49.0	4.81	0.721
11	261	0.50	2.4	84	77	48.1	4.80	0.707
12	261	0.75	3.6	84	77	58.9	4.80	0.866
13	260	0.77	3.7	83	77	59.6	4.81	0.877
14	260	0.64	3.1	86	78	54.3	4.84	0.800
15	260	0.50	2.4	86	78	48.0	4.80	0.707
16	260	0.50	2.4	87	78	48.0	4.80	0.707
17	260	0.55	2.6	88	79	50.4	4.73	0.742
18	261	0.60	2.9	88	78	52.7	4.83	0.775
19	261	0.85	4.1	88	78	62.7	4.82	0.922
20	261	0.85	4.1	88	78	62.7	4.82	0.922
21	260	0.85	4.1	88	78	62.6	4.82	0.922
22	259	0.75	3.6	88	78	58.8	4.80	0.866
23	259	0.65	3.1	90	80	54.7	4.77	0.806
24	259	0.50	2.4	90	80	48.0	4.80	0.707
25	259	0.60	2.9	90	80	52.6	4.83	0.775
26	261	0.60	2.9	90	80	52.7	4.83	0.775
27	261	0.60	2.9	90	80	52.7	4.83	0.775
28	261	0.65	3.1	90	80	54.8	4.77	0.806
29	259	0.65	3.1	90	80	54.7	4.77	0.806
30	259	0.65	3.1	90	80	54.7	4.77	0.806
AVG	259.6	0.598	2.87	85.5	78.1	52.23		0.7690

STACK GAS MOL WT. WET	26.73	AVG ABS STACK TEMP (deg R)	719.6
STACK VELOCITY (ft/sec)	52.23	AVG ABS METER TEMP (deg R)	541.8
STD VOL SAMPLED (std ft2)	52.83	METER LEAK RATE (ft3/min)	0.000
AVG METER TEMP (deg F)	81.82	SAMPLE VOL LK CORR'D (ft3)	54.68
PERCENT MOISTURE (%)	22.06	AVG ABS STACK PRESS (in Hg)	30.10
STD STACK FLOW RATE (DSCFM)	25389.89	VOL H20 IN METER GAS (std ft3)	14.95
		H20 IN GAS STREAM (vol frac)	0.221
ISOKINETIC VARIATION (%)	99.45	NOZZLE AREA (ft2)	0.00049
PARTIC EMISSION RATE (lb/hr)	1.8754	STACK AREA (ft2)	14.083
PARTICULATE CONC (gr/DSCF)	0.008617	STACK EQUIV DIAMETER (in)	44.57

PLANT NAME:N. B. West TEST UNIT:CMI drum-mix asphalt plant
LOCATION: House Spring, MO DATE: 9/21/93 RUN NO: 3

PLANT NAME:N. B. West TEST UNIT:CMI drum-mix asphalt plant
LOCATION: House Spring, MO DATE: 9/21/93 RUN NO: 3

USE FOR ANY TEST WITH A SQUARE OR RECTANGULAR STACK

NUMBER OF POINTS	30	PERCENT OXYGEN	13.00
TIME, MINUTE/POINT	2.00	PERCENT CARBON DIOXIDE	3.70
LEAK RATE, FT3/MIN	0.001	PERCENT CARBON MONOXIDE	0.00
BAR PRESS, INCH Hg	30.10	Cp (PITOT COEFFICIENT)	0.840
STATIC PRESS (in H2O)	0.01	NOZZLE DIAMETER, INCHES	0.300
STACK EXIT LENGTH IN	52.00	INITIAL METER VOL, FT3	294.200
STACK EXIT WIDTH IN	39.00	FINAL METER VOL, FT3	350.486
IMPINGER H20, ML	325.0	METER CORR FACT, Y	0.979
SILICA GEL H20, GM	6.4	PARTIC COLLECTED, MG	49.50

PT NO	STACK TEMP (Ts)	VELOC PRESS (dPs)	ORIFICE PRESS (dH)	METER TEMP INLET (Tmi	METER TEMP OUTLET (Tmo)	STACK VEL ft/sec	"K" "FACTOR" dPs/dH	SQR ROOT VELOC PRESS
1	261	0.82	3.9	78	78	61.7	4.76	0.906
2	261	0.63	3.0	78	78	54.1	4.76	0.794
3	260	0.80	3.8	79	77	60.9	4.75	0.894
4	260	0.80	3.8	79	77	60.9	4.75	0.894
5	261	0.80	3.8	83	78	60.9	4.75	0.894
6	261	0.75	3.6	83	78	59.0	4.80	0.866
7	265	0.80	3.8	84	78	61.1	4.75	0.894
8	261	0.75	3.6	85	78	59.0	4.80	0.866
9	261	0.65	3.1	85	78	54.9	4.77	0.806
10	260	0.65	3.1	87	78	54.9	4.77	0.806
11	265	0.65	3.1	89	80	55.1	4.77	0.806
12	265	0.65	3.1	89	80	55.1	4.77	0.806
13	265	0.75	3.6	89	80	59.1	4.80	0.866
14	264	0.55	2.6	90	80	50.6	4.73	0.742
15	264	0.55	2.6	90	80	50.6	4.73	0.742
16	264	0.50	2.4	90	80	48.3	4.80	0.707
17	263	0.50	2.4	90	80	48.2	4.80	0.707
18	263	0.60	2.9	90	80	52.8	4.83	0.775
19	264	0.64	3.1	90	80	54.6	4.84	0.800
20	265	0.60	2.9	93	80	52.9	4.83	0.775
21	265	0.50	2.4	93	83	48.3	4.80	0.707
22	265	0.50	2.4	93	83	48.3	4.80	0.707
23	265	0.50	2.4	93	83	48.3	4.80	0.707
24	265	0.50	2.4	93	83	48.3	4.80	0.707
25	261	0.40	1.9	88	84	43.1	4.75	0.632
26	260	0.50	2.4	90	84	48.1	4.80	0.707
27	260	0.50	2.4	90	84	48.1	4.80	0.707
28	260	0.50	2.4	90	84	48.1	4.80	0.707
29	260	0.35	1.7	90	84	40.3	4.86	0.592
30	260	0.35	1.7	90	84	40.3	4.86	0.592
AVG	262.5	0.601	2.88	87.7	80.5	52.53		0.7704

STACK GAS MOL WT. WET	26.63	AVG ABS STACK TEMP (deg R)	722.5
STACK VELOCITY (ft/sec)	52.53	AVG ABS METER TEMP (deg R)	544.1
STD VOL SAMPLED (std ft2)	54.15	METER LEAK RATE (ft3/min)	0.000
AVG METER TEMP (deg F)	84.08	SAMPLE VOL LK CORR'D (ft3)	56.29
PERCENT MOISTURE (%)	22.36	AVG ABS STACK PRESS (in Hg)	30.10
STD STACK FLOW RATE (DSCFM)	25335.09	VOL H20 IN METER GAS (std ft3)	15.60
		H20 IN GAS STREAM (vol frac)	0.224
ISOKINETIC VARIATION (%)	102.16	NOZZLE AREA (ft2)	0.00049
PARTIC EMISSION RATE (lb/hr)	3.0632	STACK AREA (ft2)	14.083
PARTICULATE CONC (gr/DSCF)	0.014106	STACK EQUIV DIAMETER (in)	44.57
FUEL F FACTOR DRY (Fd)			
POUNDS PER MILLION BTU	0		

NB west Production rate	
	206
	210
	212
	215
	212
	214
	214
	216
	218
	212
	212
	210
	210
	210
	207
	205
	210
	214
	210
	212
	194
	205
	195
Avg	209.6957

SECTION A.

1. INTRODUCTION

On September 21, 1993 personnel from RAMCON Environmental Corporation conducted a source emissions test pursuant to permit no. 0487-012 for particulate emissions compliance at N.B. West Contracting Company's CMI drum-mix asphalt plant located in Brentwood, Missouri. RAMCON personnel conducting the test were Allen Turner, Team Leader, Clint Daniels and Earl Crook. Tommy South was responsible for the laboratory analysis including taring the beakers and filters and recording final data in the laboratory record books. Custody of the samples was limited to Mr. Turner and Mr. South.

The purpose of the test was to determine if the rate of particulate emissions from this plant's baghouse is below or equal to the allowable emissions limit set by US EPA and the State of Missouri.

2. TEST RESULTS

Table I summarizes the test results. The grain loading limitation for EPA is .04 gr/dscf as specified in 39 FR 9314, March 8, 1974, 60.92 Standards for Particulate Matter (1), as amended. The allowable emissions for the State of Missouri are the same as those set by EPA.

Mr. Peter Yronwode of Missouri's Department of Natural Resources, Division of Environmental Quality, observed the testing conducted by RAMCON Environmental Corporation. Earl Crook of RAMCON Environmental conducted the opacity test which ranged from zero (0) to five (5) percent on all three (3) runs and therefore meets N.S.P.S. requirements.

SUMMARY OF TEST RESULTS

TABLE I

September 21, 1993

Test Run	Time	Actual Emissions gr/dscf	Emissions lbs/hr	Isokinetic Variation %
1	06:33 - 08:02	0.0082	1.69	98.0
2	08:40 - 09:47	0.0086	1.88	99.1
3	10:39 - 12:00	0.0141	3.06	102.3
Avg:		0.0103	2.21	

On the basis of these test results, the average grain loading of the three test runs is below the .04 gr/DSCF allowable emissions limitation set by EPA and the State of Missouri. Therefore, the plant is operating in compliance with State standards.

3. TEST PROCEDURES

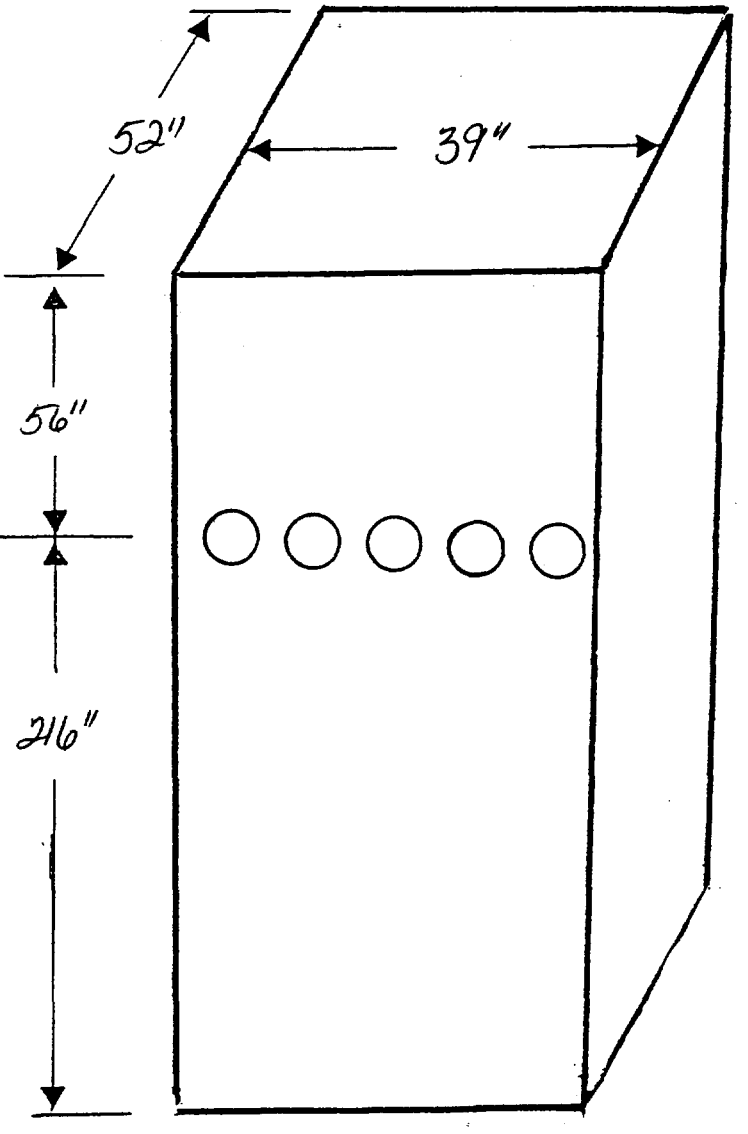
(a) Method Used: Method 5 source sampling was conducted in accordance with requirements of the U.S. Environmental Protection Agency as set forth in 39 FR 9314, March 8, 1974, 60.93, as amended.

