

Koppers Inc

General Information

ID	Branch	SIC	County	Basin	Start	End
876	Energy and Transportation	2491	Grenada	Yazoo River	11/09/1981	

Address

Physical Address (Primary)	Mailing Address
1 Koppers Drive Tie Plant, MS 38960	PO Box 160 Tie Plant, MS 38960

Telecommunications

Type	Address or Phone
Work phone number	(662) 226-4584, Ext. 11

Alternate / Historic AI Identifiers

Alt ID	Alt Name	Alt Type	Start Date	End Date
2804300012	Koppers Industries, Inc.	Air-AIRS AFS	10/12/2000	
096000012	Koppers Industries, Inc.	Air-Title V Fee Customer	03/11/1997	
096000012	Koppers Industries, Inc.	Air-Title V Operating	03/11/1997	03/01/2002
096000012	Koppers Industries, Inc.	Air-Title V Operating	01/13/2004	01/01/2009
MSR220005	Koppers Industries, Inc.	GP-Wood Treating	09/25/1992	
MSD007027543	Koppers Industries, Inc.	Hazardous Waste-EPA ID	08/27/1999	
HW8854301	Koppers Industries, Inc.	Hazardous Waste-TSD	06/28/1988	06/28/1998
HW8854301	Koppers Industries, Inc.	Hazardous Waste-TSD	11/10/1999	09/30/2009
876	Koppers Industries, Inc.	Historic Site Name	11/09/1981	12/11/2006
876	Koppers, Inc.	Official Site Name	12/11/2006	
MSP090300	Koppers Industries, Inc.	Water-Pretreatment	11/14/1995	11/13/2000
MSP090300	Koppers Industries, Inc.	Water-Pretreatment	09/18/2001	08/31/2006
MSU081080	Koppers Industries, Inc.	Water-SOP	11/09/1981	11/30/1985

Regulatory Programs

Program	SubProgram	Start Date	End Date
Air	Title V - major	06/01/1900	
Hazardous Waste	Large Quantity Generator	08/27/1999	
Hazardous Waste	TSD - Not Classified	06/28/1988	
Water	Baseline Stormwater	01/01/1900	
Water	PT CIU	11/14/1995	
	PT CIU - Timber Products		

Water	Processing (Subpart 429)	11/14/1995	
Water	PT SIU	11/14/1995	

Locational Data

Latitude	Longitude	Metadata	S / T / R	Map Links
33 ° 44 ' 3 .00 (033.734167)	89 ° 47 ' 8 .06 (089.785572)	Point Desc: PG- Plant Entrance (General). Data collected by Mike Hardy on 11/8/2005. Elevation 223 feet. Just inside entrance gate. Method: GPS Code (Psuedo Range) Standard Position (SA Off) Datum: NAD83 Type: MDEQ	Section: Township: Range:	SWIMS TerraServer Map It

12/20/2006 12:16:40 PM



Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4584
FAX: (601) 226-4588

October 28, 2002

CERTIFIED MAIL

Mr. David Lee
Environmental Compliance Division
P.O. BOX 10385
Jackson, MS. 39289-0385

RECEIVED
OCT 30 2002
Dept. of Environmental Quality
Office of Pollution Control

**Re: Koppers Industries Inc.- Grenada
2002 Stack Test Results**

Dear Mr. Lee,

Enclosed are the Stack Test Results for Koppers Industries, Inc., performed on September 23, 2002. Environmental Monitoring Laboratories, Inc. performed the testing. If you have any questions regarding the application, please call me at (662) 226- 4584 ext. 40.

Sincerely,

A handwritten signature in black ink, appearing to read "Haley P. Biddy", written over a horizontal line.

Haley P. Biddy
Environmental Supervisor

Cc. Tim Basilone

***PARTICULATE AND VISIBLE EMISSIONS TEST
WOOD WASTE BOILER***

KOPPERS INDUSTRIES

FACILITY NO. 0960-00012

***Grenada, Mississippi
September 23, 2002***

Koppers Industries
P.O. Box 160
Tie Plant, MS 38960

Performed by:

ENVIRONMENTAL MONITORING LABORATORIES, INC.

624 Ridgewood Road
P.O. Box 655
Ridgeland, Mississippi 39158

Phone: (601)856-3092

Fax: (601)853-2151

REPORT OF PARTICULATE AND VISIBLE
EMISSIONS TESTING FOR
KOPPERS INDUSTRIES
GRENADA PLANT
WOOD WASTE BOILER

Grenada, Mississippi
September 23, 2002

FACILITY NO. 0960-00012

EMISSION POINT NO. AA-001

Koppers Industries
P.O. Box 160
Tie Plant, MS 38960

Contact: Haley Biddy
ph: 662/226-4584

Prepared By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi
✻ 601/856-3092 ✻

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 ☉ 624 Ridgewood Road
Ridgeland, Mississippi 39158

phone: 601/856-3092
fax : 601/853-2151

September 29, 2000

Subject: Koppers Industries - Grenada, Mississippi
Wood Waste Boiler - Stack Emissions Test
Facility No. 0960-00012

On September 23, 2002, Environmental Monitoring Laboratories performed air emissions testing for Koppers Industries in the Tie Plant community near Grenada, Mississippi. Testing was done to measure particulate and visible emissions from the wood waste boiler in accordance with requirements of the Mississippi Department of Environmental Quality.

Results of emissions testing are shown below.

PARTICULATE EMISSIONS			VISIBLE EMISSIONS
#/hr	gr/dscf	#/MM Btu	High SMA, % opacity
26.80	0.181	0.551	8.96

Mr. Haley Biddy of Koppers coordinated the testing project. Otis Rayburn of Environmental Monitoring Laboratories was responsible for collection and analysis of particulate samples. Sample custody was limited to Mr. Rayburn.

Following is a report of the test.

REPORT OF PARTICULATE EMISSIONS TESTS
FOR KOPPERS INDUSTRIES, INC.
GRENADA PLANT
WOOD WASTE BOILER

Grenada, Mississippi
September 23, 2002

CONTENTS

1.0	TEST RESULTS	page 1
2.0	SOURCE DESCRIPTION	2
3.0	TEST PROCEDURES	2
4.0	DATA REDUCTION	3
5.0	NOMENCLATURE	6
6.0	CALIBRATION	7
7.0	APPENDICES:	8
A.	Field and Laboratory Data	
B.	Calibrations	
C.	Visible Emissions Record	
D.	Boiler Steam Chart (Koppers)	

REPORT CERTIFICATION

I certify that I have examined the information submitted herein,
and based upon inquiries of those responsible for obtaining the
data or upon my direct acquisition of data, I believe the
submitted information is true, accurate and complete.

Signed _____

Daniel G. Russell

1.0 Test Results:

Wellons Wood Waste Boiler

Run No.		1	2	3	AVG.
Date		09/23/02	09/23/02	09/23/02	-----
Time Start		1205	1320	1432	----
Time End		1306	1421	1533	----
PARTICULATE EMISSIONS	#/hr	34.51	21.24	24.66	26.80
PARTICULATE EMISSIONS	gr/dscf	0.236	0.143	0.163	0.181
PARTICULATE EMISSIONS	#/MM Btu	0.702	0.454	0.497	0.551
VISIBLE EMISSIONS	high SMA, %	8.96	5.83	5.83	8.96
HEAT INPUT	MM Btu/hr	49.20	46.75	49.65	48.53
VOLUMETRIC FLOWRATE	acfm	30977	31452	30796	31075
VOLUMETRIC FLOWRATE	dscfm	16991	17292	17600	17294
VELOCITY	ft./sec.	79.5	80.7	79.1	79.8
STACK TEMPERATURE	°F	365	365	366	366
MOISTURE	%	14.0	13.8	10.3	12.7
SAMPLE RATE	% isokinetic	94	99	95	96

2.0 SOURCE DESCRIPTION:

Koppers Industries, Inc. operates a 30,000 pound per hour Wellons wood waste boiler at their wood preserving facility in Grenada, Mississippi. The boiler provides steam for the timber treating processes and a turbine generator. Fuel is typically wood waste generated from the manufacture of wood products.

Heat input as calculated from the test data and an F-Factor was an average 48.53 MM Btu/hr.

The boiler exhausts to the atmosphere by way of a 34.5 inch diameter vertical stack. Two sample ports at 90° are provided at a location that is 432 inches (12.5 diameters) below the stack exit and 356 inches (10.3 diameters) above an upstream stack tapered section.

3.0 TEST PROCEDURES:

Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points and Method 5 to determine flow rates, moisture content, and particulate emissions. The sampling train was identical to that described in Method 5 except that the cyclone was omitted. Visible emissions were read in accordance with Method 9 concurrently with the emissions test

Heat input to the boilers was determined by continuously monitoring oxygen content of the flue gas as described in Method 3A and calculating heat input using an F-factor of 9400 scf per million Btu of heat input for the wood waste fuel.

Filters were recovered by rinsing the front half of the filter holder into the probe wash and securing the filters in glass petri dishes. Part of the sample filter often adheres to the filter gasket, and some of the adhering material is recovered into the probe wash. Therefore some of the filter weight is attributed to the probe wash weight.

Filters were heated in an oven for 2 hours at 105° C, desiccated at least 24 hours and weighed to constant weight. Probe wash samples in acetone were evaporated to dryness over low heat in tared beakers, desiccated for at least 24 hours and weighed to constant weight. Weighings are made at 6 hour or greater intervals (samples stored in desiccator). Final weights were considered valid and were recorded if there was no more than 0.5 milligrams difference from the previous weighing.

4.0 DATA REDUCTION

Koppers - Grenada
 Wellons Wood Waste Boiler
 Particulate Emissions Test - September 23, 2002

Collected Test Data:

	RUN 1	RUN 2	RUN 3
Date :	09/23/02	09/23/02	09/23/02
Time start :	1205	1320	1432
Time end :	1306	1421	1533
1. As : sq ft	6.4918	6.4918	6.4918
2. Dn : in.	0.270	0.205	0.205
3. Cp : dimensionless	0.84	0.84	0.84
4. Theta : minutes	60.00	60.00	60.00
5. Y : dimensionless	1.00	1.00	1.00
6. Pbar : in. Hg	29.94	29.94	29.94
7. Pg : in. H2O	-1.7	-1.7	-1.7
8. Vm : cf (dry gas)	60.098	37.499	36.582
9. $\text{sqr}(\Delta P)_{\text{avg}}$: in.H2O ^{0.5}	1.1185	1.1366	1.1196
10. ΔH : in. H2O	3.7333	1.2567	1.2183
11. ts : degrees F	365.33	365.25	366.25
12. tm : degrees F	84.04	88.00	87.29
13. Vlc : ml	203	123	86
14. CO2 : percent	9.00	9.00	8.80
15. O2 : percent	11.42	12.05	11.66
16. CO : percent	0.00	0.00	0.00
18. F : dscf	9400	9400	9400
19. M,PM : milligrams	904.4	336.7	375.2

Koppers - Grenada
Wellons Wood Waste Boiler
Particulate Emissions Test - September 23, 2002

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
^{1.} Pm : in.Hg $(\Delta H/13.6)+Pbar$	30.2145	30.0324	30.0296	
^{2.} Ps : in. Hg $(Pg/13.6)+Pbar$	29.8150	29.8150	29.8150	
^{3.} An : sq ft $((Dn/24)^2)(3.1416)$	3.98E-04	2.29E-04	2.29E-04	
^{4.} Vmstd : dscf $Vm Y(Pm/Pstd)(Tstd/Tm)$	58.900	36.266	35.422	43.529
^{5.} Vwstd : scf $(.04707cf/ml)(Vlc)$	9.555	5.790	4.048	
^{6.} Bws : dimensionless $Vwstd/(Vwstd+Vmstd)$	0.1396	0.1377	0.1026	0.1266
^{7.} Md : mol.wt. dry basis .44 CO ₂ +.32 O ₂ +.28(CO+N ₂)	29.90	29.92	29.87	
^{8.} Ms : mol.wt. wet basis $Md(1-Bws)+18 Bws$	28.24	28.28	28.66	
^{9.} Vs : ft/sec $Kp Cp (sqr\Delta P)sqr(Ts/(Ps Ms))$	79.53	80.75	79.06	79.78
^{10.} Q : cfm $Vs As(60 \text{ sec/min})$	30977	31452	30796	31075
^{11.} Qstw : scfm $Q(Ps/Pstd)(Tstd/Ts)$	19748	20053	19611	19804
^{12.} Qstd : dscfm $Qstw(1-Bws)$	16991	17292	17600	17294
^{13.} Xsair : percent $100[(O_2-.5CO)/(.264 N_2-(O_2-.5CO))]$	119.09	136.95	124.92	126.99
^{14.} HeatInput : MM Btu/hr $60 Qstd/(F 20.9/(20.9 - O_2))$	49.20	46.75	49.65	48.53
^{15.} I : percent $[(100 Ts)(.002669 Vlc+(Vm Pm/Tm))/(60 \theta Vs Ps An)]$	94.34	99.01	95.01	96.12

Particulate Emissions

^{16.} E,PM : pounds/hr $(M,PM/Vmstd)(Qstd)(60)/(453590)$	34.51	21.24	24.66	26.80
^{17.} C,PM : grains/dscf $(M,PM/Vmstd)(.0154 \text{ grains/mg})$	0.2365	0.1430	0.1631	0.1809
^{18.} C'PM : grains/dscf @ 50% Xsair $C'PM/(1-((1.5 O_2-.133 N_2 - .75 CO)/21))$	0.3435	0.2236	0.2432	0.2701
^{19.} E'PM : pounds/MM Btu $E,PM/HeatInput$	0.702	0.454	0.497	0.551

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
A_n	ft^2	Nozzle cross sectional area
A_s	ft^2	Stack cross sectional area
B_{ws}	dimensionless	Wet gas fraction
CO_2	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
C_p	dimensionless	Pitot correction factor
C, X	as labeled	Concentration of pollutant X
DGF	dimensionless	Dry gas fraction
D_n	inches	Nozzle diameter
ΔH (delta H)	in. H_2O	Pressure drop across meter orifice
ΔP (delta P)	in. H_2O	Stack gas velocity pressure
E, X	$\#/\text{hr}$	Emission rate of pollutant X
$E'X$	$\#/\text{MM Btu}$	Emission rate of pollutant X
F	dscf	Volume of flue gas per MM Btu
l	percent	Nozzle velocity/stack gas velocity
K_p	consistent	Pitot tube constant
M, X	milligrams	Sample weight of pollutant X
M_d	$\#/\#$ mole	Dry molecular weight of stack gas
M_s	$\#/\#$ mole	Wet molecular weight of stack gas
N_2	percent	Nitrogen content by volume, dry basis
O_2	percent	Oxygen content by volume, dry basis
P_{bar}	in. Hg	Barometric pressure
P_g	in. Hg	Stack static pressure
P_m	in. Hg	Total pressure at meter ($P_{bar} + (\Delta H/13.6)$)
P_s	in. Hg	Total stack pressure ($P_{bar} + (P_g/13.6)$)
P_{std}	in. Hg	Standard barometric pressure = 29.92
Q	acfm	Volumetric flow rate at stack conditions
Q_{std}	dscfm	Volumetric flow rate at standard conditions, dry basis
Q_{stdw}	scfm	Volumetric flow rate at standard conditions, wet basis
θ (theta)	minutes	Sample duration
t_m	$^{\circ}\text{F}$	Meter temperature (T_m denotes $^{\circ}\text{R}$)
t_s	$^{\circ}\text{F}$	Stack temperature (T_s denotes $^{\circ}\text{R}$)
T_{std}	$^{\circ}\text{R}$	Standard temperature = 528 $^{\circ}\text{R}$
V_l	ml	volume of water collected
V_m	ft^3	Volume of dry gas sampled through meter
V_{mstd}	dscf	Sample volume at standard conditions
V_{wstd}	scf	Sample volume of water vapor
Y	dimensionless	Meter coefficient
X_{sair}	percent	Excess air

6.0 CALIBRATIONS:

Measurement devices used by Environmental Monitoring Laboratories and subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

Dry Gas Meter:

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired (new gaskets etc. as required). Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. This service is provided by Big Three Meter Company in Jackson, Mississippi. Overhaul service or any six month period is followed by a five point calibration described in APTD-0576 using either a wet test meter or calibrated dry gas meter (used exclusively for calibrations) as a standard reference. Following field use, a gas meter calibration is checked in one of two ways. [1] Three calibration checks at intermediate orifice settings are performed or [2] orifice meter coefficients are used.

If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

Orifice:

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration.

Nozzles:

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

Pitot Tubes:

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration which it retains unless damaged. All pitot tubes used by Environmental Monitoring Laboratories are manufactured by NuTech, Inc.

Temperature Measuring Instruments:

All temperature measurements are made with type K thermocouples and digital thermocouple thermometers, which have an initial calibration traceable to NBS. Thermocouples are checked during a test series against an ASTM mercury in glass thermometer at ambient temperature. Continuity and proper thermocouple contact location are checked by challenging the thermocouple with a temperature change. (EMTIC GD028 -- June 21, 1994)

Barometer:

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

Differential Pressure Gauges:

Velocity head (ΔP) and orifice pressure differential (ΔH) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration.

7.0 APPENDICES

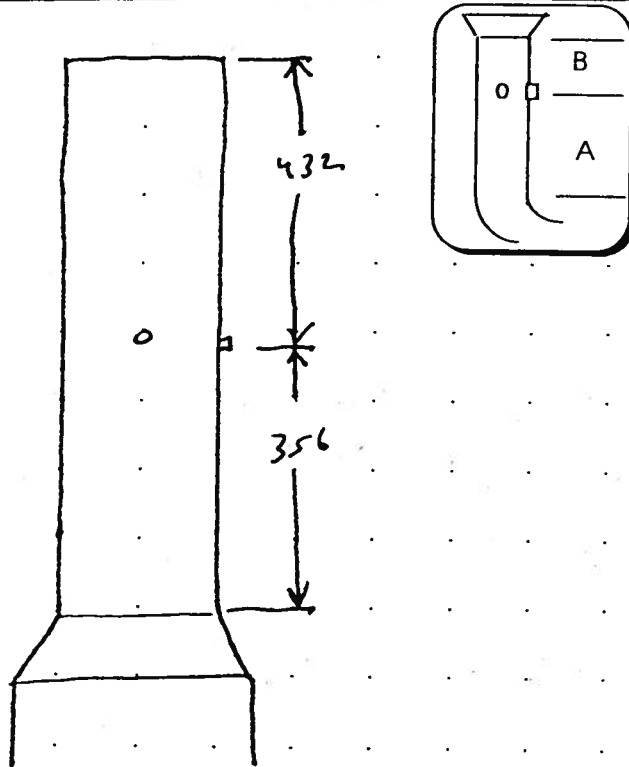
- A. Field and Laboratory Data
- B. Calibrations
- C. Visible Emissions Record
- D. Boiler Steam Chart (Koppers)

STACK CONFIGURATION AND SAMPLE POINT LAYOUT FOR CIRCULAR STACKS

PLANT: Koppe - Grande
 SOURCE: Boiler
 TEST FOR: Pa. Setup
 TEST OPERATORS: _____

Date: _____

SKETCH OF STACK



PERCENT OF DIAMETER

point no.	points on a diameter							
	2	4	6	8	10	12	14	16
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

STACK DIAMETER:

Distance from ports to disturbance:

A. to upstream disturbance

B. to downstream disturbance

Upstream diameters:

Downstream diameters:

Minimum No. sample points required:

No. sample points selected:

Port Length:

Port Type:

Port Access:

395

356

432

10.3

12.5

8

12 (12.5)

8" (NE) + 75" (SE)

4" nipple

Platform / boards / chains

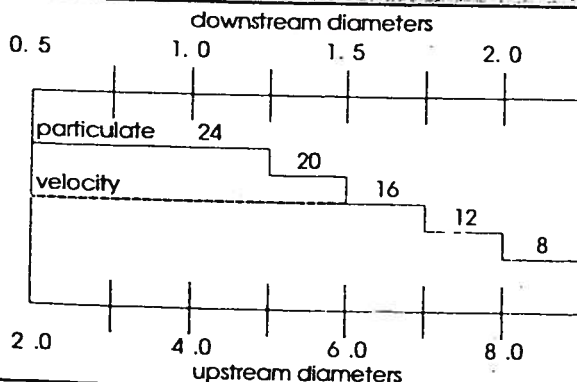
Point No.

inches from wall

velocity head

1 1.5
 2 5.0
 3 10.2
 4 24.3
 5 29.5
 6 33.0

MINIMUM NO. OF POINTS ON A DIAMETER



Pitot ID :

Pitot Cp:

Stack Temp:

270

Remarks:

RUN NO. 1
Date 9-23-02
Time start 1205 **end** 1306

CONDENSATE:
init. 200 final 389
SILICA GEL:
init. 778 final 792

Leak Checks: Sample Train: $\frac{.010}{.019} = .009$ cfm @ $\frac{10}{21}$ " Hg Pretest: Sample Train

RUN NO. 2
Date 9-23-02
Time start 1320 end 1421

Notes: _____

NO 22/10

Ø.205

Ø.205

Ø.205

CONDENSATE:
init. 200 final 313

SILICA GEL:
init. 790 final 800

Leak Checks:	Sample Train: $\frac{.060}{.51} \rightarrow \frac{.021}{.42} = \frac{.011}{.42} \text{ cfm @ } \frac{7}{42} \text{ " Hg}$ Pilot Tubes:	Pretest:	Sample Train	
---------------------	---	-----------------	---------------------	--

Plant: Koppers Tie, ms
 Source: Boiler
 Test For: PM/02/VE
 Test Operators: Rayburn/Mullen/Warner

RUN NO. 3
 Date 9-23-02
 Time start 1432 end 1533

Meter Box Notch 2
 Sample Box No. 2
 Probe/Pitot 4'SS
 Pitot Cp .84
 Nozzle Dia. .205
 Filter No. _____

No. Sample Pts. 6x2
 Minutes/Pt. 5.0

K FACTOR SETUP
 $\Delta H@$ 1.77
 Meter Temp 88
 % H₂O 14
 Stack Temp. 365
 K Factor 0.98

GAS ANALYSIS: Elyte

CO ₂	<u>8.8</u>		
O ₂	<u>CFM</u>		
CO			
Time			

Notes: _____

Amb. Temp. °F 81
 Bar. Press. "Hg 29.88
 Static Press. "H₂O -1.7

CONDENSATE:
 init. 200 final 278
 SILICA GEL:
 init. 819.5 final 827.5

Port Point	Elapsed Time Min/sec	DGM Reading FL ³	Velocity Head ΔP in. H ₂ O	Orifice ΔH in. H ₂ O	Stack Temp °F	Meter Temp °F		Oven Temp. °F	Imp. Temp °F	VAC in. Hg
						in	out			
1	000	714.620	1.40	1.35	377	88	86	251	80	3
2	5	721.9	1.40	1.35	368	88	86	250	55	3
3	10	724.9	1.40	1.35	366	88	86	259	50	3
4	15	727.9	1.40	1.35	367	88	86	261	46	3
5	20	731.2	1.20	1.15	367	88	86	261	46	3
6	25	734.4	0.84	0.82	362	88	86	261	50	3
7										
8	30/00	736.908	1.30	1.25	361	88	86	262	56	3
9	5	739.9	1.40	1.35	364	88	86	260	50	3
10	10	743.0	1.40	1.35	367	89	87	260	42	3
11	15	746.3	1.40	1.35	367	89	87	258	43	3
12	20	749.7	1.20	1.15	365	89	87	262	47	3
13	25	752.5	0.82	0.80	364	89	86	259	50	4
14	END 40/00	755.202	.	.						
15		.	.	.						
16		.	.	.						
17		.	.	.						
18		.	.	.						
19		.	.	.						
20		.	.	.						
21		.	.	.						
22		.	.	.						
23		.	.	.						
24		.	.	.						
25		.	.	.						
26		.	.	.						
27		.	.	.						
28		36.582	1.1196	1.2183	366.25		87.29			
29		.	.	.						
30		.	.	.						
31		.	.	.						
32		.	.	.						
33		.	.	.						

Leak Checks:

Sample Train: 1040 → 1052 = .012 cfm @ 6 " Hg
 Pitot Tubes: High ☒ @ 5.5 " H₂O || Low ☒ @ 4.4 " H₂O

Pretest: Sample Train ☒
 Pitot Tubes ☒

PARTICULATE CATCH ANALYSIS

SAMPLES: Koppers Tie Plant, Ms Boiler

DATE TAKEN: 9-23-02 DATE ANALYZED: _____

DELIVERED BY: ONR RECEIVED BY: ONR

ANALYZED BY: ONR / DGA

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	1812	1811	1813	
FILTER TARE, gms.	.6653	.6683	.6628	
	1.3487	1.8800	1.8915	
FINAL WEIGHT, gms.	1.7484	.8798	.8915	
NET GAIN, gms.	.6831	.2115	.2287	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	Koppers 121	Koppers 122	Koppers 123	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	150	110	125	
	(1)	(3)	(4)	()
TARE WEIGHT, gms.	116.6696	103.2096	116.7994	
	116.8910	103.3350	116.9460	
FINAL WEIGHT, gms	116.8909	103.3348	116.9459	
NET GAIN, gms.	.2213	.1252	.1465	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	904.4	336.7	375.2	

TIME	"11C2"
TIME	"VDC"
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09/23/02 9:07	20.98
09/23/02 9:08	20.99
09/23/02 9:08	21.01
09/23/02 9:08	21.02
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-0.01
-0.03
-0.02

0.01
0.01
0.01
0.00
0.01

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09/23/02 10:42	13.78
09/23/02 10:42	13.73
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09/23/02 11:22	10.93
09/23/02 11:22	11.02
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09/23/02 11:38	11.03
09/23/02 11:38	10.94
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09/23/02 12:44	11.52
09/23/02 12:44	11.64
09/23/02 12:45	11.74
09/23/02 12:45	11.61
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09/23/02 12:46	11.63

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09/23/02 12:54	11.78
09/23/02 12:54	11.71
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09/23/02 12:55	11.38
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09/23/02 12:57	11.13
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09/23/02 12:59	11.56
09/23/02 12:59	11.70
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09/23/02 13:04	11.91
09/23/02 13:04	11.87
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AVG R 1	11.42

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09/23/02 13:12	0.01
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09/23/02 13:14	10.03
09/23/02 13:14	10.04
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09/23/02 13:55	12.17
09/23/02 13:56	12.23
09/23/02 13:56	12.10
09/23/02 13:56	12.01
09/23/02 13:56	12.03
09/23/02 13:57	12.08
09/23/02 13:57	12.03
09/23/02 13:57	11.85
09/23/02 13:57	11.72
09/23/02 13:58	11.63
09/23/02 13:58	11.73
09/23/02 13:58	11.69
09/23/02 13:58	11.53
09/23/02 13:59	11.46
09/23/02 13:59	11.48
09/23/02 13:59	11.46
09/23/02 13:59	11.37
09/23/02 14:00	11.34
09/23/02 14:00	11.39

09/23/02 14:00	11.48
09/23/02 14:00	11.51
09/23/02 14:01	11.44
09/23/02 14:01	11.49
09/23/02 14:01	11.51
09/23/02 14:01	11.43
09/23/02 14:02	11.30
09/23/02 14:02	11.28
09/23/02 14:02	11.34
09/23/02 14:02	11.41
09/23/02 14:03	11.55
09/23/02 14:03	11.72
09/23/02 14:03	11.62
09/23/02 14:03	11.52
09/23/02 14:04	11.51
09/23/02 14:04	11.60
09/23/02 14:04	11.59
09/23/02 14:04	11.48
09/23/02 14:05	11.60
09/23/02 14:05	11.81
09/23/02 14:05	11.85
09/23/02 14:05	11.85
09/23/02 14:06	11.75
09/23/02 14:06	11.75
09/23/02 14:06	11.76
09/23/02 14:06	11.69
09/23/02 14:07	11.58
09/23/02 14:07	11.52
09/23/02 14:07	11.52
09/23/02 14:07	11.48
09/23/02 14:08	11.48
09/23/02 14:08	11.57
09/23/02 14:08	11.70
09/23/02 14:08	11.76
09/23/02 14:09	11.70
09/23/02 14:09	11.71
09/23/02 14:09	11.72
09/23/02 14:09	11.70
09/23/02 14:10	11.73
09/23/02 14:10	11.60
09/23/02 14:10	11.84
09/23/02 14:10	11.94
09/23/02 14:11	11.98
09/23/02 14:11	11.86
09/23/02 14:11	11.66
09/23/02 14:11	11.54
09/23/02 14:12	11.56
09/23/02 14:12	11.62
09/23/02 14:12	11.66
09/23/02 14:12	11.69
09/23/02 14:13	11.62
09/23/02 14:13	11.58
09/23/02 14:13	11.56
09/23/02 14:13	11.63
09/23/02 14:14	11.69
09/23/02 14:14	11.71
09/23/02 14:14	11.58
09/23/02 14:14	11.50
09/23/02 14:15	11.43
09/23/02 14:15	11.47
09/23/02 14:15	11.59
09/23/02 14:15	11.73
09/23/02 14:16	11.62
09/23/02 14:16	11.54
09/23/02 14:16	11.63
09/23/02 14:16	11.77
09/23/02 14:17	11.84
09/23/02 14:17	11.83
09/23/02 14:17	11.66
09/23/02 14:17	11.56
09/23/02 14:18	11.55
09/23/02 14:18	11.64
09/23/02 14:18	11.78
09/23/02 14:18	11.84
09/23/02 14:19	11.74
09/23/02 14:19	11.61
09/23/02 14:19	11.66
09/23/02 14:19	11.97
09/23/02 14:20	12.20
09/23/02 14:20	12.12
09/23/02 14:20	11.68
09/23/02 14:20	11.65
AVG R 2	12.05

09/23/02 14:21	11.58
09/23/02 14:21	11.71
09/23/02 14:21	11.84
09/23/02 14:21	11.69
09/23/02 14:22	11.42
09/23/02 14:22	11.57
09/23/02 14:22	12.21
09/23/02 14:22	9.08
09/23/02 14:23	4.19
09/23/02 14:23	1.03
09/23/02 14:23	0.14
09/23/02 14:23	0.04
09/23/02 14:24	0.03
09/23/02 14:24	0.03
09/23/02 14:24	0.03

09/23/02 14:24	0.02
09/23/02 14:25	0.02
09/23/02 14:25	0.02
09/23/02 14:25	0.01
09/23/02 14:25	0.02
09/23/02 14:26	0.02
09/23/02 14:26	2.41
09/23/02 14:26	7.20
09/23/02 14:26	9.49
09/23/02 14:27	9.96
09/23/02 14:27	10.02
09/23/02 14:27	10.02
09/23/02 14:27	10.03
09/23/02 14:28	10.03
09/23/02 14:28	10.03
09/23/02 14:28	10.03
09/23/02 14:28	10.03
09/23/02 14:29	10.03
09/23/02 14:29	10.04
09/23/02 14:29	10.70
09/23/02 14:29	15.34
09/23/02 14:30	19.02
09/23/02 14:30	17.14
09/23/02 14:30	14.13
09/23/02 14:30	12.20
09/23/02 14:31	11.48
09/23/02 14:31	11.29
09/23/02 14:31	11.29
09/23/02 14:31	11.30
09/23/02 14:32	11.30
09/23/02 14:32	11.34
09/23/02 14:32	11.37
09/23/02 14:32	11.31

START R	O2
09/23/02 14:33	11.26
09/23/02 14:33	11.23
09/23/02 14:33	11.26
09/23/02 14:33	11.29
09/23/02 14:34	11.23
09/23/02 14:34	11.16
09/23/02 14:34	11.12
09/23/02 14:34	11.23
09/23/02 14:35	11.30
09/23/02 14:35	11.37
09/23/02 14:35	11.44
09/23/02 14:35	11.32
09/23/02 14:36	11.19
09/23/02 14:36	11.19
09/23/02 14:36	11.25
09/23/02 14:36	11.27
09/23/02 14:37	11.23
09/23/02 14:37	11.28
09/23/02 14:37	11.31
09/23/02 14:37	11.28
09/23/02 14:38	11.26
09/23/02 14:38	11.25
09/23/02 14:38	11.14
09/23/02 14:38	11.12
09/23/02 14:39	11.14
09/23/02 14:39	11.13
09/23/02 14:39	11.15
09/23/02 14:39	11.47
09/23/02 14:40	11.54
09/23/02 14:40	11.52
09/23/02 14:40	11.58
09/23/02 14:40	11.65
09/23/02 14:41	11.74
09/23/02 14:41	11.62
09/23/02 14:41	11.35
09/23/02 14:41	11.36
09/23/02 14:42	11.59
09/23/02 14:42	11.51
09/23/02 14:42	11.61
09/23/02 14:42	11.97
09/23/02 14:43	11.94
09/23/02 14:43	11.79
09/23/02 14:43	11.80
09/23/02 14:43	12.09
09/23/02 14:44	12.12
09/23/02 14:44	11.92
09/23/02 14:44	11.82
09/23/02 14:44	11.96
09/23/02 14:45	12.08
09/23/02 14:45	12.08
09/23/02 14:45	12.23
09/23/02 14:45	12.44
09/23/02 14:46	12.21
09/23/02 14:46	11.88
09/23/02 14:46	11.84
09/23/02 14:46	11.72
09/23/02 14:47	11.77
09/23/02 14:47	12.10
09/23/02 14:47	12.16
09/23/02 14:47	11.98
09/23/02 14:48	11.87
09/23/02 14:48	11.97
09/23/02 14:48	12.24
09/23/02 14:48	12.11
09/23/02 14:48	11.74