(b) Problems Encountered: No problems were encountered that affected testing.

(c) Sampling Site: The emissions test was conducted after a baghouse on a rectangular stack measuring 52" x 39" with an equivalent diameter of 44.6". Five (5) sampling ports were placed 56" down (1.3 diameters upstream) from the top of the stack and 216" up (4.8 diameters downstream) from the last flow disturbance. The ports were evenly spaced on 7.8" centers. The two outside ports are 3.9" from the side walls of the stack. Thirty (30) points were sampled, six (6) through each port for two (2) minutes each for a total testing time of sixty (60) minutes.

Points on a Diameter	Probe Mark
1	10.3"
2	18.9"
3	27.5"
4	30.1"
5	44.7"
6	53.3"

* Measurements include a 6" standoff.



SECTION B:

THE SOURCE

THE SOURCE

N.B. West Contracting Company employs a CMI drum-mix asphalt plant which is used to manufacture hot mix asphalt for road pavement. The process consists of blending prescribed portions of cold feed materials (sand, gravel, screenings, chips, etc.) uniformly and adding sufficient hot asphalt oil to bind the mixture together. After the hot asphalt mix is manufactured at the plant, it is transported to the location where it is to be applied. The hot asphalt mix is spread evenly over the surface with a paver then compacted with a heavy roller to produce the final product.

The following is a general description of the plant's manufacturing process: The cold feed materials (aggregate) are dumped into separate bins which in turn feed a common continuous conveyor. The aggregate is dispensed from the bins in accordance with the desired formulation onto the cold feed system conveyor, to an inclined weigh conveyor, then to a rotating drum for continuous mixing and drying at approximately 300°F. When recycled asphalt mix is used, it is added halfway down the drum through a separate conveyor. The required amount of hot asphalt oil is then injected onto and mixed into the dried aggregate. The now newly formed hot asphalt mix is pulled to the top of a storage silo by a conveyor. The hot asphalt mix is then discharged from the storage silo through a slide gate into waiting dump trucks which transports the material to a final destination for spreading. The rated capacity of the plant will vary with each aggregate mix and moisture content with a 5% surface moisture removal.

The drum mixer uses a burner fired with no. 2 diesel to heat air to dry the aggregate, and the motion of the rotating drum to blend the aggregate. The air is drawn into the system via an exhaust fan. After passing through the gas burner and the mixing drum, the air passes through a baghouse. The baghouse is manufactured by CMI. The exhaust gases are drawn through the baghouse and discharged to the atmosphere through the stack. The design pressure drop across the tube sheet is 2-6 inches of water. The particulate matter, which is removed by the baghouse, is reinjected into the drum mixer.

Form RFC#03

DATA ON FACILITY BEING STACK TESTED

COMPANY NAME _____ COMPANY REP. _____ PHONE (___) _____

LOCATION OF FACILITY _____ ORIGINAL START-UP DATE _____ DESIGNED CAPACITY _____

OEM _____ MODEL NO. _____ TYPE _____ AC TYPE _____

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use 2 #Fuel Oil X Nat. Gas ___ Propane ___ Coal ___ other	3 Burner Setting	4 Blower Pressure	5 Production Rate Mix Aggregate TPH	5 Production Rate RAP TPH	6 Asphalt Cement %	7 Mix Temp. °F	8 Exhaust Gas Temp. °F	9 Venturi Scrubber X Baghouse Pressure Drop in w.g.	9 Venturi Scrubber X Baghouse Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
4:1% X		100%		206		4.8	310°	245°	5"				45%
6:45		100%		210		4.8	310°	257°	5"				50%
7:00		100%		212		4.8	310°	248°	4"				45%
7:18		100%		215		4.8	305°	244°	5"				50%
7:35		100%		212		4.8	310°	250°	5"				50%
7:50		100%		214		4.8	310°	244°	6"				45%
8:05		100%		214		4.8	310°	246°	5"				50%
8:20		100%		216		4.8	305°	245°	6"				55%
8:45		100%		218		4.8	310°	245°	4"				50%
9:00		100%		212		4.8	315°	245°	6"				60%
9:15		100%		212		4.8	310°	256°	4"				45%
9:30		100%		210		4.8	310°	245°	6"				55%
9:45		100%		210		4.8	310°	250°	4"				45%
10:00		100%		210		4.8	310°	248°	5"				50%
10:18		100%		207		4.8	305°	247°	3"				40%
10:30		100%		205		4.8	300°	251°	5"				50%
10:45		100%		210		4.8	310°	253°	4"				45%
11:00		100%		214		4.8	310°	250	4"				50%

Form [illegible]C#[illegible]

PAGE ____ OF ____

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use __#Fuel Oil__ Nat. Gas___ Propane ___ Coal ___ _____ other	3 Burner Setting	4 Blower Pressure	5 Production Rate ___Mix ___Aggregate TPH	5 ___RAP TPH	6 Asphalt Cement %	7 Mix Temp. °F	8 Exhaust Gas Temp. °F	9 ___Venturi Scrubber ___Baghouse Pressure Drop in w.g.	9 Water Pressure psi	10 Ambient Temp. °F	11 Relative Humidity %	12 Exhaust Damper Position
11:25		100%		210		4.8	310°	252°	3"				45%
11:40		100%		212	/	4.8	310°	250°	6"				55%
11:55		100%		194		4.8	315°	254°	4"				45%
12:13		100%		205		4.8	310°	254°	4"				45%
12:30		100%		195		4.8	320°	260°	4"				45%

DATA SUMMARY ON STACK BEING TESTED

AGGREGATE

1. Name/type of mix Surface Leveling Mix
2. Name/type of 2nd mix (if used) _____
3. Type/temperature of Liquid Asphalt AC-10 / 300 °F
4. Sieve/Screening analysis: _____ % Passing;

	1st mix / 2nd mix		1st mix / 2nd mix		1st mix / 2nd mix
1"	_____/_____	3/8"	_____/_____	#____	_____/_____
3/4"	_____/_____	#200	_____/_____	#____	_____/_____
1/2"	_____/_____	#____	_____/_____	#____	_____/_____

CONTROL SYSTEM

Manufacturer CMI

A. Baghouse:

1. Type of bags NOMEX # of bags 500 Sq. ft. of bags _____
2. Air to cloth ratio _____ Designed ACFM _____
3. Type of cleaning - pulse jet _____ reverse air X plenum pulse _____ other _____
4. Cleaning cycle time _____ Interval between cleaning cycle _____
5. Pulse pressure on cleaning cycle _____ psi

B. Scrubber:

1. Type - Venturi _____ Wet Washer _____
   Spray Booth _____ Other _____
2. Gallons per minute through system _____
3. Water source _____ (i.e., pond, lagoon, etc.)
4. Number of spray nozzles _____

Company Name W. B. West Contracting Date 9-21-93

Company Representative Rick Count

1. Aggregate bins: Virgin aggregate is fed individually into bins by type. It is metered onto a conveyor belt running under the bins to a shaker screen. The proportion to each aggregate type is determined by the job mix formula and pre-set to be metered out to meet these specifications.

2. Preliminary oversize screen: The aggregate is fed through a shaker screen where oversize rocks and foreign material is screened out of the mix.

3. Weigh conveyor belt: The aggregate is conveyed to the rotary drum dryer on a conveyor belt which weighs the material. The production rate is determined by this weight reading.

4. Rotary drum/dryer mixer: The aggregate is fed into the rotary drum dryer where it is tumbled by flighting into a veil in front of a flame which drives off the moisture. Further mixing is also accomplished in an outer shell of this drum. Hot liquid asphalt is injected in the outer shell of the drum where it is mixed with the aggregate.

5. Burner: The fuel fired burner is used to provide the flame which drys the aggregate.

6. Knock off baffling: A baffling plate is inserted in the "dirty" side plenum as a knock out for heavy particles in the air stream. These particles fall to the bottom of the baghouse.

7. Baghouse: The hot gases are pulled through the bags into the clean air plenum. The solid particulate matter is trapped on the dust coat buildup on the bags. A bag cleaning cycle consisting of jet burst of air from the inside (or clean air side) of the bags sends a large bubble of air down the inside of the bags shaking loose buildup on the bag surface. This particulate matter is collected at the bottom of the baghouse and reinjected into the drum mixer where it is used as part of the finished product.

8. Liquid asphalt storage: The liquid asphalt is stored in this heated tank until it is needed in the mixer. The amount of asphalt content and its temperature are pre-set for each different type job.

9. Conveyor to surge/storage bin: The finished product of aggregate mixed with liquid asphalt is conveyed to a surge bin.

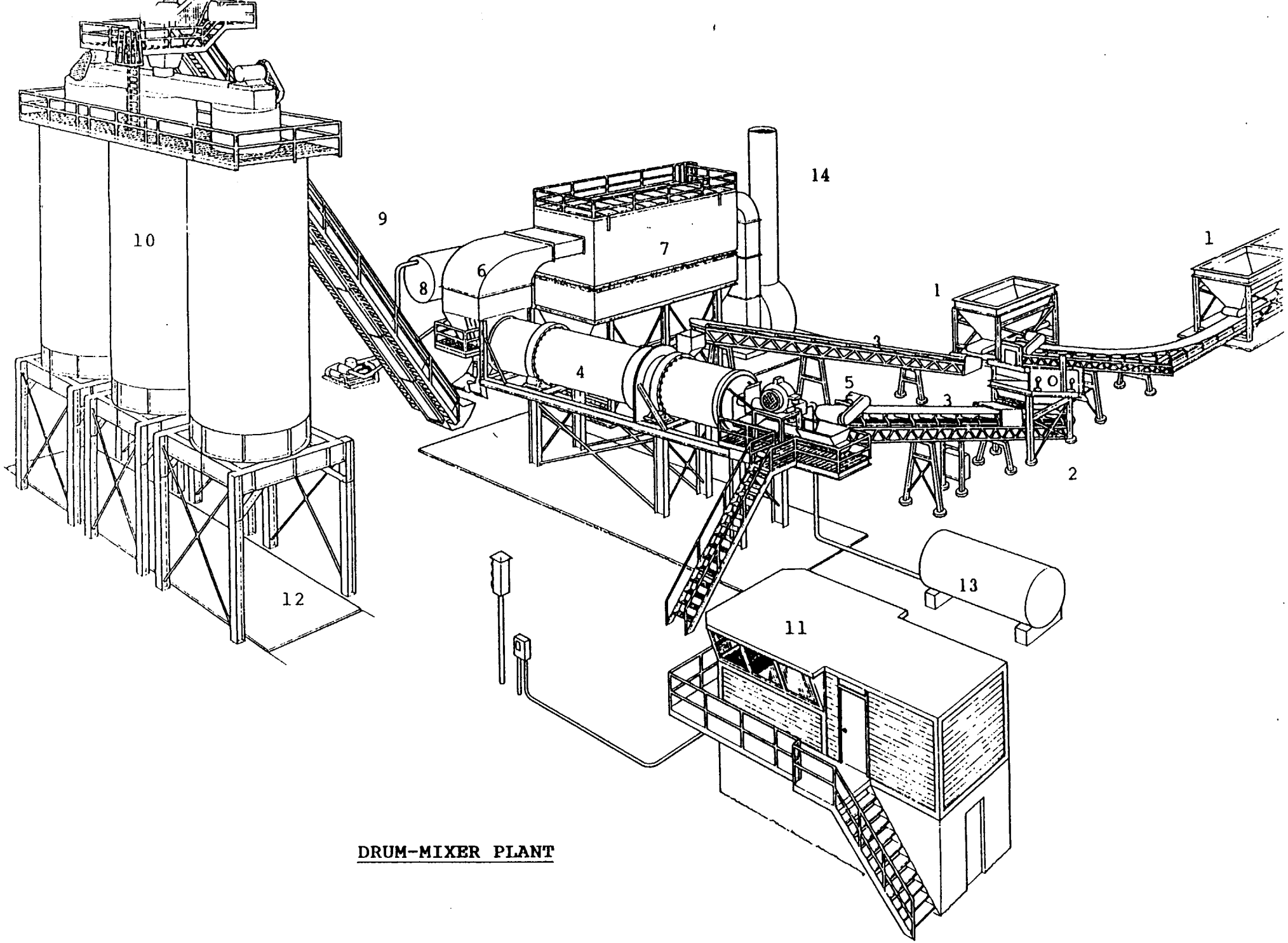
10. Surge/Storage bin: The asphaltic cement is dumped into this surge bin and metered out to dump trucks which pull underneath a slide gate at the bottom of the bin.