09/23/02 14:49	11.76
09/23/02 14:49	12.01
09/23/02 14:49	12.01
09/23/02 14:50	11.90
09/23/02 14:50	11.72
09/23/02 14:50	11.80
09/23/02 14:50	11.83
09/23/02 14:51	11.60
09/23/02 14:51	11.83
09/23/02 14:51	11.64
09/23/02 14:51	11.82
09/23/02 14:52	11.68
09/23/02 14:52	11.70
09/23/02 14:52	11.64
09/23/02 14:52	11.74
09/23/02 14:53	11.90
09/23/02 14:53	11.97
09/23/02 14:53	12.07
09/23/02 14:53	12.01
09/23/02 14:54	11.92
09/23/02 14:54	11.79
09/23/02 14:54	11.52
09/23/02 14:54	11.41
09/23/02 14:55	11.57
09/23/02 14:55	11.54
09/23/02 14:55	11.49
09/23/02 14:55	11.83
09/23/02 14:56	11.94
09/23/02 14:56	12.01
09/23/02 14:56	12.19
09/23/02 14:56	12.21
09/23/02 14:57	11.97
09/23/02 14:57	11.82
09/23/02 14:57	11.92
09/23/02 14:57	11.93
09/23/02 14:58	11.79
09/23/02 14:58	11.83
09/23/02 14:58	11.89
09/23/02 14:58	11.66
09/23/02 14:59	11.52
09/23/02 14:59	11.59
09/23/02 14:59	11.75
09/23/02 14:59	11.76
09/23/02 15:00	11.81
09/23/02 15:00	12.05
09/23/02 15:00	12.22
09/23/02 15:00	12.26
09/23/02 15:01	12.23
09/23/02 15:01	12.03
09/23/02 15:01	11.70
09/23/02 15:01	11.47
09/23/02 15:02	11.39
09/23/02 15:02	11.46
09/23/02 15:02	11.60
09/23/02 15:02	11.80
09/23/02 15:03	11.91
09/23/02 15:03	11.93
09/23/02 15:03	11.96
09/23/02 15:03	11.95
09/23/02 15:04	11.68
09/23/02 15:04	11.43
09/23/02 15:04	11.37
09/23/02 15:04	11.40
09/23/02 15:05	11.56
09/23/02 15:05	11.73
09/23/02 15:05	11.71
09/23/02 15:05	11.67
09/23/02 15:06	11.56
09/23/02 15:06	11.62
09/23/02 15:06	11.75
09/23/02 15:06	11.71
09/23/02 15:07	11.74
09/23/02 15:07	11.79
09/23/02 15:07	11.68
09/23/02 15:07	11.39
09/23/02 15:08	11.25
09/23/02 15:08	11.21
09/23/02 15:08	11.20
09/23/02 15:08	11.21
09/23/02 15:09	11.32
09/23/02 15:09	11.43
09/23/02 15:09	11.44
09/23/02 15:09	11.46
09/23/02 15:10	11.53
09/23/02 15:10	11.75
09/23/02 15:10	11.94
09/23/02 15:10	11.97
09/23/02 15:11	11.93
09/23/02 15:11	11.90
09/23/02 15:11	11.85
09/23/02 15:11	11.81
09/23/02 15:12	11.80
09/23/02 15:12	11.87
09/23/02 15:12	11.94
09/23/02 15:12	12.03
09/23/02 15:13	12.04
09/23/02 15:13	11.92
09/23/02 15:13	11.97
09/23/02 15:13	12.08

09/23/02 15:14	11.97
09/23/02 15:14	11.78
09/23/02 15:14	11.61
09/23/02 15:14	11.47
09/23/02 15:15	11.45
09/23/02 15:15	11.47
09/23/02 15:15	11.47
09/23/02 15:15	11.53
09/23/02 15:16	11.55
09/23/02 15:16	11.38
09/23/02 15:16	11.23
09/23/02 15:16	11.19
09/23/02 15:17	11.19
09/23/02 15:17	11.12
09/23/02 15:17	11.08
09/23/02 15:17	11.13
09/23/02 15:18	11.23
09/23/02 15:18	11.19
09/23/02 15:18	11.20
09/23/02 15:18	11.23
09/23/02 15:19	11.14
09/23/02 15:19	11.08
09/23/02 15:19	11.12
09/23/02 15:19	11.30
09/23/02 15:20	11.26
09/23/02 15:20	11.15
09/23/02 15:20	11.03
09/23/02 15:20	11.06
09/23/02 15:21	11.22
09/23/02 15:21	11.34
09/23/02 15:21	11.56
09/23/02 15:21	11.48
09/23/02 15:22	11.20
09/23/02 15:22	11.07
09/23/02 15:22	11.09
09/23/02 15:22	11.11
09/23/02 15:23	11.15
09/23/02 15:23	11.25
09/23/02 15:23	11.39
09/23/02 15:23	11.44
09/23/02 15:24	11.61
09/23/02 15:24	11.78
09/23/02 15:24	11.86
09/23/02 15:24	11.82
09/23/02 15:25	11.66
09/23/02 15:25	11.60
09/23/02 15:25	11.52
09/23/02 15:25	11.49
09/23/02 15:26	11.78
09/23/02 15:26	12.06
09/23/02 15:26	12.05
09/23/02 15:26	11.89
09/23/02 15:27	11.86
09/23/02 15:27	12.03
09/23/02 15:27	12.16
09/23/02 15:27	12.26
09/23/02 15:28	12.31
09/23/02 15:28	12.26
09/23/02 15:28	12.45
09/23/02 15:28	12.63
09/23/02 15:29	12.68
09/23/02 15:29	12.61
09/23/02 15:29	12.47
09/23/02 15:29	12.27
09/23/02 15:30	12.05
09/23/02 15:30	11.84
09/23/02 15:30	11.88
09/23/02 15:30	11.94
09/23/02 15:31	11.92
09/23/02 15:31	11.79
09/23/02 15:31	11.67
09/23/02 15:31	11.56
09/23/02 15:32	11.49
09/23/02 15:32	11.43
09/23/02 15:32	11.47
09/23/02 15:32	11.44
AVG R 3	11.66

09/23/02 15:33	11.53
09/23/02 15:33	11.61
09/23/02 15:33	11.60
09/23/02 15:33	11.52
09/23/02 15:34	11.40
09/23/02 15:34	11.68
09/23/02 15:34	13.20
09/23/02 15:34	8.55
09/23/02 15:35	3.19
09/23/02 15:35	0.54
09/23/02 15:35	0.08
09/23/02 15:35	0.05
09/23/02 15:36	0.04
09/23/02 15:36	0.03
09/23/02 15:36	0.03
09/23/02 15:36	0.02
09/23/02 15:37	0.02
09/23/02 15:37	0.02
09/23/02 15:37	0.02
09/23/02 15:38	0.01

09/23/02 15:38	0.02
09/23/02 15:38	0.01
09/23/02 15:38	0.01
09/23/02 15:39	1.92
09/23/02 15:39	6.77
09/23/02 15:39	9.37
09/23/02 15:39	9.94
09/23/02 15:40	10.01
09/23/02 15:40	10.02
09/23/02 15:40	10.02
09/23/02 15:40	10.03
09/23/02 15:41	10.03
09/23/02 15:41	10.03
09/23/02 15:41	10.03
09/23/02 15:41	10.03
09/23/02 15:42	10.03
09/23/02 15:42	10.03
09/23/02 15:42	10.03
09/23/02 15:42	10.03
09/23/02 15:42	11.52
09/23/02 15:43	16.45

DRY GAS METER CALIBRATION

Meter ID NuTech No. 2 (2298915)
Calibration Method DGM/DGM **By** Rayburn
Calibration Meter ID 28197 **Pbar** 29.44
Date 09/27/02

Vac. in. Hg	ΔH in. H ₂ O	Time min.	Calibrating Meter			Field Meter						Y	Q	K	$\Delta H@$
			Vi,cal ft ³	Vf,cal ft ³	Temp °F	Vi,dgm ft ³	Vf,dgm ft ³	Temp. in		Temp out					
								init.	final	init.	final				
2	2.00	16.00	881.852	894.814	73	961.351	974.106	69	73	69	71	1.006	0.80	0.72	1.771
2	2.00	17.00	894.814	908.523	73	974.106	987.689	73	76	71	73	1.005	0.80	0.72	1.781
2	2.00	15.00	908.523	920.585	73	987.689	999.697	76	78	73	74	1.004	0.80	0.72	1.786
Averages:												1.00			1.78

Calculations:

$$\begin{aligned}
 V_{cal} &= [V_{f,cal} - V_{i,cal}] \\
 V_{dgm} &= [V_{f,dgm} - V_{i,dgm}] \\
 T_{cal} &= [\text{Temp. at calibrating meter} + 460] \\
 T_{dgm} &= [\text{average Temp. at field meter} + 460] \\
 T_{dgm \text{ out}} &= [\text{average Temp. at field meter outlet} + 460] \\
 Y &= [V_{cal}(P_{bar})(T_{dgm})] / [(V_{dgm})(P_m)(T_{cal})] \\
 K &= [Q(\sqrt{(P_m M_m)} / ((T_{dgm \text{ out}})(\Delta H)))] \\
 Q &= [(V_{dgm}/\text{min.})(T_{dgm \text{ out}}/T_{dgm})(Y)] \\
 \Delta H@ &= [0.921/K^2]
 \end{aligned}$$

Where:

Y = Meter correction factor; dimensionless
Pbar = Barometric pressure; in. Hg
Pm = Meter pressure, (Pbar + $\Delta H/13.6$); in. Hg
Mm = molecular weight of air (29)

DRY GAS METER CALIBRATION

Meter ID NuTech No. 2 (2298915)
Calibration Method DGM/DGM **By** Clack
Calibration Meter ID 651729 **Pbar** 29.88
Date 07/01/02

Vac. in. Hg	ΔH in. H ₂ O	Time min.	Calibrating Meter			Field Meter						Y	Q	K	$\Delta H@$
			Vi,cal ft ³	Vf,cal ft ³	Temp °F	Vi,dgm ft ³	Vf,dgm ft ³	Temp. in		Temp out					
								init.	final	init.	final				
2	5.00	10.00	136.934	149.386	78	279.721	292.075	75	76	75	76	0.991	1.22	0.70	1.875
2	4.00	15.00	149.386	166.404	78	292.075	309.026	76	79	76	77	0.992	1.12	0.72	1.800
2	3.00	18.50	166.404	184.613	77	309.026	327.202	79	79	77	76	0.996	0.98	0.72	1.782
2	2.00	12.50	184.613	194.846	77	327.202	337.456	79	78	76	76	0.994	0.813	0.7328	1.715
2	1.00	18.00	194.846	205.353	76	337.456	348.006	78	77	76	76	0.995	0.582	0.7413	1.676
Averages:												0.99			1.77

Calculations:

$$\begin{aligned}
 V_{cal} &= [V_{f,cal} - V_{i,cal}] \\
 V_{dgm} &= [V_{f,dgm} - V_{i,dgm}] \\
 T_{cal} &= [\text{Temp. at calibrating meter} + 460] \\
 T_{dgm} &= [\text{average Temp. at field meter} + 460] \\
 T_{dgm \text{ out}} &= [\text{average Temp. at field meter outlet} + 460] \\
 Y &= [V_{cal}(P_{bar})(T_{dgm})] / [(V_{dgm})(P_m)(T_{cal})] \\
 K &= [Q(\sqrt{(P_m M_m)} / ((T_{dgm \text{ out}})(\Delta H)))] \\
 Q &= [(V_{dgm}/\text{min.})(T_{dgm \text{ out}}/T_{dgm})(Y)] \\
 \Delta H@ &= [0.921/K^2]
 \end{aligned}$$

Where:

Y = Meter correction factor; dimensionless
Pbar = Barometric pressure; in. Hg
Pm = Meter pressure, (Pbar + $\Delta H/13.6$); in. Hg
Mm = molecular weight of air (29)

RATA CLASS



Scott Specialty Gases

9810 BAY AREA BLVD. PASADENA, TX 77507

Phone: 281-474-5800

Fax: 281-474-5857

Dual-Analyzed Calibration Standard

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
9810 BAY AREA BLVD
PASADENA, TX 77507

P.O. No.: PTC302 STOCK
Project No.: 04-96323-001

Customer

SCOTT SPECIALTY GASES

LADEQ
9810 BAY AREA BLVD
PASADENA TX 77507

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards: Procedure #G1: September, 1997.

Cylinder Number: ALM047207
Cylinder Pressure***: 2000 PSIG

Certification Date: 5/16/01

Exp. Date: 5/16/2004

ANALYTICAL

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
OXYGEN	10.07 %	± 1 %	Direct NIST and NMI
PROPANE	64.4 PPM	± 1 %	Direct NIST and NMI
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol procedure #G1: September, 1997.

Product certified as ± 1 % analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NRM 2658	10/01/02	ALM065059	9.930 %	OXYGEN
NRM 1668	8/01/01	ALM005674	99.50 PPM	PROPANE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#

MIL A 7200-171109
MIL A 7200-171109

DATE LAST CALIBRATED

05/04/01
05/04/01

ANALYTICAL PRINCIPLE

GAS CHROMATOGRAPHY
GAS CHROMATOGRAPHY

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

OXYGEN

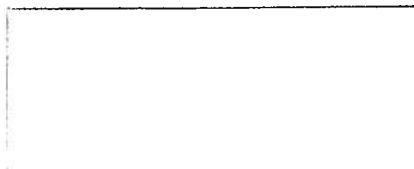
Date:	05/16/01	Response Unit: AREA
Z1 = 90.00000	R1 = 36351.00	T1 = 36882.00
R2 = 36350.00	Z2 = 51.00000	T2 = 36871.00
Z3 = 60.00000	T3 = 36906.00	R3 = 36394.00
Avg. Concentration:	10.07	



Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999979801	
Constants:	A = 0.10126878
B = 0.000272389	C =
D =	E =

PROPANE

Date:	05/16/01	Response Unit: AREA
Z1 = 1.00000	R1 = 4976.000	T1 = 3257.000
R2 = 4966.000	Z2 = 21.00000	T2 = 3203.000
Z3 = 30.00000	T3 = 3201.000	R3 = 4971.000
Avg. Concentration:	64.44	PPM



Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999937758	
Constants:	A = 0.08654192
B = 0.020034265	C =
D =	E =

APPROVED BY:

ANALYZER CALIBRATION RECORD

Plant	<u>Koppers</u>	<u>Tia, Ms</u>	Run No	<u>1</u>	<u>2</u>	<u>3</u>
Source	<u>Boiler</u>		Date	<u>9-23-02</u>	<u>9-23-02</u>	<u>9-23-02</u>
Test For	<u>O₂</u>		Time Start	<u>1205</u>	<u>1320</u>	<u>1432</u>
Operators	<u>Raghu</u>		Time End	<u>1306</u>	<u>1421</u>	<u>1532</u>

Analyte	Level	Cal. Value	Cyl. Ref.	Diluted Y/N	Pre-Test				Run No. <u>1</u>			Run No. <u>2</u>			Run No. <u>3</u>		
Analyzer ID					Cal. Reading	% Cal. Error	Bias Reading	% Bias	Bias/Drift	% Bias	% Drift	Bias/Drift	% Bias	% Drift	Bias/Drift	% Bias	% Drift
Span																	
DAQ Channel																	
<u>O₂</u>	Zero	<u>0</u>	<u>1</u>	<u>N</u>	<u>0</u>				<u>0</u>			<u>0</u>			<u>0</u>		
<u>Service 1400</u>	Low																
<u>0-25</u>	Mid	<u>10.07</u>	<u>2</u>	<u>N</u>	<u>10.0</u>				<u>10.0</u>			<u>10.0</u>			<u>10</u>		
<u>2</u>	High	<u>20.9</u>	<u>AIR</u>	<u>AIR</u>													
	Zero																
	Low																
	Mid																
	High																
	Zero																
	Low																
	Mid																
	High																
	Zero																
	Low																
	Mid																
	High																
	Zero																
	Low																
	Mid																
	High																

Cylinder Ref.	Cylinder No.	Contents	Expiration Date	Notes:
<u>1</u>	<u>-</u>	<u>N₂</u>		
<u>2</u>	<u>A1M647207</u>	<u>10.07 O₂</u>		

Method Specifications:

Methods 3A, 6C, 7E

Zero < 0.25 % of span
 Mid = 40 to 60 % of span
 High = 80 to 100 % of span

Method 10

Zero < 0.25% of span
 Mid = 30% of span
 High = 60% of span

Method 25A

Zero < 0.1 % of span
 Low = 25 to 35 % of span
 Mid = 45 to 60 % of span
 High = 80 to 90 % of span

Error Specifications:

Calibration Error Allowable	< 2% of span	$[(\text{Cyl. Value} - \text{Reading}) / \text{span}] * 100\%$
25A Calibration Error Allowable	< 5% Cyl. Value	$[(\text{Cyl. Value} - \text{Reading}) / (\text{Cyl Value}) * 100\%]$
System Bias	< 5% span (not for 20 & 25A)	$[(\text{System Cal} - \text{Reading}) / \text{span} * 100]$
Drift	< 3%	$[(\text{Initial System Cal.} - \text{Final System Cal.}) / \text{Span} * 100\%]$

STATE OF MISSISSIPPI
DAVID ROSS ALL MISSISSIPPI GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
CHARLES H. CHRISTENSEN, EXECUTIVE DIRECTOR

June 5, 2002

Mr. Richard Warriner
EML
624 Ridgewood Road/P.O. Box 655
Ridgeland, MS 39158

Dear Mr. Warriner:

Please be advised that you have successfully participated in the Visible Emissions Certification conducted in Jackson, Mississippi, by the Office of Pollution Control on April 16 - 18, 2002. You met the following standards as specified in the November 12, 1974, issue of the Federal Register (Volume 39, No. 219, Method):

1. Maintained an average deviation of less than 7.5% for a set of 25 white and 25 black smoke readings
2. Did not have any one reading with a deviation greater than 15%.

The deviations for you qualifying run, Run No 17-1W were:

White Smoke:	3.6
Black Smoke:	3.0

Your certification will expire on October 18, 2002.

The original of your test paper is being maintained in our files. If you need a copy of your test paper or any other assistance concerning this matter, feel free to contact this office.

Very truly yours,



Connie J. Simmons, Chief
Air Quality Management Section

VISIBLE EMISSIONS EVALUATION RECORD

Run 1

PLANT	Koppers Ind. Tic Plant, ms	
Emission Point	Wood Waste Bl.	
Date	09/23/02	
Stack height	80'	
Distance to source	175' 220'	
Direction from source	SSEW	
CONDITIONS	START	STOP
Time	1205	1305
Wind direction	East	East
Wind speed	0-5 mph	0-4 mph
Ambient temp. °F	78	80
Sky cover	clear	clear
Plume color	Black	Black
Plume background	sky	sky

draw north arrow

emission point

draw wind direction arrow

indicate sun position with symbol

observer location

140°

 Condensing water vapor? No. Detached ☐ Attached ☐ Distance visible _____

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

Remarks:

Avg. opacity for period:

5.479

Highest six minute average:

8.958

Other data reduction:

VISIBLE EMISSIONS EVALUATION RECORD

Run 2

PLANT	Koppers Ind. Tie Plant, MS	
Emission Point	WoodWaste Bld.	
Date	09.23.02	
Stack height	80'	
Distance to source	175'	
Direction from source	WSW	

CONDITIONS	START	STOP
Time	1320	1420
Wind direction	East	East
Wind speed	3-5 mph	5-7 mph
Ambient temp. °F	81	82
Sky cover	clear	clear
Plume color	Black	black
Plume background	sky	sky

draw north arrow

emission point

draw wind direction arrow

indicate sun position with symbol

observer location

140°

 Condensing water vapor? No. Detached ☐ Attached ☐ Distance visible _____

seconds				
min	0	15	30	45
0	0	0	5	5
1	5	10	10	5
2	5	5	5	5
3	5	10	10	5
4	5	5	5	5
5	5	5	5	5
6	5	5	10	10
7	5	5	0	5
8	0	0	5	5
9	5	5	10	10
10	5	10	5	5
11	5	5	5	5
12	5	5	5	5
13	5	5	5	5
14	5	5	5	5

seconds				
min	0	15	30	45
15	5	5	5	5
16	5	5	0	0
17	0	5	5	5
18	0	5	5	0
19	0	0	5	5
20	5	0	0	5
21	5	5	5	0
22	0	0	5	5
23	0	5	5	5
24	5	5	5	5
25	0	0	5	0
26	0	0	0	5
27	5	10	5	5
28	5	5	5	5
29	5	5	5	5

seconds				
min	0	15	30	45
30	5	0	0	0
31	0	5	5	5
32	5	5	5	5
33	0	0	5	5
34	0	5	5	0
35	0	5	5	5
36	0	0	5	5
37	5	0	0	0
38	5	5	5	0
39	0	0	0	0
40	5	5	5	5
41	5	5	5	5
42	0	0	0	0
43	0	0	0	0
44	5	5	5	10

seconds				
min	0	15	30	45
45	5	0	0	5
46	5	10	10	10
47	5	5	5	5
48	0	0	5	5
49	0	5	5	10
50	10	5	5	0
51	0	0	0	0
52	0	5	5	10
53	10	5	5	5
54	10	10	10	5
55	5	5	5	5
56	0	0	15	25
57	10	0	0	5
58	5	5	5	5
59	5	5	5	5

Remarks:

Avg. opacity for period:

4.21

Highest six minute average:

5.83

Other data reduction:

VISIBLE EMISSIONS EVALUATION RECORD

Run 3

PLANT	Koppers Ind. Tie Plant, MS	
Emission Point	Wood Waste Blr.	
Date	09-23-02	
Stack height	80'	
Distance to source	215'	
Direction from source	West S. West	
CONDITIONS	START	STOP
Time	1434	1534
Wind direction	East	East
Wind speed	0-4 mph	7.5 mph
Ambient temp. °F	84	85
Sky cover	clear	clear
Plume color	Black	Black
Plume background	sky	sky

draw north arrow

draw wind direction arrow

emission point

indicate sun position with symbol

observer location

140°

 Condensing water vapor? ☐ Detached ☐ Attached ☐ Distance visible ☐

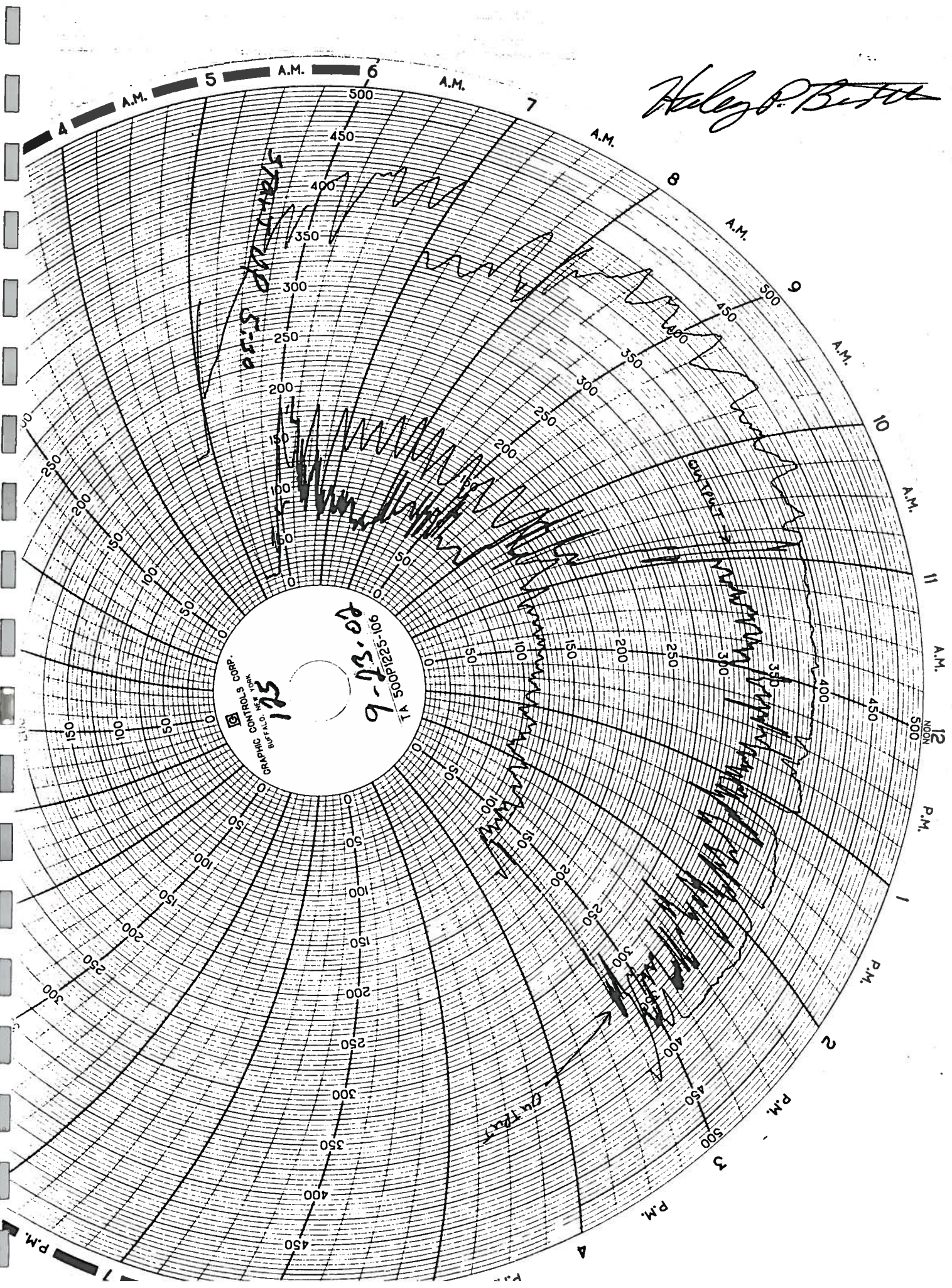
seconds					seconds					seconds					seconds				
min	0	15	30	45	min	0	15	30	45	min	0	15	30	45	min	0	15	30	45
0	5	5	5	5	15	0	5	5	0	30	0	0	5	5	45	5	5	5	5
1	5	5	5	5	16	5	0	0	5	31	5	5	5	5	46	5	5	0	0
2	10	10	5	10	17	10	0	5	0	32	0	0	0	5	47	0	5	5	0
3	10	10	10	5	18	5	5	0	5	33	5	5	5	5	48	0	0	10	0
4	5	0	0	5	19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

Remarks: 270 200 345 265

Avg. opacity for period: 4.50 Highest six minute average: 5.83

Other data reduction:

Wiley P. Butler





Mississippi Department of Environmental Quality
Office of Pollution Control
Air Stack Test Review Report



Site Name: Koppers Industries Inc
Energy and Transportation Branch

AFS ID: 04300012

Air Permit No.: 960-00012 {Iss./Mod. Date: 1-13-04 Exp. Date: 1-1-09}

Physical Address

1 Koppers Drive
Tie Plant, MS 38960
Grenada County

Mailing Address

PO Box 160
Tie Plant, Mississippi 38960

CMS Source Category: Major - A
ECED Contact: Azzam Abu-Mirshid

Date Reviewed: 10-22-04

Stack Testing Firm: Environmental Monitoring Laboratories

Official Signing/Submitting Report:

Name: Kevin Coker Title: Plant Manager

☐ Stack test report contains emission data not evaluated (i.e. No requirement to test)

Were any findings and/or recommendations relayed to the facility during the compliance evaluation: Not Applicable

If yes, describe:

Comments: Failed to test boiler at maximum capacity. However, since the PM emissions are seven times less than the permit limit, no re-testing or enforcement action will be taken.



Mississippi Department of Environmental Quality
Office of Pollution Control
Air Stack Test Review Report

Evaluation of Stack Test Report												
Emission Point (including description)	Pollutant	Conducted				Submitted		Methodology	Operating Conditions	Compliance w/ Permit Limit	Appl. Standard or Subpart	Observed
		Due	Done	Due	Done							
AA-001 60 MMBTUH Wellons/Nebraska wood waste boiler	PM	Fourth quarter of 04	9-7-04	10-22-04	10-21-04	Acceptable	Unacceptable	Acceptable	SIP	No		

Appropriate Table Values:
Emission Point → Permit emission point designation and description (e.g. AA-001 25MMBTUH Gas Fired Boiler)
Pollutant → PM, PM₁₀, NO_x, CO, SO₂, VOC, HAP Total, HAP-Benzene, Opacity, etc.
Conducted → Due = Date Testing Due, Done = Date Testing Performed/Conducted
Submitted → Due = Date Test Report Due, Done = Date Test Report Received/Submitted
Methodology → Acceptable or Unacceptable
Operating Conditions → Acceptable or Unacceptable
Compliance with Permit Limit → Compliant, Non-Compliant, or Not Applicable
Applicable Standard or Subpart → PSD, PSD Avoidance, SIP Only, SM-Criteria, SM-HAP, 60-XX, 61-XX, or 63-XX
Observed → Yes or No

Signature: Sherry Traweek Date: 10-22-04

cc: DID
Sherry Traweek

Kevin B. Coker
Plant Manager



Koppers Inc.
Utility Poles and Piling
P. O. Box 160
Tie Plant, MS 38960
Tel 662 226 4584 ext. 11
Fax 662 226 4588
CokerKB@koppers.com
www.koppers.com

October 19, 2004

Mr. David Lee
Environmental Compliance Division
Office of Pollution Control
P.O. Box 10385
Jackson, MS 39289-0385

RECEIVED
OCT 21 2004
Dept. of Environmental Quality
Office of Pollution Control

CERTIFIED MAIL 7002 0460 0003 7596 0904

RE: Bi-Annual Stack Test (Test Results)
Title V Operating Permit #0960-00012
Koppers Inc. Grenada, Mississippi

Dear Mr. Lee,

Enclosed are the Stack Test Results for Koppers Industries, Inc., performed on September 7, 2004. Environmental Monitoring Laboratories, Inc. performed the testing. If you have any questions regarding the application, please call me at (662) 226- 4584 ext. 11.

Sincerely,

A handwritten signature in black ink, appearing to read "K.B. Coker", written over a horizontal line.

Kevin B. Coker
Plant Manager

Cc. Tim Basilone, Koppers CSG-Pittsburgh

**WELLONS**

2525 W. FIRESTONE LANE, VANCOUVER, WA 98660

FAX: (360) 750-3400 PHONE: (360) 750-3500 1-800-WELLONS
www.Wellons.comTo: *MARK
KOPPERS CO
GRENADA, MISS.*Fax: *662-226-4588*

From: Dick Hune

Date: *7/20/04*RE: *BOILER HEAT OUTPUT*

CC:

Pages: *ONE*☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply

Message:

*THE NEBRASKA BOILER AT YOUR PLANT
WAS ORIGINALLY DESIGNED FOR A
MAXIMUM HEAT OUTPUT OF
37,629,000 BTU/HR. BASED ON
PRODUCING 30,000 LB/HR STEAM
@ 150 PSIG PRESSURE AND 466°F
TEMPERATURE*

BOILER MAXIMUM HEAT OUTPUT

LOCATION: KIPPERS INC
GRENADA MILLS

JOB NO. # B-7734

STEAM GENERATOR: NEBRASKA BOILER

MODEL # KITS-2-45-5H

STYLE: TYPE A

OUTPUT: 30,000 PPH STEAM

@ 150 PSIG PRESSURE

@ 466°F SUPERHEAT TEMP

HEAT OUTPUT:

ENTHALPY OF STEAM @ 150 PSIG & 466°F TEMPERATURE
LEAVING BOILER

$h = 1234.3 \text{ BTU/lb}$

MAXIMUM STEAMING CAPACITY @ 30,000 PPH

$\text{MAX } \dot{Q}_{\text{output}} = (30,000 \text{ lb/hr}) (1234.3 \text{ BTU/lb})$

$\dot{Q}_{\text{max}} = 37,029,000 \text{ BTU/hr}$

NO.