11. Control/operators house: The entire plant operation is controlled from this operator's house.

12. Truck loading scale: As the trucks receive the asphalt from the storage/surge bin, they are weighed on the lading scale which tells the plant operator the amount of asphalt that is being trucked on each individual load.

13. Fuel storage.

14. Stack



DRUM-MIXER PLANT

SECTION C:

EQUIPMENT USED

EQUIPMENT USED

Equipment used to conduct the particulate emissions test was:

A. A Lear Siegler PM-100 stack sampler with appropriate auxiliary equipment and glassware (with train set up according to the schematic on the next page).

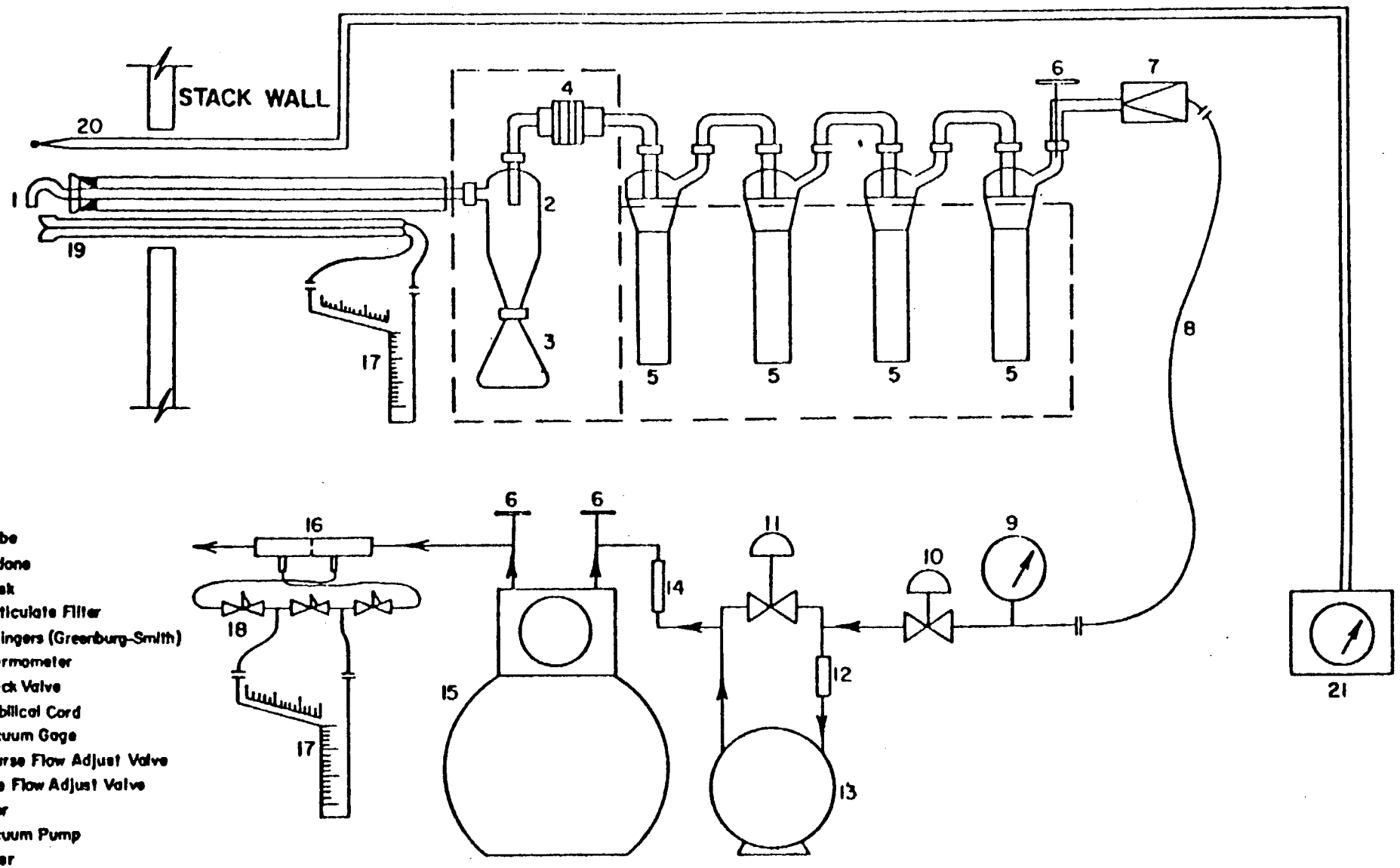
B. An Airguide Instruments Model 211-B (uncorrected) aneroid barometer for checking the barometric pressure.

C. Weston dial thermometers to check meter temperatures or an Analogic Model 2572 Digital Thermocouple to check stack temperatures.

D. A Hays 621 Analyzer to measure the oxygen, carbon dioxide and carbon monoxide content of the stack gases or, for non-combustion sources, a Bacharach Instrument Company Fyrite for gas analysis.

E. Schleicher and Schuell Type 1-HV filters with a porosity of .03 microns.

F. Reagent- or ACS-grade acetone with a residue of ≤ .001.



1) Probe
2) Cyclone
3) Flask
4) Particulate Filter
5) Impingers (Greenburg-Smith)
6) Thermometer
7) Check Valve
8) Umbilical Cord
9) Vacuum Gage
10) Course Flow Adjust Valve
11) Fine Flow Adjust Valve
12) Oiler
13) Vacuum Pump
14) Filter
15) Dry Gas Meter
16) Orifice Tube
17) Incline Manometer
18) Solenoid Valves
19) Pitot
20) Thermocouple
21) Pyrometer

SAMPLING TRAIN
USED FOR ISOKINETIC SAMPLING

SECTION D:

LABORATORY PROCEDURES AND RESULTS

LABORATORY PROCEDURES FOR PARTICULATE SAMPLING

I. Field Preparation

A. FILTERS: Fiberglass 4" sampling filters are prepared as follows:

Filters are removed from their box and numbered on the back side with a felt pen. The numbering system is continuous from job to job. The filters are placed in a desiccator to dry for at least 24 hours. Clean plastic petri dishes, also numbered, top and bottom, are placed in the desiccator with the filters. After desiccation, the filters are removed, one at a time, and weighed on the Sartorius analytical balance then placed in the correspondingly numbered petri dish. Weights are then recorded in the lab record books. Three filters are used for each complete particulate source emissions test and there should be several extra filters included as spares.

B. SILICA GEL: Silica Gel used for the test is prepared as follows:

Approximately 200 g of silica gel is placed in a wide mouth "Mason" type jar and dried in an oven at 175°C for two hours. The open jars are removed and placed in a desiccator until cool for two hours and then tightly sealed. The jars are then numbered and weighed on the triple beam balance to the closest tenth of a gram. This weight is recorded for each sealed jar. The number of silica gel jars used is the same as the number of filters. Silica gel should be indicating type, 6-16 mesh.

II. Post - Testing Lab Analysis

A. FILTERS: The filters are returned to the lab in their sealed petri dishes. In the lab, the dishes are opened and placed into a desiccator for at least 24 hours. Then the filters are weighed continuously every six hours until a constant weight is achieved. All data is recorded on the laboratory forms that will be bound in the test report.

B. SILICA GEL: The silica gel used in the stack test is returned to the appropriate mason jar and sealed for transport to the laboratory where it is reweighed to a constant weight on a triple beam balance to the nearest tenth of a gram.

C. PROBE RINSINGS: In all tests where a probe washout analysis is necessary, this is accomplished in accordance with procedures specified in "EPA Reference Method 5". These samples are returned to the lab in sealed mason jars for analysis. The front half of the filter holder is washed in accordance with the same procedures and included with the probe wash. Reagent or ACS grade acetone is used as the solvent. The backhalf of the filter holder is washed with deionized water into the impinger catch for appropriate analysis.

D. IMPINGER CATCH: In some testing cases, the liquid collected in the impingers must be analyzed for solid content. This involves a similar procedure to the probe wash solids determination, except that the liquid is deionized water.

E. ACETONE: A blank analysis of acetone is conducted from the one gallon glass container used in the field preparation. This acetone was used in the field for rinsing the probe, nozzle, and top half of the filter holder. A blank analysis is performed prior to testing on all new containers of acetone received from the manufacturer to insure that the quality of the acetone used will be exceed the .001% residual purity standard.

SPECIAL NOTE

When sampling sources high in moisture content, (such as asphalt plants) the filter paper sometimes sticks to the filter holder. When removing the filter, it may tear. In order to maintain control of any small pieces of filter paper which may be easily lost, they are washed with acetone into the probe washing. This makes the filter weight light (sometimes negative) and the probe wash correspondingly heavier. this laboratory procedure is taught by EPA in the "Quality Assurance for Source Emissions Workshop" at Research Triangle Park and is approved by EPA.

WEIGHING PROCEDURE - SARTORIUS ANALYTICAL BALANCE

The Sartorius balance is accurate to 0.1 mg and has a maximum capacity of 200 grams. The balance precision (standard deviation) is 0.05 mg. Before weighing an item, the balance should first be zeroed. This step should be taken before every series of weighings. To do this, the balance should have all weight adjustments at the "zero" position. The beam arrest lever (on the lower left hand side toward the rear of the balance) is then slowly pressed downward to the full release position. The lighted vernier scale on the front of the cabinet should align with the "zero" with the mark on the cabinet. If it is not so aligned, the adjustment knob on the right hand side (near the rear of the cabinet) should be turned carefully until the marks align. Now return the beam arrest to the horizontal arrest position. The balance is now "zeroed".

To weigh an item, it is first placed on the pan. And the sliding doors are closed to avoid air current disturbance. The weight adjustment knob on the right hand side must be at "zero". The beam arrest is then slowly turned upward. The lighted scale at the front of the cabinet will now indicate the weight of the item in grams. If the scale goes past the divided area, the item then exceeds 100 g weight (about 3-1/2 ounces) and it is necessary to arrest the balance (beam arrest lever) and move the lever for 100 g weight away from you. It is located on the left hand side of the cabinet near the front, and is the knob closest to the side of the cabinet. The balance will not weigh items greater than 200 grams in mass, and trying to do this might harm the balance. Remember, this is a delicate precision instrument.