PROJECT

DATE 7/21/04 BY R HONE

REQ.

SHEET

***PARTICULATE AND VISIBLE EMISSIONS TEST
WOOD WASTE BOILER***

KOPPERS INDUSTRIES

FACILITY NO. 0960-00012

***Grenada, Mississippi
September 7, 2004***

Koppers Industries
P.O. Box 160
Tie Plant, MS 38960

Performed by:

ENVIRONMENTAL MONITORING LABORATORIES, INC.

624 Ridgewood Road
P.O. Box 655
Ridgeland, Mississippi 39158

Phone: (601)856-3092
Fax: (601)853-2151

**REPORT OF PARTICULATE AND VISIBLE
EMISSIONS TESTING FOR
KOPPERS INDUSTRIES
GRENADA PLANT
WOOD WASTE BOILER**

**Grenada, Mississippi
September 7, 2004**

FACILITY NO. 0960-00012

EMISSION POINT NO. AA-001

**Koppers Industries
P.O. Box 160
Tie Plant, MS 38960**

**Contact: Haley Biddy
Phone: 662/226-4584**

*Prepared By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi
☼ 601/856-3092 ☼*

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 • 624 Ridgewood Road
Ridgeland, Mississippi 39158

phone: 601/856-3092
fax : 601/853-2151

September 17, 2004

Subject: Koppers Industries - Grenada, Mississippi
Wood Waste Boiler - Stack Emissions Test
Facility No. 0960-00012

On September 7, 2004, Environmental Monitoring Laboratories performed air emissions testing for Koppers Industries in the Tie Plant community near Grenada, Mississippi. Testing was done to measure particulate and visible emissions from the wood waste boiler in accordance with requirements of the Mississippi Department of Environmental Quality.

Results of emissions testing are shown below.

PARTICULATE EMISSIONS			VISIBLE EMISSIONS
#/hr	gr/dscf	#/MM Btu	High SMA, % opacity
7.42	0.042	0.310	0.00

Mr. Haley Biddy of Koppers coordinated the testing project. Danny Russell of Environmental Monitoring Laboratories was responsible for collection and analysis of particulate samples.

Following is a report of the test.

**REPORT OF PARTICULATE EMISSIONS TESTS
FOR KOPPERS INDUSTRIES, INC.
GRENADA PLANT
WOOD WASTE BOILER**

**Grenada, Mississippi
September 7, 2004**

CONTENTS

1.0	TEST RESULTS	page 1
2.0	SOURCE DESCRIPTION	2
3.0	TEST PROCEDURES	2
4.0	DATA REDUCTION	3
5.0	NOMENCLATURE	6
6.0	CALIBRATION	7
7.0	APPENDICES:	8
A.	Field and Laboratory Data	
B.	Calibrations	
C.	Visible Emissions Record	
D.	Boiler Steam Chart (Koppers)	

REPORT CERTIFICATION

I certify that I have examined the information submitted herein,
and based upon inquires of those responsible for obtaining the
data or upon my direct acquisition of data, I believe the
submitted information is true, accurate and complete.

Signed



Daniel G. Russell

1.0 TEST RESULTS:

The following table is a summary of test results for air emissions testing done on September 7, 2004, for the Wellons wood fired boiler (EP AA-001) at Koppers Industries in Grenada, Mississippi.

Run No.		1	2	3	AVG.
Date		09/07/04	09/07/04	09/07/04	-----
Time Start		1204	1338	1504	----
Time End		1309	1439	1606	----
PARTICULATE EMISSIONS	#/hr	9.17	6.92	6.32	7.47
PARTICULATE EMISSIONS	gr/dscf	0.051	0.039	0.036	0.042
PARTICULATE EMISSIONS	#/MM Btu	0.357	0.293	0.280	0.310
VISIBLE EMISSIONS	high SMA, %	0.00	0.00	0.00	0.00
HEAT INPUT	MM Btu/hr	25.66	23.61	22.54	23.94
VOLUMETRIC FLOWRATE	acfm	32257	31530	30561	31449
VOLUMETRIC FLOWRATE	dscfm	20861	20539	20221	20540
VELOCITY	ft./sec.	82.8	80.9	78.5	80.7
STACK TEMPERATURE	°F	270	268	263	267
MOISTURE	%	9.7	9.3	8.4	9.1
SAMPLE RATE	% isokinetic	103	100	101	101

2.0 SOURCE DESCRIPTION:

Koppers Industries, Inc. operates a 30,000 pound per hour Wellons wood waste boiler at their wood preserving facility in Grenada, Mississippi. The boiler provides steam for the timber treating cylinders and kilns. Fuel is wood waste generated from the manufacture of wood poles and cross ties.

Heat input as calculated from the test data and an F-Factor was an average 23.94 MM Btu/hr. The steam chart record (Appendix D) indicates a steam rate of 15,000 to 18,000 pounds of steam per hour during testing. This steam rate is representative of the current maximum capacity of the plant to utilize steam. A co-generator has been removed from service. During testing, all equipment using steam was operating in a manner representative of maximum conditions and where possible, steam was vented to simulate more than maximum steam usage.

The boiler exhausts to the atmosphere by way of a 34.5 inch diameter vertical stack. Two sample ports at 90° are provided at a location that is 432 inches (12.5 diameters) below the stack exit and 356 inches (10.3 diameters) above an upstream stack tapered section.

3.0 TEST PROCEDURES:

Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points and Method 5 to determine flow rates, moisture content, and particulate emissions. The sampling train was identical to that described in Method 5 except that the cyclone was omitted. Visible emissions were read in accordance with Method 9 concurrently with the emissions test. The visible emissions reader's certification is provided in Appendix C.

Heat input to the boilers was determined by continuously monitoring oxygen content of the flue gas as described in Method 3A and calculating heat input using an F-factor of 9400 scf per million Btu of heat input for the wood waste fuel.

Filters were recovered by rinsing the front half of the filter holder into the probe wash and securing the filters in glass petri dishes. Part of the sample filter often adheres to the filter gasket, and some of the adhering material is recovered into the probe wash. Therefore some of the filter weight is attributed to the probe wash weight.

Filters were heated in an oven for 2 hours at 105° C, desiccated at least 24 hours and weighed to constant weight. Probe wash samples in acetone were evaporated to dryness over low heat in tared beakers, desiccated for at least 24 hours and weighed to constant weight. Weighings are made at 6 hour or greater intervals (samples stored in desiccator). Final weights were considered valid and were recorded if there was no more than 0.5 milligrams difference from the previous weighing.

4.0 DATA REDUCTION

Koppers - Grenada

Wellons Wood Waste Boiler

Particulate Emissions Test - September 7, 2004

Collected Test Data:

		RUN 1	RUN 2	RUN 3
Date	:	09/07/04	09/07/04	09/07/04
Time start	:	1204	1338	1504
Time end	:	1309	1439	1606
1.	As : sq ft	6.4918	6.4918	6.4918
2.	Dn : in.	0.248	0.203	0.203
3.	Cp : dimensionless	0.84	0.84	0.84
4.	Theta : minutes	60.00	60.00	60.00
5.	Y : dimensionless	1.00	1.00	1.00
6.	Pbar : in. Hg	29.65	29.65	29.65
7.	Pg : in. H2O	-0.46	-0.46	-0.46
8.	Vm : cf (dry gas)	68.056	43.499	43.678
9.	sqr(ΔP),avg : in.H2O ^{.5}	1.2350	1.2087	1.1761
10.	ΔH : in. H2O	4.0292	1.7500	1.6625
11.	ts : degrees F	269.75	268.08	263.42
12.	tm : degrees F	78.21	78.25	79.88
13.	Vlc : ml	152.5	92	83
14.	CO2 : percent	4.29	3.92	3.50
15.	O2 : percent	16.87	17.14	17.25
16.	F : dscf	9400	9400	9400
17.	M,PM : milligrams	222.0	108.1	100.4

Wellons Wood Waste Boiler

Particulate Emissions Test - September 7, 2004

Calculations:		RUN 1	RUN 2	RUN 3	AVG.
1.	Pm : in.Hg ($\Delta H/13.6$)+Pbar	29.9463	29.7787	29.7722	
2.	Ps : in. Hg (Pg/13.6)+Pbar	29.6162	29.6162	29.6162	
3.	An : sq ft ($(Dn/24)^2(3.1416)$)	3.35E-04	2.25E-04	2.25E-04	
4.	Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)	66.824	42.469	42.506	50.600
5.	Vwstd : scf (.04707cf/ml)(Vlc)	7.178	4.330	3.907	
6.	Bws : dimensionless Vwstd/(Vwstd+Vmstd)	0.0970	0.0925	0.0842	0.0912
7.	Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.36	29.31	29.25	
8.	Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.26	28.27	28.30	
9.	Vs : ft/sec Kp Cp (sqr ΔP)sqr(Ts/(Ps Ms))	82.81	80.95	78.46	80.74
10.	Q : cfm Vs As(60 sec/min)	32257	31530	30561	31449
11.	Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)	23102	22633	22079	22605
12.	Qstd : dscfm Qstw(1-Bws)	20861	20539	20221	20540
13.	Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]	428.24	462.55	469.81	453.53
14.	HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))	25.66	23.61	22.54	23.94
15.	I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm))/(60 theta Vs Ps An)	103.33	99.54	101.20	101.36

Particulate Emissions

16.	E,PM : pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	9.17	6.92	6.32	7.47
17.	C,PM : grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.0512	0.0392	0.0364	0.0422
18.	C'PM : grains/dscf @ 50% Xsair C'PM/(1-((1.5 O2-.133 N2 - .75 CO)/21))	0.1740	0.1420	0.1348	0.1503
19.	E'PM : pounds/MM Btu E,PM/HeatInput	0.357	0.293	0.280	0.310

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
An	ft ²	Nozzle cross sectional area
As	ft ²	Stack cross sectional area
Bws	dimensionless	Wet gas fraction
CO ₂	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
C,X	as labeled	Concentration of pollutant X
DGF	dimensionless	Dry gas fraction
Dn	inches	Nozzle diameter
ΔH (delta H)	in. H ₂ O	Pressure drop across meter orifice
ΔP (delta P)	in. H ₂ O	Stack gas velocity pressure
E,X	#/hr	Emission rate of pollutant X
E'X	#/MM Btu	Emission rate of pollutant X
F	dscf	Volume of flue gas per MM Btu
I	percent	Nozzle velocity/stack gas velocity
Kp	consistent	Pitot tube constant
M,X	milligrams	Sample weight of pollutant X
Md	## mole	Dry molecular weight of stack gas
Ms	## mole	Wet molecular weight of stack gas
N ₂	percent	Nitrogen content by volume, dry basis
O ₂	percent	Oxygen content by volume, dry basis
Pbar	in. Hg	Barometric pressure
Pg	in. Hg	Stack static pressure
Pm	in. Hg	Total pressure at meter (Pbar+(ΔH/13.6))
Ps	in. Hg	Total stack pressure (Pbar+(Pg/13.6))
Pstd	in. Hg	Standard barometric pressure = 29.92
Q	acfm	Volumetric flow rate at stack conditions
Qstd	dscfm	Volumetric flow rate at standard conditions, dry basis
Qstdw	scfm	Volumetric flow rate at standard conditions, wet basis
θ (theta)	minutes	Sample duration
tm	°F	Meter temperature (Tm denotes °R)
ts	°F	Stack temperature (Ts denotes °R)
Tstd	°R	Standard temperature = 528°R
Vlc	ml	volume of water collected
Vm	ft ³	Volume of dry gas sampled through meter
Vmstd	dscf	Sample volume at standard conditions
Vwstd	scf	Sample volume of water vapor
Y	dimensionless	Meter coefficient
Xsair	percent	Excess air

6.0 CALIBRATIONS:

Measurement devices used by Environmental Monitoring Laboratories and subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

Dry Gas Meter:

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired (new gaskets etc. as required). Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. This service is provided by Big Three Meter Company in Jackson, Mississippi. Overhaul service or any six month period is followed by a five point calibration described in APTD-0576 using either a wet test meter or calibrated dry gas meter (used exclusively for calibrations) as a standard reference. Following field use, gas meter calibration is checked by performing three calibration checks at intermediate orifice settings. If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

Orifice:

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration. The calibration is included with the Dry Gas Meter Calibration

Nozzles:

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

Pitot Tubes:

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration that it retains unless damaged. All pitot tubes used by Environmental Monitoring Laboratories are manufactured by NuTech, Inc.

Temperature Measuring Instruments:

All temperature measurements are made with type K thermocouples and digital thermocouple thermometers, which have an initial calibration traceable to NBS. Thermocouples are checked during a test series against an ASTM mercury in glass thermometer at ambient temperature. Continuity and proper thermocouple contact location are checked by challenging the thermocouple with a temperature change. (EMTIC GD-028 -- June 21, 1994)

Barometer:

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

Differential Pressure Gauges:

Velocity head (ΔP) and orifice pressure differential (ΔH) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration.

Analytical Balance:

The analytical balance used was initially calibrated by the manufacturer. Additionally, the balance is equipped with an automatic zero and calibration feature that is used daily or prior to each use. Prior to each use, or daily, a quality control check is made using Class A weights of 0.5000 grams and 100.0000 grams.

7.0 APPENDICES

- A. Field and Laboratory Data*
- B. Calibrations*
- C. Visible Emissions Record*
- D. Boiler Steam Chart (Koppers)*

APPENDIX A

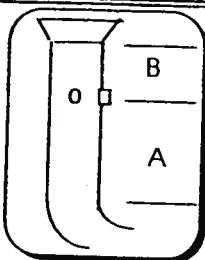
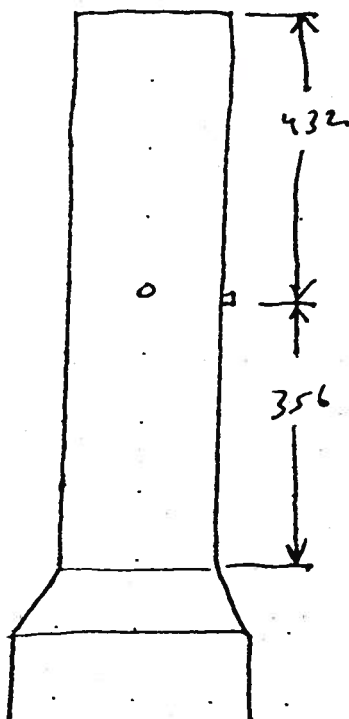
FIELD AND LABORATORY DATA

STACK CONFIGURATION AND SAMPLE POINT LAYOUT FOR CIRCULAR STACKS

PLANT: Koppers - Gamuda
 SOURCE: Boiler
 TEST FOR: Pa Setty
 TEST OPERATORS: _____

Date: _____

SKETCH OF STACK



PERCENT OF DIAMETER

points on a diameter

point no.	2	4	6	8	10	12	14	16
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

Point No. inches from wall velocity head

1 1.5
 2 5.0
 3 10.2
 4 24.3
 5 21.5
 6 33.0

STACK DIAMETER:

Distance from ports to disturbance:

A. to upstream disturbance

B. to downstream disturbance

Upstream diameters:

Downstream diameters:

Minimum No. sample points required:

No. sample points selected:

Port Length:

Port Type:

Port Access:

346

356

432

10.3

12.5

8

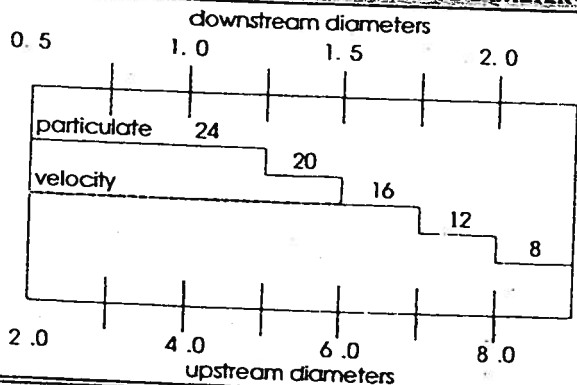
12 (L/2)

8" (NE) + 7.5" (SE)

4" nipple

Platform / boards / chains

MINIMUM NO. OF POINTS ON A DIAMETER



Pitot ID: _____ Pitot Cp: _____ Stack Temp: 270

Remarks:

RUN NO. 1
Date 9-7-04
Time start 1204 end 1309

Notes: _____

10

12

15

CONDENSATE:
init. 200 final 337

SILICA GEL:
init. 767.5 final 783

Standby 10:15 to - no

Leak Checks:

Pretest:	Sample Train
	Pitot Tubes

Plant: Koppers - Tin Plant
Source: Bella
Test For: PM/VE
Test Operators: Raman

RUN NO. 2

Date 9-7-04

Time start 1338 end 1439

Meter Box	<u>North 3</u>
Sample Box	<u>no. 1</u>
Probe/Pitot	<u>41 Teflon</u>
Pitot Cp	<u>.84</u>
Nozzle Dia.	<u>1.203</u>
Filter No.	

No. Sample Pts. 62
Minutes/Pt 5.0

GAS ANALYSIS: *CE*

 CO_2

Q,

CO

Time

K FACTOR SETUP

 ΔH°

Meter Temp

% H₂O

Stack Temp.

K Factor

CONDENSATE:

init. 200

final 2/22

SILICA GEL:

init. 021

final 8.3

Notes:

Amb. Temp. °F	85
Bar. Press. "Hg	29.65
Static Press. "H ₂ O	-46

[illegible]

Leak Checks:

Sample Train:

-->

c/m @

" He

Pitot Tubes

High

(a)

" H₂O

Low

①

" H C

Pretest:

Sample Train

Pilot Tubes

RUN NO. 3
Date 9-7-04
Time start 1504 end 1606

Notes: _____

CONDENSATE:
init. 200 final 276
SILICA GEL:
init. 760 final 767

Leak Checks:	Sample Train	.255 → .257 = 100% elm @ 12" Hg		Pretest.	Sample Train	☒
	Pitot Tubes:	High ☒	@ 6.6" H ₂ O Low ☒	@ 7.0" H ₂ O	Pitot Tubes	☐

PARTICULATE CATCH ANALYSIS

SAMPLES: Koppers Grenada, MS Boiler
 DATE TAKEN: 9-7-04 DATE ANALYZED: 9-8-04
 DELIVERED BY: DGR RECEIVED BY: DGR
 ANALYZED BY: _____

(Attach chain of custody if additional exchanges occur)

FILTERS: _____

RUN NO.	1	2	3	
FILTER NO.	3327	396	3329	
FILTER TARE, gms.	.4730	.4616	.4707	
	.6468	.5508	.5562	
FINAL WEIGHT, gms.	.6468	.5509	.5562	
NET GAIN, gms.	.1738	.0893	.0855	

PROBE WASH: _____

RUN NO.	1	2	3	
CONTAINER I.D.	KOPR1	KOPR2	KOPR3	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	125	125	125	
	(1)	(2)	(3)	()
TARE WEIGHT, gms.	116.6663	117.1630	103.2022	
	116.7147	117.1818	103.2170	
FINAL WEIGHT, gms	116.7145	117.1818	103.2171	
NET GAIN, gms.	.0482	.0188	.0149	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	222.0	108.1	100.4	

TIME	CO2	O2	CO
09/07/04 10:22	0.03	1.82	42.37
09/07/04 10:22	0.02	0.39	42.37
09/07/04 10:23	0.05	0.24	42.37
09/07/04 10:23	0.01	0.21	0.38
09/07/04 10:23	0.03	0.11	0.38
09/07/04 10:23	0.03	0.01	0.38
09/07/04 10:24	0.02	0.00	0.38
09/07/04 10:24	0.01	0.00	0.38
09/07/04 10:24	0.00	-0.01	0.38
09/07/04 10:24	0.00	0.02	0.38
09/07/04 10:25	0.00	7.81	13.39
09/07/04 10:25	0.00	14.77	18.39
09/07/04 10:25	0.00	18.71	7.38
09/07/04 10:25	0.00	20.31	2.38
09/07/04 10:26	0.00	20.51	1.38
09/07/04 10:26	0.00	20.36	2.38
09/07/04 10:26	0.00	19.61	0.38
09/07/04 10:26	0.31	20.26	0.38
09/07/04 10:27	0.09	20.54	-0.62
09/07/04 10:27	0.09	20.57	-0.62
09/07/04 10:27	0.11	20.58	-0.62
09/07/04 10:27	0.03	20.61	-0.62
09/07/04 10:28	0.08	20.61	-0.62
09/07/04 10:28	0.06	20.60	-0.62
09/07/04 10:28	0.07	20.58	-0.62
09/07/04 10:28	0.09	20.57	-0.61
09/07/04 10:29	0.08	20.56	-0.62
09/07/04 10:29	0.15	20.51	-0.62
09/07/04 10:29	0.15	20.51	-0.62
09/07/04 10:29	0.13	20.53	-0.62
09/07/04 10:30	0.09	20.54	-0.62
09/07/04 10:30	0.06	20.55	-0.62
09/07/04 10:30	0.06	20.55	-0.62
09/07/04 10:30	0.07	20.54	-1.62
09/07/04 10:31	0.07	20.53	-1.62
09/07/04 10:31	0.09	20.53	-1.62
09/07/04 10:31	0.00	20.51	-1.62
09/07/04 10:31	0.03	20.51	-1.61
09/07/04 10:32	0.05	20.50	-1.61
09/07/04 10:32	0.04	20.49	-1.62
09/07/04 10:32	-0.02	20.49	-1.62
09/07/04 10:32	-0.01	20.49	-1.62
09/07/04 10:33	-0.01	20.48	-1.61
09/07/04 10:33	-0.01	20.46	-1.62
09/07/04 10:33	0.00	20.46	-1.61
09/07/04 10:33	3.64	18.81	-2.62
09/07/04 10:34	10.94	13.84	-3.56
09/07/04 10:34	15.34	10.89	-3.61
09/07/04 10:34	17.12	9.78	-4.60
09/07/04 10:34	17.35	9.63	-4.61
09/07/04 10:35	17.38	9.63	-4.61
09/07/04 10:35	17.42	9.62	-4.61
09/07/04 10:35	17.46	9.81	0.39
09/07/04 10:35	17.45	9.94	0.38
09/07/04 10:36	17.68	9.94	0.38
09/07/04 10:36	16.72	9.94	0.39
09/07/04 10:36	17.73	9.94	0.39
09/07/04 10:36	17.66	9.94	0.38
09/07/04 10:37	19.10	9.94	0.38
09/07/04 10:37	17.79	9.95	0.39
09/07/04 10:37	17.43	9.94	0.38
09/07/04 10:37	18.17	9.93	0.39
09/07/04 10:38	19.08	9.94	0.38
09/07/04 10:38	17.43	9.94	0.38
09/07/04 10:38	17.38	10.00	2.39
09/07/04 10:38	9.13	14.83	2.39
09/07/04 10:39	2.71	19.41	2.39
09/07/04 10:39	1.04	20.75	2.39
09/07/04 10:39	4.06	18.85	9.39
09/07/04 10:39	2.11	19.60	9.39
09/07/04 10:40	0.35	21.00	4.39
09/07/04 10:40	0.15	21.22	3.41
09/07/04 10:40	0.18	21.24	4.39
09/07/04 10:40	0.14	21.24	9.39
09/07/04 10:41	0.20	21.09	15.39
09/07/04 10:41	0.18	20.99	11.39
09/07/04 10:41	0.13	21.13	6.38
09/07/04 10:41	0.05	21.19	8.38
09/07/04 10:42	0.14	21.08	7.38
09/07/04 10:42	0.11	21.11	5.38
09/07/04 10:42	-0.11	21.22	2.39
09/07/04 10:42	0.06	21.09	2.39
09/07/04 10:43	0.07	21.07	5.38
09/07/04 10:43	1.56	17.90	5.38
09/07/04 10:43	3.92	11.86	4.39
09/07/04 10:43	4.30	10.56	4.39
09/07/04 10:44	4.37	10.47	3.39

TIME	CO2	O2	CO
09/07/04 10:44	4.36	10.46	3.39
09/07/04 10:44	4.36	10.47	2.39
09/07/04 10:44	4.35	10.48	2.39
09/07/04 10:45	2.56	14.18	2.39
09/07/04 10:45	0.42	20.01	2.39
09/07/04 10:45	0.15	20.90	2.39
09/07/04 10:45	1.60	20.98	2.39
09/07/04 10:46	0.10	20.98	2.39
09/07/04 10:46	0.11	20.98	2.39
09/07/04 10:46	0.07	20.99	2.39
09/07/04 10:46	0.10	20.99	2.39
09/07/04 10:47	0.11	20.99	2.39
09/07/04 10:47	0.08	20.99	2.39
09/07/04 10:47	0.09	20.99	2.39
09/07/04 10:47	0.12	20.99	2.39
09/07/04 10:48	0.09	20.99	2.39
09/07/04 10:48	0.06	20.99	2.39
09/07/04 10:48	0.10	20.99	2.39
09/07/04 10:48	0.10	20.99	2.39
09/07/04 10:49	0.11	20.99	2.39
09/07/04 10:49	0.11	20.99	2.39
09/07/04 10:49	0.10	20.99	2.39
09/07/04 10:49	0.09	20.99	1.39
09/07/04 10:50	0.87	20.99	3.39
09/07/04 10:50	1.42	20.60	8.38
09/07/04 10:50	11.61	18.10	14.39
09/07/04 10:50	4.05	16.97	15.39
09/07/04 10:51	4.20	16.79	16.39
09/07/04 10:51	4.24	16.76	17.39
09/07/04 10:51	4.25	16.72	18.40
09/07/04 10:51	4.24	16.74	18.40
09/07/04 10:52	4.24	16.73	88.35
09/07/04 10:52	2.64	18.21	118.33
09/07/04 10:52	2.82	18.26	85.35
09/07/04 10:52	3.37	17.62	61.19
09/07/04 10:53	3.27	17.68	52.37
09/07/04 10:53	3.47	17.56	47.36
09/07/04 10:53	3.47	17.54	40.37
09/07/04 10:53	3.43	17.57	35.38
09/07/04 10:54	3.35	17.64	37.37
09/07/04 10:54	3.30	17.70	42.05
09/07/04 10:54	3.22	17.78	46.36
09/07/04 10:54	3.22	17.80	45.89
09/07/04 10:55	3.16	17.85	41.37
09/07/04 10:55	3.17	17.86	40.37
09/07/04 10:55	3.29	17.81	40.37
09/07/04 10:55	3.30	17.81	37.97
09/07/04 10:56	3.34	17.78	36.38
09/07/04 10:56	3.18	17.81	38.37
09/07/04 10:56	3.16	17.95	38.37
09/07/04 10:56	3.15	17.97	37.37
09/07/04 10:57	3.21	17.91	38.37
09/07/04 10:57	3.18	17.92	39.37
09/07/04 12:06	4.48	16.65	26.37
09/07/04 12:06	4.44	16.70	27.37
09/07/04 12:06	4.42	16.73	27.37
09/07/04 12:06	4.41	16.72	26.37
09/07/04 12:07	4.41	16.72	25.39
09/07/04 12:07	4.39	16.76	25.37
09/07/04 12:07	4.50	16.64	26.37
09/07/04 12:07	4.57	16.53	26.37
09/07/04 12:08	4.52	16.61	28.37
09/07/04 12:08	4.46	16.65	27.37
09/07/04 12:08	4.38	16.76	29.36

START RUN 1	CO2	O2	CO
09/07/04 12:08	4.33	16.82	32.37
09/07/04 12:09	4.35	16.81	31.36
09/07/04 12:09	4.39	16.74	28.37
09/07/04 12:09	4.38	16.76	27.37
09/07/04 12:09	4.37	16.80	29.36
09/07/04 12:10	4.28	16.86	32.36
09/07/04 12:10	4.27	16.87	35.37
09/07/04 12:10	4.28	16.88	36.36
09/07/04 12:10	4.33	16.84	33.37
09/07/04 12:11	4.35	16.79	31.37
09/07/04 12:11	4.39	16.78	28.37
09/07/04 12:11	4.39	16.76	29.36
09/07/04 12:11	4.32	16.82	31.37
09/07/04 12:12	4.37	16.78	29.36
09/07/04 12:12	4.36	16.81	31.36
09/07/04 12:12	4.33	16.82	34.37
09/07/04 12:12	4.35	16.79	33.37
09/07/04 12:13	4.36	16.79	32.36
09/07/04 12:13	4.30	16.79	29.37
09/07/04 12:13	4.28	16.85	27.37
09/07/04 12:13	4.26	16.90	28.38
09/07/04 12:14	4.23	16.93	32.36
09/07/04 12:14	4.26	16.91	33.37

TIME	CO2	O2	CO
09/07/04 12:14	4.26	16.90	31.36
09/07/04 12:14	4.20	16.97	30.37
09/07/04 12:15	4.20	16.97	30.37
09/07/04 12:15	4.20	16.98	35.37
09/07/04 12:15	4.23	16.95	36.37
09/07/04 12:15	4.24	16.92	40.36
09/07/04 12:16	4.26	16.91	44.36
09/07/04 12:16	4.35	16.82	51.36
09/07/04 12:16	4.33	16.82	54.35
09/07/04 12:16	4.36	16.80	50.35
09/07/04 12:17	4.38	16.78	45.35
09/07/04 12:17	4.30	16.85	37.36
09/07/04 12:17	4.27	16.89	34.37
09/07/04 12:17	4.28	16.90	31.37
09/07/04 12:18	4.25	16.92	31.37
09/07/04 12:18	4.30	16.86	32.36
09/07/04 12:18	4.35	16.81	32.36
09/07/04 12:18	4.29	16.86	39.36
09/07/04 12:19	4.30	16.86	43.36
09/07/04 12:19	4.24	16.92	42.36
09/07/04 12:19	4.24	16.94	41.36
09/07/04 12:19	4.24	16.92	46.35
09/07/04 12:20	4.30	16.86	49.36
09/07/04 12:20	4.39	16.78	48.35
09/07/04 12:20	4.42	16.72	48.35
09/07/04 12:20	4.48	16.65	46.35
09/07/04 12:21	4.46	16.68	42.36
09/07/04 12:21	4.47	16.67	37.36
09/07/04 12:21	4.46	16.67	37.36
09/07/04 12:21	4.42	16.72	34.37
09/07/04 12:22	4.43	16.72	31.36
09/07/04 12:22	4.37	16.77	27.37
09/07/04 12:22	4.34	16.82	28.37
09/07/04 12:22	4.37	16.80	36.37
09/07/04 12:23	4.37	16.78	38.36
09/07/04 12:23	4.35	16.80	38.36
09/07/04 12:23	4.32	16.83	39.36
09/07/04 12:23	4.32	16.84	38.36
09/07/04 12:24	4.30	16.85	37.36
09/07/04 12:24	4.36	16.80	39.36
09/07/04 12:24	4.39	16.76	40.35
09/07/04 12:24	4.42	16.72	40.36
09/07/04 12:25	4.44	16.70	39.36
09/07/04 12:25	4.44	16.72	41.35
09/07/04 12:25	4.44	16.69	39.36
09/07/04 12:25	4.37	16.73	36.36
09/07/04 12:26	4.41	16.76	35.37
09/07/04 12:26	4.35	16.77	36.36
09/07/04 12:26	4.37	16.80	37.36
09/07/04 12:26	4.35	16.81	48.35
09/07/04 12:27	4.50	16.71	51.35
09/07/04 12:27	4.46	16.67	49.35
09/07/04 12:27	4.44	16.72	46.35
09/07/04 12:27	4.40	16.77	40.35
09/07/04 12:28	4.42	16.74	38.36
09/07/04 12:28	4.41	16.72	36.36
09/07/04 12:28	4.52	16.64	36.37
09/07/04 12:28	4.63	16.48	34.36
09/07/04 12:29	4.53	16.58	34.37
09/07/04 12:29	4.45	16.70	34.36
09/07/04 12:29	4.41	16.73	35.37
09/07/04 12:29	4.41	16.73	35.37
09/07/04 12:30	4.40	16.75	34.37
09/07/04 12:30	4.37	16.77	43.36
09/07/04 12:30	4.47	16.71	47.35
09/07/04 12:30	4.49	16.67	45.35
09/07/04 12:31	4.35	16.77	42.36
09/07/04 12:31	4.39	16.78	34.37
09/07/04 12:31	4.41	16.74	32.36
09/07/04 12:31	4.32	16.84	35.37
09/07/04 12:32	4.31	16.87	33.37
09/07/04 12:32	4.28	16.89	32.36
09/07/04 12:32	4.24	16.93	34.37
09/07/04 12:32	4.31	16.87	38.36
09/07/04 12:33	4.34	16.83	41.35
09/07/04 12:33	4.33	16.81	40.36
09/07/04 12:33	4.36	16.80	41.36
09/07/04 12:33	4.36	16.81	38.36
09/07/04 12:34	4.43	16.73	34.37
09/07/04 12:34	4.40	16.77	34.36
09/07/04 12:34	4.30	16.85	38.36
09/07/04 12:34	4.36	16.81	56.35
09/07/04 12:35	4.79	16.71	61.34
09/07/04 12:35	4.41	16.73	59.34
09/07/04 12:35	4.41	16.73	57.18
09/07/04 12:35	4.38	16.78	53.35
09/07/04 12:36	4.42	16.77	47.44
09/07/04 12:36	4.41	16.70	43.36