After the beam is arrested in either weight range, the procedure is the same. When the weight of the item in grams is found, "dial in" that amount with the two knobs on the left hand side (near the 100 g lever) color coded yellow and green. As you dial the weight, the digits will appear on the front of the cabinet. When the proper amount is dialed, carefully move the arrest lever down with a slow, steady turn of the wrist. The lighted dial will appear, and the right hand side knob (front of cabinet) is turned to align the mark with the lower of the two lighted scale divisions which the mark appears between. when these marks are aligned, the two lighted digits along with the two indicated on the right hand window on the cabinet front are fractional weight in grams (the decimal would appear before the lighted digits) and the whole number of grams weight is the amount "dialed in" on the left.

In general, be sure that the beam is in "arrest" position before placing weight on or taking weight off of the pan. Don't "dial in" weight unless the beam is arrested. The balance is sensitive to even a hand on the table near the balance, so be careful and painstaking in every movement while weighing.

Form REC#8

SAMPLE ANALYTICAL DATA FORM

Company Name N. B. West

Sample Location Missouri

Relative Humidity in Lab 50 %

Blank Volume (V_a) 100 ml

Density of Acetone (ρ_a) .7857 mg/ml

Date/Time wt. blank 9/28 8:00A Gross wt. 92.5019 g

Date/Time wt. blank 9/28 2:00P Gross wt. 92.5019 g

Ave. Gross wt. 92.5019 g

Tare wt. 92.5018 g

Weight of blank (m_{ab}) .0001 g

Acetone blank residue concentration (C_a) : (C_a) = (m_{ab}) / (V_a) (ρ_a) = (.00000/ mg/g)

Acetone Blank Wt. : $W_a = C_a V_{aw} \rho_a$ = (.000001)(300)(.7857) = (.0002 g)

		Run # 1	Run # 2	Run # 3
Acetone rinse volume (V_{aw})	ml	300	300	300
Date/Time of wt. 9/28 8:00A Gross wt.	g	166.5437	162.0914	165.7063
Date/Time of wt. 9/28 2:00P Gross wt.	g	166.5442	162.0910	165.7068
Average Gross wt.	g	166.5440	162.0912	165.7066
Tare wt.	g	166.5310	162.0639	165.6596
Less Acetone blank wt. (W_a)	g	.0002	.0002	.0002
Weight of particulate in acetone rinse (m_a)	g	.0128	.0271	.0468

Filter Numbers	#	TS00495	TS00494	TS00493
Date/Time of wt. 9/28 8:00A Gross wt.	g	.5795	.5648	.5675
Date/Time of wt. 9/28 2:00P Gross wt.	g	.5991	.5648	.5673
Average Gross wt.	g	.5793	.5648	.5674
Tare wt.	g	.5659	.5624	.5647

Weight of particulate on filter (m_f)	g	.0134	.0024	.0027
Weight of particulate in acetone rinse (m_a)	g	.0128	.0271	.0468
Total weight of particulate (m_n)	g	.0262	.0295	.0495

NOTE: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Remarks: _____

Signature of Analyst Donna Scott Signature of Reviewer _____

D:\DONNA\FORMS\LAB\SAMPLE.TBL

SECTION E:

CALCULATIONS

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

SUMMARY OF TEST DATA

			09-21-93 Run #1	09-21-93 Run #2	09-21-93 Run #3
		start	06:33	08:40	10:39
		finish	08:02	09:47	12:00
	SAMPLING TRAIN DATA				
1.	Sampling time, minutes	Θ	60.00	60.00	60.00
2.	Sampling nozzle diameter, inches	D_n	0.300	0.300	0.300
3.	Sampling nozzle cross-section area, ft²	A_n	0.000491	0.000491	0.000491
4.	Isokinetic variation	I	98.0	99.1	102.3
5.	Sample gas volume — meter condition, cf	V_m	50.465	54.682	56.286
6.	Average meter temperature, °R	T_m	536	542	544
7.	Average orifice pressure drop, inches H_2O	ΔH	2.57	2.87	2.88
8.	Total particulate collected, mg.	M_n	26.20	29.50	49.50
	VELOCITY TRAVERSE DATA				
9.	Stack area, ft²	A	14.08	14.08	14.08
10.	Absolute stack gas pressure, inches Hg.	P_s	30.10	30.10	30.10
11.	Barometric pressure, inches Hg.	P_{bar}	30.10	30.10	30.10
12.	Average absolute stack temperature, R°	T_s	718	720	722
13.	Average $\sqrt{}$vel. head, (C_p = .84)	$\sqrt{dP}$	0.72	0.77	0.77
14.	Average stack gas velocity, ft/second	V_s	48.67	52.47	52.48
	STACK MOISTURE CONTENT				
15.	Total water collected by train, ml	V_{ic}	278.20	317.70	331.40
16.	Moisture in stack gas, percent (%)	B_{ws}	21.01	22.12	22.36
	EMISSIONS DATA				
17.	Stack gas flow rate, dscf/hr	Q_{sd}	1,441,627.3	1,528,088.5	1,519,449.0
18.	Stack gas flow rate, cfm	acfm	41,116	44,327	44,335
19.	Particulate concentration, gr/dscf	C_s	0.0082	0.0086	0.0141
20.	Particulate concentration, lb/hr	E	1.69	1.88	3.06
	ORSAT DATA				
21.	Percent CO_2 by volume	CO_2	4.5	4.0	3.7
22.	Percent O_2 by volume	O_2	14.0	9.3	13.0
23.	Percent CO by volume	CO	0.0	0.0	0.0
24.	Percent N_2 by volume	N_2	81.5	86.7	83.3

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

DRY GAS VOLUME

$$V_{m(std)} = V_m \left[\frac{T_{(std)}}{T_m}\right] \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{P_{std}}\right] = 17.64 \frac{°R}{\in. Hg} \; Y \; V_m \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right]$$

Where:

$V_{m(std)}$	=	Dry gas volume through meter at standard conditions, ft^3.
V_m	=	Dry gas volume measured by meter, ft^3.
P_{bar}	=	Barometric pressure at orifice meter, in. Hg.
P_{std}	=	Standard absolute pressure, (29.92 in. Hg.).
T_m	=	Absolute temperature at meter, °R.
T_{std}	=	Standard absolute temperature, (528°R).
ΔH	=	Avg. pressure drop across orifice meter, in. H_2O.
Y	=	Dry gas meter calibration factor.
13.6	=	Inches of water per Hg.

Run #1:

$$V_{m(std)} = (17.64)\ (0.979)\ (50.465) \left[\frac{(30.10) + \frac{2.57}{13.6}}{536}\right] = 49.248 \quad dscf$$

Run #2:

$$V_{m(std)} = (17.64)\ (0.979)\ (54.682) \left[\frac{(30.10) + \frac{2.87}{13.6}}{542}\right] = 52.811 \quad dscf$$

Run #3:

$$V_{m(std)} = (17.64)\ (0.979)\ (56.286) \left[\frac{(30.10) + \frac{2.88}{13.6}}{544}\right] = 54.162 \quad dscf$$

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

TOTAL CONTAMINANTS BY WEIGHT: GRAIN LOADING

Particulate Concentration: C_s' gr/dscf

$$C_s' = \left[0.0154 \frac{gr}{mg}\right] \left[\frac{M_n}{V_{m(std)}}\right]$$

Where:

C_s' = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, gr/dscf.

M_n = Total amount of particulate matter collected, mg.

$V_{m(std)}$ = Dry gas volume through meter at standard conditions, cu. ft.

Run #1:

$$C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{26.20}{49.248} \right] = 0.0082 \text{ gr/dscf}$$

Run #2:

$$C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{29.50}{52.811} \right] = 0.0086 \text{ gr/dscf}$$

Run #3:

$$C_s' = \left[0.0154 \frac{gr}{mg} \right] \left[\frac{49.50}{54.162} \right] = 0.0141 \text{ gr/dscf}$$

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

DRY MOLECULAR WEIGHT

$$M_d = 0.44\ (\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%CO + \%N_2)$$

Where:

M_d	=	Dry molecular weight, lb/lb-mole.
$\%CO_2$	=	Percent carbon dioxide by volume, dry basis.
$\%O_2$	=	Percent oxygen by volume, dry basis.
$\%N_2$	=	Percent nitrogen by volume, dry basis.
%CO	=	Percent carbon monoxide by volume, dry basis.
0.264	=	Ratio of O_2 to N_2 in air, v/v.
0.28	=	Molecular weight of N_2 or CO, divided by 100.
0.32	=	Molecular weight of O_2 divided by 100.
0.44	=	Molecular weight of CO_2 divided by 100.

Run #1:

$$\mathbf{M_d = 0.44\ (4.5\%) + 0.32\ (14.0\%) + 0.28\ (\ .00\% + 81.5\%) = 29.29}\ \frac{\mathbf{lb}}{\mathbf{lb\text{-}mole}}$$

Run #2:

$$\mathbf{M_d = 0.44\ (4.0\%) + 0.32\ (9.3\%) + 0.28\ (\ .00\% + 86.7\%) = 29.01}\ \frac{\mathbf{lb}}{\mathbf{lb\text{-}mole}}$$

Run #3:

$$\mathbf{M_d = 0.44\ (3.7\%) + 0.32\ (13.0\%) + 0.28\ (\ .00\% + 83.3\%) = 29.12}\ \frac{\mathbf{lb}}{\mathbf{lb\text{-}mole}}$$

NAME: N.B. West Contractors, Inc. **DATE:** September 21, 1993
LOCATION: Brentwood, Missouri

WATER VAPOR CONDENSED

$$V_{wc_{std}} = [V_f - V_i] \left[\frac{P_w R T_{(std)}}{M_w P_{(std)}}\right] = 0.04707 \ [V_f - V_i]$$

$$V_{wsg_{std}} = [W_f - W_i] \left[\frac{R T_{(std)}}{M_w P_{(std)}}\right] = 0.04715 \ [W_f - W_i]$$

Where:

0.04707	=	Conversion factor, ft^3/ml.
0.04715	=	Conversion factor, ft^3/g.
Vwc_{std}	=	Volume of water vapor condensed (std. cond.), ml.
$Vwsg_{std}$	=	Volume of water vapor collected in silica gel (standard conditions), ml.
$V_f - V_i$	=	Final volume of impinger contents less initial volume, ml.
$W_f - W_i$	=	Final weight of silica gel less initial weight, g.
P_w	=	Density of water, 0.002201 lb/ml.
R	=	Ideal gas constant, 21.85 in.Hg. (cu.ft./lb-mole)(°R).
M_w	=	Molecular weight of water vapor, 18.0 lb/lb-mole.
T_{std}	=	Absolute temperature at standard conditions, 528°R.
P_{std}	=	Absolute pressure at standard conditions, 29.92 inches Hg.

Run #1:

$V_{wc(std)}$ = (0.04707) (270.00) = **12.7 cu. ft**
$V_{wsg(std)}$ = (0.04715) (8.20) = **0.4 cu. ft**

Run #2:

$V_{wc(std)}$ = (0.04707) (310.00) = **14.6 cu. ft**
$V_{wsg(std)}$ = (0.04715) (7.70) = **0.4 cu. ft**

Run #3:

$V_{wc(std)}$ = (0.04707) (325.00) = **15.3 cu. ft**
$V_{wsg(std)}$ = (0.04715) (6.40) = **0.4 cu. ft**

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

MOISTURE CONTENT OF STACK GASES

$$B_{ws} = \left[\frac{V_{wc_{std}} + V_{wsg_{std}}}{V_{wc_{std}} + V_{wsg_{std}} + V_{mstd}} \right] \times 100$$

Where:

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

V_m = Dry gas volume measured by dry gas meter, dcf.

Vwc_{std} = Volume of water vapor condensed, corrected to standard conditions, scf.