TIME	CO2	O2	CO
09/07/04 12:36	4.34	16.79	45.98
09/07/04 12:36	4.31	16.86	48.35
09/07/04 12:37	4.31	16.87	50.35
09/07/04 12:37	4.35	16.79	53.35
09/07/04 12:37	4.46	16.64	48.25
09/07/04 12:37	4.44	16.68	44.36
09/07/04 12:38	4.41	16.74	42.34
09/07/04 12:38	4.33	16.83	40.35
09/07/04 12:38	4.37	16.81	36.45
09/07/04 12:38	4.42	16.74	35.37
09/07/04 12:39	4.43	16.73	33.70
09/07/04 12:39	4.30	16.75	33.37
09/07/04 12:39	4.41	16.72	41.36
09/07/04 12:39	4.48	16.65	43.36
09/07/04 12:40	4.46	16.68	38.86
09/07/04 12:40	4.41	16.71	33.36
09/07/04 12:40	4.34	16.79	33.37
09/07/04 12:40	4.30	16.85	34.37
09/07/04 12:41	4.29	16.87	38.25
09/07/04 12:41	4.28	16.88	41.35
09/07/04 12:41	4.32	16.82	42.35
09/07/04 12:41	4.33	16.82	43.36
09/07/04 12:42	4.36	16.79	40.35
09/07/04 12:42	4.34	16.82	40.35
09/07/04 12:42	4.31	16.86	44.36
09/07/04 12:42	4.31	16.84	45.35
09/07/04 12:43	4.26	16.85	40.36
09/07/04 12:43	4.25	16.93	37.36
09/07/04 12:43	4.24	16.97	36.36
09/07/04 12:43	4.26	16.90	39.35
09/07/04 12:44	4.28	16.86	40.35
09/07/04 12:44	4.22	16.95	36.36
09/07/04 12:44	7.13	16.98	31.36
09/07/04 12:44	4.21	16.95	31.36
09/07/04 12:45	4.18	16.97	32.36
09/07/04 12:45	4.15	17.01	32.36
09/07/04 12:45	4.16	16.99	31.36
09/07/04 12:45	4.16	16.97	32.36
09/07/04 12:46	4.28	16.90	42.35
09/07/04 12:46	4.25	16.89	43.35
09/07/04 12:46	4.23	16.92	34.36
09/07/04 12:46	4.24	16.91	35.37
09/07/04 12:47	4.31	16.84	41.36
09/07/04 12:47	4.37	16.78	43.35
09/07/04 12:47	4.37	16.77	45.35
09/07/04 12:47	4.35	16.79	45.35
09/07/04 12:48	4.32	16.82	49.35
09/07/04 12:48	4.34	16.79	48.35
09/07/04 12:48	4.36	16.78	42.35
09/07/04 12:48	4.32	16.81	40.36
09/07/04 12:49	4.29	16.86	40.36
09/07/04 12:49	4.28	16.87	41.36
09/07/04 12:49	4.26	16.91	42.35
09/07/04 12:49	4.38	16.78	42.36
09/07/04 12:50	4.51	16.62	45.35
09/07/04 12:50	4.49	16.62	42.36
09/07/04 12:50	4.39	16.74	36.36
09/07/04 12:50	4.57	16.78	36.36
09/07/04 12:51	4.32	16.82	41.35
09/07/04 12:51	4.32	16.81	42.36
09/07/04 12:51	4.37	16.78	38.36
09/07/04 12:51	4.33	16.80	38.35
09/07/04 12:52	4.29	16.84	42.36
09/07/04 12:52	4.34	16.81	41.35
09/07/04 12:52	4.29	16.85	36.37
09/07/04 12:52	4.36	16.79	36.36
09/07/04 12:53	4.33	16.82	38.36
09/07/04 12:53	4.33	16.80	40.36
09/07/04 12:53	4.36	16.77	43.35
09/07/04 12:53	4.30	16.82	42.36
09/07/04 12:54	4.31	16.86	42.36
09/07/04 12:54	4.24	16.90	49.35
09/07/04 12:54	4.28	16.90	74.34
09/07/04 12:54	4.41	16.73	79.34
09/07/04 12:55	4.47	16.64	66.33
09/07/04 12:55	4.42	16.71	64.33
09/07/04 12:55	4.41	16.70	67.34
09/07/04 12:55	4.36	16.76	67.34
09/07/04 12:56	4.25	16.79	83.34
09/07/04 12:56	4.42	16.69	95.32
09/07/04 12:56	4.55	16.58	105.32
09/07/04 12:56	4.52	16.58	99.32
09/07/04 12:57	4.44	16.58	83.34
09/07/04 12:57	4.53	16.56	83.34
09/07/04 12:57	4.58	16.57	81.34
09/07/04 12:57	4.45	16.66	78.33
09/07/04 12:58	4.36	16.78	76.34
09/07/04 12:58	4.35	16.78	81.34

TIME	CO2	O2	CO
09/07/04 12:58	4.40	16.74	91.33
09/07/04 12:58	4.37	16.76	97.32
09/07/04 12:59	4.37	16.69	100.32
09/07/04 12:59	4.34	16.76	100.32
09/07/04 12:59	4.26	16.84	102.32
09/07/04 12:59	4.24	16.90	100.32
09/07/04 13:00	4.18	17.00	106.32
09/07/04 13:00	4.17	16.99	104.32
09/07/04 13:00	4.13	17.01	84.33
09/07/04 13:00	4.12	17.04	75.34
09/07/04 13:01	3.99	17.17	75.34
09/07/04 13:01	3.87	17.30	82.34
09/07/04 13:01	3.87	17.32	88.32
09/07/04 13:01	3.86	17.32	87.33
09/07/04 13:02	3.83	17.36	85.33
09/07/04 13:02	3.88	17.31	94.32
09/07/04 13:02	4.01	17.19	105.32
09/07/04 13:02	4.12	17.06	100.32
09/07/04 13:03	4.07	17.09	86.33
09/07/04 13:03	3.97	17.18	77.34
09/07/04 13:03	3.77	17.29	64.33
09/07/04 13:03	3.81	17.37	61.33
09/07/04 13:04	3.77	17.43	58.34
09/07/04 13:04	3.75	17.46	61.33
09/07/04 13:04	3.80	17.41	69.33
09/07/04 13:04	3.78	17.40	81.34
09/07/04 13:05	3.85	17.39	95.32
09/07/04 13:05	3.81	17.40	95.32
09/07/04 13:05	3.78	17.39	79.33
09/07/04 13:05	3.69	17.48	73.34
09/07/04 13:06	3.69	17.49	70.33
09/07/04 13:06	3.56	17.50	75.35
09/07/04 13:06	3.68	17.52	99.32
09/07/04 13:06	3.84	17.37	99.32
09/07/04 13:07	3.86	17.33	81.34
09/07/04 13:07	3.83	17.34	74.34
09/07/04 13:07	3.84	17.36	66.33
09/07/04 13:07	3.71	17.46	65.34
09/07/04 13:08	3.70	17.48	65.34
09/07/04 13:08	3.66	17.53	65.34
09/07/04 13:08	3.68	17.52	67.34
AVG. R 1	4.29	16.87	49.38

09/07/04 13:08	3.64	17.54	65.34
09/07/04 13:09	3.59	17.60	62.33
09/07/04 13:09	3.56	17.64	60.34
09/07/04 13:09	3.56	17.64	60.34
09/07/04 13:09	3.55	17.65	64.33
09/07/04 13:10	3.56	17.59	69.33
09/07/04 13:10	3.63	17.56	73.35
09/07/04 13:10	3.70	17.51	77.34
09/07/04 13:10	3.46	17.48	72.33
09/07/04 13:11	2.97	17.54	67.34
09/07/04 13:11	3.59	17.61	65.34
09/07/04 13:11	3.61	17.59	70.33
09/07/04 13:11	3.66	17.53	72.33
09/07/04 13:12	3.72	17.48	66.34
09/07/04 13:12	3.67	17.52	61.34
09/07/04 13:12	3.64	17.55	53.35
09/07/04 13:12	3.71	16.82	54.35
09/07/04 13:13	3.77	16.44	63.34
09/07/04 13:13	3.69	17.24	65.34
09/07/04 13:13	3.66	17.50	65.34
09/07/04 13:13	3.64	17.56	65.34
09/07/04 13:14	3.68	17.52	68.34
09/07/04 13:14	3.70	17.52	70.33
09/07/04 13:14	3.63	17.56	72.33
09/07/04 13:14	3.56	17.63	72.33
09/07/04 13:15	3.67	17.54	64.33
09/07/04 13:15	3.72	17.48	64.33
09/07/04 13:15	3.73	17.49	73.35
09/07/04 13:15	3.76	17.44	81.34
09/07/04 13:16	3.87	17.32	99.33
09/07/04 13:16	4.00	17.18	99.32
09/07/04 13:16	4.07	17.10	87.33
09/07/04 13:16	4.08	17.08	86.33
09/07/04 13:17	4.08	17.10	80.33
09/07/04 13:17	4.07	17.13	78.33
09/07/04 13:17	4.00	17.12	57.34
09/07/04 13:17	4.16	16.07	32.36
09/07/04 13:18	7.29	5.75	1.37
09/07/04 13:18	8.77	0.71	-0.63
09/07/04 13:18	8.99	0.04	-1.62
09/07/04 13:18	9.01	-0.02	-1.63
09/07/04 13:19	8.99	-0.04	-1.63
09/07/04 13:19	8.94	-0.05	-1.63
09/07/04 13:19	9.09	-0.05	-1.63
09/07/04 13:19	9.03	-0.06	-1.63

TIME	CO2	O2	CO
09/07/04 13:20	9.05	-0.06	-1.60
09/07/04 13:20	9.07	-0.07	-1.63
09/07/04 13:20	9.03	-0.06	-1.63
09/07/04 13:20	9.01	-0.07	-1.63
09/07/04 13:21	9.05	-0.08	-1.63
09/07/04 13:21	9.02	-0.08	-1.63
09/07/04 13:21	7.52	-0.07	-1.63
09/07/04 13:21	9.03	-0.08	-1.63
09/07/04 13:22	9.06	-0.08	-1.63
09/07/04 13:22	9.05	-0.08	-1.63
09/07/04 13:22	9.04	-0.08	-1.63
09/07/04 13:22	9.06	-0.08	-1.63
09/07/04 13:23	9.05	-0.08	-1.63
09/07/04 13:23	9.04	-0.09	-1.63
09/07/04 13:23	9.05	-0.09	-1.63
09/07/04 13:23	9.06	-0.09	-1.63
09/07/04 13:24	9.05	-0.09	-1.63
09/07/04 13:24	9.05	-0.09	-1.63
09/07/04 13:24	9.07	-0.09	-1.63
09/07/04 13:24	9.06	-0.09	-1.63
09/07/04 13:25	9.06	-0.09	-1.63
09/07/04 13:25	9.06	-0.09	-1.63
09/07/04 13:25	9.06	-0.10	-1.63
09/07/04 13:25	9.04	-0.09	-1.63
09/07/04 13:26	9.07	-0.10	-1.63
09/07/04 13:26	9.04	-0.10	-1.63
09/07/04 13:26	9.09	-0.10	-1.63
09/07/04 13:26	9.07	-0.10	-1.63
09/07/04 13:27	9.03	-0.10	-1.63
09/07/04 13:27	9.06	-0.10	-1.63
09/07/04 13:27	9.01	-0.09	-1.63
09/07/04 13:27	9.07	-0.10	-1.63
09/07/04 13:28	9.04	-0.11	-1.63
09/07/04 13:28	9.07	-0.11	-1.63
09/07/04 13:28	9.08	-0.10	-1.62
09/07/04 13:28	9.07	-0.10	-1.63
09/07/04 13:29	9.07	-0.10	-1.63
09/07/04 13:29	9.07	-0.10	-1.63
09/07/04 13:29	9.05	-0.10	-1.63
09/07/04 13:29	9.06	-0.10	-1.62
09/07/04 13:30	9.07	-0.10	-1.62
09/07/04 13:30	9.11	-0.10	-1.63
09/07/04 13:30	9.05	-0.10	-1.63
09/07/04 13:30	9.07	-0.11	-1.63
09/07/04 13:31	9.05	-0.10	-1.63
09/07/04 13:31	9.04	-0.10	-1.62
09/07/04 13:31	8.70	-0.10	-1.62
09/07/04 13:31	8.63	0.05	-1.63
09/07/04 13:32	8.50	0.05	-1.63
09/07/04 13:32	8.63	0.05	-0.63
09/07/04 13:32	7.58	1.63	0.37
09/07/04 13:32	5.52	8.50	0.37
09/07/04 13:33	4.47	10.23	0.37
09/07/04 13:33	4.39	10.43	0.37
09/07/04 13:33	4.40	10.46	0.37
09/07/04 13:33	4.39	10.49	0.37
09/07/04 13:34	4.37	10.51	0.37
09/07/04 13:34	4.35	10.50	0.37
09/07/04 13:34	9.52	10.58	22.37
09/07/04 13:34	4.20	13.92	36.36
09/07/04 13:35	4.14	16.45	46.35
09/07/04 13:35	4.12	16.84	43.35
09/07/04 13:35	4.16	16.81	35.36
09/07/04 13:35	4.12	16.86	34.37
09/07/04 13:36	4.06	16.95	44.36
09/07/04 13:36	4.04	16.96	47.35
09/07/04 13:36	4.02	17.00	43.36
09/07/04 13:36	4.01	17.03	39.35
09/07/04 13:37	4.28	17.02	33.37
09/07/04 13:37	4.04	16.99	32.36
09/07/04 13:37	4.00	17.02	30.36
09/07/04 13:37	3.98	17.05	30.36
09/07/04 13:38	3.99	17.04	39.35
09/07/04 13:38	4.05	16.98	44.35
09/07/04 13:38	4.05	16.95	43.36
09/07/04 13:38	4.02	17.00	41.35

START RUN 2	CO2	O2	CO
09/07/04 13:39	4.06	17.00	45.35
09/07/04 13:39	4.08	16.94	47.35
09/07/04 13:39	4.03	16.98	45.35
09/07/04 13:39	4.05	16.99	43.35
09/07/04 13:40	4.01	17.00	35.37
09/07/04 13:40	3.97	17.06	31.36
09/07/04 13:40	4.01	17.04	26.37
09/07/04 13:40	4.00	17.02	27.36
09/07/04 13:41	3.97	17.06	46.35
09/07/04 13:41	4.08	16.96	50.35

TIME	CO2	O2	CO
09/07/04 13:41	4.06	16.89	38.36
09/07/04 13:41	4.15	16.85	36.36
09/07/04 13:42	4.12	16.89	33.36
09/07/04 13:42	4.06	16.95	32.36
09/07/04 13:42	4.05	16.96	38.35
09/07/04 13:42	4.08	16.96	51.35
09/07/04 13:43	4.15	16.86	71.33
09/07/04 13:43	4.21	16.79	75.34
09/07/04 13:43	4.17	16.81	68.33
09/07/04 13:43	4.09	16.91	61.33
09/07/04 13:44	4.06	16.96	51.35
09/07/04 13:44	4.06	16.95	53.34
09/07/04 13:44	4.12	16.91	62.33
09/07/04 13:44	4.18	16.82	61.33
09/07/04 13:45	4.05	16.97	53.35
09/07/04 13:45	3.95	17.09	50.35
09/07/04 13:45	3.99	17.04	47.35
09/07/04 13:45	3.94	17.05	48.35
09/07/04 13:46	3.99	17.05	45.35
09/07/04 13:46	4.11	16.92	47.34
09/07/04 13:46	4.11	16.91	60.34
09/07/04 13:46	4.14	16.80	60.34
09/07/04 13:47	4.12	16.88	53.34
09/07/04 13:47	4.04	16.98	55.34
09/07/04 13:47	4.05	16.99	69.33
09/07/04 13:47	4.12	16.90	67.34
09/07/04 13:48	4.07	16.94	53.34
09/07/04 13:48	4.08	16.95	51.35
09/07/04 13:48	4.12	16.89	53.35
09/07/04 13:48	4.08	16.94	55.34
09/07/04 13:49	4.02	17.02	57.34
09/07/04 13:49	4.02	17.05	56.34
09/07/04 13:49	3.94	17.09	49.35
09/07/04 13:49	3.87	17.18	49.35
09/07/04 13:50	3.87	17.20	50.35
09/07/04 13:50	3.89	17.17	47.35
09/07/04 13:50	3.84	17.21	44.35
09/07/04 13:50	3.86	17.22	45.35
09/07/04 13:51	3.87	17.18	44.35
09/07/04 13:51	3.85	17.18	43.35
09/07/04 13:51	3.83	17.20	42.35
09/07/04 13:51	3.83	17.22	47.34
09/07/04 13:52	3.90	17.17	55.35
09/07/04 13:52	3.91	17.12	59.34
09/07/04 13:52	3.92	17.10	65.33
09/07/04 13:52	3.98	17.06	65.34
09/07/04 13:53	4.05	16.96	60.34
09/07/04 13:53	4.03	17.00	57.34
09/07/04 13:53	4.04	16.99	52.35
09/07/04 13:53	3.98	17.03	50.35
09/07/04 13:54	3.95	17.08	50.35
09/07/04 13:54	3.93	17.09	50.35
09/07/04 13:54	3.82	17.22	47.35
09/07/04 13:54	3.84	17.22	47.35
09/07/04 13:55	3.89	17.19	54.35
09/07/04 13:55	3.93	17.12	59.34
09/07/04 13:55	3.97	17.04	53.34
09/07/04 13:55	3.91	17.14	46.35
09/07/04 13:56	3.88	17.17	39.36
09/07/04 13:56	8.47	17.15	38.35
09/07/04 13:56	3.84	17.17	35.36
09/07/04 13:56	3.83	17.21	38.35
09/07/04 13:57	3.92	17.17	62.33
09/07/04 13:57	4.04	16.98	66.33
09/07/04 13:57	4.08	16.95	59.34
09/07/04 13:57	4.08	16.94	53.34
09/07/04 13:58	4.07	16.96	50.35
09/07/04 13:58	4.05	16.96	50.35
09/07/04 13:58	4.05	16.98	41.35
09/07/04 13:58	4.00	17.03	38.36
09/07/04 13:59	3.96	17.07	36.36
09/07/04 13:59	3.96	17.09	36.36
09/07/04 13:59	3.91	17.12	37.36
09/07/04 13:59	3.91	17.14	41.35
09/07/04 14:00	3.93	17.14	46.35
09/07/04 14:00	3.91	17.14	49.35
09/07/04 14:00	4.04	17.02	49.35
09/07/04 14:00	3.98	17.02	47.35
09/07/04 14:01	3.94	17.10	46.35
09/07/04 14:01	3.92	17.14	47.35
09/07/04 14:01	3.95	17.08	48.35
09/07/04 14:01	3.97	17.07	48.35
09/07/04 14:02	4.03	16.99	51.35
09/07/04 14:02	4.06	16.96	48.35
09/07/04 14:02	4.03	16.99	41.35
09/07/04 14:02	3.98	17.05	43.36
09/07/04 14:03	3.88	17.14	48.35
09/07/04 14:03	3.86	17.18	48.35

TIME	CO2	O2	CO
09/07/04 14:03	3.92	17.14	45.35
09/07/04 14:03	3.87	17.17	44.36
09/07/04 14:04	3.88	17.16	47.35
09/07/04 14:04	3.91	17.14	54.35
09/07/04 14:04	3.94	17.09	65.34
09/07/04 14:04	3.93	17.12	74.34
09/07/04 14:05	4.02	16.99	104.32
09/07/04 14:05	4.16	16.81	105.32
09/07/04 14:05	4.24	16.75	78.34
09/07/04 14:05	4.23	16.71	62.34
09/07/04 14:06	4.09	16.92	45.35
09/07/04 14:06	4.08	16.91	42.36
09/07/04 14:06	4.11	16.91	39.36
09/07/04 14:06	4.07	16.94	40.37
09/07/04 14:07	4.05	16.99	54.35
09/07/04 14:07	4.12	16.91	66.34
09/07/04 14:07	4.20	16.78	77.34
09/07/04 14:07	4.22	16.80	73.34
09/07/04 14:08	4.24	16.74	59.34
09/07/04 14:08	4.05	16.96	53.35
09/07/04 14:08	3.97	17.06	53.35
09/07/04 14:08	3.88	17.12	53.35
09/07/04 14:09	3.93	17.11	52.35
09/07/04 14:09	3.97	17.04	48.35
09/07/04 14:09	3.98	17.05	44.36
09/07/04 14:09	3.94	17.07	47.35
09/07/04 14:10	3.97	17.06	52.35
09/07/04 14:10	4.01	17.02	53.35
09/07/04 14:10	3.98	17.04	52.35
09/07/04 14:10	3.96	17.07	53.35
09/07/04 14:11	4.03	17.01	52.35
09/07/04 14:11	3.99	17.07	55.34
09/07/04 14:11	3.96	17.08	62.34
09/07/04 14:11	3.98	17.05	70.33
09/07/04 14:12	4.04	17.00	72.33
09/07/04 14:12	4.02	17.01	74.35
09/07/04 14:12	4.08	16.97	89.33
09/07/04 14:12	4.15	16.86	81.34
09/07/04 14:13	4.11	16.91	60.34
09/07/04 14:13	4.04	16.98	55.34
09/07/04 14:13	3.95	17.08	60.34
09/07/04 14:13	4.03	17.03	66.34
09/07/04 14:14	4.17	16.83	67.34
09/07/04 14:14	4.08	16.90	62.34
09/07/04 14:14	3.93	17.09	57.34
09/07/04 14:14	3.98	17.07	60.34
09/07/04 14:15	4.13	17.02	64.33
09/07/04 14:15	3.99	17.03	67.34
09/07/04 14:15	4.11	16.90	71.33
09/07/04 14:15	4.24	16.76	73.34
09/07/04 14:16	4.18	16.79	75.34
09/07/04 14:16	4.05	16.97	80.33
09/07/04 14:16	4.07	16.94	77.34
09/07/04 14:16	4.04	16.97	69.55
09/07/04 14:17	3.96	17.08	61.33
09/07/04 14:17	3.92	17.12	62.33
09/07/04 14:17	4.03	17.02	64.33
09/07/04 14:17	4.02	17.00	64.71
09/07/04 14:18	3.93	17.10	66.34
09/07/04 14:18	3.84	17.21	65.34
09/07/04 14:18	3.76	17.30	61.34
09/07/04 14:18	3.80	17.28	58.34
09/07/04 14:19	3.79	17.27	55.34
09/07/04 14:19	3.73	17.30	63.14
09/07/04 14:19	3.83	17.19	61.33
09/07/04 14:19	3.73	17.31	59.34
09/07/04 14:20	3.74	17.31	58.34
09/07/04 14:20	3.72	17.31	58.35
09/07/04 14:20	3.81	17.22	58.34
09/07/04 14:20	3.81	17.24	64.33
09/07/04 14:21	3.87	17.19	70.33
09/07/04 14:21	3.92	17.09	69.46
09/07/04 14:21	3.85	17.19	67.34
09/07/04 14:21	3.89	17.15	64.33
09/07/04 14:22	3.92	17.11	61.33
09/07/04 14:22	3.88	17.16	56.34
09/07/04 14:22	3.96	17.07	54.35
09/07/04 14:22	3.98	17.05	52.36
09/07/04 14:23	3.92	17.09	51.35
09/07/04 14:23	3.90	17.13	50.35
09/07/04 14:23	3.84	17.20	50.35
09/07/04 14:23	3.82	17.21	47.35
09/07/04 14:24	3.76	17.28	46.35
09/07/04 14:24	3.76	17.29	41.35
09/07/04 14:24	3.71	17.34	36.37
09/07/04 14:24	3.66	17.40	34.36
09/07/04 14:25	3.65	17.42	33.37
09/07/04 14:25	3.63	17.43	30.36

TIME	CO2	O2	CO
09/07/04 14:25	3.60	17.46	31.36
09/07/04 14:25	3.60	17.48	31.36
09/07/04 14:26	3.59	17.50	29.36
09/07/04 14:26	3.60	17.46	29.36
09/07/04 14:26	3.66	17.41	32.36
09/07/04 14:26	3.70	17.37	32.36
09/07/04 14:27	3.65	17.41	30.37
09/07/04 14:27	3.58	17.49	34.37
09/07/04 14:27	3.59	17.49	36.37
09/07/04 14:27	3.63	17.44	30.36
09/07/04 14:28	3.64	17.44	28.37
09/07/04 14:28	3.59	17.50	29.36
09/07/04 14:28	3.65	17.44	30.36
09/07/04 14:28	3.64	17.43	29.36
09/07/04 14:29	3.57	17.51	28.37
09/07/04 14:29	3.55	17.53	25.37
09/07/04 14:29	3.55	17.54	26.37
09/07/04 14:29	3.53	17.56	25.37
09/07/04 14:30	3.53	17.56	26.37
09/07/04 14:30	3.55	17.54	27.37
09/07/04 14:30	3.54	17.55	28.37
09/07/04 14:30	3.55	17.55	29.37
09/07/04 14:31	3.51	17.58	28.37
09/07/04 14:31	3.50	17.60	30.37
09/07/04 14:31	3.53	17.57	30.36
09/07/04 14:31	3.51	17.57	28.37
09/07/04 14:32	3.55	17.54	29.36
09/07/04 14:32	3.59	17.51	28.37
09/07/04 14:32	3.65	17.45	27.37
09/07/04 14:32	3.62	17.44	24.37
09/07/04 14:33	3.67	17.42	23.37
09/07/04 14:33	3.71	17.36	22.37
09/07/04 14:33	3.66	17.40	22.38
09/07/04 14:33	3.64	17.43	24.37
09/07/04 14:34	3.66	17.42	23.37
09/07/04 14:34	3.64	17.43	23.37
09/07/04 14:34	3.60	17.47	25.37
09/07/04 14:34	3.69	17.39	26.37
09/07/04 14:35	3.74	17.32	24.37
09/07/04 14:35	3.76	17.29	23.37
09/07/04 14:35	3.76	17.30	24.37
09/07/04 14:35	3.77	17.27	29.36
09/07/04 14:36	3.77	17.28	32.36
09/07/04 14:36	3.73	17.33	36.36
09/07/04 14:36	3.77	17.30	37.36
09/07/04 14:36	3.78	17.28	32.36
09/07/04 14:37	3.70	17.35	29.37
09/07/04 14:37	3.65	17.41	25.37
09/07/04 14:37	3.61	17.46	26.37
09/07/04 14:37	3.63	17.44	31.36
09/07/04 14:38	3.74	17.33	33.36
09/07/04 14:38	3.76	17.29	30.36
09/07/04 14:38	3.79	17.26	28.37
09/07/04 14:38	3.76	17.29	25.37
AVG. R 2	3.92	17.14	48.56
09/07/04 14:39	3.70	17.37	24.37
09/07/04 14:39	3.70	17.38	26.37
09/07/04 14:39	3.67	17.40	28.37
09/07/04 14:39	3.69	17.37	29.36
09/07/04 14:40	3.72	17.34	27.37
09/07/04 14:40	3.71	17.34	25.37
09/07/04 14:40	3.60	17.45	24.37
09/07/04 14:40	3.59	17.50	22.37
09/07/04 14:41	3.63	17.46	21.37
09/07/04 14:41	3.61	17.45	22.37
09/07/04 14:41	3.63	17.45	23.37
09/07/04 14:41	3.68	17.38	22.37
09/07/04 14:42	3.66	17.40	22.37
09/07/04 14:42	3.68	17.41	24.37
09/07/04 14:42	3.72	17.34	26.37
09/07/04 14:42	3.74	17.32	29.36
09/07/04 14:43	3.75	17.31	29.37
09/07/04 14:43	3.75	17.32	27.37
09/07/04 14:43	3.69	17.37	28.37
09/07/04 14:43	3.72	17.35	28.37
09/07/04 14:44	3.71	17.34	27.37
09/07/04 14:44	3.65	17.41	26.37
09/07/04 14:44	3.64	17.44	30.36
09/07/04 14:44	3.68	17.39	35.37
09/07/04 14:45	3.71	17.34	34.37
09/07/04 14:45	3.60	17.47	37.36
09/07/04 14:45	3.57	17.45	37.36
09/07/04 14:45	3.66	17.42	35.37
09/07/04 14:46	3.65	17.42	34.36
09/07/04 14:46	3.65	17.42	34.36
09/07/04 14:46	3.74	17.34	33.37
09/07/04 14:46	3.75	17.31	32.36

TIME	CO2	O2	CO
09/07/04 14:47	3.73	17.34	33.36
09/07/04 14:47	3.78	17.28	34.37
09/07/04 14:47	3.75	17.26	34.37
09/07/04 14:47	3.77	17.30	34.37
09/07/04 14:48	3.78	17.26	37.36
09/07/04 14:48	3.73	17.32	36.37
09/07/04 14:48	3.76	17.31	33.37
09/07/04 14:48	3.83	17.23	33.37
09/07/04 14:49	3.79	17.25	34.37
09/07/04 14:49	3.75	17.30	35.37
09/07/04 14:49	3.72	17.36	37.36
09/07/04 14:49	3.71	17.36	36.37
09/07/04 14:50	3.70	17.38	37.36
09/07/04 14:50	3.73	17.33	39.36
09/07/04 14:50	3.76	17.28	37.36
09/07/04 14:50	3.73	17.32	31.37
09/07/04 14:51	3.71	17.35	30.36
09/07/04 14:51	3.72	17.36	22.38
09/07/04 14:51	3.37	15.73	12.39
09/07/04 14:51	1.27	5.69	1.38
09/07/04 14:52	0.35	0.72	0.37
09/07/04 14:52	0.24	0.17	-0.62
09/07/04 14:52	0.22	0.13	-0.62
09/07/04 14:52	0.22	0.12	-0.63
09/07/04 14:53	0.22	0.11	-0.62
09/07/04 14:53	0.22	0.11	-0.62
09/07/04 14:53	0.21	0.11	-0.63
09/07/04 14:53	0.22	0.10	-0.63
09/07/04 14:54	0.22	0.10	-0.62
09/07/04 14:54	0.20	0.10	-0.63
09/07/04 14:54	0.22	0.10	-0.62
09/07/04 14:54	0.21	0.09	-0.62
09/07/04 14:55	0.21	0.09	-0.62
09/07/04 14:55	0.21	0.09	-0.63
09/07/04 14:55	0.21	0.09	-0.62
09/07/04 14:55	0.21	0.09	-0.62
09/07/04 14:56	0.21	0.08	-0.62
09/07/04 14:56	0.21	0.08	-0.63
09/07/04 14:56	0.21	0.08	-0.62
09/07/04 14:56	0.06	0.09	-0.62
09/07/04 14:57	0.05	0.08	-0.63
09/07/04 14:57	0.06	0.10	4.38
09/07/04 14:57	1.20	4.86	3.38
09/07/04 14:57	3.17	8.92	0.37
09/07/04 14:58	3.99	10.33	-0.63
09/07/04 14:58	4.11	10.53	-0.63
09/07/04 14:58	4.12	10.55	-0.62
09/07/04 14:58	4.12	10.54	-0.63
09/07/04 14:59	4.12	10.55	-0.63
09/07/04 14:59	4.12	10.55	-0.63
09/07/04 14:59	4.20	10.49	-0.63
09/07/04 14:59	4.20	10.44	-0.63
09/07/04 15:00	4.21	10.45	-0.63
09/07/04 15:00	4.22	10.45	-0.62
09/07/04 15:00	4.21	10.45	-0.63
09/07/04 15:00	4.22	10.45	-0.62
09/07/04 15:01	4.19	10.44	-0.62
09/07/04 15:01	4.21	10.48	16.38
09/07/04 15:01	3.93	13.70	26.37
09/07/04 15:01	3.69	16.58	35.37
09/07/04 15:02	3.68	17.00	37.36
09/07/04 15:02	3.72	17.00	36.37
09/07/04 15:02	3.68	17.02	35.37
09/07/04 15:02	3.67	17.04	35.37
09/07/04 15:03	3.61	17.11	35.37
09/07/04 15:03	3.66	17.07	35.37
09/07/04 15:03	3.73	16.98	35.37
09/07/04 15:03	3.76	16.97	35.37
09/07/04 15:04	3.63	17.05	35.37
09/07/04 15:04	3.66	17.09	35.37
09/07/04 15:04	3.76	17.04	36.37
09/07/04 15:04	3.68	17.04	34.37

START RUN 3	CO2	O2	CO
09/07/04 15:05	3.71	17.02	34.37
09/07/04 15:05	3.70	17.04	33.37
09/07/04 15:05	3.66	17.06	33.37
09/07/04 15:05	3.71	17.03	34.37
09/07/04 15:06	3.70	17.04	33.37
09/07/04 15:06	3.64	17.09	36.37
09/07/04 15:06	3.63	17.10	44.36
09/07/04 15:06	3.69	17.04	49.36
09/07/04 15:07	3.72	17.01	44.36
09/07/04 15:07	3.66	17.08	37.36
09/07/04 15:07	3.66	17.10	34.37
09/07/04 15:07	3.66	17.09	32.36
09/07/04 15:08	3.61	17.13	32.36
09/07/04 15:08	3.62	17.13	34.37
09/07/04 15:08	3.63	17.12	33.37

TIME	CO2	O2	CO
09/07/04 15:08	3.68	17.06	34.37
09/07/04 15:09	3.68	17.07	35.37
09/07/04 15:09	3.69	17.04	35.37
09/07/04 15:09	3.73	16.99	38.36
09/07/04 15:09	3.77	16.93	43.36
09/07/04 15:10	3.76	16.97	45.35
09/07/04 15:10	3.86	16.90	44.36
09/07/04 15:10	3.78	16.91	40.36
09/07/04 15:10	3.80	16.93	40.36
09/07/04 15:11	3.78	16.93	40.36
09/07/04 15:11	3.75	16.97	36.37
09/07/04 15:11	3.77	16.97	35.37
09/07/04 15:11	3.75	16.97	35.37
09/07/04 15:12	3.71	17.02	34.37
09/07/04 15:12	3.67	17.07	35.37
09/07/04 15:12	3.68	17.05	36.37
09/07/04 15:12	3.66	17.08	42.36
09/07/04 15:13	3.68	17.06	41.36
09/07/04 15:13	3.72	17.02	33.37
09/07/04 15:13	3.64	17.10	31.37
09/07/04 15:13	3.58	17.18	28.38
09/07/04 15:14	3.53	17.23	31.37
09/07/04 15:14	3.62	17.13	38.37
09/07/04 15:14	3.71	17.02	37.36
09/07/04 15:14	3.69	17.05	30.37
09/07/04 15:15	3.77	16.98	29.37
09/07/04 15:15	3.75	16.97	27.37
09/07/04 15:15	3.64	17.10	29.36
09/07/04 15:15	3.64	17.11	31.37
09/07/04 15:16	3.59	17.15	30.36
09/07/04 15:16	3.59	17.17	30.36
09/07/04 15:16	3.56	17.18	29.36
09/07/04 15:16	3.55	17.20	32.36
09/07/04 15:17	3.63	17.12	40.36
09/07/04 15:17	3.68	17.08	47.35
09/07/04 15:17	3.69	17.06	46.35
09/07/04 15:17	3.63	17.11	45.35
09/07/04 15:18	3.57	17.17	44.36
09/07/04 15:18	3.58	17.18	48.35
09/07/04 15:18	3.61	17.15	45.35
09/07/04 15:18	3.57	17.16	36.36
09/07/04 15:19	3.52	17.23	35.37
09/07/04 15:19	3.58	17.21	38.36
09/07/04 15:19	3.54	17.20	39.36
09/07/04 15:19	3.56	17.21	40.36
09/07/04 15:20	3.52	17.23	38.36
09/07/04 15:20	3.53	17.21	45.35
09/07/04 15:20	3.61	17.15	46.35
09/07/04 15:20	3.64	17.12	39.36
09/07/04 15:21	3.64	17.09	34.37
09/07/04 15:21	3.61	17.14	30.37
09/07/04 15:21	3.63	17.12	29.36
09/07/04 15:21	3.69	17.03	32.36
09/07/04 15:22	3.63	17.11	35.37
09/07/04 15:22	3.65	17.09	35.37
09/07/04 15:22	3.60	17.14	34.37
09/07/04 15:22	3.55	17.20	35.37
09/07/04 15:23	3.62	17.14	38.36
09/07/04 15:23	3.68	17.06	46.35
09/07/04 15:23	3.75	16.99	47.35
09/07/04 15:23	3.69	17.03	43.36
09/07/04 15:24	3.62	17.10	41.36
09/07/04 15:24	3.58	17.16	43.36
09/07/04 15:24	3.60	17.17	43.36
09/07/04 15:24	3.63	17.12	39.36
09/07/04 15:25	3.57	17.18	38.36
09/07/04 15:25	3.53	17.22	37.36
09/07/04 15:25	3.54	17.20	36.37
09/07/04 15:25	3.60	17.16	39.36
09/07/04 15:26	3.72	17.05	41.35
09/07/04 15:26	3.74	17.01	40.36
09/07/04 15:26	3.62	17.10	38.36
09/07/04 15:26	3.56	17.18	45.35
09/07/04 15:27	3.54	17.21	49.36
09/07/04 15:27	3.55	17.20	43.36
09/07/04 15:27	3.50	17.26	40.36
09/07/04 15:27	3.49	17.27	37.36
09/07/04 15:28	3.46	17.29	36.37
09/07/04 15:28	3.47	17.29	34.37
09/07/04 15:28	3.49	17.27	33.37
09/07/04 15:28	3.52	17.25	32.36
09/07/04 15:29	3.64	17.11	33.37
09/07/04 15:29	3.66	17.07	34.37
09/07/04 15:29	3.64	17.11	35.37
09/07/04 15:29	3.68	17.07	36.37
09/07/04 15:30	3.65	17.07	36.37
09/07/04 15:30	3.60	17.14	41.37
09/07/04 15:30	3.60	17.14	44.36

TIME	CO2	O2	CO
09/07/04 15:30	3.62	17.12	41.36
09/07/04 15:31	3.69	17.05	40.36
09/07/04 15:31	3.70	17.03	46.36
09/07/04 15:31	3.71	17.03	54.35
09/07/04 15:31	3.75	16.99	67.34
09/07/04 15:32	3.73	16.98	70.34
09/07/04 15:32	3.74	16.98	64.34
09/07/04 15:32	3.68	17.04	61.35
09/07/04 15:32	3.65	17.09	58.34
09/07/04 15:33	3.65	17.08	59.36
09/07/04 15:33	3.66	17.08	63.35
09/07/04 15:33	3.65	17.08	67.34
09/07/04 15:33	3.63	17.11	69.34
09/07/04 15:34	3.62	17.10	71.33
09/07/04 15:34	3.61	17.14	65.35
09/07/04 15:34	3.50	17.23	58.35
09/07/04 15:34	3.45	17.29	53.35
09/07/04 15:35	3.48	17.29	53.35
09/07/04 15:35	3.49	17.25	50.36
09/07/04 15:35	3.49	17.27	55.35
09/07/04 15:35	3.50	17.25	61.34
09/07/04 15:36	3.45	17.29	63.34
09/07/04 15:36	3.42	17.34	57.35
09/07/04 15:36	3.43	17.32	53.35
09/07/04 15:36	3.44	17.32	49.36
09/07/04 15:37	3.39	17.38	49.36
09/07/04 15:37	3.31	17.46	51.36
09/07/04 15:37	3.22	17.55	52.36
09/07/04 15:37	3.26	17.52	52.36
09/07/04 15:38	3.24	17.53	52.35
09/07/04 15:38	3.25	17.54	53.35
09/07/04 15:38	3.25	17.53	52.36
09/07/04 15:38	3.22	17.55	54.35
09/07/04 15:39	3.18	17.59	57.34
09/07/04 15:39	3.23	17.54	59.35
09/07/04 15:39	3.24	17.52	58.35
09/07/04 15:39	3.27	17.50	52.36
09/07/04 15:40	3.33	17.43	51.36
09/07/04 15:40	3.31	17.46	59.34
09/07/04 15:40	3.31	17.46	62.34
09/07/04 15:40	3.33	17.44	56.35
09/07/04 15:41	3.46	17.31	55.35
09/07/04 15:41	3.52	17.23	57.35
09/07/04 15:41	3.47	17.29	57.34
09/07/04 15:41	3.50	17.24	49.36
09/07/04 15:42	3.47	17.27	45.35
09/07/04 15:42	3.49	17.26	42.36
09/07/04 15:42	3.45	17.28	41.35
09/07/04 15:42	3.36	17.38	40.36
09/07/04 15:43	3.34	17.42	41.36
09/07/04 15:43	3.37	17.38	45.35
09/07/04 15:43	3.41	17.33	48.35
09/07/04 15:43	3.46	17.28	53.35
09/07/04 15:44	3.52	17.22	57.34
09/07/04 15:44	3.50	17.21	63.34
09/07/04 15:44	3.46	17.27	62.34
09/07/04 15:44	3.48	17.25	70.34
09/07/04 15:45	3.50	17.22	77.34
09/07/04 15:45	3.56	17.18	88.33
09/07/04 15:45	3.61	17.13	85.34
09/07/04 15:45	3.65	17.08	67.34
09/07/04 15:46	3.63	17.09	61.34
09/07/04 15:46	3.58	17.16	61.34
09/07/04 15:46	3.47	17.28	60.34
09/07/04 15:46	3.40	17.35	57.34
09/07/04 15:47	3.44	17.31	58.35
09/07/04 15:47	3.47	17.28	57.35
09/07/04 15:47	3.38	17.37	58.34
09/07/04 15:47	3.35	17.42	59.34
09/07/04 15:48	3.32	17.44	59.35
09/07/04 15:48	3.33	17.42	57.34
09/07/04 15:48	3.31	17.45	55.36
09/07/04 15:48	3.26	17.49	57.34
09/07/04 15:49	3.34	17.43	58.34
09/07/04 15:49	3.38	17.39	65.34
09/07/04 15:49	3.41	17.37	72.33
09/07/04 15:49	3.45	17.31	80.34
09/07/04 15:50	3.48	17.27	81.35
09/07/04 15:50	3.49	17.28	80.34
09/07/04 15:50	3.46	17.29	75.35
09/07/04 15:50	3.47	17.28	64.34
09/07/04 15:51	3.46	17.29	61.34
09/07/04 15:51	3.47	17.27	59.34
09/07/04 15:51	3.45	17.29	58.35
09/07/04 15:51	3.40	17.36	58.35
09/07/04 15:52	3.37	17.40	61.34
09/07/04 15:52	3.38	17.40	67.34
09/07/04 15:52	3.42	17.33	69.33

TIME	CO2	O2	CO
09/07/04 15:52	3.50	17.25	64.34
09/07/04 15:53	3.59	17.17	60.34
09/07/04 15:53	3.56	17.18	58.35
09/07/04 15:53	3.47	17.26	60.35
09/07/04 15:53	3.34	17.40	72.33
09/07/04 15:54	3.34	17.43	75.35
09/07/04 15:54	3.31	17.46	81.35
09/07/04 15:54	3.31	17.47	81.34
09/07/04 15:54	3.27	17.51	84.34
09/07/04 15:55	3.21	17.55	88.33
09/07/04 15:55	3.25	17.53	93.33
09/07/04 15:55	3.23	17.54	94.32
09/07/04 15:55	3.15	17.60	90.33
09/07/04 15:56	3.14	17.63	93.33
09/07/04 15:56	3.24	17.57	110.33
09/07/04 15:56	3.38	17.38	115.33
09/07/04 15:56	3.31	17.44	125.32
09/07/04 15:57	3.25	17.53	123.32
09/07/04 15:57	3.22	17.55	111.32
09/07/04 15:57	3.23	17.55	107.33
09/07/04 15:57	3.22	17.55	110.33
09/07/04 15:58	3.31	17.48	111.32
09/07/04 15:58	3.39	17.37	94.33
09/07/04 15:58	3.39	17.38	87.34
09/07/04 15:58	3.40	17.36	82.34
09/07/04 15:59	3.41	17.35	85.34
09/07/04 15:59	3.46	17.31	79.34
09/07/04 15:59	3.38	17.37	74.35
09/07/04 15:59	3.39	17.36	72.34
09/07/04 16:00	3.39	17.38	72.09
09/07/04 16:00	3.42	17.33	74.35
09/07/04 16:00	3.39	17.36	75.35
09/07/04 16:00	3.35	17.42	69.34
09/07/04 16:01	3.32	17.44	64.34
09/07/04 16:01	3.31	17.43	61.34
09/07/04 16:01	3.27	17.49	63.34
09/07/04 16:01	3.24	17.53	64.34
09/07/04 16:02	3.22	17.56	66.34
09/07/04 16:02	3.21	17.55	75.35
09/07/04 16:02	3.35	17.46	78.34
09/07/04 16:02	3.27	17.47	73.35
09/07/04 16:03	3.21	17.55	71.34
09/07/04 16:03	3.18	17.59	76.35
09/07/04 16:03	3.17	17.59	71.33
09/07/04 16:03	3.05	17.71	69.34
09/07/04 16:04	2.98	17.76	66.68
09/07/04 16:04	2.97	17.80	67.34
09/07/04 16:04	3.02	17.77	67.22
09/07/04 16:04	3.04	17.75	69.34
AVG. R 3	3.50	17.25	54.43

09/07/04 16:05	3.03	17.73	77.35
09/07/04 16:05	3.04	17.75	81.35
09/07/04 16:05	3.02	17.75	88.34
09/07/04 16:05	3.13	17.66	87.34
09/07/04 16:06	3.15	17.62	114.33
09/07/04 16:06	3.25	17.51	121.32
09/07/04 16:06	3.22	17.55	120.66
09/07/04 16:06	3.16	17.61	115.33
09/07/04 16:07	3.24	17.54	97.33
09/07/04 16:07	3.44	17.33	88.34
09/07/04 16:07	3.50	17.26	66.35
09/07/04 16:07	3.65	17.08	61.34
09/07/04 16:08	3.69	17.05	59.35
09/07/04 16:08	3.56	17.17	58.35
09/07/04 16:08	3.49	17.25	56.35
09/07/04 16:08	3.45	17.30	56.35
09/07/04 16:09	3.46	17.29	34.37
09/07/04 16:09	2.77	14.24	17.39
09/07/04 16:09	0.88	4.48	0.38
09/07/04 16:09	0.15	0.47	-0.62
09/07/04 16:10	0.08	0.14	-1.62
09/07/04 16:10	0.08	0.11	-1.62
09/07/04 16:10	0.08	0.10	-1.62
09/07/04 16:10	0.07	0.10	-1.62
09/07/04 16:11	0.08	0.09	-1.62
09/07/04 16:11	0.07	0.10	-1.62
09/07/04 16:11	0.07	0.09	-1.62
09/07/04 16:11	0.07	0.09	3.39
09/07/04 16:12	0.53	1.66	3.39
09/07/04 16:12	2.63	7.02	0.38
09/07/04 16:12	3.95	9.85	-1.62
09/07/04 16:12	4.17	10.40	-1.62
09/07/04 16:13	4.20	10.45	-1.62
09/07/04 16:13	4.20	10.44	-1.62
09/07/04 16:13	4.21	10.45	-1.62
09/07/04 16:13	4.23	10.45	-1.62
09/07/04 16:14	4.23	10.44	-0.62

TIME	CO2	O2	CO
09/07/04 16:14	4.23	10.44	9.39
09/07/04 16:14	3.84	11.82	12.39
09/07/04 16:14	1.75	17.29	5.38
09/07/04 16:15	0.33	20.40	-0.62
09/07/04 16:15	0.14	20.79	-1.62
09/07/04 16:15	0.12	20.82	-1.62
09/07/04 16:15	0.12	20.83	-1.62
09/07/04 16:16	0.12	20.84	-1.62
09/07/04 16:16	0.11	20.84	-1.62
09/07/04 16:16	0.11	20.84	-1.62
09/07/04 16:16	0.12	20.84	-1.62
09/07/04 16:17	0.11	20.85	-1.62
09/07/04 16:17	0.12	20.85	-1.62
09/07/04 16:17	0.11	20.85	-1.62
09/07/04 16:17	0.15	20.85	-1.62

APPENDIX B

CALIBRATION DATA

DRY GAS METER CALIBRATION

By Critical Orifice

Meter ID Nutech 3 Date 07/14/04
 Orifice ID 1312 By Russell
 T, Amb 84 Pbar 29.53

Orifice			ΔH in. H ₂ O	VAC in. Hg	Time min.	Meter						Vmstd	Vcrstd	Y	ΔH@
No.	K'	Q' cfm				Vi	Vf	Temp. in		Temp out					
						ft ³	ft ³	init.	final	init.	final				
12	0.3169	0.42	0.50	22	16.00	192.236	198.946	84	85	84	85	6.422	6.437	1.002	1.655
17	0.4391	0.58	1.05	20	14.00	198.946	207.141	85	85	85	85	7.836	7.778	0.993	1.818
23	0.6091	0.80	2.05	18	9.00	207.141	214.420	85	85	85	85	6.960	6.897	0.991	1.861
26	0.6905	0.92	2.65	17	6.00	214.420	219.959	85	87	85	85	5.291	5.288	0.999	1.816
31	0.8293	1.10	3.75	12	5.00	219.959	225.504	87	88	85	85	5.290	5.269	0.996	1.793
														0.9963	1.79

$$Vmstd = (17.64)(Vm)(Pbar + \Delta H/13.6)/Tm$$

$$Vcrstd = K'[(Pbar)(\theta)/(T, amb)]$$

$$Y = (Vcrstd/Vmstd)$$

Calculations:

$$\begin{aligned} V_{cal} &= [V_{f, cal} - V_{i, cal}] \\ V_{dgm} &= [V_{f, dgm} - V_{i, dgm}] \\ T_{cal} &= [\text{Temp. at calibrating meter} + 460] \\ T_{dgm} &= [\text{average Temp. at field meter} + 460] \\ T_{dgm out} &= [\text{average Temp. at field meter outlet} + 460] \\ Y &= [V_{cal}(Pbar)(T_{dgm})]/[(V_{dgm})(Pm)(T_{cal})] \\ K &= [Q(\sqrt{(Pm Mm)})/((T_{dgm out})(\Delta H))] \\ Q &= [(V_{dgm}/min.)(T_{dgm out}/T_{dgm})(Y)] \\ \Delta H@ &= [0.921/K^2] \end{aligned}$$

Where:

Y = Meter correction factor, dimensionless
 Pbar = Barometric pressure; in. Hg
 Pm = Meter pressure, (Pbar + $\Delta H/13.6$); in. Hg
 Mm = molecular weight of air (29)

DRY GAS METER CALIBRATION **By Critical Orifice**

Meter ID	<u>Nutech 3</u>	Date	<u>06/19/04</u>
Orifice ID	<u>1312</u>	By	<u>DGR</u>
T, Amb	<u>80</u>	Pbar	<u>29.77</u>

Orifice			ΔH in. H ₂ O	VAC in. Hg	Time min.	Meter						Vmstd	Verstd	Y	ΔH@
No.	K'	Q' cfm				Vi	Vf	Temp. in		Temp out					
						ft ³	ft ³	init.	final	init.	final				
12	0.3169	0.42	0.51	21	24.25	570.004	580.510	80	81	80	80	10.216	9.909	0.970	1.663
17	0.4391	0.58	1.00	21	17.5	580.510	590.958	81	82	80	80	10.151	9.875	0.973	1.708
23	0.6091	0.80	2.00	19	15.25	590.958	603.416	82	83	80	80	12.092	11.869	0.982	1.791
26	0.6905	0.92	2.60	17	10.5	603.416	613.342	83	85	80	81	9.617	9.398	0.977	1.757
31	0.8293	1.10	3.70	16	12.5	613.342	627.424	84	87	81	82	13.612	13.377	0.983	1.741
														0.98	1.73

$$Vmstd = (17.64)(Vm)(Pbar + \Delta H/13.6)/Tm$$

$$Vcrstd = K'[(Pbar)(\theta)/(T, amb)]$$

$$Y = (Vcrstd/Vmstd)$$

Calculations:

$$\begin{aligned}
 V_{cal} &= [V_{f, cal} - V_{i, cal}] \\
 V_{dgm} &= [V_{f, dgm} - V_{i, dgm}] \\
 T_{cal} &= [\text{Temp. at calibrating meter} + 460] \\
 T_{dgm} &= [\text{average Temp. at field meter} + 460] \\
 T_{dgm \text{ out}} &= [\text{average Temp. at field meter outlet} + 460] \\
 Y &= [V_{cal}(Pbar)(T_{dgm})]/[(V_{dgm})(Pm)(T_{cal})] \\
 K &= [Q(\sqrt{(Pm \text{ Mm})}/((T_{dgm \text{ out}})(\Delta H)))] \\
 Q &= [(V_{dgm}/\text{min.})(T_{dgm \text{ out}}/T_{dgm})(Y)] \\
 \Delta H@ &= [0.921/K^2]
 \end{aligned}$$

Where:

Y = Meter correction factor, dimensionless
 Pbar = Barometric pressure; in. Hg
 Pm = Meter pressure, (Pbar + $\Delta H/13.6$); in. Hg
 Mm = molecular weight of air (29)

DRY GAS METER CALIBRATION

By Critical Orifice

Meter ID Nutech 3 **Date** 09/10/04
Orifice ID 1312 **By** Rayburn
T, Amb 89 **Pbar** 29.74

Orifice			ΔH in. H ₂ O	VAC in. Hg	Time min.	Meter						Vmstd	Vcrstd	Y	ΔH@
No.	K'	Q' cfm				Vi	Vf	Temp. in		Temp out					
						ft ³	ft ³	init.	final	init.	final				
17	0.4391	0.58	1.00	21	8.75	99.075	104.180	88	90	88	89	4.882	4.852	0.994	1.740
23	0.6091	0.80	2.10	19	6.75	104.180	109.661	90	91	89	89	5.232	5.162	0.987	1.914
26	0.6905	0.92	2.60	17	5.75	109.661	114.973	91	92	89	90	5.064	5.057	0.999	1.788
														0.99	1.81

$$Vmstd = (17.64)(Vm)(Pbar + \Delta H/13.6)/Tm$$

$$Vcrstd = K'[(Pbar)(\theta)/(T, amb)]$$

$$Y = (Vcrstd/Vmstd)$$

Calculations:

Vcal = [Vf,cal-Vi,cal]
Vdgm = [Vf,dgm-Vi,dgm]
Tcal = [Temp. at calibrating meter + 460]
Tdgm = [average Temp. at field meter + 460]
Tdgm out = [average Temp. at field meter outlet + 460]
Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]
K = [Q(sqrt((Pm Mm)/((Tdgm out)(ΔH)))]
Q = [(Vdgm/min.)(Tdgm out/Tdgm)(Y)]
 $\Delta H@$ = [0.921/K²]

Where:

Y = Meter correction factor; dimensionless
Pbar = Barometric pressure; in. Hg
Pm = Meter pressure, (Pbar + $\Delta H/13.6$); in. Hg
Mm = molecular weight of air (29)

ANALYZER CALIBRATION RECORD

Plant <u>Kymore</u>	Run No	
Source <u>Biller</u>	Date	
Test For <u>O2</u>	Time Start	
Operators <u>Rumore</u>	Time End	

Analyte Analyzer ID Span DAQ Channel	Level	Cal. Value	Cyl. Ref.	Diluted Y/N	Pre-Test				Run No. _____			Run No. _____			Run No. _____		
					Cal. Reading	% Cal. Error	Bias Reading	% Bias	Bias/ Drift	% Bias	% Drift	Bias/ Drift	% Bias	% Drift	Bias/ Drift	% Bias	% Drift
<u>CO2</u>	Zero	<u>0.0</u>			<u>0.0</u>				<u>0</u>			<u>0.0</u>			<u>0.1</u>		
	Low	<u>4.3</u>			<u>4.3</u>							<u>4.2</u>			<u>4.2</u>		
	Mid	<u>8.6</u>			<u>8.6</u>				<u>8.6</u>			<u>8.1</u>					
	High	<u>17.6</u>			<u>17.6</u>												
<u>O2</u>	Zero	<u>0.0</u>			<u>0.0</u>				<u>0</u>			<u>0.0</u>			<u>0.0</u>		
	Low	<u>9.9</u>			<u>9.9</u>												
	Mid	<u>10.4</u>			<u>10.4</u>				<u>10.5</u>			<u>10.5</u>			<u>10.5</u>		
	High	<u>20.9</u>			<u>21.0</u>												
	Zero																
	Low																
	Mid																
	High																
	Zero																
	Low																
	Mid																
	High																
	Zero																
	Low																
	Mid																
	High																
	Zero																
	Low																
	Mid																
	High																

Cylinder Ref.	Cylinder No.	Contents	Expiration Date

Notes:

Method Specifications:

Methods 3A, 6C, 7E

Zero < 0.25 % of span
Mid = 40 to 60 % of span
High = 80 to 100 % of span

Method 10

Zero < 0.25 % of span
Mid = 30 % of span
High = 60 % of span

Method 25A

Zero < 0.1 % of span
Low = 25 to 35 % of span
Mid = 45 to 60 % of span
High = 80 to 90 % of span

Error Specifications:

Calibration Error Allowable	< 2% of span	$(((\text{Cyl. Value} - \text{Reading}) / \text{span}) * 100\%)$
25A Calibration Error Allowable	< 5% Cyl. Value	$[(\text{Cyl. Value} - \text{Reading}) / (\text{Cyl. Value}) * 100\%]$
System Bias	< 5% span (not for 20 & 25A)	$[(\text{System Cal} - \text{Reading}) / \text{span} * 100]$
Drift	< 3%	$[(\text{Initial System Cal.} - \text{Final System Cal.}) / \text{Span} * 100\%]$
Method 20 Drift	< 2%	$[(\text{initial system cal.} - \text{final system cal.}) / \text{Span} * 100\%]$

RATA CLASS**Scott Specialty Gases****Dual-Analyzed Calibration Standard**

9810 BAY AREA BLVD PASADENA, TX 77507

Phone: 281-474-5800

Fax: 281-474-5857

CERTIFICATE OF ACCURACY: Interference Free TM EPA Protocol Gas**Assay Laboratory**SCOTT SPECIALTY GASES
9810 BAY AREA BLVD
PASADENA, TX 77507

P.O. No.: CREDIT CARD DR

Project No.: 04-15644-003

CustomerENVIRONMENTAL MONITORING
DANNY RUSSELL
624 RIDGEWOOD RD EXTENDED
RIDGELAND MS 39158**ANALYTICAL INFORMATION**

This certification was performed according to EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards, Procedure G-1, September, 1997.

Cylinder Number: ALM059777

Certification Date: 28Apr2003

Exp. Date: 27Apr2006

Cylinder Pressure***: 1937 PSIG

ANALYTICAL**ACCURACY******TRACEABILITY****COMPONENT****CERTIFIED CONCENTRATION (Moles)**

CARBON DIOXIDE

8.63 %

- 1%

Direct NIST and NMI

NITROGEN

BALANCE

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G-1, September 1997.

Product certified as - 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM	01 Jun 2004	K003155	13.93 %	CO2/N2

INSTRUMENTATION**INSTRUMENT/MODEL/SERIAL#**

FIR System: B220 AAB9400260

DATE LAST CALIBRATED

07Apr2003

ANALYTICAL PRINCIPLE

FIR

ANALYZER READINGS

IZ = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient

First Triad Analysis**Second Triad Analysis****Calibration Curve****CARBON DIOXIDE**

Date: 28Apr2003 Response Unit: %

Z1 - 0.01910	R1 - 13.92299	T1 - 8.64044
R2 - 13.93650	Z2 - 0.05590	T2 - 8.63983
Z3 - 0.02570	R3 - 8.63883	R3 - 13.93050

Avg. Concentration: 8.639 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4

r = 0.999990

Constants

A = 0.000000

B = 1.000000

C = 0.000000

D = 0.000000

E = 0.000000

APPROVED BY:

GARY WRIGHT



CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: DRV040504
Project No.: 05-17711-003

Customer

ENVIRONMENTAL MONITORING
DANNY RUSSELL
PO BOX 655
RIDGELAND MS 39158

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM049467 Certification Date: 27Apr2004 Exp. Date: 27Apr2007
Cylinder Pressure***: 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON DIOXIDE	17.64 %	+/- 1 %	Direct NIST and NMI
OXYGEN	9.890 %	+/- 1 %	Direct NIST and NMI
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2300	01Jan2008	ALM049142	23.34 %	CARBON DIOXIDE
NTRM 2350	01Feb2008	A1377	23.51 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#

VARIAN/3400/10893
ROSEMOUNT/755R/1000430

DATE LAST CALIBRATED

16Apr2004
02Apr2004

ANALYTICAL PRINCIPLE

THERMAL CONDUCTIVITY
PARAMAGNETIC

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

CARBON DIOXIDE

Date: 26Apr2004 Response Unit: AREA
Z1 = 0.00000 R1 = 119584.0 T1 = 90187.00
R2 = 119733.0 Z2 = 0.00000 T2 = 90456.00
Z3 = 0.00000 T3 = 90670.00 R3 = 119810.0
Avg. Concentration: 17.64 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 1.000000
Constants: A = 0.010000
B = 1.94E-04 C = 0.00
D = 0.00 E = 0.00

OXYGEN

Date: 27Apr2004 Response Unit: MV
Z1 = 0.00000 R1 = 23.51000 T1 = 9.90000
R2 = 23.51000 Z2 = 0.00000 T2 = 9.90000
Z3 = 0.00000 T3 = 9.90000 R3 = 23.51000
Avg. Concentration: 9.889 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999999
Constants: A = -0.01269806
B = 1.0002270 C = 0.00
D = 0.00 E = 0.00

APPROVED BY:

RATA CLASS**Scott Specialty Gases****Dual-Analyzed Calibration Standard**

9810 BAY AREA BLVD. PASADENA, TX 77507

Phone: 281-474-5800

Fax: 281-474-5857

CERTIFICATE OF ACCURACY: Interference FreeTM EPA Protocol Gas**Assay Laboratory**SCOTT SPECIALTY GASES
9810 BAY AREA BLVD
PASADENA, TX 77507

P.O. No.: CREDIT CARD DR

Project No.: 04-15644-003

CustomerENVIRONMENTAL MONITORING
DANNY RUSSELL
624 RIDGEWOOD RD EXTENDED
RIDGELAND MS 39158**ANALYTICAL INFORMATION**

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards, Procedure G-1: September, 1997.

Cylinder Number: ALM059777

Certification Date: 28Apr2003

Exp. Date: 27Apr2006

Cylinder Pressure***: 1937 PSIG

COMPONENTCARBON DIOXIDE
NITROGEN**CERTIFIED CONCENTRATION (Moles)**8.63 %
BALANCE**ANALYTICAL****ACCURACY****

± 1%

TRACEABILITY

Direct NIST and NMI

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G-1: September 1997.

Product certified as ± 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
WTM	01Jun2004	K003155	13.93 %	CO2/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#

FIR System/E220/AAB9400260

DATE LAST CALIBRATED

07Apr2003

ANALYTICAL PRINCIPLE

FTIR

ANALYZER READINGS

(Z - Zero Gas R - Reference Gas T - Test Gas * - Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

CARBON DIOXIDE

Date: 28Apr2003	Response Unit: %		
Z1 - 0.01910	R1 - 13.92299	T1 - 8.64044	
R2 - 13.93650	Z2 - 0.05990	T2 - 8.63983	
Z3 - 0.02570	T3 - 8.63883	R3 - 13.93050	
Avg. Concentration 8.639 %			

Concentration - $A + Bx + Cx^2 + Dx^3 + Ex^4$

r = 0.999990

Constants

A = 0.000000

B = 1.000000

C = 0.000000

D = 0.000000

E = 0.000000

APPROVED BY:

GARY WRIGT

APPENDIX C

VISIBLE EMISSIONS RECORD



STATE OF MISSISSIPPI
HALEY BARBOUR
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
CHARLES H. CHISOLM, EXECUTIVE DIRECTOR

May 21, 2004

Mr. Warren Wallace
Environmental Monitoring Lab
P.O. Box 655/624 Ridgewood Road
Ridgeland, MS 39158

Dear Mr. Wallace:

Please be advised that you have successfully participated in the Visible Emissions Certification conducted in Jackson, Mississippi, by the Office of Pollution Control on April 14 - 16, 2004. You met the following standards as specified in the November 12, 1974, issue of the Federal Register (Volume 39, No. 219, Method):

1. Maintained an average deviation of less than 7.5% for a set of 25 white and 25 black smoke readings.
2. Did not have any one reading with a deviation greater than 15%.