$Vwsg_{std}$ = Volume of water vapor collected in silica gel corrected to std. cond., scf.

Run #1:

$$B_{ws} = \frac{12.7 + 0.4}{12.7 + 0.4 + 49.248} \times 100 = 21.01\ \%$$

Run #2:

$$B_{ws} = \frac{14.6 + 0.4}{14.6 + 0.4 + 52.811} \times 100 = 22.12\ \%$$

Run #3:

$$B_{ws} = \frac{15.3 + 0.3}{15.3 + 0.3 + 54.162} \times 100 = 22.36\ \%$$

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

MOLECULAR WEIGHT OF STACK GASES

$$M_s = M_d (1 - B_{ws}) + 18 (B_{ws})$$

Where:

M_s = Molecular weight of stack gas, wet basis (lb./lb.-mole).

M_d = Molecular weight of stack gas, dry basis (lb./lb.-mole).

Run #1:

$$M_s = 29.29 (1 - 0.2101) + 18 (0.2101) = 26.92 \ \frac{lb}{lb\text{-}mole}$$

Run #2:

$$M_s = 29.01 (1 - 0.2212) + 18 (0.2212) = 26.57 \ \frac{lb}{lb\text{-}mole}$$

Run #3:

$$M_s = 29.12 (1 - 0.2236) + 18 (0.2236) = 26.63 \ \frac{lb}{lb\text{-}mole}$$

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

STACK GAS VELOCITY

$$V_s = K_p \; C_p \; [\sqrt{\Delta P}]\,\text{avg} \quad \sqrt{\frac{T_s(\text{avg})}{P_s \; M_s}}$$

Where:

V_s = Average velocity of gas stream in stack, ft/sec.
K_p = 85.49 ft/sec [(g/g-mole) — (mm Hg)/(°K)(mm H_2O]^{½}
C_p = Pitot tube coefficient, dimensionless.
ΔP = Velocity head of stack gas, in. H_2O.
P_{bar} = Barometric pressure at measurement site, in. Hg.
P_g = Stack static pressure, in. Hg.
P_s = Absolute stack gas pressure, in. Hg. = $P_{bar} + P_g$
P_{std} = Standard absolute pressure, 29.92 in. Hg.
t_s = Stack temperature, °F.
T_s = Absolute stack temperature, °R. = 460 + t_s.
M_s = Molecular weight of stack gas, wet basis, lb/lb-mole.

Run #1:

$$V = (85.49)\;(0.84)\;(0.72)\;\sqrt{\frac{718}{(30.10)\;(26.92)}} = 48.67 \text{ ft/sec}$$

Run #2:

$$V = (85.49)\;(0.84)\;(0.77)\;\sqrt{\frac{720}{(30.10)\;(26.57)}} = 52.47 \text{ ft/sec}$$

Run #3:

$$V = (85.49)\;(0.84)\;(0.77)\;\sqrt{\frac{722}{(30.10)\;(26.63)}} = 52.48 \text{ ft/sec}$$

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

STACK GAS FLOW RATE

$$Q_{sd} = 3600 \left[1 - B_{wc} \right] V_s A \left[\frac{T_{std}}{T_{stk}} \right] \left[\frac{P_s}{P_{std}} \right]$$

Where:

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions (dscf/hr).
A = Cross sectional area of stack (ft^2).
3600 = Conversion factor (sec/hr).
T_{stk} = Absolute stack temperature (°R).
T_{std} = Standard absolute temperature (528°R).
P_{bar} = Barometric pressure at measurement site (in. Hg.).
P_g = Stack static pressure (in. Hg.).
P_s = Absolute stack gas pressure (in. Hg.) = $P_{bar} + P_g$
P_{std} = Standard absolute pressure (29.92 in. Hg.).

Run #1: Q_{sd} =

$$3600 \ (1 - 0.2101) \ (48.67) \ (14.08) \left[\frac{528}{718} \right] \left[\frac{30.10}{29.92} \right] = 1{,}441{,}627.3 \ \frac{dscf}{hr}$$

Run #2: Q_{sd} =

$$3600 \ (1 - 0.2212) \ (52.47) \ (14.08) \left[\frac{528}{720} \right] \left[\frac{30.10}{29.92} \right] = 1{,}528{,}088.5 \ \frac{dscf}{hr}$$

Run #3: Q_{sd} =

$$3600 \ (1 - 0.2236) \ (52.48) \ (14.08) \left[\frac{528}{722} \right] \left[\frac{30.10}{29.92} \right] = 1{,}519{,}449.0 \ \frac{dscf}{hr}$$

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

EMISSIONS RATE FROM STACK

$$E = \left[\frac{(C_s)\ (Q_{sd})}{7{,}000\ gr/lb}\right] = lb/hr$$

Where:

E = Emissions rate, lbs/hr.

C_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, gr/dscf.

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, dscf/hr.

Run #1:

$$E = \frac{(0.0082)\ \ (1{,}441{,}627.3)}{7000} = 1.69\ lb/hr$$

Run #2:

$$E = \frac{(0.0086)\ \ (1{,}528{,}088.5)}{7000} = 1.88\ lb/hr$$

Run #3:

$$E = \frac{(0.0141)\ \ (1{,}519{,}449.0)}{7000} = 3.06\ lb/hr$$

NAME: N.B. West Contractors, Inc.
LOCATION: Brentwood, Missouri

DATE: September 21, 1993

ISOKINETIC VARIATION

$$I = 100\ T_s \left[\frac{(0.002669)\ (V_{ic} + \left(\frac{Y_i\ V_m}{T_m} \right) (P_{bar} + \Delta H/13.6)}{60\ \ \theta\ \ V_s\ \ P_s\ \ A_n} \right]$$

Where:

I	=	Percent isokinetic sampling.
100	=	Conversion to percent.
T_s	=	Absolute average stack gas temperature, °R.
0.002669	=	Conversion factor, Hg - ft³/ml - °R.
V_{ic}	=	Total volume of liquid collected in impingers and silica gel, ml.
T_m	=	Absolute average dry gas meter temperature, °R.
P_{bar}	=	Barometric pressure at sampling site, in. Hg.
ΔH	=	Average pressure differential across the orifice meter, in. H_2O.
13.6	=	Specific gravity of mercury.
60	=	Conversion seconds to minutes.
Θ	=	Total sampling time, minutes.
V_s	=	Stack gas velocity, ft/sec.
P_s	=	Absolute stack gas pressure, in. Hg.
A_n	=	Cross sectional area of nozzle, ft².
Y_i	=	Calibration factor.

Run #1:

$$I = (100)\ (718) \left[\frac{(0.002669)\ (278.20) + \frac{(0.979)\ (50.465)}{536} \left[30.10 + \frac{2.57}{13.6} \right]}{60\ \ (\ 60.00\ )\ \ (\ 48.67\ )\ \ (30.10)\ \ (0.000491)} \right] = 98.0\%$$

Run #2:

$$I = (100)\ (720) \left[\frac{(0.002669)\ (317.70) + \frac{(0.979)\ (54.682)}{542} \left[30.10 + \frac{2.87}{13.6} \right]}{60\ \ (\ 60.00\ )\ \ (\ 52.47\ )\ \ (30.10)\ \ (0.000491)} \right] = 99.1\%$$

Run #3:

$$I = (100)\ (720) \left[\frac{(0.002669)\ (331.40) + \frac{(0.979)\ (56.286)}{544} \left[30.10 + \frac{2.88}{13.6} \right]}{60\ \ (\ 60.00\ )\ \ (\ 52.48\ )\ \ (30.10)\ \ (0.000491)} \right] = 102.3\%$$

SECTION F:

FIELD DATA

RAMCON ENVIRONMENTAL CORPORATION

Plant N.B. West

Location Grace Springs No.

Operator [illegible]

Date 9-21-93

Run No. 1

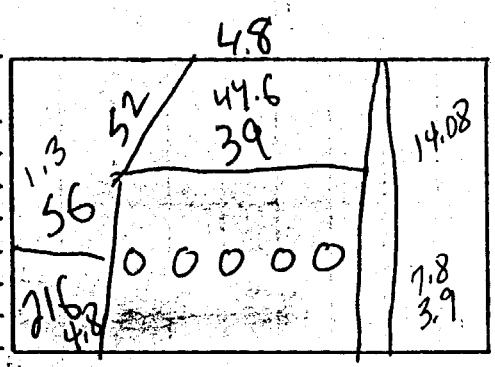
Sample Box No. 1

Meter Box No. Nutool

Meter H @ 1.941

C Factor 979

Pitot Tube Coefficient Cp .84



Schematic of Stack Cross Section

	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL	470	375.8
INITIAL	200	367.6
DIFFERENCE	270	8.2

Ambient Temperature 65

Barometric Pressure 30.10

Assumed Moisture, % 22

Probe Length, m(ft) 6 ft

Nozzle Identification No. 0004909

Avg. Calibrated Nozzle Dia., (in.) .30/.30/.30

Probe Heater Setting Dens

Leak Rate, m^3/min. (cfm) .01@ 12 liter

Probe Liner Material stainless steel

Static Pressure, mm Hg (in.Hg) +.01

Filter No. TS-00495

TRAV. PT NO.	SAMPLING TIME (θ) min.	VACUUM in. Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (Ps) in H2O	PRESSURE DIFF. ORF. MTR in H2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F Inlet	GAS SAMPLE TEMP. AT DRY GAS METER °F Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
1	6:33/6:35	3	260	.40	1.9	189.1/189.7	69	69	225	68
2	6:37	3	260	.32	1.5	190.9	69	69	225	68
3	6:39	3	260	.32	1.5	192.7	70	69	225	68
4	6:41	3	260	.25	1.2	199.0	70	69	225	68
5	6:43	3	258	.25	1.2	194.2	70	69	225	68
6	6:45	3	255	.45	2.2	196.3	70	69	225	68
1	6:48/6:50	3	255	.25	1.2	197.4	73	69	225	54
2	6:52	3	255	.25	1.2	198.6	73	69	224	53
3	6:54	3	255	.30	1.4	199.9	73	69	224	53
4	6:56	4	255	.43	2.0	201.4	74	69	230	53
5	6:58	4	255	.43	2.0	203.2	74	69	230	53
6	7:00	4	255	.40	1.9	203.8	74	69	230	53
1	7:23/7:25	6	255	.45	2.2	205.1	72	69	230	53

Form #REC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 9-21-93 LOCATION Grass Springs MT TEST NO. 1

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME Vm (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	7:27	5	260	.40	1.9	206.7	75	72	229	60
3	7:29	5	260	.50	2.4	208.2	75	72	228	60
4	7:31	6	260	.50	2.4	210.1	77	74	230	60
5	7:33	6	259	.60	2.9	212.3	78	75	231	59
6	7:35	6	258	.65	3.1	214.1	81	74	231	59
1	~~7:37~~ 7:39	6	259	.50	2.4	215.7	81	74	232	59
2	7:41	7	257	.90	4.3	218.0	83	75	241	59
3	7:43	7	257	.75	3.6	220.2	86	76	241	59
4	7:45	7	257	.75	3.6	221.8	86	76	241	59
5	7:47	7	257	.75	3.6	224.3	88	76	241	59
6	7:49	6	257	.63	3.0	226.1	88	76	241	59
1	~~7:50~~ 7:52	5	258	.51	2.4	227.7	88	75	251	54
2	7:54	5	258	.51	2.4	229.5	88	75	251	54
3	7:56	8	258	.98	4.7	231.3	90	81	251	54
4	7:58	8	261	.90	4.3	234.6	92	78	251	54
5	8:00	8	260	.90	4.3	235.9	92	78	251	54
6	8:02	8	259	.90	4.3	238.565	92	78	251	54