The deviations for your qualifying run, Run No. 15-1W were:

White Smoke: 6.6

Black Smoke: 3.2

Your certification will expire on October 16, 2004.

The original of your test paper is being maintained in our files. If you need a copy of your test paper or any other assistance concerning this matter, feel free to contact this office.

Very truly yours,

Connie J. Simmons

Connie J. Simmons, Chief

OFFICE OF POLLUTION CONTROL
POST OFFICE BOX 10385 • JACKSON, MISSISSIPPI 39289-0385
AN EQUAL OPPORTUNITY EMPLOYER



MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL

Training Coordinator

acknowledges that Warren Wallace successfully participated in Visible Emissions Evaluation Training on April 14 - 16, 2004, and is certified to evaluate Visible Emissions in accordance with EPA Test Method 9 for a period of six (6) months from the date of certification.
CERTIFICATION EXPIRES: October 16, 2004

VISIBLE EMISSIONS EVALUATION RECORD

Run 1

PLANT	Koppure - Tie Plant	
Emission Point	Boiler	
Date	9-7-04	
Stack height	80'	
Distance to source	200'	
Direction from source	East	
CONDITIONS	START	STOP
Time	1204	1304
Wind direction	South East	South East
Wind speed	0-5 mph	0-5
Ambient temp. °F	80°	81°
Sky cover	clear	clear
Plume color	N/A	N/A
Plume background	Sky	Sky

draw north arrow

draw wind direction arrow

emission point

indicate sun position with symbol

observer location

140°

 Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

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

Remarks: _____

Avg. opacity for period: -0- Highest six minute average: -0-

Other data reduction: _____

Observer: Warren Walker date certified: 4-16-04 Signature: [Signature]

VISIBLE EMISSIONS EVALUATION RECORD

Run 2

PLANT	Kopper Ind. Tie Plant, Ms	
Emission Point	Wood Waste Bldg	
Date	9-7-04	
Stack height	80'	
Distance to source	200'	
Direction from source	East	
CONDITIONS	START	STOP
Time	1338	1439
Wind direction	South East	South East
Wind speed	0-5 mph	0-5 mph
Ambient temp. °F	83°	84°
Sky cover	Clear	Clear
Plume color	N/A	N/A
Plume background	Sky	Sky

draw north arrow

draw wind direction arrow

emission point

indicate sun position with symbol

observer location

140°

 Condensing water vapor? N/O Detached ☐ Attached ☐ Distance visible _____

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

Remarks: _____

Avg. opacity for period: -0-Highest six minute average: -0-

Other data reduction: _____

Observer: Warren Wallacedate certified: 4-16-04Signature: Warren Wallace

VISIBLE EMISSIONS EVALUATION RECORD

Run 3

PLANT	Koppers Ind. Tie Plant, MS	
Emission Point	Wood Waste Bk.	
Date	9-4-04	
Stack height	80'	
Distance to source	200'	
Direction from source	East	
CONDITIONS	START	STOP
Time	1504	1604
Wind direction	Southeast	South East
Wind speed	0-5 mph	0-5 mph
Ambient temp. °F	84°	84°
Sky cover	clear	clear
Plume color	N/A	N/A
Plume background	sky	sky

draw north arrow

draw wind direction arrow

emission point

indicate sun position with symbol

observer location

140°

 Condensing water vapor? No Detached ☐ Attached ☐ Distance visible _____

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

Remarks: _____

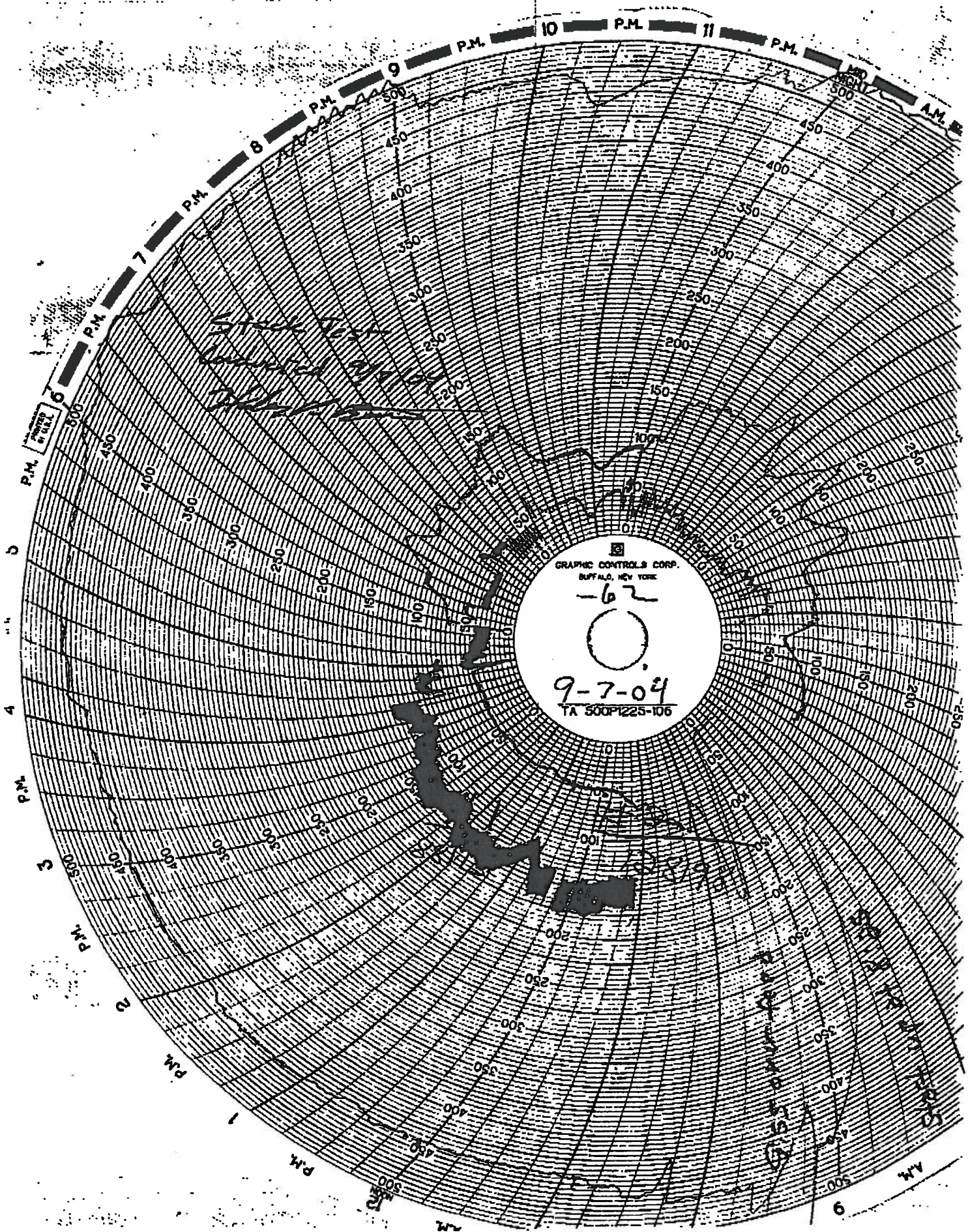
Avg. opacity for period: 0Highest six minute average: 0

Other data reduction: _____

Observer: Warren Wallacedate certified: 4-16-04Signature: Warren Wallace

APPENDIX D

BOILER STEAM CHART RECORD



***PARTICULATE AND VISIBLE EMISSIONS TEST
WOOD WASTE BOILER***

KOPPERS INDUSTRIES

FACILITY NO. 0960-00012

***Grenada, Mississippi
September 22, 2000***

Koppers Industries
P.O. Box 160
Tie Plant, MS 38960

Performed by:

ENVIRONMENTAL MONITORING LABORATORIES, INC.

624 Ridgewood Road
P.O. Box 655
Ridgeland, Mississippi 39158

Phone: (601)856-3092
Fax: (601)853-2151

**REPORT OF PARTICULATE AND VISIBLE
EMISSIONS TESTING FOR
KOPPERS INDUSTRIES
GRENADA PLANT
WOOD WASTE BOILER**

**Grenada, Mississippi
September 22, 2000**

FACILITY NO. 0960-00012

EMISSION POINT NO. AA-001

**Koppers Industries
P.O. Box 160
Tie Plant, MS 38960**

**Contact: Anthony Mahan
ph: 662/226-4584**

***Prepared By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi
☼ 601/856-3092 ☼***

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 • 624 Ridgewood Road
Ridgeland, Mississippi 39158

phone: 601/856-3092
fax : 601/853-2151

September 29, 2000

Subject: Koppers Industries - Grenada, Mississippi
Wood Waste Boiler - Stack Emissions Test
Facility No. 0960-00012

On September 22, 2000, Environmental Monitoring Laboratories performed air emissions testing for Koppers Industries in the Tie Plant community near Grenada, Mississippi. Testing was done to measure particulate and visible emissions from the wood waste boiler in accordance with requirements of the Mississippi Department of Environmental Quality.

Results of emissions testing are shown below.

PARTICULATE EMISSIONS			VISIBLE EMISSIONS
#/hr	gr/dscf	#/MM Btu	High SMA, % opacity
8.75	0.076	0.192	31.88

Mr. Anthony Mahan of Koppers coordinated the testing project. Danny Russell of Environmental Monitoring Laboratories was responsible for sample collection and analysis of particulate samples. Sample custody was limited to Mr. Russell.

Following is a report of the test.

REPORT OF AIR EMISSIONS TESTS
FOR KOPPERS INDUSTRIES, INC.
GRENADA PLANT
WOOD WASTE BOILER

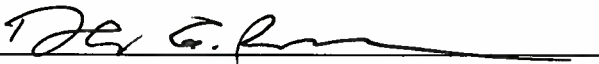
Grenada, Mississippi
September 22, 2000

CONTENTS

1.0	TEST RESULTS	page 1
2.0	SOURCE DESCRIPTION	2
3.0	TEST PROCEDURES	2
4.0	DATA REDUCTION	3
5.0	NOMENCLATURE	6
6.0	CALIBRATION	7
7.0	APPENDICES:	8
A.	Field and Laboratory Data	
B.	Calibrations	
C.	Visible Emissions Record	
D.	Boiler Steam Chart (Koppers)	

REPORT CERTIFICATION

I certify that I have examined the information submitted herein,
and based upon inquiries of those responsible for obtaining the
data or upon my direct acquisition of data, I believe the
submitted information is true, accurate and complete.

Signed 

Daniel G. Russell

1.0 Test Results:

Wellons Wood Waste Boiler

Run No.		1	2	3	AVG.
Date		9/22/00	9/22/00	9/22/00	-----
Time Start		0955	0116	1235	-----
Time End		1059	1220	1339	-----
PARTICULATE EMISSIONS	#/hr	12.69	5.10	8.46	8.75
PARTICULATE EMISSIONS	gr/dscf	0.109	0.044	0.075	0.076
PARTICULATE EMISSIONS	#/MM Btu	0.265	0.113	0.199	0.192
VISIBLE EMISSIONS	high SMA, %	31.88	15.00	10.42	31.88
HEAT INPUT	MM Btu/hr	47.92	45.12	42.43	45.16
VOLUMETRIC FLOWRATE	acfm	27884	26664	26376	26975
VOLUMETRIC FLOWRATE	dscfm	13593	13454	13149	13399
VELOCITY	ft./sec.	71.6	68.5	67.7	69.3
STACK TEMPERATURE	°F	481	470	462	471
MOISTURE	%	12.9	10.9	12.8	12.2
SAMPLE RATE	% isokinetic	100	101	97	99

2.0 SOURCE DESCRIPTION:

Koppers Industries, Inc. operates a 30,000 pound per hour Wellons wood waste boiler at their wood preserving facility in Grenada, Mississippi. The boiler provides steam for the timber treating processes and a turbine generator. Fuel is typically wood waste generated from the manufacture of treated wood products.

Heat input as calculated from the test data and an F-Factor was an average 45.16 MM Btu/hr.

The boiler exhausts to the atmosphere by way of a 34.5 inch diameter vertical stack. Two sample ports at 90° are provided at a location that is 432 inches (12.5 diameters) below the stack exit and 356 inches (10.3 diameters) above an upstream stack tapered section.

3.0 TEST PROCEDURES:

Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points and Method 5 to determine flow rates, moisture content, and particulate emissions. The sampling train was identical to that described in Method 5 except that the cyclone was omitted. Visible emissions were read in accordance with Method 9 concurrently with the emissions test

Heat input to the boilers was determined by continuously monitoring oxygen content of the flue gas as described in Method 3A and calculating heat input using an F-factor of 9280 scf per million Btu of heat input for the wood waste fuel.

Filters were recovered by rinsing the front half of the filter holder into the probe wash and securing the filters in glass petri dishes. Part of the sample filter normally adheres to the filter gasket, and some of the adhering material is recovered into the probe wash. Therefore some of the filter weight is attributed to the probe wash weight.

Filters were heated in an oven for 2 hours at 105° C, desiccated at least 24 hours and weighed to constant weight. Probe wash samples in acetone were evaporated to dryness over low heat in tared beakers, desiccated for at least 24 hours and weighed to constant weight. Weighings are made at 6 hour or greater intervals (samples stored in desiccator). Final weights were considered valid and were recorded if there was no more than 0.5 milligrams difference from the previous weighing.

4.0 DATA REDUCTION

Koppers - Grenada
 Wellons Wood Waste Boiler
 Particulate Emissions Test - September 22, 2000

Collected Test Data:		RUN 1	RUN 2	RUN 3
Date :		9/22/00	9/22/00	9/22/00
Time start :		0955	0116	1235
Time end :		1059	1220	1339
^{1.} As : sq ft		6.4918	6.4918	6.4918
^{2.} Dn : in.		0.265	0.265	0.265
^{3.} Cp : dimensionless		0.84	0.84	0.84
^{4.} Theta : minutes		60.00	60.00	60.00
^{5.} Y : dimensionless		1.01	1.01	1.01
^{6.} Pbar : in. Hg		29.88	29.88	29.88
^{7.} Pg : in. H2O		-0.5	-0.5	-0.5
^{8.} Vm : cf (dry gas)		48.013	48.205	45.639
^{9.} $\text{sqr}(\Delta P)_{\text{avg}}$: in.H2O ^{.5}		0.9471	0.9165	0.9100
^{10.} ΔH : in. H2O		2.4833	2.2833	2.2625
^{11.} ts : degrees F		480.83	469.92	461.58
^{12.} tm : degrees F		76.79	77.29	82.46
^{13.} Vlc : ml		151	125	140
^{14.} CO2 : percent		10.20	10.80	12.00
^{15.} O2 : percent		9.36	9.92	10.33
^{16.} CO : percent		0.02	0.00	0.00
^{17.} C,CO : ppm (dry)		167.96	18.21	34.84
^{18.} F : dscf		9400	9400	9400
^{19.} M,PM : milligrams		338.3	137.6	219.2

Koppers - Grenada
Wellons Wood Waste Boiler
Particulate Emissions Test - September 22, 2000

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg $(\Delta H/13.6)+P_{bar}$	30.0626	30.0479	30.0464	
2. Ps : in. Hg $(P_g/13.6)+P_{bar}$	29.8432	29.8432	29.8432	
3. An : sq ft $((D_n/24)^2)(3.1416)$	3.83E-04	3.83E-04	3.83E-04	
4. Vmstd : dscf $V_m Y(P_m/P_{std})(T_{std}/T_m)$	47.926	48.050	45.056	47.011
5. Vwstd : scf $(.04707cf/ml)(V_{lc})$	7.108	5.884	6.590	
6. Bws : dimensionless $V_{wstd}/(V_{wstd}+V_{mstd})$	0.1291	0.1091	0.1276	0.1219
7. Md : mol.wt. dry basis .44 CO ₂ +.32 O ₂ +.28(CO+N ₂)	30.01	30.12	30.33	
8. Ms : mol.wt. wet basis $M_d(1-B_{ws})+18 B_{ws}$	28.46	28.80	28.76	
9. Vs : ft/sec $K_p C_p (\sqrt{q\Delta P})\sqrt{(T_s/(P_s M_s))}$	71.59	68.46	67.72	69.25
10. Q : cfm $V_s A_s(60 \text{ sec/min})$	27884	26664	26376	26975
11. Qstw : scfm $Q(P_s/P_{std})(T_{std}/T_s)$	15609	15101	15073	15261
12. Qstd : dscfm $Q_{stw}(1-B_{ws})$	13593	13454	13149	13399
13. Xsair : percent $100[(O_2-.5CO)/(.264 N_2-(O_2-.5CO))]$	78.74	90.09	101.63	90.15
14. HeatInput : MM Btu/hr $60 Q_{std}/(F 20.9/(20.9 - O_2))$	47.92	45.12	42.43	45.16
15. I : percent $[(100 T_s)(.002669 V_{lc}+(V_m P_m/T_m))/(60 \theta V_s P_s A_n)]$	99.61	100.90	96.80	99.10

Particulate Emissions

16. E,PM : pounds/hr $(M_{,PM}/V_{mstd})(Q_{std})(60)/(453590)$	12.69	5.10	8.46	8.75
17. C,PM : grains/dscf $(M_{,PM}/V_{mstd})(.0154 \text{ grains/mg})$	0.1087	0.0441	0.0749	0.0759
18. C'PM : grains/dscf @ 50% Xsair $C'PM/(1-((1.5 O_2-.133 N_2-.75 CO)/21))$	0.1291	0.0556	0.0994	0.0947
19. E'PM : pounds/MM Btu $E_{,PM}/\text{HeatInput}$	0.265	0.113	0.199	0.192

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
An	ft ²	Nozzle cross sectional area
As	ft ²	Stack cross sectional area
Bws	dimensionless	Wet gas fraction
CO ₂	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
C _x	as labeled	Concentration of pollutant X
DGF	dimensionless	Dry gas fraction
Dn	inches	Nozzle diameter
ΔH (delta H)	in. H ₂ O	Pressure drop across meter orifice
ΔP (delta P)	in. H ₂ O	Stack gas velocity pressure
E _x	#/hr	Emission rate of pollutant X
E'X	#/MM Btu	Emission rate of pollutant X
F	dscf	Volume of flue gas per MM Btu
I	percent	Nozzle velocity/stack gas velocity
Kp	consistent	Pitot tube constant
M _x	milligrams	Sample weight of pollutant X
Md	## mole	Dry molecular weight of stack gas
Ms	## mole	Wet molecular weight of stack gas
N ₂	percent	Nitrogen content by volume, dry basis
O ₂	percent	Oxygen content by volume, dry basis
Pbar	in. Hg	Barometric pressure
Pg	in. Hg	Stack static pressure
Pm	in. Hg	Total pressure at meter (Pbar+(ΔH/13.6))
Ps	in. Hg	Total stack pressure (Pbar+(Pg/13.6))
Pstd	in. Hg	Standard barometric pressure = 29.92
Q	acfm	Volumetric flow rate at stack conditions
Qstd	dscfm	Volumetric flow rate at standard conditions, dry basis
Qstdw	scfm	Volumetric flow rate at standard conditions, wet basis
θ (theta)	minutes	Sample duration
tm	°F	Meter temperature (Tm denotes °R)
ts	°F	Stack temperature (Ts denotes °R)
Tstd	°R	Standard temperature = 528°R
Vlc	ml	volume of water collected
Vm	ft ³	Volume of dry gas sampled through meter
Vmstd	dscf	Sample volume at standard conditions
Vwstd	scf	Sample volume of water vapor
Y	dimensionless	Meter coefficient
Xsair	percent	Excess air

6.0 CALIBRATIONS:

Measurement devices used by Environmental Monitoring Laboratories and subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

Dry Gas Meter:

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired (new gaskets etc. as required). Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. This service is provided by Big Three Meter Company in Jackson, Mississippi. Overhaul service or any six month period is followed by a five point calibration described in APTD-0576 using either a wet test meter or calibrated dry gas meter (used exclusively for calibrations) as a standard reference. Following field use, a gas meter calibration is checked in one of two ways. [1] Three calibration checks at intermediate orifice settings are performed or [2] orifice meter coefficients are used.

If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

Orifice:

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration.

Nozzles:

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

Pitot Tubes:

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration which it retains unless damaged. All pitot tubes used by Environmental Monitoring Laboratories are manufactured by NuTech, Inc.

Temperature Measuring Instruments:

All temperature measurements are made with type K thermocouples and digital thermocouple thermometers, which have an initial calibration traceable to NBS. Thermocouples are checked during a test series against an ASTM mercury in glass thermometer at ambient temperature. Continuity and proper thermocouple contact location are checked by challenging the thermocouple with a temperature change. (EMTIC GD-028 -- June 21, 1994)

Barometer:

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

Differential Pressure Gauges:

Velocity head (ΔP) and orifice pressure differential (ΔH) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration.

7.0 APPENDICES

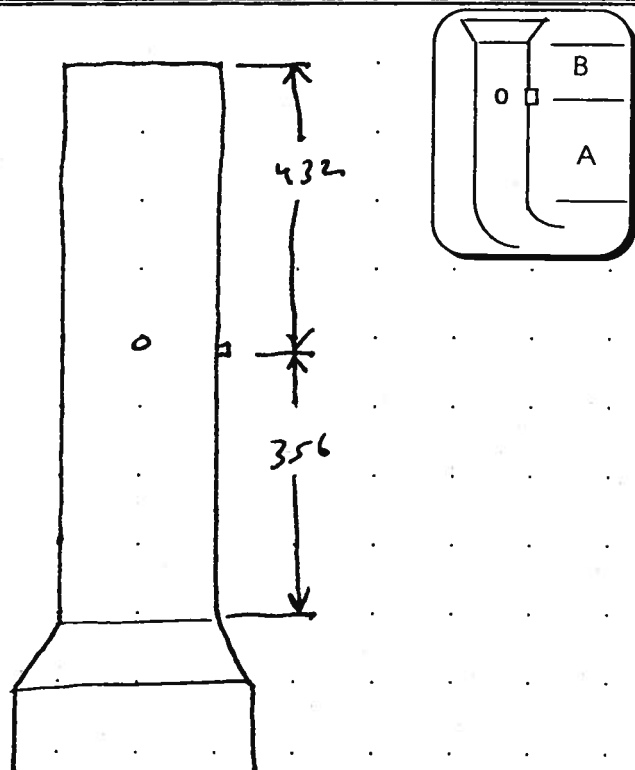
- A. Field and Laboratory Data
- B. Calibrations
- C. Visible Emissions Record
- D. Boiler Steam Chart (Koppers)

STACK CONFIGURATION AND SAMPLE POINT LAYOUT FOR CIRCULAR STACKS

PLANT: Koppers - Canada
SOURCE: Baler
TEST FOR: Pm Setup
TEST OPERATORS:

Date:

SKETCH OF STACK



PERCENT OF DIAMETER

points on a diameter

[illegible]

STACK DIAMETER:

Distance from ports to disturbance:

A. to upstream disturbance

B. to downstream disturbance

Upstream diameters:

Downstream diameters:

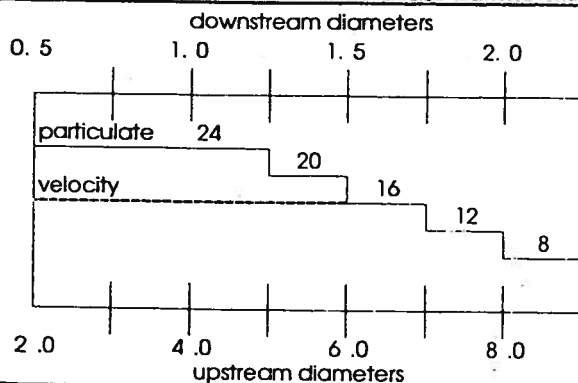
Minimum No. sample points required:

No. sample points selected:

Port Length:

Port Type:

Port Access:

MINIMUM NO. OF POINTS ON A DIAMETER

Point No.	inches from wall	velocity head
--------------	---------------------	---------------

[illegible]

Pitot ID : _____ Pitot Cp: _____ Stack Temp: 270

Remarks:

RUN NO. 1
Date 9-22-00
Time start 0955 end 1059

Notes:

CONDENSATE:
init. 200 final 738

SILICA GEL:
init. 683 final 196

Leak Checks:	Sample Train:	<u>1073</u> --> <u>1076</u> = <u>.263</u> cfm @ <u>8</u> " Hg				Pretest:	Sample Train	<u>4</u>	
	Pitot Tubes:	High	☒	@ <u>6.2</u> " H ₂ O		Low	☒	@ <u>4.4</u> " H ₂ O	Pitot Tubes

RUN NO. 2
Date 9-22-00
Time start 1116 **end** 1220

Notes:

CONDENSATE:
init. 200 final 315

SILICA GEL:
init. 643 final 653

[illegible]

Leak Checks:

Sample Train: $\frac{.013}{.023} \rightarrow \frac{.010}{.023} = \frac{.010}{.023} \text{ cfm @ } 9 \text{ " Hg}$
 Pitot Tubes: High ☒ @ $3.7 \text{ " H}_2\text{O}$ || Low ☒ @ $5.3 \text{ " H}_2\text{O}$

Pretest: Sample Train
Pitot Tubes

RUN NO. 3
Date 9-22-00
Time start 1235 **end** 1339

CONDENSATE:
init. 200 final 325

SILICA GEL:
init. 660 final 675

Peak Checks:

Pretest: **Sample Train**
Pitot Tubes

PARTICULATE CATCH ANALYSIS

SAMPLES: Koppers Grenada
 DATE TAKEN: 9-22-00 DATE ANALYZED: 9-23-00
 DELIVERED BY: DSR RECEIVED BY: DSR
 ANALYZED BY: DSR/mkr

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	245	244	246	
FILTER TARE, gms.	.7070	.7066	.7099	
	.9189	.7973	.8317	
	.9194	.7972	.8317	
FINAL WEIGHT, gms.	.9194	.7970	.8316	
NET GAIN, gms.	.2124	.0904	.1217	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	Koppers R1	Koppers R2	Koppers R2	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	160	190	180	
	(21)	(22)	(99)	()
TARE WEIGHT, gms.	107.1687	120.4585	115.7634	
	107.2941	120.5053	115.8609	
FINAL WEIGHT, gms	107.2946	120.5057	115.8609	
NET GAIN, gms.	.1259	.0472	.0975	
LESS BLANK, gms.	-0-	-0-	-0-	

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	338.3	137.6	219.2	

VISIBLE EMISSIONS EVALUATION RECORD

Run 1

PLANT	Koppels Tie Plant, Ms.	
Emission Point	Woodwaste Boiler	
Date	9-22-2000	
Stack height	80'	
Distance to source	200'	
Direction from source	Southeast	
CONDITIONS	START	STOP
Time	0956	1056
Wind direction	N/A	North
Wind speed	25 N/A	0-5
Ambient temp. ° F	78	78
Sky cover	cloudy	cloudy
Plume color	black	black
Plume background	sky	sky

draw north arrow

emission point

draw wind direction arrow

indicate sun position with symbol

observer location

140°

 Condensing water vapor? ☒ No ☐ Detached ☐ Attached ☐ Distance visible _____

seconds				
min	0	15	30	45
0	5	5	5	5
1	5	5	10	10
2	10	10	10	5
3	60	45	100	100
4	50	60	5	5
5	25	10	5	5
6	5	5	5	5
7	5	5	5	5
8	20	45	45	50
9	60	100	100	45
10	5	5	5	15
11	25	50	75	60
12	5	5	5	5
13	5	10	15	10
14	20	5	5	5

seconds				
min	0	15	30	45
15	5	5	5	5
16	5	5	5	5
17	5	5	5	5
18	5	5	5	5
19	5	5	5	5
20	5	5	5	50
21	65	80	100	100
22	100	20	5	5
23	5	5	5	5
24	5	5	5	5
25	5	5	5	5
26	5	5	5	5
27	5	5	5	5
28	5	5	5	5
29	5	5	5	5

seconds				
min	0	15	30	45
30	5	5	5	5
31	5	5	5	5
32	5	5	5	5
33	5	5	10	10
34	5	5	5	10
35	5	5	5	5
36	5	5	5	5
37	5	5	5	5
38	5	5	5	5
39	5	5	5	5
40	5	5	5	5
41	5	5	5	5
42	5	5	5	5
43	5	5	5	5
44	5	5	5	5

seconds				
min	0	15	30	45
45	5	5	5	5
46	5	5	5	5
47	5	5	5	5
48	5	5	5	5
49	5	5	5	5
50	5	5	5	5
51	5	5	5	5
52	5	5	5	5
53	5	5	5	5
54	5	5	5	5
55	5	5	5	5
56	5	10	5	5
57	15	10	70	5
58	5	5	5	5
59	10	10	10	10

Remarks:

Avg. opacity for period:

11.77

Highest six minute average:

31.88

Other data reduction:

Observer:

Otis Rayburn

date certified:

Signature:

Otis Rayburn

VISIBLE EMISSIONS EVALUATION RECORD

Run 2

PLANT Koppers T.e. Plant, Ms.

Emission Point Woodwater Baler

Date 9-22-2000

Stack height 80'

Distance to source 200'

Direction from source South East

CONDITIONS	START	STOP
Time	<u>1116</u>	<u>1214</u>
Wind direction	<u>North</u>	<u>North</u>
Wind speed	<u>0-5</u>	<u>0-5</u>
Ambient temp. ° F	<u>78</u>	<u>80</u>
Sky cover	<u>cloudy</u>	<u>cloudy</u>
Plume color	<u>black</u>	<u>black</u>
Plume background	<u>sky</u>	<u>sky</u>

draw north arrow

emission point

draw wind direction arrow

indicate sun position with symbol

observer location

140°

Condensing water vapor? no Detached ☐ Attached ☐ Distance visible _____

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

Remarks:

Avg. opacity for period:

6.8125

Highest six minute average:

15.00

Other data reduction:

Observer:

Otis Rayburn

date certified:

Signature:

Otis Rayburn

VISIBLE EMISSIONS EVALUATION RECORD

Run 3

PLANT Koppers Tie Plant, MS

Emission Point Woodwaste

Date 9-22-2000

Stack height 80'

Distance to source 200 feet

Direction from source South East

CONDITIONS	START	STOP
Time	1236	1336
Wind direction	North	North
Wind speed	0-5	0-5
Ambient temp. ° F	86	86
Sky cover	cloudy	cloudy
Plume color	black	black
Plume background	sky	sky

draw north arrow

draw wind direction arrow

emission point

indicate sun position with symbol

observer location

140°

Condensing water vapor? NO Detached ☐ Attached ☐ Distance visible

seconds				
min	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	5	5	5
6	5	0	0	15
7	25	40	25	45
8	20	5	5	5
9	5	5	5	5
10	5	5	5	5
11	5	5	5	5
12	5	5	5	5
13	5	5	5	5
14	5	5	5	5

seconds				
min	0	15	30	45
15	5	5	5	10
16	5	5	5	5
17	5	5	5	5
18	5	5	5	5
19	5	5	5	5
20	5	5	5	5
21	5	5	5	5
22	5	5	5	5
23	5	5	5	5
24	5	5	5	5
25	5	5	5	5
26	5	0	0	0
27	0	0	0	0
28	0	0	5	5
29	5	0	0	0

seconds				
min	0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	5	5
35	10	5	10	10
36	10	10	10	10
37	5	5	5	5
38	5	5	10	5
39	5	5	5	5
40	5	5	5	5
41	5	5	5	5
42	5	5	5	5
43	5	5	5	5
44	5	5	5	5

seconds				
min	0	15	30	45
45	5	5	5	5
46	5	5	5	5
47	5	5	5	5
48	5	5	5	5
49	5	5	5	5
50	5	5	5	5
51	5	5	5	5
52	5	5	5	5
53	5	5	5	5
54	5	5	5	5
55	5	5	5	5
56	5	5	5	5
57	5	5	5	5
58	5	5	5	5
59	5	5	5	5

Remarks: 385 245 250 300Avg. opacity for period: 4.67Highest six minute average: 10.42Other data reduction: Observer: Otis Rayburndate certified: 4/1/2000 Signature: Otis Rayburn



MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

James I. Palmer, Jr., Executive Director

June 6, 2000

Mr. Otis Rayburn
EML
P.O. Box 655
Ridgeland, MS 39158

Dear Mr. Rayburn:

Please be advised that you have successfully participated in the Visible Emissions Certification conducted in Jackson, Mississippi, by the Office of Pollution Control on April 19-20, 2000. You met the following standards as specified in the November 12, 1974, issue of the Federal Register (Volume 39, No. 219, Method):

1. Maintained an average deviation of less than 7.5% for a set of 25 white and 25 black smoke readings.
2. Did not have any one reading with a deviation greater than 15%.

The deviations for you qualifying run, Run No 19-3W were:

White Smoke:	6.8
Black Smoke:	7.0

Your certification will expire on October 19, 2000.

The original of your test paper is being maintained in our files. If you need a copy of your test paper or any other assistance concerning this matter, feel free to contact this office.

Very truly yours,

Jim Barr
Air Quality Management Section

OFFICE OF POLLUTION CONTROL

P.O. Box 10385 Jackson, MS 39289-0385 Phone 601.961.5171 Fax 601.354.6612

H:\PMYers\WPDOCS\SMOKE\Final 04-00 PA.wpd.32

TIME	"VDC"
09/22/00 9:21	20.99
09/22/00 9:21	20.94
09/22/00 9:22	20.94
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09/22/00 11:48	9.68
09/22/00 11:48	9.53
09/22/00 11:48	9.45
09/22/00 11:49	9.32
09/22/00 11:49	9.08
09/22/00 11:49	8.85
09/22/00 11:49	8.69
09/22/00 11:50	8.69
09/22/00 11:50	8.72
09/22/00 11:50	8.81
09/22/00 11:50	8.92
09/22/00 11:51	8.92
09/22/00 11:51	8.87
09/22/00 11:51	8.97
09/22/00 11:51	9.10
09/22/00 11:52	9.14
09/22/00 11:52	9.29
09/22/00 11:52	9.50
09/22/00 11:52	9.73
09/22/00 11:53	9.88
09/22/00 11:53	9.78
09/22/00 11:53	9.82
09/22/00 11:53	10.09
09/22/00 11:54	10.23
09/22/00 11:54	10.20
09/22/00 11:54	10.07
09/22/00 11:54	9.94
09/22/00 11:55	9.87
09/22/00 11:55	9.91
09/22/00 11:55	9.96
09/22/00 11:55	9.87
09/22/00 11:56	9.73
09/22/00 11:56	9.68
09/22/00 11:56	9.68
09/22/00 11:56	9.61
09/22/00 11:57	9.49
09/22/00 11:57	9.38
09/22/00 11:57	9.28
09/22/00 11:57	9.39
09/22/00 11:58	9.68
09/22/00 11:58	9.84
09/22/00 11:58	9.90
09/22/00 11:58	9.96
09/22/00 11:59	9.99
09/22/00 11:59	9.90
09/22/00 11:59	9.94
09/22/00 11:59	10.03
09/22/00 12:00	10.08
09/22/00 12:00	10.06
09/22/00 12:00	10.00
09/22/00 12:00	9.93
09/22/00 12:01	9.93
09/22/00 12:01	10.06
09/22/00 12:01	10.28
09/22/00 12:01	10.55
09/22/00 12:02	10.73
09/22/00 12:02	10.83
09/22/00 12:02	10.93
09/22/00 12:02	10.98
09/22/00 12:03	11.08
09/22/00 12:03	11.24
09/22/00 12:03	11.32
09/22/00 12:03	11.38
09/22/00 12:04	11.59
09/22/00 12:04	11.58
09/22/00 12:04	11.47
09/22/00 12:04	11.49
09/22/00 12:05	11.54
09/22/00 12:05	11.46
09/22/00 12:05	11.38
09/22/00 12:05	11.39
09/22/00 12:06	11.41
09/22/00 12:06	11.33
09/22/00 12:06	11.24
09/22/00 12:06	11.20
09/22/00 12:07	11.06
09/22/00 12:07	10.89
09/22/00 12:07	10.85
09/22/00 12:07	10.86
09/22/00 12:08	10.86
09/22/00 12:08	10.83
09/22/00 12:08	10.80
09/22/00 12:08	10.91
09/22/00 12:09	11.15
09/22/00 12:09	11.28
09/22/00 12:09	11.21
09/22/00 12:09	11.11
09/22/00 12:10	10.97

09/22/00 12:10	10.83
09/22/00 12:10	10.77
09/22/00 12:10	10.78
09/22/00 12:11	10.64
09/22/00 12:11	10.43
09/22/00 12:11	10.28
09/22/00 12:11	10.29
09/22/00 12:12	10.41
09/22/00 12:12	10.52
09/22/00 12:12	10.55
09/22/00 12:12	10.46
09/22/00 12:13	10.60
09/22/00 12:13	10.82
09/22/00 12:13	10.87
09/22/00 12:13	10.86
09/22/00 12:14	10.98
09/22/00 12:14	11.00
09/22/00 12:14	11.06
09/22/00 12:14	11.21
09/22/00 12:15	11.22
09/22/00 12:15	11.21
09/22/00 12:15	11.20
09/22/00 12:15	11.19
09/22/00 12:16	11.26
09/22/00 12:16	11.35
09/22/00 12:16	11.38
09/22/00 12:16	11.33
AVG R 2	9.92

09/22/00 12:17	11.32
09/22/00 12:17	11.33
09/22/00 12:17	11.24
09/22/00 12:17	11.19
09/22/00 12:18	11.06
09/22/00 12:18	10.82
09/22/00 12:18	10.62
09/22/00 12:18	10.52
09/22/00 12:19	10.51
09/22/00 12:19	10.67
09/22/00 12:19	10.82
09/22/00 12:19	11.06
09/22/00 12:20	11.14
09/22/00 12:20	11.13
09/22/00 12:20	12.62
09/22/00 12:20	14.94
09/22/00 12:21	12.30
09/22/00 12:21	7.41
09/22/00 12:21	3.11
09/22/00 12:21	0.73
09/22/00 12:22	0.11
09/22/00 12:22	0.03
09/22/00 12:22	0.02
09/22/00 12:22	0.02
09/22/00 12:23	0.01
09/22/00 12:23	0.01
09/22/00 12:23	0.01
09/22/00 12:23	0.00
09/22/00 12:24	0.01
09/22/00 12:24	0.00
09/22/00 12:24	0.00
09/22/00 12:24	0.00
09/22/00 12:25	0.00
09/22/00 12:25	0.00
09/22/00 12:25	0.00
09/22/00 12:25	-0.01
09/22/00 12:26	-0.01
09/22/00 12:26	-0.01
09/22/00 12:26	-0.01
09/22/00 12:27	0.02
09/22/00 12:27	2.54
09/22/00 12:27	6.90
09/22/00 12:27	9.54
09/22/00 12:28	10.30
09/22/00 12:28	10.42
09/22/00 12:28	10.45
09/22/00 12:28	10.46
09/22/00 12:29	10.45
09/22/00 12:29	10.46
09/22/00 12:29	10.45
09/22/00 12:29	10.46
09/22/00 12:30	10.46
09/22/00 12:30	10.46
09/22/00 12:30	10.46
09/22/00 12:30	10.46
09/22/00 12:31	10.46
09/22/00 12:31	10.46
09/22/00 12:31	10.40
09/22/00 12:32	10.32
09/22/00 12:32	10.31
09/22/00 12:32	10.35
09/22/00 12:32	10.39
09/22/00 12:33	10.40
09/22/00 12:33	10.48
09/22/00 12:33	10.63
09/22/00 12:33	10.61

09/22/00 12:34	10.51
09/22/00 12:34	10.46
09/22/00 12:34	10.48
09/22/00 12:35	10.56
09/22/00 12:35	10.53
09/22/00 12:35	10.37
09/22/00 12:35	10.30

START R	O2
09/22/00 12:36	10.40
09/22/00 12:36	10.39
09/22/00 12:36	10.33
09/22/00 12:36	10.38
09/22/00 12:37	10.62
09/22/00 12:37	10.88
09/22/00 12:37	11.05
09/22/00 12:37	10.97
09/22/00 12:38	10.77
09/22/00 12:38	10.69
09/22/00 12:38	10.71
09/22/00 12:38	10.60
09/22/00 12:39	10.37
09/22/00 12:39	10.27
09/22/00 12:39	10.35
09/22/00 12:39	10.47
09/22/00 12:40	10.46
09/22/00 12:40	10.21
09/22/00 12:40	9.90
09/22/00 12:40	9.73
09/22/00 12:41	9.86
09/22/00 12:41	10.10
09/22/00 12:41	10.19
09/22/00 12:41	10.16
09/22/00 12:42	10.10
09/22/00 12:42	10.07
09/22/00 12:42	10.07
09/22/00 12:42	9.88
09/22/00 12:43	9.51
09/22/00 12:43	9.22
09/22/00 12:43	9.02
09/22/00 12:43	8.92
09/22/00 12:44	8.91
09/22/00 12:44	8.88
09/22/00 12:44	8.75
09/22/00 12:44	8.46
09/22/00 12:45	8.03
09/22/00 12:45	7.73
09/22/00 12:45	7.56
09/22/00 12:45	7.54
09/22/00 12:46	7.49
09/22/00 12:46	7.54
09/22/00 12:46	8.45
09/22/00 12:46	9.33
09/22/00 12:47	10.08
09/22/00 12:47	10.62
09/22/00 12:47	10.40
09/22/00 12:47	10.17
09/22/00 12:48	9.97
09/22/00 12:48	9.86
09/22/00 12:48	9.95
09/22/00 12:48	10.01
09/22/00 12:49	9.95
09/22/00 12:49	9.81
09/22/00 12:49	9.56
09/22/00 12:49	9.40
09/22/00 12:50	9.42
09/22/00 12:50	9.67
09/22/00 12:50	10.28
09/22/00 12:50	11.06
09/22/00 12:51	11.82
09/22/00 12:51	12.39
09/22/00 12:51	12.84
09/22/00 12:51	13.21
09/22/00 12:52	13.43
09/22/00 12:52	13.62
09/22/00 12:52	13.83
09/22/00 12:52	13.75
09/22/00 12:53	13.03
09/22/00 12:53	12.23
09/22/00 12:53	11.82
09/22/00 12:53	11.72
09/22/00 12:54	11.76
09/22/00 12:54	11.94
09/22/00 12:54	12.01
09/22/00 12:54	11.89
09/22/00 12:55	11.69
09/22/00 12:55	11.50
09/22/00 12:55	11.26
09/22/00 12:55	10.99
09/22/00 12:56	10.72
09/22/00 12:56	10.43
09/22/00 12:56	10.22
09/22/00 12:56	10.12
09/22/00 12:57	10.17
09/22/00 12:57	10.14
09/22/00 12:57	10.15
09/22/00 12:57	10.20
09/22/00 12:58	10.22

09/22/00 12:58	10.15
09/22/00 12:58	10.02
09/22/00 12:58	9.90
09/22/00 12:59	9.95
09/22/00 12:59	10.04
09/22/00 12:59	10.16
09/22/00 12:59	10.28
09/22/00 13:00	10.26
09/22/00 13:00	10.22
09/22/00 13:00	10.30
09/22/00 13:00	10.44
09/22/00 13:01	10.59
09/22/00 13:01	10.62
09/22/00 13:01	10.62
09/22/00 13:01	10.56
09/22/00 13:02	10.52
09/22/00 13:02	10.48
09/22/00 13:02	10.49
09/22/00 13:02	10.53
09/22/00 13:03	10.47
09/22/00 13:03	10.40
09/22/00 13:03	10.42
09/22/00 13:03	10.38
09/22/00 13:04	10.30
09/22/00 13:04	10.29
09/22/00 13:04	10.40
09/22/00 13:04	10.53
09/22/00 13:05	10.56
09/22/00 13:05	10.57
09/22/00 13:05	10.53
09/22/00 13:05	10.48
09/22/00 13:06	10.46
09/22/00 13:06	10.41
09/22/00 13:06	10.27
09/22/00 13:06	10.20
09/22/00 13:07	10.23
09/22/00 13:07	10.23
09/22/00 13:07	10.17
09/22/00 13:07	10.12
09/22/00 13:08	10.12
09/22/00 13:08	10.13
09/22/00 13:08	11.02
09/22/00 13:08	10.12
09/22/00 13:09	10.20
09/22/00 13:09	10.27
09/22/00 13:09	10.30
09/22/00 13:09	10.22
09/22/00 13:10	10.07
09/22/00 13:10	10.09
09/22/00 13:10	10.08
09/22/00 13:10	9.86
09/22/00 13:11	9.63
09/22/00 13:11	9.70
09/22/00 13:11	10.07
09/22/00 13:11	9.61
09/22/00 13:12	9.33
09/22/00 13:12	8.95
09/22/00 13:12	8.89
09/22/00 13:12	9.03
09/22/00 13:13	9.27
09/22/00 13:13	9.21
09/22/00 13:13	8.96
09/22/00 13:13	8.68
09/22/00 13:14	8.58
09/22/00 13:14	8.45
09/22/00 13:14	8.43
09/22/00 13:14	8.52
09/22/00 13:15	8.42
09/22/00 13:15	8.36
09/22/00 13:15	8.40
09/22/00 13:15	8.69
09/22/00 13:16	8.93
09/22/00 13:16	8.97
09/22/00 13:16	9.04
09/22/00 13:16	9.09
09/22/00 13:17	9.09
09/22/00 13:17	9.05
09/22/00 13:17	8.86
09/22/00 13:17	8.73
09/22/00 13:18	8.77
09/22/00 13:18	8.91
09/22/00 13:18	8.99
09/22/00 13:18	9.10
09/22/00 13:19	9.22
09/22/00 13:19	9.37
09/22/00 13:19	9.56
09/22/00 13:19	9.65
09/22/00 13:20	9.65
09/22/00 13:20	9.76
09/22/00 13:20	9.99
09/22/00 13:20	10.08
09/22/00 13:21	10.06
09/22/00 13:21	10.19
09/22/00 13:21	10.39
09/22/00 13:21	10.51
09/22/00 13:22	10.59
09/22/00 13:22	10.68

09/22/00 13:22	10.73
09/22/00 13:22	10.78
09/22/00 13:23	10.88
09/22/00 13:23	11.10
09/22/00 13:23	12.20
09/22/00 13:23	11.63
09/22/00 13:24	11.21
09/22/00 13:24	11.27
09/22/00 13:24	11.59
09/22/00 13:24	11.99
09/22/00 13:25	11.98
09/22/00 13:25	11.74
09/22/00 13:25	11.74
09/22/00 13:25	11.60
09/22/00 13:26	11.63
09/22/00 13:26	11.77
09/22/00 13:26	11.96
09/22/00 13:26	12.16
09/22/00 13:27	11.83
09/22/00 13:27	12.03
09/22/00 13:27	12.03
09/22/00 13:27	11.98
09/22/00 13:28	12.17
09/22/00 13:28	12.04
09/22/00 13:28	12.08
09/22/00 13:28	12.00
09/22/00 13:29	11.68
09/22/00 13:29	11.64
09/22/00 13:29	11.78
09/22/00 13:29	11.69
09/22/00 13:30	11.51
09/22/00 13:30	11.41
09/22/00 13:30	11.32
09/22/00 13:30	11.06
09/22/00 13:31	10.73
09/22/00 13:31	10.55
09/22/00 13:31	10.43
09/22/00 13:31	10.42
09/22/00 13:32	10.41
09/22/00 13:32	10.40
09/22/00 13:32	10.41
09/22/00 13:32	10.46
09/22/00 13:33	10.46
09/22/00 13:33	10.34
09/22/00 13:33	10.15
09/22/00 13:33	9.83
09/22/00 13:34	9.80
09/22/00 13:34	10.65
09/22/00 13:34	11.01
09/22/00 13:34	10.88
09/22/00 13:35	10.64
09/22/00 13:35	10.26
09/22/00 13:35	9.82
09/22/00 13:35	9.51
AVG. R	10.33

09/22/00 13:36	9.34
09/22/00 13:36	9.14
09/22/00 13:36	8.98
09/22/00 13:36	8.75
09/22/00 13:37	8.55
09/22/00 13:37	8.44
09/22/00 13:37	8.29
09/22/00 13:37	8.23
09/22/00 13:38	8.29
09/22/00 13:38	8.56
09/22/00 13:38	8.86
09/22/00 13:38	8.89
09/22/00 13:39	8.86
09/22/00 13:39	9.67
09/22/00 13:39	12.59
09/22/00 13:39	16.05
09/22/00 13:40	18.80
09/22/00 13:40	20.35
09/22/00 13:40	20.84
09/22/00 13:40	20.93
09/22/00 13:41	20.94
09/22/00 13:41	20.94
09/22/00 13:41	20.94
09/22/00 13:41	20.96
09/22/00 13:42	20.95
09/22/00 13:42	20.95
09/22/00 13:42	20.97
09/22/00 13:42	20.86
09/22/00 13:43	20.97
09/22/00 13:43	20.97
09/22/00 13:43	20.97
09/22/00 13:43	20.97
09/22/00 13:44	20.97
09/22/00 13:44	20.98
09/22/00 13:44	20.99
09/22/00 13:44	20.99
09/22/00 13:45	20.98
09/22/00 13:45	20.99
09/22/00 13:45	20.99
09/22/00 13:45	20.99
09/22/00 13:46	20.99

DRY GAS METER CALIBRATION

Meter ID NuTech (2298915)
Calibration Method DGM/DGM **By** RAW
Calibration Meter ID 651729 **Pbar** 29.80
Date 09/14/00

Vac. in. Hg	ΔH in. H ₂ O	Time min	Calibrating Meter			Field Meter						Y	Q	K	ΔH@
			Vi ft ³	Vf ft ³	Temp °F	Vi ft ³	Vf ft ³	Temp. in		Temp out					
								78	76	76	final				
2	1.85	32.50	923.849	948.231	82	962.054	986.156	80	81	80	80	1.004	0.74	0.694	1.914
2	1.85	26.00	948.231	967.655	81	986.156	1005.460	81	82	80	80	1.001	0.74	0.692	1.923
2	1.85	15.50	967.655	979.212	81	1005.460	1016.954	82	83	80	81	1.002	0.74	0.691	1.929
Averages:												1.00			1.92

$$Y = [V_{cal}(P_{bar})(T_{dgm})]/[(V_{dgm})(P_m)(T_{cal})]$$

$$K = Q(\sqrt{(P_m M_m)} / ((T_m \text{ out})(\Delta H)))$$

$$Q = ((V_{mi} - V_{mf}) / \text{min.})(T_{M, \text{out}} / T_{m, \text{avg}})(Y)$$

$$\Delta H@ = 0.921 / K^2$$

Where:

Y = Meter correction factor, dimensionless

V_{cal} = Volume of gas through calibrating meter, cubic feet

V_{dgm} = Volume of gas through field dry gas meter, cubic feet

P_{bar} = Barometric pressure, in. Hg

P_m = Meter pressure, (P_{bar} = $\Delta H / 13.6$)

T_{dgm} = Average dry gas meter temp, degrees R

T_{cal} = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID NuTech (2298915)
Calibration Method DGM/DGM **By** Warriner
Calibration Meter ID 651729 **Pbar** 29.67
Date 07/05/00

Vac. in. Hg	ΔH in. H ₂ O	Time min	Calibrating Meter			Field Meter						Y	Q	K	ΔH@
			Vi ft ³	Vf ft ³	Temp °F	Vi ft ³	Vf ft ³	Temp. in		Temp out					
								init.	final	init.	final				
2	5.00	8.00	930.899	941.547	82	211.542	222.081	85	86	84	85	1.004	1.32	0.747	1.650
2	4.00	10.50	941.547	953.203	82	222.081	233.799	86	88	85	85	0.992	1.11	0.698	1.891
2	3.00	11.00	953.203	963.594	83	233.799	244.164	88	89	85	86	1.002	0.94	0.686	1.960
2	2.00	14.50	963.594	974.597	84	244.164	255.185	89	90	86	87	1.001	0.76	0.675	2.023
2	1.00	19.50	974.597	985.558	85	255.185	266.276	89	90	87	88	0.992	0.56	0.707	1.842
Averages:												1.00			1.87

$$Y = [V_{cal}(P_{bar}(T_{dgm})]/[(V_{dgm})(P_m)(T_{cal})]$$

$$K = Q(\sqrt{(P_m M_m)/((T_m \text{ out})(\Delta H))})$$

$$Q = ((V_{mi} - V_{mf})/\text{min.})(T_{M,out}/T_{m,avg})(Y)$$

$$\Delta H@ = 0.921/K^2$$

Where:

Y = Meter correction factor, dimensionless

V_{cal} = Volume of gas through calibrating meter, cubic feet

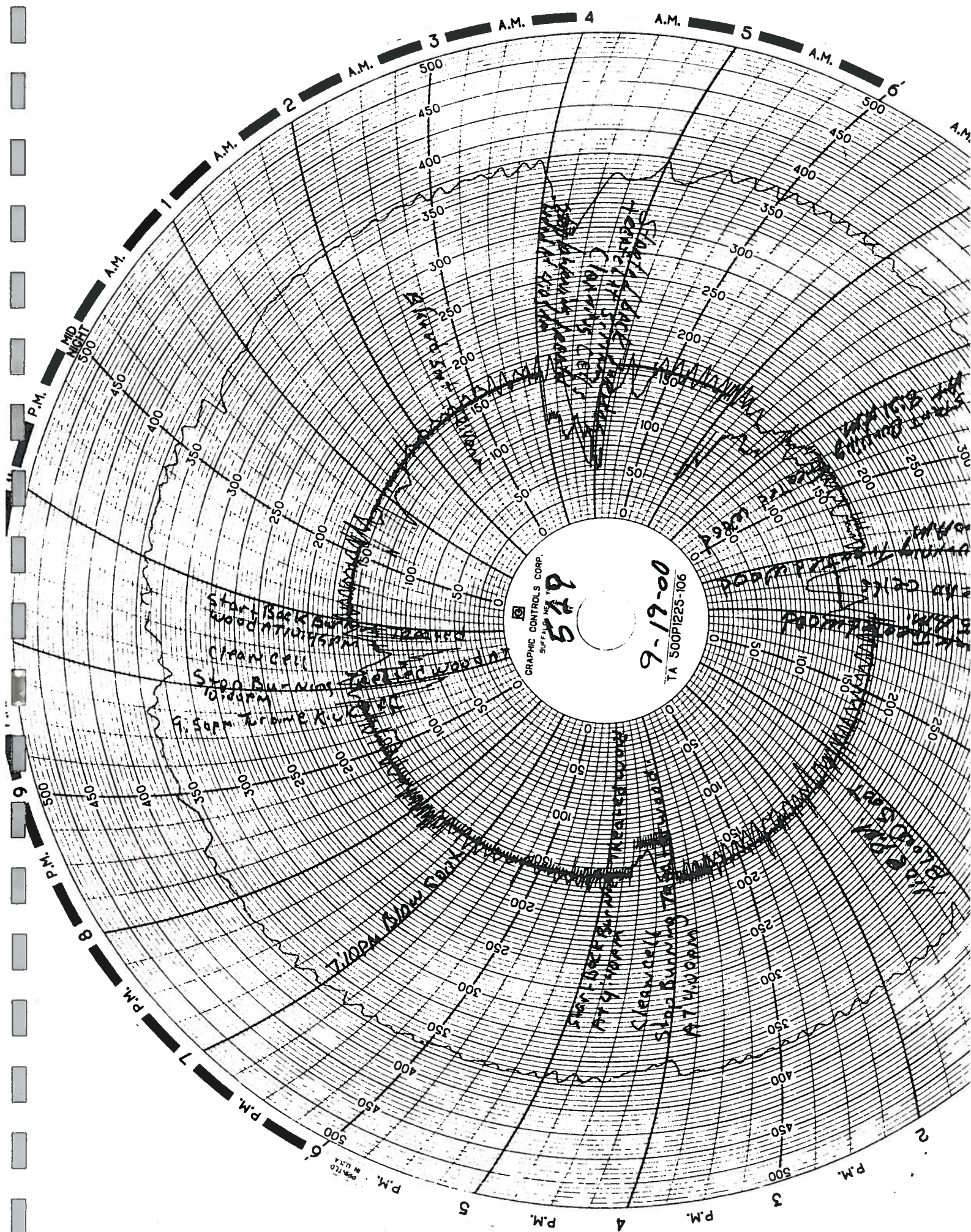
V_{dgm} = Volume of gas through field dry gas meter, cubic feet

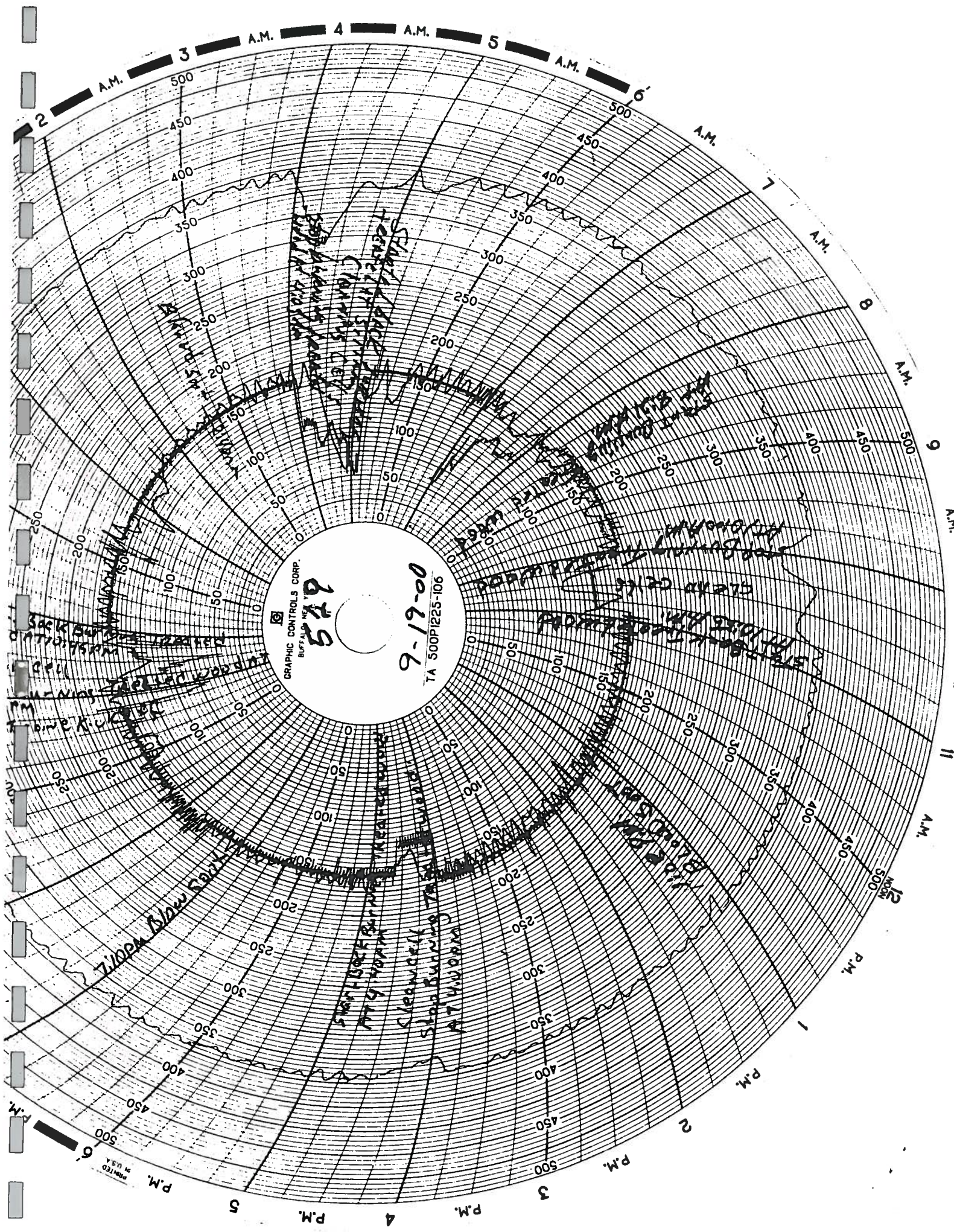
P_{bar} = Barometric pressure, in. Hg

P_m = Meter pressure, (P_{bar} = $\Delta H/13.6$)

T_{dgm} = Average dry gas meter temp, degrees R

T_{cal} = Temperature of gas at calibrating meter, degrees R





GRAPHIC CONTROLS CORP.
BUFFALO, N.Y.

579

9-19-00

TA 500P1225-106

7:00pm Slow Scan

Clearwell
Slow Scan
7:00pm

7:00pm
7:00pm
7:00pm

7:00pm
7:00pm
7:00pm



Title V
Grenada County

Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4584
FAX: (601) 226-4588

October 5, 2000

CERTIFIED MAIL

Melissa Collier
MS Department of Environmental Quality
P. O. Box 10385
Jackson, MS 39289-0385

Dear Ms. Collier,

Re: **Koppers Industries, Inc.**
Title V Permit No. 0960-00012

FILE COPY

RECEIVED
OCT - 9 2000
Dept. of Environmental Quality
Office of Pollution Control

Enclosed are the Stack Test Results for Koppers Industries, Inc., performed on September 22, 2000. Environmental Monitoring Laboratories, Inc performed the testing. If you have any question regarding the application, please call me at 662-226-4584 ext. 40.

Sincerely,


Anthony A. Mayhan
Environmental Supervisor

Cc: Tim Basilone

Enclosures

***PARTICULATE AND VISIBLE EMISSIONS TEST
WOOD WASTE BOILER***

KOPPERS INDUSTRIES

FACILITY NO. 0960-00012

***Grenada, Mississippi
February 9, 2010***

Koppers Industries
1 Koppers Drive
Tie Plant, MS 38960

Performed by:

ENVIRONMENTAL MONITORING LABORATORIES, INC.

624 Ridgewood Road
P.O. Box 655
Ridgeland, Mississippi 39158

Phone: (601)856-3092
Fax: (601)853-2151

REPORT OF PARTICULATE AND VISIBLE
EMISSIONS TESTING FOR
KOPPERS INDUSTRIES
GRENADA PLANT
WOOD WASTE BOILER

Grenada, Mississippi
February 9, 2010

FACILITY NO. 0960-00012

EMISSION POINT NO. AA-001

Koppers Industries
P.O. Box 160
Tie Plant, MS 38960

Contact: Blair Simpson
Phone: 662/226-4583

Prepared By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi

◀601/856-3092▶

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 624 Ridgewood Road
Ridgeland, Mississippi 39158

Phone: 601/856-3092
Fax 601/853-2151

EXECUTIVE SUMMARY OF STACK EMISSIONS TEST

March 4, 2010

Subject: Koppers Industries - Grenada, Mississippi
Wood Waste Boiler - Stack Emissions Test
Facility No. 0960-00012

On February 9, 2010, Environmental Monitoring Laboratories performed air emissions testing for Koppers Industries in the Tie Plant community near Grenada, Mississippi. Testing was done to measure particulate and visible emissions from the wood waste boiler in accordance with requirements of the Mississippi Department of Environmental Quality.

Results of emissions testing are shown below.

PARTICULATE EMISSIONS			Heat Input
#/hr	gr/dscf	#/MM Btu	MM Btu/hr
22.52	0.113	0.776	28.96

Mr. Blair Simpson of Koppers coordinated the testing project. The EML test team included Otis Rayburn, Shaun Walker and Andre Thompson. A wood fuel sample integrated from a sample from each run was sent to Standard Laboratories in Mayking, Kentucky for an ultimate analysis so that a site specific fuel F-Factor could be used for determining heat input during testing. Following is a report of the test.

**REPORT OF PARTICULATE EMISSIONS TEST
FOR KOPPERS INDUSTRIES, INC.
GRENADA PLANT
WOOD WASTE BOILER**

Grenada, Mississippi
February 9, 2010

CONTENTS

1.0	TEST RESULTS	page 5
2.0	SOURCE DESCRIPTION	6
3.0	TEST PROCEDURES	6
4.0	CALCULATIONS	7
5.0	NOMENCLATURE	12
6.0	CALIBRATION	13
7.0	APPENDICES:	14
A.	Sampling Data	15
B.	Calibration Data	21
C.	O2 and CO2 Data	27
D.	Operating and Opacity (COM) Records	32
E.	Fuel Analysis (Standard Laboratories)	44

REPORT CERTIFICATION

I certify that I have examined the information submitted herein,
and based upon inquiries of those responsible for obtaining the
data or upon my direct acquisition of data, I believe the
submitted information is true, accurate and complete.

Signed



Daniel G. Russell

1.0 TEST RESULTS:

The following table is a summary of test results for air emissions testing done on February 9, 2010, for the Wellons wood fired boiler (EP AA-001) at Koppers Industries in Grenada, Mississippi.