RAMCON ENVIRONMENTAL CORPORATION

Plant N.B. West

Location Trona Pump No.
Operator Allan Turner
Date 9.21-93
Run No. 2
Sample Box No. 1
Meter Box No. Nutech
Meter H @ 1.941
C Factor .979
Pitot Tube Coefficient Cp .84

4.8

Ambient Temperature 65
Barometric Pressure 30.10
Assumed Moisture, % 17
Probe Length, m(ft) 6.5

	FINAL	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
	FINAL	510	339.3
	INITIAL	200	332.4
	DIFFERENCE	310	7.9

Nozzle Identification No. CCCC4909
Avg. Calibrated Nozzle Dia., (in.) .30/.30/.30
Probe Heater Setting Oven
Leak Rate, m^3/min. (cfm) .005 at 14 inHg
Probe Liner Material Borosilicate
Static Pressure, mm Hg(in.Hg)
Filter No. TS-00494

Schematic of Stack Cross Section

TRAV. PT NO.	SAMPLING TIME (θ)min.	VACUUM in. Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (Ps) in H2O	PRESSURE DIFF. ORF. MTR in H2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F		FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
							Inlet	Outlet		
1	~~8:40~~ 9:12	4	256	.51	.24	~~239.1~~ 240.6	77	77	229	59
2	8:44	4	256	.45	.22	242.5	77	77	242	56
3	8:46	4	260	.50	.24	243.9	79	77	249	56
4	9:49	4	260	.40	.19	245.7	80	77	249	56
5	8:50	4	261	.54	.26	248.9	81	77	250	60
6	8:52	4	261	.42	.20	248.5	83	77	250	63
1	~~8:54~~ 8:56	4	257	.46	.22	250.0	82	77	253	64
2	8:58	4	257	.55	.26	252.1	82	77	253	64
3	9:00	4	257	.60	.29	253.4	83	77	251	64
4	9:02	4	261	.52	.25	255.3	83	77	251	64
5	9:04	4	261	.50	.24	257.2	84	77	251	64
6	9:06	4	261	.75	.36	259.1	84	77	250	63
1	~~9:08~~ 9:10	5	260	.77	.37	260.7	83	77	250	62

Form #REC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 9-21-93 LOCATION Source Sampling Pos. TEST NO. 2

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	9:12	5	260	.64	3.1	262.8	86	78	250	61
3	9:14	5	260	.50	2.4	264.7	86	78	250	61
4	9:16	5	260	.50	2.4	266.4	87	78	253	61
5	9:18	5	260	.55	2.6	268.1	88	79	253	59
6	9:20	5	261	.60	2.9	270.0	88	78	253	59
1	9:22/9:24	9	261	.85	4.1	272.0	88	78	253	59
2	9:26	9	261	.85	4.1	273.9	88	78	253	59
3	9:28	9	260	.85	4.1	276.4	88	78	253	59
4	9:30	6	259	.75	3.6	279.1	88	80	253	59
5	9:32	5	259	.65	3.1	280.9	90	80	251	58
6	9:34	5	259	.50	2.4	282.6	90	80	251	58
1	9:35/9:37	5	259	.60	2.9	284.2	90	80	251	58
2	9:39	5	261	.60	2.9	285.9	90	80	251	59
3	9:41	5	261	.60	2.9	287.5	90	80	251	59
4	9:43	5	261	.65	3.1	289.7	90	80	250	63
5	9:45	5	259	.65	3.1	291.5	90	80	250	63
6	9:47	5	259	.65	3.1	293.782	90	80	250	63

RAMCON ENVIRONMENTAL CORPORATION

49

Plant N.B. West
Location Frans Springs Mo.
Operator Allen Isler
Date 9-21-93
Run No. 3
Sample Box No. 1
Meter Box No. Nutech
Meter H @ 1.941
C Factor .929
Pitot Tube Coefficient Cp .89

Schematic of Stack Cross Section

Ambient Temperature 70
Barometric Pressure 30.10
Assumed Moisture, % 22
Probe Length, m(ft) 6 ft
Nozzle Identification No. .0004909
Avg. Calibrated Nozzle Dia., (in.) 30/30/30
Probe Heater Setting Oas
Leak Rate, m^3/min. (cfm) .001 at 8 in Hg
Probe Liner Material Stainless Steel
Static Pressure, mm Hg (in.Hg) +.01
Filter No. TS-00493

	IMPINGER VOLUME ml	SILICA GEL WEIGHT g
FINAL	525	453.5
INITIAL	200	447.1
DIFFERENCE	325	6.4

TRAV. PT NO.	SAMPLING TIME (θ)min.	VACUUM in. Hg	STACK TEMP (T_s) °F	VELOCITY HEAD (P_s) in H2O	PRESSURE DIFF. ORF. MTR in H2O	GAS SAMPLE VOLUME ft^3	GAS SAMPLE TEMP. AT DRY GAS METER °F Inlet	Outlet	FILTER HOLDER TEMP °F	GAS TEMP LVG CONDENSER OR LAST IMPINGER °F
1	10:39 / 10:41	6	261	.82	3.9	294.2 / 295.9	78	78	244	65
2	10:43	5	261	.63	3.0	298.0	78	78	244	65
3	10:45	6	260	.80	3.8	300.0	79	77	244	63
4	10:47	6	260	.80	3.8	301.7	79	77	244	63
5	10:49	6	261	.80	3.8	304.0	83	78	253	63
6	10:51	6	261	.75	3.6	306.4	83	78	252	65
1	10:54 / 10:56	6	265	.80	3.8	308.1	84	78	258	67
2	10:58	6	261	.75	3.6	310.1	85	78	256	67
3	11:00	6	261	.65	3.1	312.3	85	78	255	67
4	11:02	6	260	.65	3.1	314.4	87	78	255	67
5	11:04	6	265	.65	3.1	316.6	89	80	255	67
6	11:06	6	265	.65	3.1	318.5	89	80	254	66
1	11:09 / 11:10	6	265	.75	3.6	320.2	89	80	254	64

Form #REC-05

Form #REC-06

RAMCON emissions test log sheet, cont. DATE 9-21-93 LOCATION Texas Eagle Ford TEST NO. 3

TRAVERSE POINT	SAMPLING TIME θ (min)	VACUUM mm Hg (in. Hg)	STACK TEMP T_s (°F)	VELOCITY HEAD ΔP_s (in. H_2O)	ORFICE DIFF. PRESSURE ΔH (in. H_2O)	GAS VOLUME V_m (ft^3)	GAS SAMPLE TEMP. (°F)		SAMPLE BOX TEMP. (°F)	IMPINGER TEMP (°F)
							in	out		
2	11:12	6	264	.55	2.6	322.6	90	80	253	64
3	11:14	6	264	.55	2.6	324.3	90	80	253	64
4	11:16	6	264	.50	2.4	326.3	90	80	250	63
5	11:18	6	263	.50	2.4	328.4	90	80	251	63
6	11:20	6	263	.60	2.9	330.5	90	80	251	63
1	~~11:23~~ 11:25	6	264	.64	3.1	332.3	90	80	251	64
2	11:27	6	265	.60	2.9	334.3	93	83	261	64
3	11:29	6	265	.50	2.4	335.9	93	83	261	64
4	11:31	6	265	.50	2.4	337.5	93	83	261	64
5	11:33	6	265	.50	2.4	339.2	93	83	261	64
6	11:35	6	265	.50	2.4	341.1	93	83	261	64
1	~~11:48~~ 11:50	4	261	.40	1.9	342.3	88	84	260	66
2	11:52	4	260	.50	2.4	344.3	90	84	244	66
3	11:54	4	260	.50	2.4	346.0	90	84	244	66
4	11:56	4	260	.50	2.4	347.3	90	84	248	66
5	11:58	4	260	.35	1.7	348.9	90	84	248	60
6	12:00	4	260	.35	1.7	350.486	90	84	248	60

N.B. West
Company Name

9-21-93
Date

REFERENCE METHOD 3: GAS ANALYSIS BY FYRITE

FUEL	F_o FACTORS
WOOD	1.0540
BARK	1.0830
ANTHRACITE	1.0699
BITUMINOUS	1.1398
LIGNITE	1.0761
OIL	1.3465
GAS	1.7489
PROPANE	1.5095
BUTANE	1.4791

$O_2\% = 20.9 - [F_o \times CO_2\%]$

RUN #1: ____ = 20.9 - [____ x ____]

RUN #2: ____ = 20.9 - [____ x ____]

RUN #3 ____ = 20.9 - [____ x ____]

RUN 1:	$CO_{2\%}$	4.5	$CO_{2\%}$	4.5	$CO_{2\%}$	4.6	AVG.	
	$O_{2\%}$	14.0	$O_{2\%}$	14.2	$O_{2\%}$	13.8	AVG.	
	$N_{2\%}$		$N_{2\%}$		$N_{2\%}$		AVG.	
RUN 2:	$CO_{2\%}$	4.0	$CO_{2\%}$	4.4	$CO_{2\%}$	3.6	AVG.	
	$O_{2\%}$	14.0	$O_{2\%}$	13.8	$O_{2\%}$		AVG.	
	$N_{2\%}$		$N_{2\%}$		$N_{2\%}$		AVG.	
RUN 3:	$CO_{2\%}$	3.6	$CO_{2\%}$	3.6	$CO_{2\%}$	4.0	AVG.	
	$O_{2\%}$	12.5	$O_{2\%}$	13.0	$O_{2\%}$	13.4	AVG.	
	$N_{2\%}$		$N_{2\%}$		$N_{2\%}$		AVG.	

SECTION G:

CALIBRATION

4A

TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 1.3 ° (<10°), α_2 = 0.8 ° (<10°), β_1 = 0.5 ° (<5°),

β_2 = 1.8 ° (<5°)

γ = 2.9 °, θ = 1.7 °, A = .97 cm (in.)

z = A sin γ = .05 cm (in.); <0.32 cm (<1/8 in.),

w = A sin θ = .03 cm (in.); <.08 cm (<1/32 in.)

P_A .48 cm (in.) P_b .49 cm (in.)

D_t = .38 cm (in.)

Comments: _____

_____

_____

Calibration required? _____ yes ✓ no

4B

TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) _____ no

α_1 = 2.3 ° (<10°), α_2 = .5 ° (<10°), β_1 = 1.8 ° (<5°),

β_2 = 1.8 ° (<5°)

γ = 3.2 °, θ = 1.0 °, A = .98 cm (in.)

z = A sin γ = .05 cm (in.); <0.32 cm (<1/8 in.),

w = A sin θ = .02 cm (in.); <.08 cm (<1/32 in.)

P_A .49 cm (in.) P_b .49 cm (in.)

D_t = .38 cm (in.)

Comments: _____

_____

_____

Calibration required? _____ yes ✓ no

RAMCON ENVIRONMENTAL CORPORATION

Lear Siegler Stack Sampler

Nozzle Diameter Calibration

Date _____ Signature _____

Nozzle No.	Average Diameter	Nozzle No.	Average Diameter
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

Pitot Tube Calibration (S Type)

Pitot Tube Identification No. 6-4 Date 6-9-91

Calibrated by: G Buck

"A" SIDE CALIBRATION

Run No.	Δp std cm H_2O (in. H_2O)	Δp (s) cm H_2O (in. H_2O)	$C_p(s)$	DEVIATION $C_{p(s)}-\bar{C}_p(A)$
1	2.2	3.2	.829	.001
2	1.8	2.6	.832	.002
3	1.1	1.6	.829	.001
		$\bar{C}_p$ (SIDE A)	.830	

"B" SIDE CALIBRATION

Run No.	Δp std cm H_2O (in. H_2O)	Δp(s) cm H_2O in. H_2O)	$C_p(s)$	DEVIATION $C_p(s)-\bar{C}_p(B)$
1	2.2	3.2	.829	.001
2	1.8	2.6	.832	.002
3	1.1	1.6	.829	.001
		$\bar{C}_p$ (SIDE B)	.830	

$$\text{AVERAGE DEVIATION} = \sigma(\text{A OR B}) = \frac{\sum_{1}^{3} |C_p(s)-\bar{C}_p(\text{A OR B})|}{3} \leftarrow \text{MUST BE} \leq 0.01$$

$$|\bar{C}_p(\text{SIDE A})-\bar{C}_p(\text{SIDE B})| \leftarrow \text{MUST BE} \leq 0.01$$

$$C_{p(s)} = C_{p(std)}\sqrt{\frac{\Delta p\ std}{\Delta p_s}}$$

RAMCON

Lear Siegler Stack Sampler

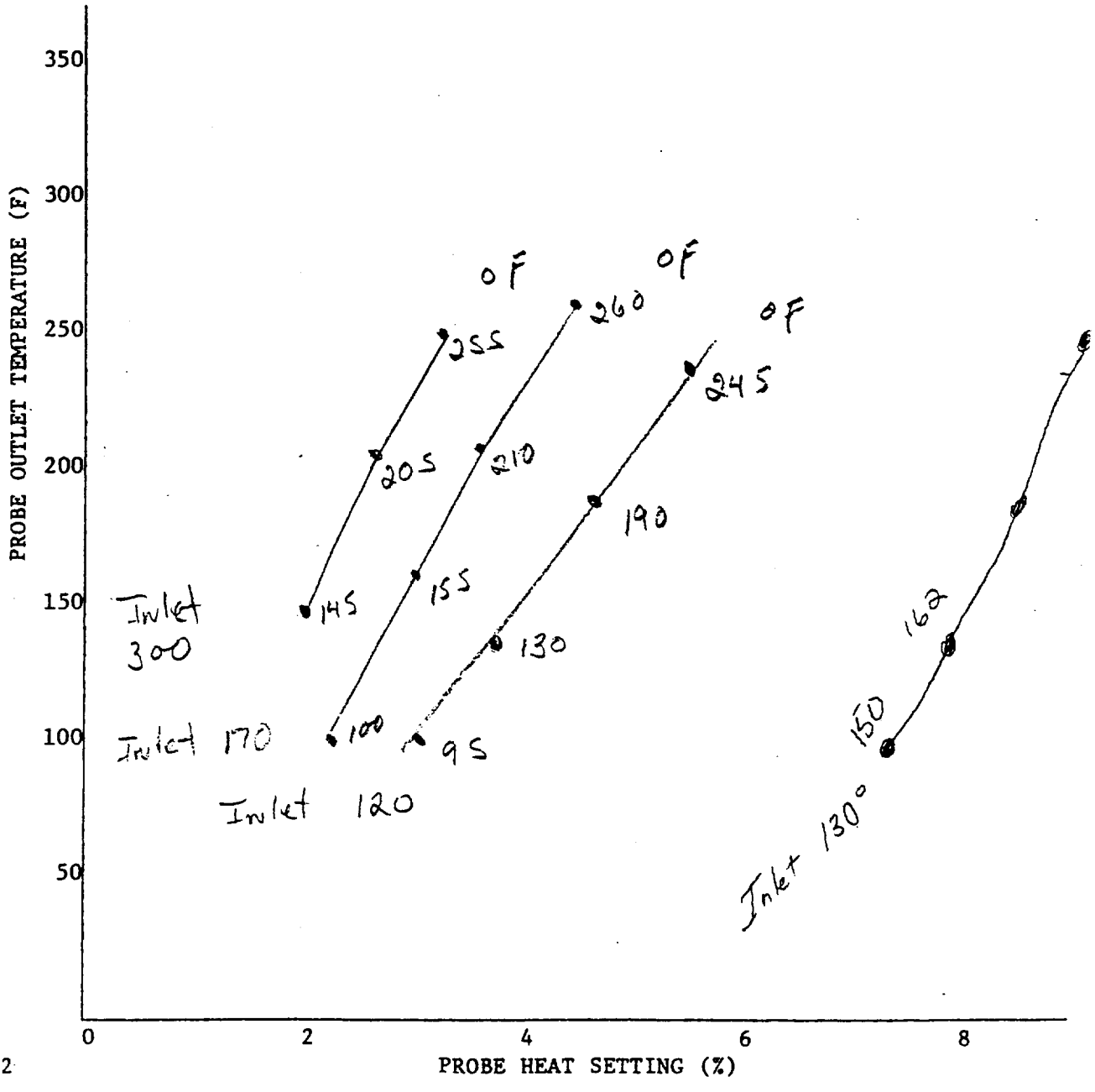
Heating Probe Calibration

Probe No. 64 Probe Length 6'

Date of Calibration 5-7-90 Signature Sam Turner

Name of Company to be tested _____

Note: 3 ft. probe - 5 min. warmup
6 ft. probe - 15 min. warmup
10 ft. probe - 30 min. warmup
Calibration flow rate = .75 CFM



STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 5-5-90 Thermocouple number 64

Ambient temperature 20 °C Barometric pressure 29.88 in. Hg

Calibrator S Turner Reference: mercury-in-glass ✓

other _____

Reference point number	Source[a] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[b] %
A	Ice Bath	32	32	0
B	Boiling water	212	211	.005
C	Boiling oil	381	378	.008
D	Ambient			

[a] Type of calibration system used.

[b] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English Units)

Test No. _____ Date 9-29-93 Meter Box No. Nutech 2 Plant No. _____

Barometric Pressure P_b = 30.50 in.Hg Dry Gas Meter No. _____ Pretest Y _____

Orifice Manometer Setting (ΔH),	Gas Volume		Temperature				Time (Θ)	Vacuum Setting	Y_i	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$ 534
	Wet Test Meter (V_w)	Dry Gas Meter (V_d)	Wet Test Meter (t_w)	Dry Gas Meter						
				Inlet (t_{d_i})	Outlet (t_{d_o})	Avg.† (t_d)				
in. H_2O	ft³	ft³	°F	°F	°F	°F	min	in. Hg		
3.0	10	734.800 744.793	74	72 79	69 69	735	10.78		993	Obs 1.94
2.0	10	744.819 754.865	74	80 86	70 73	77.25	13.31		997	1.95
1.0	10	755.1 765.198	74	93 87	75 76	80.25	9.17		990	1.95 Obs 1.91
									Y = .993	

† If there is only one thermometer on the dry gas meter, record the temperature under t_d where:

V_w – Gas volume passing through the wet test meter, ft³.
V_d – Gas volume passing through the dry gas meter, ft³.
t_w – Temperature of the gas in the wet test meter, °F.
t_{d_i} – Temperature of the inlet gas of the dry gas meter, °F.
t_{d_o} – Temperature of the outlet gas of the dry gas meter, °F.
t_d – Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.
ΔH – Pressure differential across orifice, in. H_2O.
Y_i – Ratio of accuracy of wet test meter to dry gas meter for each run.
Y – Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y.
P_b – Barometric pressure, in. Hg.
Θ – Time of calibration run, minutes.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English Units)

Test No. _____ Date 9-7-93 Meter Box No. NuTech 2 Plant No. _____

Barometric Pressure P_b = 30.12 in.Hg Dry Gas Meter No. _____ Pretest Y _____

Orifice Manometer Setting (ΔH), in. H_2O	Gas Volume: Wet Test Meter (V_w) ft³	Gas Volume: Dry Gas Meter (V_d) ft³	Temperature: Wet Test Meter (t_w) °F	Temperature: Dry Gas Meter: Inlet (t_{d_i}) °F	Temperature: Dry Gas Meter: Outlet (t_{d_o}) °F	Temperature: Dry Gas Meter: Avg.† (t_d) °F	Time (Θ) min	Vacuum Setting in. Hg	Y_i	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1.0	~~10~~ 5	22.424 / 27.683	<82	95 / 97	87 / 89	92	9.22	2	.968	1.905
2.0	10	28.083 / 38.390	<82	95 / 100	89 / 91	94	13.15	3	.992	1.930
3.0	~~10~~ 11	10.623 / 22.065	82	91 / 99	85 / 96	90	11.8	3	.976	1.941
									Y = .979	1.941

.259
.307
1.442

† If there is only one thermometer on the dry gas meter, record the temperature under t_d where:

- V_w = Gas volume passing through the wet test meter, ft³.
- V_d = Gas volume passing through the dry gas meter, ft³.
- t_w = Temperature of the gas in the wet test meter, °F.
- t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.
- t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.
- t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.
- ΔH = Pressure differential across orifice, in. H_2O.
- Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.
- Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y.
- P_b = Barometric pressure, in. Hg.
- Θ = Time of calibration run, minutes.

Quality Assurance Handbook M4-2.4A

F:\FORMS\DryGasMe.Cal

SECTION H:

RAMCON PERSONNEL

Name: Mr. Sumner Buck
Title: President

Qualifications: Mr. Buck is a graduate of the University of Mississippi with graduate studies at Memphis State University and State Technical Institute of Memphis. He is a graduate of the EPA 450 "Source Sampling for Particulate Pollutant's" course and the 474 "Continuous Emissions Monitoring" courses outlined by EPA at Research Triangle Park, N.C. He has been directly involved in conducting and supervising air emission testing for over 15 years. He has personally conducted over 400 air emission tests. He currently sponsors and directs visual emission certification schools for US EPA Method 9.

Project Duties: Mr. Buck is responsible for the overall supervision of each testing project. This includes the correspondence to the State Regulatory Agency and the plant personnel regarding scheduling, testing requirements, etc. He will assist in supervision of the project preparation for each team involved and the overall organization between the testing crew(s) and facility.

Name: Mr. Joe Sewell
Title: Vice President

Qualifications: Mr. Sewell is currently serving as the Vice President of RAMCON Environmental Corporation. Mr. Sewell is a graduate of Christian Brothers University in Memphis, Tennessee where he obtained a Bachelor of Science degree in Chemical Engineering. He has conducted and supervised air emissions testing projects ranging a broad spectrum of facility process categories. His accomplishments include the development of the instrumental branch of emissions testing utilizing continuous emission monitors and gas chromatography. Mr. Sewell performs a major role in the upgrading of testing capabilities and professional quality that RAMCON Environmental Corporation offers.

Project Duties: Mr. Sewell provides staff engineering and project administration to ensure the integrity of the requested services. He serves as the primary contact person for RAMCON Environmental Corporation handling all correspondence between the facility

personnel involved in the project and respective state agency representative(s). He provides project leadership to RAMCON Environmental Corporation field supervisors and managers involved in the testing project.

Name: Mr. Ray Jenkins
Title: Source Sampling Director

Qualifications: Mr. Jenkins is serving as the Source Sampling Director for RAMCON Environmental Corporation. He was promoted to this leadership position after gaining a significant amount of experience in conducting and providing field supervision of a variety of air testing projects. Mr. Jenkins has personally conducted and/or supervised all of the prevalent EPA approved procedures with expertise in the instrumental analyzer procedures. He graduated from Memphis State University obtaining a Bachelor of Science degree in Biology. He is also currently certified to conduct US EPA Reference Method 9 for the visual determination of emission opacity.

Project Duties: Mr. Jenkins provides project leadership to the Team Leaders and Field Technicians. He ensures the test crew(s) involved in the test project will be properly informed to his respective duties and responsibilities during the testing process. Mr. Jenkins also serves as the Quality Assurance/Quality Control Coordinator and provides guidance in QA/QC to each Team Leader with regard to sample integrity.

Name: Mr. Tommy South
Title: Laboratory Technician

Qualifications: Mr. South is currently serving as Laboratory Technician. He is proficient in conducting many analysis procedures such as front and back-half particulate analysis, titrations, extractions, etc.

Project Duties: Mr. South conducts the laboratory analysis on the particulate samples. He is also responsible for accepting the remaining field samples from the Field Sample Bank

Manager and performing inspection as to integrity. He documents the transfer on the chain of custody forms and distributed the subcontracted samples to the respective laboratories.

Name: Mr. Allen Turner
Title: Team Leader

Qualifications: Mr. Turner has been employed with RAMCON Environmental Corporation for five years. Altogether, he has sampled approximately 300 stacks of all types. Mr. Turner became qualified for a Team Leader in 1988 and has served as such since that time. He is a current V.E. reader and continues his studies at State Technical Institute in Memphis, Tennessee. Mr. Turner has extensive experience in EPA Methods 1-9.

Project Duties: Mr. Turner is responsible for isokinetic sampling procedures, including but not limited to, Method 5 for particulate, multi-metals, PAH, calibration and cleaning of necessary equipment for his testing. His duties on-site include assembling the sample train, leak checking the system, operation of the train and recording the test data on the field data forms.

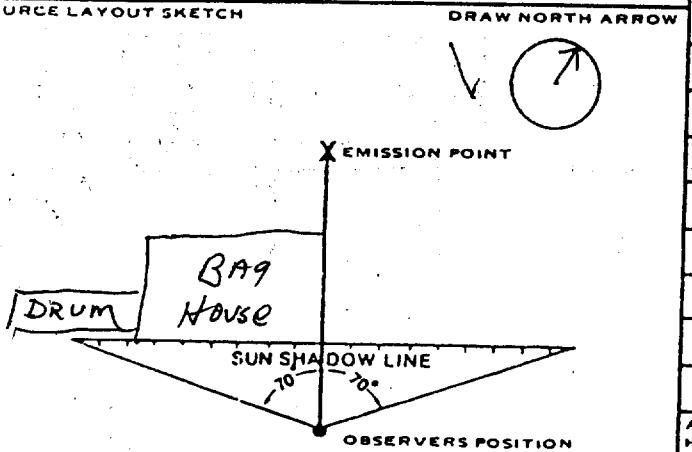
SECTION I:

VISIBLE EMISSIONS

RUN #1

SOURCE NAME: N.D. West Contractors Inc.
ADDRESS: 2780 Mary Avenue
Facility Location - (Jefferson County)
CITY: Brentwood | STATE: Mo | ZIP: 63144
PHONE: 314/962-3145 | SOURCE ID NUMBER:
PROCESS EQUIPMENT: Asphalt/DM/BH | OPERATING MODE:
CONTROL EQUIPMENT: Baghouse | OPERATING MODE:
DESCRIBE EMISSION POINT: Rectangular Metal Stack
HEIGHT ABOVE GROUND LEVEL: 32' | HEIGHT RELATIVE TO OBSERVER: 32'
DISTANCE FROM OBSERVER: 87' | DIRECTION FROM OBSERVER: NW
DESCRIBE EMISSIONS: Lofting Plume
EMISSION COLOR: Gray | PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]
WATER DROPLETS PRESENT: NO [X] YES [ ] | IS WATER DROPLET PLUME: ATTACHED [ ] DETACHED [X]
AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: Stack Outlet
DESCRIBE BACKGROUND: Sky
BACKGROUND COLOR: Blue/Gray | SKY CONDITIONS: Clear - Ground Fog
WIND SPEED: 1-3 mph | WIND DIRECTION: NW
AMBIENT TEMPERATURE: 55° F | RELATIVE HUMIDITY:

SOURCE LAYOUT SKETCH



COMMENTS: Sunglasses Worn

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

OBSERVATION DATE: Sept 21, 1993 | START TIME: 6:40 AM | STOP TIME: 7:40 AM

MIN	SEC 0	SEC 15	SEC 30	SEC 45	MIN	SEC 0	SEC 15	SEC 30	SEC 45
1	0	0	5	0	31	0	5	0	0
2	0	0	0	0	32	0	0	5	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	5	0	0	0
5	0	0	0	0	35	0	0	0	0
6	5	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	5	5
8	0	0	0	0	38	0	0	0	0
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11	5	0	0	0	41	0	0	0	0
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14	0	0	0	0	44	0	0	0	0
15	5	0	5	5	45	0	5	0	5
16	0	5	0	0	46	0	0	0	0
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18	0	0	0	0	48	0	5	0	5
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21	0	0	5	0	51	0	0	0	0
22	5	0	0	5	52	0	5	0	5
23	0	0	0	5	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	5	0	55	0	0	0	0
26	0	0	0	0	56	0	0	5	5
27	0	0	0	0	57	0	0	0	0
28	5	0	5	0	58	0	0	0	0
29	0	0	0	0	59	5	0	0	0
30	0	0	0	5	60	0	0	0	0

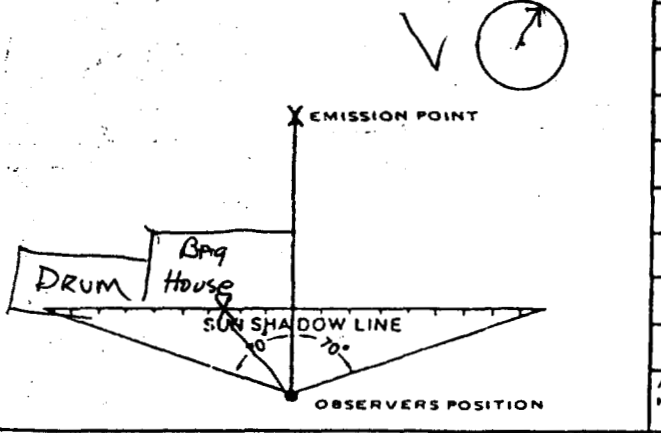
AVERAGE OPACITY FOR HIGHEST PERIOD: 1.46 %
NUMBER OF READINGS ABOVE 1.46 % WERE: 7
RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 5
OBSERVER'S NAME (PRINT): EARL CROOK
OBSERVER'S SIGNATURE: Earl Crook | DATE: APR 21, 93
ORGANIZATION:
CERTIFIED BY | DATE
VERIFIED BY | DATE

REC#14

RUN # 2

SOURCE NAME	N. B. West Contractors Inc
ADDRESS	2780 Mary Avenue
Facility Location (Jefferson County)	
CITY	Brentwood
STATE	Mo
ZIP	63144
PHONE	314/962-3145
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Asphalt/Dm/BH
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT	Rectangular Metal Stack
HEIGHT ABOVE GROUND LEVEL	32'
HEIGHT RELATIVE TO OBSERVER	32'
DISTANCE FROM OBSERVER	87'
DIRECTION FROM OBSERVER	NW
DESCRIBE EMISSIONS	Lofting Plume
EMISSION COLOR	Silver Gray
PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]	
WATER DROPLETS PRESENT NO [X] YES [ ]	
IS WATER DROPLET PLUME ATTACHED [ ] DETACHED [X]	
AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED	Stack Outlet
DESCRIBE BACKGROUND	Sky
BACKGROUND COLOR	Blue
SKY CONDITIONS	Clear
WIND SPEED	1-3 mph
WIND DIRECTION	NW
AMBIENT TEMPERATURE	62° F
RELATIVE HUMIDITY	

SOURCE LAYOUT SKETCH



OBSERVATION DATE: Sept 21, 1993 | START TIME: 8:45 AM | STOP TIME:

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3	0	0	5	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	5	35	0	0	0	5
6	0	0	0	0	36	0	0	5	0
7	5	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
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16	0	0	0	0	46	0	0	0	0
17	0	5	0	0	47	0	0	0	0
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19	0	0	5	0	49	0	0	0	0
20	5	0	0	0	50	5	0	0	0
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22	0	0	0	0	52	0	5	5	0
23	0	0	0	5	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	5	0	0	5	55	0	0	0	0
26	5	0	5	0	56	0	5	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	5	0	58	0	0	0	0
29	0	5	0	0	59	0	0	0	0
30	0	5	0	0	60	0	0	5	0

AVERAGE OPACITY FOR HIGHEST PERIOD:

NUMBER OF READINGS ABOVE ____ % WERE:

RANGE OF OPACITY READINGS — MINIMUM: MAXIMUM:

COMMENTS: Sunglasses Worn

OBSERVER'S NAME (PRINT): Earl Crook

OBSERVER'S SIGNATURE: Earl Crook | DATE: Apr 21, 93

ORGANIZATION:

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | TITLE | DATE

CERTIFIED BY | DATE

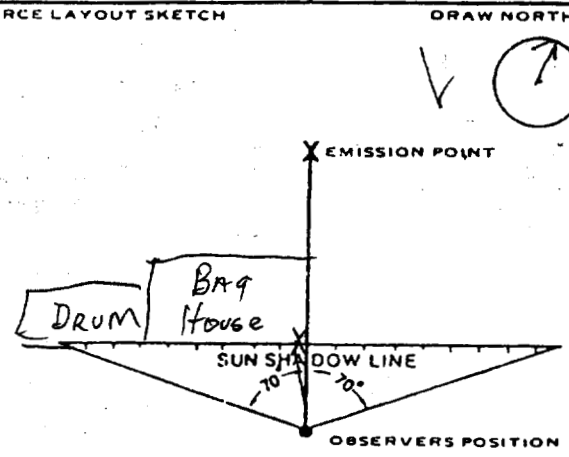
VERIFIED BY | DATE

REC#14

RUN #3

SOURCE NAME	NB West Contractors Inc
ADDRESS	2780 Mary Avenue
Facility Location (Jefferson County)	
CITY	Brentwood
STATE	Mo
ZIP	63144
PHONE	314/962-3145
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Asphalt/DM/BH
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT	Rectangular Metal Stack
HEIGHT ABOVE GROUND LEVEL	32'
HEIGHT RELATIVE TO OBSERVER	32'
DISTANCE FROM OBSERVER	87'
DIRECTION FROM OBSERVER	NW
DESCRIBE EMISSIONS	Looping Plume
EMISSION COLOR	Gray
PLUME TYPE: CONTINUOUS [X] FUGITIVE [ ] INTERMITTENT [ ]	
WATER DROPLETS PRESENT NO [X] YES [ ]	
IS WATER DROPLET PLUME ATTACHED [ ] DETACHED [X]	
AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED	Stack Outlet
DESCRIBE BACKGROUND	Sky
BACKGROUND COLOR	Blue
SKY CONDITIONS	Clear
WIND SPEED	8-10 mph
WIND DIRECTION	NW
AMBIENT TEMPERATURE	70° F
RELATIVE HUMIDITY	

SOURCE LAYOUT SKETCH



OBSERVATION DATE: Sept 21, 1993 | START TIME: 10:39 | STOP TIME:

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6	0	5	0	0	36	0	0	0	0
7	5	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
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11	5	0	0	0	41	0	0	0	0
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13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	5	0
15	0	0	0	0	45	5	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	5	0	0	47	0	0	5	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	5	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	5	0	53	0	0	0	0
24	0	0	0	5	54	0	0	5	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	5	0
27	0	0	5	0	57	5	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: .63 %

NUMBER OF READINGS ABOVE .63 % WERE 3

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 5

COMMENTS: Sunglasses Worn

OBSERVER'S NAME (PRINT): Earl Crook

OBSERVER'S SIGNATURE: Earl Crook | DATE: Apr 21, 93

ORGANIZATION:

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | DATE

TITLE | DATE

CERTIFIED BY | DATE

VERIFIED BY | DATE

EPA FORM

REC#14

Visible Emissions Evaluator

This certifies that

EARL T. CROOK

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 the Arkansas Department of Pollution Control and Ecology.

Mark A. Lowell
Field Instructor

James B. Jones Jr.
FOR Director

APRIL 21, 1993
Date

LITTLE ROCK, AR
Location