Run No.		1	2	3	AVG.
Date		02/09/10	02/09/10	02/09/10	-----
Time Start		1132	1257	1415	-----
Time End		1243	1400	1316	-----
PARTICULATE EMISSIONS	#/hr	16.55	26.55	24.45	22.52
PARTICULATE EMISSIONS	gr/dscf	0.083	0.134	0.122	0.113
PARTICULATE EMISSIONS	#/MM Btu	0.578	0.885	0.866	0.776
HEAT INPUT	MM Btu/hr	28.64	30.00	28.25	28.96
VOLUMETRIC FLOWRATE	acfm	32546	33656	34179	33461
VOLUMETRIC FLOWRATE	dscfm	23108	23052	23386	23182
VELOCITY	ft./sec.	83.6	86.4	87.8	85.9
STACK TEMPERATURE	°F	246	253	255	251
MOISTURE	%	4.8	7.1	7.0	6.3
SAMPLE RATE	% isokinetic	90	99	97	95

2.0 SOURCE DESCRIPTION:

Koppers Industries, Inc. operates a 30,000 pound per hour Wellons wood waste boiler at their wood preserving facility in Grenada, Mississippi. The boiler provides steam for the timber treating cylinders and kilns. Fuel is wood waste generated from the manufacture of wood poles and cross ties.

Heat input as calculated from the test data and an F-Factor was an average 28.96 MM Btu/hr. The steam rate during testing is representative of the current maximum capacity of the plant to utilize steam. During testing, all equipment using steam was operating in a manner representative of maximum conditions and where possible, steam was vented to simulate more than maximum steam usage.

The boiler exhausts to the atmosphere by way of a 34.5 inch diameter vertical stack. Two sample ports at 90° are provided at a location that is 432 inches (12.5 diameters) below the stack exit and 356 inches (10.3 diameters) above an upstream stack tapered section.

3.0 TEST PROCEDURES:

Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points and Method 5 to determine flow rates, moisture content, and particulate emissions. The sampling train was identical to that described in Method 5 except that the cyclone was omitted. Visible emissions were read in accordance with Method 9 concurrently with the emissions test. The visible emissions reader's certification is provided in Appendix C.

Heat input to the boilers was determined by continuously monitoring oxygen content of the flue gas as described in Method 3A and calculating heat input using an F-factor determined from analysis of fuel samples collected during the testing. One sample per test run was collected; the three samples were mixed and an ultimate analysis made. A report of that analysis is provided in Appendix F of this report

Filters were recovered by rinsing the front half of the filter holder into the probe wash and securing the filters in glass petri dishes. Part of the sample filter often adheres to the filter gasket, and some of the adhering material is recovered into the probe wash. Therefore some of the filter weight is attributed to the probe wash weight.

Filters were heated in an oven for 2 hours at 105° C, desiccated at least 24 hours and weighed to constant weight. Probe wash samples in acetone were evaporated to dryness over low heat in tared beakers, desiccated for at least 24 hours and weighed to constant weight. Weighings are made at 6 hour or greater intervals (samples stored in desiccator). Final weights were considered valid and were recorded if there was no more than 0.5 milligrams difference from the previous weighing.

4.0 DATA REDUCTION

Wellons Wood Waste Boiler
Particulate Emissions Test - February 9, 2010

Collected Test Data:

		RUN 1	RUN 2	RUN 3
Date	:	02/09/10	02/09/10	02/09/10
Time start	:	1132	1257	1415
Time end	:	1243	1400	1316
1. As	: sq ft	6.4918	6.4918	6.4918
2. Dn	: in.	0.240	0.180	0.180
3. Cp	: dimensionless	0.84	0.84	0.84
4. Theta	: minutes	60.00	60.00	60.00
5. Y	: dimensionless	1.008	1.008	1.008
6. Pbar	: in. Hg	29.88	29.88	29.88
7. Pg	: in. H2O	-1	-1	-1
8. Vm	: cf (dry gas)	57.461	35.987	35.890
9. $\text{sqr}(\Delta P)_{\text{avg}}$	: in.H2O ^{.5}	1.2835	1.3145	1.3338
10. ΔH	: in. H2O	3.3667	1.1750	1.2042
11. ts	: degrees F	245.58	253.08	255.08
12. tm	: degrees F	50.63	54.13	57.04
13. Vlc	: ml	64	61	59
14. CO2	: percent	4.18	4.35	4.37
15. O2	: percent	16.89	16.69	16.99
16. F	: dscf	9297	9297	9297
17. M,PM	: milligrams	326.6	324.9	292.5

Wellons Wood Waste Boiler

Particulate Emissions Test - February 9, 2010

Calculations:

		RUN 1	RUN 2	RUN 3	AVG.
1. Pm	: in.Hg $(\Delta H/13.6)+P_{bar}$	30.1276	29.9664	29.9685	
2. Ps	: in. Hg $(P_g/13.6)+P_{bar}$	29.8065	29.8065	29.8065	
3. An	: sq ft $((D_n/24)^2)(3.1416)$	3.14E-04	1.77E-04	1.77E-04	
4. Vmstd	: dscf $V_m Y(P_m/P_{std})(T_{std}/T_m)$	60.306	37.311	37.004	44.874
5. Vwstd	: scf $(.04707 \text{ cf/ml})(V_{lc})$	3.012	2.871	2.777	
6. Bws	: dimensionless $V_{wstd}/(V_{wstd}+V_{mstd})$	0.0476	0.0715	0.0698	0.0629
7. Md	: mol.wt. dry basis .44 CO ₂ + .32 O ₂ + .28(CO+N ₂)	29.34	29.36	29.38	
8. Ms	: mol.wt. wet basis $M_d(1-B_{ws})+18 B_{ws}$	28.80	28.55	28.58	
9. Vs	: ft/sec $K_p C_p (\text{sqr} \Delta P) \text{sqr}(T_s/(P_s M_s))$	83.56	86.41	87.75	85.90
10. Q	: cfm $V_s A_s(60 \text{ sec/min})$	32546	33656	34179	33461
11. Qstw	: scfm $Q(P_s/P_{std})(T_{std}/T_s)$	24262	24826	25142	24743
12. Qstd	: dscfm $Q_{stw}(1-B_{ws})$	23108	23052	23386	23182
13. Xsair	: percent $100[(O_2-.5CO)/(.264 N_2-(O_2-.5CO))]$	427.23	401.11	450.13	426.16
14. HeatInput	: MM Btu/hr $60 Q_{std}/(F 20.9/(20.9 - O_2))$	28.64	30.00	28.25	28.96
15. I	: percent $[(100 T_s)(.002669 V_{lc}+(V_m P_m/T_m))/(60 \theta V_s P_s A_n)]$	89.88	99.10	96.88	95.29

Particulate Emissions

16. E,PM	: pounds/hr $(M_{PM}/V_{mstd})(Q_{std})(60)/(453590)$	16.55	26.55	24.45	22.52
17. C,PM	: grains/dscf $(M_{PM}/V_{mstd})(.0154 \text{ grains/mg})$	0.0834	0.1341	0.1217	0.1131
18. E'PM	: pounds/MM Btu $E_{PM}/\text{HeatInput}$	0.578	0.885	0.866	0.776

CALIBRATION, DRIFT, AND BIAS CALCULATIONS

Analyte, units	Level	Cal. Value	Pre-Test				Run No. 1			Run No. 2			Run No. 3		
			Cal. Reading	% Cal. Error	Bias Reading	% Bias	Reading	% Bias	% Drift	Reading	% Bias	% Drift	Reading	% Bias	% Drift
% CO ₂	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mid	18.0	18	0.0	17.8	1.1	18.0	0.1	1.1	17.9	0.7	0.7	18.0	0.1	0.7
	High	9.0	9	0.0											
	SPAN =	18.0	Measured Result				4.16			4.34			4.35		
			Corrected Result				4.18			4.35			4.37		
% O ₂	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mid	10.6	10.6	0.0	10.6	0.0	10.5	0.5	0.5	10.6	0.0	0.5	10.5	0.5	0.5
	High	20.9	20.9	0.0											
	SPAN =	20.9	Measured Result				16.81			16.61			16.91		
			Corrected Result				16.89			16.69			16.99		

Calibration Error Allowable	< 2% of span	$(((\text{Cyl. Value} - \text{Reading}) / \text{span}) * 100\%)$
System Bias	< 5% span	$((\text{System Cal} - \text{Reading}) / \text{span} * 100\%)$
Drift	< 3% (Method 20 = 2 %).....	$((\text{Initial System Cal.} - \text{Final System Cal.}) / \text{Span} * 100\%)$

Calculation of F-Factor (40 CFR 60 § 60.45)

	R1	
Moisture	27.22	%
Carbon	49.53	%
Hydrogen	5.84	%
Nitrogen	0.06	%
Sulfur	0.01	%
Ash	1.23	%
Oxygen	43.33	%
GCV	8295	Btu/lb.
F =	9297	

$$F = 10^6 \cdot [3.64(\%H) + 1.53(\%C) + .57(\%S) + 0.14(\%N) - 0.46(\%O)] / GCV$$

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
An	ft ²	Nozzle cross sectional area
As	ft ²	Stack cross sectional area
Bws	dimensionless	Wet gas fraction
CO ₂	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
C _X	as labeled	Concentration of pollutant X
DGF	dimensionless	Dry gas fraction
Dn	inches	Nozzle diameter
ΔH (delta H)	in. H ₂ O	Pressure drop across meter orifice
ΔP (delta P)	in. H ₂ O	Stack gas velocity pressure
E _X	#/hr	Emission rate of pollutant X
EX	#/MM Btu	Emission rate of pollutant X
F	dscf	Volume of flue gas per MM Btu
I	percent	Nozzle velocity/stack gas velocity
Kp	consistent	Pitot tube constant
M _X	milligrams	Sample weight of pollutant X
Md	### mole	Dry molecular weight of stack gas
Ms	### mole	Wet molecular weight of stack gas
N ₂	percent	Nitrogen content by volume, dry basis
O ₂	percent	Oxygen content by volume, dry basis
Pbar	in. Hg	Barometric pressure
Pg	in. Hg	Stack static pressure
Pm	in. Hg	Total pressure at meter (Pbar+(DH/13.6))
Ps	in. Hg	Total stack pressure (Pbar+(Pg/13.6))
Pstd	in. Hg	Standard barometric pressure = 29.92
Q	acfm	Volumetric flow rate at stack conditions
Qstd	dscfm	Volumetric flow rate at standard conditions, dry basis
Qstdw	scfm	Volumetric flow rate at standard conditions, wet basis
θ (theta)	minutes	Sample duration
tm	°F	Meter temperature (Tm denotes °R)
ts	°F	Stack temperature (Ts denotes °R)
Tstd	°R	Standard temperature = 528°R
Vlc	ml	volume of water collected
Vm	ft ³	Volume of dry gas sampled through meter
Vmstd	dscf	Sample volume at standard conditions
Vwstd	scf	Sample volume of water vapor
Y	dimensionless	Meter coefficient
Xsair	percent	Excess air

6.0 CALIBRATIONS:

Measurement devices used by Environmental Monitoring Laboratories and subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

Dry Gas Meter:

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired (new gaskets etc. as required). Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. This service is provided by Big Three Meter Company in Jackson, Mississippi. Overhaul service or any six month period is followed by a five point calibration described in APTD-0576 using either a wet test meter or calibrated dry gas meter (used exclusively for calibrations) as a standard reference. Following field use, gas meter calibration is checked by performing three calibration checks at intermediate orifice settings. If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

Orifice:

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration. The calibration is included with the Dry Gas Meter Calibration

Nozzles:

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

Pitot Tubes:

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration that it retains unless damaged. All pitot tubes used by Environmental Monitoring Laboratories are manufactured by NuTech, Inc.

Temperature Measuring Instruments:

All temperature measurements are made with type K thermocouples and digital thermocouple thermometers, which have an initial calibration traceable to NBS. Thermocouples are checked during a test series against an ASTM mercury in glass thermometer at ambient temperature. Continuity and proper thermocouple contact location are checked by challenging the thermocouple with a temperature change. (EMTIC GD-028 -- June 21, 1994)

Barometer:

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

Differential Pressure Gauges:

Velocity head (ΔP) and orifice pressure differential (ΔH) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration.

Analytical Balance:

The analytical balance used was initially calibrated by the manufacturer. Additionally, the balance is equipped with an automatic zero and calibration feature that is used daily or prior to each use. Prior to each use, or daily, a quality control check is made using Class A weights of 0.5000 grams and 100.0000 grams.

7.0 APPENDICES

- A. *Sampling Data*
- B. *Calibration Data*
- C. *O₂ and CO₂ Data*
- D. *Operating and Opacity (COM) Records*
- E. *Fuel Analysis (Standard Laboratories)*

APPENDIX A

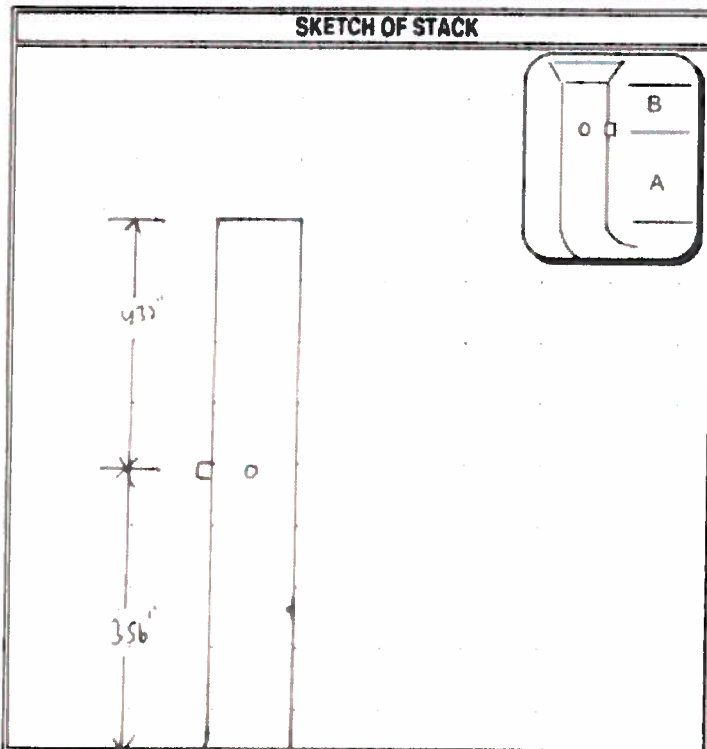
SAMPLING DATA

STACK CONFIGURATION AND SAMPLE POINT LAYOUT

PLANT: *Koppers*
 SOURCE: *Boiler*
 TEST FOR: *setup*
 TEST OPERATORS: *W. Iker*

Date: *5-9-10*

SKETCH OF STACK



PERCENT OF DIAMETER (for circular stacks)

point no	points on a diameter							
	2	4	6	8	10	12	14	16
1	14.6	6.7	4.4	3.1	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.6	9.9	8.5
4		93.3	70.4	42.3	22.6	12.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.6	55.6	46.3	38.0
7				89.5	77.4	64.4	56.6	48.5
8				96.8	85.4	75.0	63.4	54.5
9					91.6	82.5	71.1	62.5
10					97.4	88.0	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	8
13							94.1	87.5
14							99.2	91.5
15								91.1
16								96.4

STACK DIAMETER:

34.5

Distance from ports to disturbance:

A. to upstream disturbance

356"

B. to downstream disturbance

432"

Upstream diameters:

10.3

Downstream diameters:

12.5

Minimum No. sample points required:

12

No. sample points selected:

6 x 2

Port Length:

8" (NE) 7.5" (SE)

Port Type:

4" PN

Port Access:

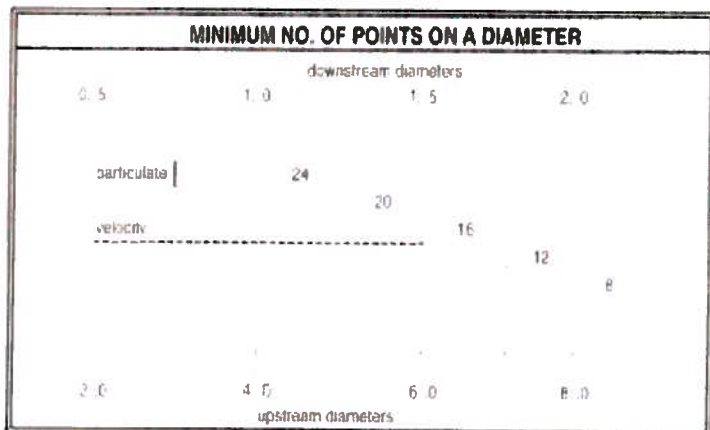
platform

Point No. inches from wall

velocity head

1 *1.5*
 2 *5.0*
 3 *10.2*
 4 *24.3*
 5 *29.5*
 6 *33.0*

MINIMUM NO. OF POINTS ON A DIAMETER



Pitot ID:

Pitot Cp:

Stack Temp

Remarks:

Plant <u>Koppers</u>		Source <u>Bailer</u>		Test For: <u>Pm/O₂</u>		Test Operators: <u>walker / Rayburn / Thompson</u>		RUN NO. <u>1</u> Date <u>2-28-90 to 2-9-90</u> Time start <u>1132</u> end <u>1233</u>		
Meter No.	<u>N73 y=1028</u>	No Sample Pts	<u>6 X 2</u>	GAS ANALYSIS O₂ H₂ CO Time			Notes: <u>had to change Filters</u> <u>Down</u> <u>1220 - 1227</u>			
Sample ID#	<u>No.1</u>	Minutes PE	<u>5.0</u>							
Inlet Pipe In	<u>4' 7"</u>	KELATOR SET P								
Pressure	<u>.84</u>	AHOC	<u>1-SS</u>							
Nozzle Dia.	<u>.240</u>	Meter Temp	<u>50</u>							
Fuel No.	<u>3A70 3971</u>	% H ₂ O	<u>7</u>							
Amb. temp L		<u>38</u>	Stack Temp	<u>250</u>	CONDENSATE					
Air Press. Hg		<u>29.88</u>	K Factor	<u>404 2.03</u>	and <u>200</u> final <u>254</u>					
Steam Press. Hg		<u>-10</u>			SILICA GEL					
					incl <u>810</u> "Da <u>820</u>					

Port	Elapsed Time	IR-M Reading	Velocity Head AP or HSO	Orifice Wt or HSG	Stack Temp	Meter Temp		Over Temp	Imp Comp	Av
						I	II			
1	0/00	429.643	2.000	4.05	240	48	47	251	40	3
2	5	434.8	1.90	3.85	247	49	48	245	39	5
3	10	440.1	2.00	4.05	245	49	48	245	43	7
4	15	445.3	1.70	3.45	247	50	49	250	45	7
5	20	450.5	1.60	3.25	246	51	49	251	46	7
6	25	455.1	1.40	2.85	238	53	49	250	48	8
1	30/00	459.409	1.90	3.85	242	53	49	251	47	8
2	5	463.7	1.40	2.85	243	53	50	250	48	8
3	10	468.1	1.30	2.65	248	54	50	251	55	8
4	15	472.217	1.20	2.45	247	55	51	250	55	8
5	20	477.6	1.80	3.65	249	53	51	251	59	7
6	25	482.7	1.70	3.45	255	55	51	250	50	7
END	6/00	487.627	.	.	.	.	.	.	.	.
mid test peak check		472.217 + 472.740								
		= .071 = .071 = .000 @ 15								
		53.461	1.2835	3.3667	245.89	50.63				

COMPLETED
2-13-90
MCK

[illegible]

[illegible]

PARTICULATE CATCH ANALYSIS

SAMPLES: Koppers Bulver
 DATE TAKEN: 2-9-10 DATE ANALYZED: 2-10-10
 DELIVERED BY: DNZ RECEIVED BY: DNZ
 ANALYZED BY: DNZ

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	3970 / 3971	3972	3973	
FILTER TARE, gms.	.4045 .4041	.4039	.4026	
	0.6227 0.4576	0.5912	0.5893	
	0.6231 0.4572	0.5916	0.5896	
FINAL WEIGHT, gms.	0.6231 0.4572	0.5916	0.5896	
NET GAIN, gms.	.2186 .531	.1877	.1870	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	Koppers Blr R1	Koppers Blr R2	Kopper Blr R3	
VOLUME INTACT?	Yes	Yes	Yes	
VOLUME, ml	175	175	175	
	(310)	(391)	(324)	
TARE WEIGHT, gms.	111.9923	101.9298	102.1186	
	112.0471	102.0668	102.2243	
	112.0472	102.0670	102.2241	
FINAL WEIGHT, gms.	112.0472	102.0670	102.2241	
NET GAIN, gms.	.0549	.1372	.1055	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	326.6	324.9	292.5	

COMPLETED
 MCR
 2-21-10

APPENDIX B

CALIBRATION DATA

DRY GAS METER CALIBRATION

By Critical Orifice

Meter ID Nutech 3 **Date** 12/29/09
Orifice ID 1312 **By** Wallace
T, Amb 70 **Pbar** 30.15

Orifice			ΔH in. H ₂ O	VAC in. Hg	Time min.	Meter						Vmstd	Vcrstd	Y	ΔH@
No.	K'	Q' cfm				Vi	Vf	Temp. in		Temp out					
						ft ³	ft ³	init.	final	init.	final				
12	0.3169	0.42	0.45	22	13.00	74.935	80.147	66	66	66	66	5.272	5.481	1.040	1.433
17	0.4391	0.58	0.92	19	10.00	80.147	85.760	66	67	66	67	5.672	5.823	1.026	1.534
23	0.6091	0.80	1.85	17	7.00	85.760	91.106	67	68	67	67	5.395	5.622	1.042	1.616
26	0.6905	0.92	2.45	16	6.00	91.106	96.567	68	69	67	68	5.503	5.541	1.007	1.614
31	0.8293	1.10	3.40	14	5.00	96.567	101.924	69	70	68	68	5.391	5.521	1.024	1.562
														1.028	1.55

Calculations:

$$\begin{aligned}
 V_m &= [V_f - V_i] \\
 V_{mstd} &= [(17.64)(V_m)(P_{bar} + \Delta H/13.6)/T_m] \\
 V_{crstd} &= K'[(P_{bar})(\theta)/(T_{amb})] \\
 Y &= [(V_{crstd}/V_{mstd})] \\
 Q &= [(V_m/\theta)(T_m \text{ out}/T_m)(Y)] \\
 K &= [Q(\sqrt{(P_m M_m)/((T_m \text{ out})(\Delta H))})] \\
 \Delta H@ &= [0.921/K^2]
 \end{aligned}$$

Where:

Pbar = Barometric pressure; in. Hg
Tm = Average Temp. at meter, °R
Pm = Meter pressure, (Pbar + $\Delta H/13.6$); in. Hg
Mm = molecular weight of air (29)
Y = Meter correction factor; dimensionless

DRY GAS METER CALIBRATION

By Critical Orifice

Meter ID Nutech 3 **Date** 02/15/10
Orifice ID 1312 **By** Walker
T, Amb 55 29.74

Orifice			ΔH in. H ₂ O	VAC in. Hg	Time min.	Meter						Vmstd	Vcrstd	Y	ΔH@
No.	K'	Q' cfm				Vi	Vf	Temp. in		Temp out					
						ft ³	ft ³	init.	final	init.	final				
17	0.4391	0.58	0.90	20	12.00	855.023	861.638	58	55	53	53	6.744	7.093	1.052	1.474
23	0.6091	0.80	1.90	16	7.00	861.638	867.012	55	54	53	53	5.490	5.707	1.040	1.631
26	0.6905	0.92	2.40	15	6.00	867.012	872.257	54	54	53	53	5.361	5.625	1.049	1.556
														1.047	1.55

Calculations:

$$\begin{aligned}
 V_m &= [V_f - V_i] \\
 V_{mstd} &= [(17.64)(V_m)(P_{bar} + \Delta H/13.6)/T_m] \\
 V_{crstd} &= K'[(P_{bar})(\theta)/(T_{amb})] \\
 Y &= [(V_{crstd}/V_{mstd})] \\
 Q &= [(V_m/\theta)(T_m \text{ out}/T_m)(Y)] \\
 K &= [Q(\sqrt{P_m M_m})/((T_m \text{ out})(\Delta H))] \\
 \Delta H@ &= [0.921/K^2]
 \end{aligned}$$

Where:

P_{bar} = Barometric pressure; in. Hg
T_m = Average Temp. at meter, °R
P_m = Meter pressure, (P_{bar} + $\Delta H/13.6$); in. Hg
M_m = molecular weight of air (29)
Y = Meter correction factor; dimensionless



AIR LIQUIDE

Air Liquide America
Specialty Gases LLC

SCOTT™

RATA CLASS

Dual-Analyzed Calibration Standard

11426 FAIRMONT PKWY, LA PORTE, TX 77571

Phone: 800-248-1427

Fax: 281-474-8419

CERTIFICATE OF ACCURACY: Interference Free Multi-Component EPA Protocol Gas**Assay Laboratory**

P.O. No.: DANILL RUSSELL
 AIR LIQUIDE AMERICA SPECIALTY GASES LLC Project No.: 04-79685-001
 11426 FAIRMONT PKWY
 LA PORTE, TX 77571

Customer

ENVIRONMENTAL MONITORING
 DANIEL RUSSELL
 624 RIDGEWOOD ROAD
 RIDGELAND MS 39157

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards,
 Procedure G-1, September, 1997.

Cylinder Number: CC62866
 Cylinder Pressure***: 1850 PSIG

Certification Date: 18Jan2010

Exp. Date: 18Jan2013

Batch No: LAP0007769

ANALYTICAL**COMPONENT****CERTIFIED CONCENTRATION (Moles)****ACCURACY******TRACEABILITY**

CARBON DIOXIDE

18.0 %

+/- 1%

Direct NIST and VSL

OXYGEN

10.6 %

+/- 1%

NITROGEN

BALANCE

*** Do not use when cylinder pressure is below 150 psig

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G-1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1800	01Mar2013	KD17950	17.87 %	CARBON DIOXIDE
NTRM 2350	01Apr2012	A8820	23.51 %	OXYGEN

INSTRUMENTATION**INSTRUMENT/MODEL/SERIAL#****DATE LAST CALIBRATED****ANALYTICAL PRINCIPLE**

FTIR 100C939060

29Dec2009

FTIR

SIG SERVO-MEX1101-4605C/4605C

07Jan2010

PARAMAGNETIC

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis**Second Triad Analysis****Calibration Curve****CARBON DIOXIDE**

Date: 18Jan2010 Response Unit: %
 Z1=0.00128 R1=17.80599 T1=17.93424
 R2=17.80674 Z2=0.01667 T2=17.95282
 Z3=0.02127 T3=17.90400 R3=17.82594
 Avg. Concentration 18.01 %

Concentration = A + Bx + Cx² + Dx³ + Ex⁴

r = 0.99997E+1

Constants: A = 0.00000E+0

B = 5.93692E-1 C = 4.32000E-3

D = 0.00000E+0 E = 0.00000E+0

OXYGEN

Date: 20Jan2010 Response Unit: %
 Z1=0.00000 R1=23.51000 T1=10.65000
 R2=23.50000 Z2=0.00000 T2=10.63000
 Z3=0.00000 T3=10.63000 R3=23.50000
 Avg. Concentration 10.59 %

Concentration = A + Bx + Cx² + Dx³ + Ex⁴

r = 0.99998E+1

Constants: A = 0.02610467

B = 0.998931428 C =

D = E =

Special Notes:

CERTS AND TAGS doc#35825274 ENVIRONMENTAL MONITORING

APPROVED BY:

DAVID KELLY

ANALYZER CALIBRATION RECORD

Plant	Koppers	Run No	1	2	3
Source	Boiler	Date	2-9-10	2-9-10	2-9-10
Test For	O ₂	Time Start	1132	1257	1415
Operators	Rayburn	Time End	1243	1400	1516

Analyzer	Level	Cal Value	Cyl Ref.	Drived Y/N	Pre-Test				Run No. 1			Run No. 2			Run No. 3		
					Cal Reading	% Cal Error	Bus Reading	% Bias	Reading	% Bias	% Off	Reading	% Bias	% Off	Reading	% Bias	% Off
1/6 CO ₂ 01440 C1102/2542	Zero	0.0	N ₂	N/A	0.0		0.0		0.0			0.0			0.0		
	Low	9.0	1	Yes	9.0												
	High	18.0	1	N/A	18.0		17.9		18.0			17.9			18.0		
1/1 O ₂ 01420/8157	Zero	0.0	N ₂	N/A	0.0		0.0		0.0			0.0			0.0		
	Low	10.6	1	No	10.6		10.6		10.5			10.5			10.5		
	High	20.9	1	N/A	20.9												
	Zero																
	Low																
	High																
	Zero																
	Low																
	High																
	Zero																
	Low																
	High																
	Zero																
	Low																
	High																

Calibrator Ref	Cylinder No	Contents	Expiration Date	Notes
1	CL62866	% CO ₂ 18.0 % O ₂ 10.6	1-18-13	DATA LOGGED 15 min Pastern Time Zone

Analyst's signature: 

Method Specifications Method 3A, 6C, 7E Zero = 21% O ₂ span = 25% Mid = 40 to 60% O ₂ span High = 92%	Method 7A Zero = 21% O ₂ span Low = 25 to 35% O ₂ span Mid = 40 to 60% O ₂ span High = 80 to 90% O ₂ span	High Value: Reading error (1.00%) Low Value: Reading error (1.00%) System Error: Reading error (1.00%) System Error: Reading error (1.00%) System Error: Reading error (1.00%)
---	--	--

METHOD 205 - VERIFICATION OF GAS DILUTION SYSTEMS FOR FIELD INSTRUMENT CALIBRATIONS

PROJECT: Koppers Butler Tie Plant, MS DATE: 2-9-10

ANALYST: Chris Rayburn SIGNATURE: [Signature]

DILUTION SYSTEM

MAKE
MODEL
NO. OF DIL. DEVICES
TYPE OF DIL. DEVICE

ENVIRONICS
4240 SN 3616
4
MFC

REFERENCE MONITOR

TYPE
MAKE
MODEL
SPAN

% O ₂
SPIDEX
1400 01420/8157
20.9

HIGH LEVEL SUPPLY GAS CONC.

20.9

20.9 CYLINDER ID

ZERO A.R.

MID LEVEL SUPPLY GAS CONC.

10.4

10.4 CYLINDER ID

CC62866

DILUTION GAS

0.0

0.0 CYLINDER ID

ZERO Nitrogen

MFC No.

Target Value

10.5	15.7				
------	------	--	--	--	--

Injections (Triplicate injection of 2 dilutions per MFC to be used)

1st

10.5	15.7				
10.5	15.7				
10.5	15.7				
10.5	15.7				

2nd

3rd

Average

% Difference = $((\text{target conc.} - \text{Avg. conc.}) / \text{target conc.}) \times 100$

Must be within 2% of avg.

1st inject

2nd inject

3rd inject

0.0	0.0				
0.0	0.0				
0.0	0.0				

Triplicate injection of Mid Level Gas to Reference Monitor. Must be within 10% of one dilution

Response	% Difference
10.6	0.0
10.6	0.0
10.6	0.0
10.6	0.0

Average must be within +/- 2%
of the certified gas concentration.

10.5 - 49.76
15.7 - 24.81

APPENDIX C

O₂ AND CO₂ DATA LOG

Koppers - Tie Plant, MS
Wood Fired Boiler
Particulate Emissions Test 02/09/10
Data Log, page of 4

	%CO2	%O2
02/09/10 10:25	0.0	21.6
02/09/10 10:33	14.9	7.8
02/09/10 10:34	18.0	10.7
02/09/10 10:35	16.5	10.8
02/09/10 10:36	5.7	16.4
02/09/10 10:37	2.2	20.2
02/09/10 10:38	0.2	12.2
02/09/10 10:39	0.0	10.5
02/09/10 10:40	0.0	10.9
02/09/10 10:41	0.0	15.5
02/09/10 10:42	0.0	15.7
02/09/10 10:43	0.0	13.8
02/09/10 10:44	0.0	10.5
02/09/10 10:45	0.0	10.8
02/09/10 10:46	0.0	15.4
02/09/10 10:47	0.0	15.7
02/09/10 10:48	0.0	15.7
02/09/10 10:49	0.0	15.7
02/09/10 10:50	0.0	11.4
02/09/10 10:51	0.0	10.4
02/09/10 10:52	0.0	10.4
02/09/10 10:53	0.0	10.5
02/09/10 10:54	0.0	12.4
02/09/10 10:55	0.0	15.8
02/09/10 10:56	0.0	15.8
02/09/10 10:57	0.0	15.8
02/09/10 10:58	11.6	13.9
02/09/10 10:59	18.0	10.7
02/09/10 11:00	17.8	10.6
02/09/10 11:01	8.0	14.8
02/09/10 11:02	2.7	19.2
02/09/10 11:03	1.1	20.3
02/09/10 11:04	13.9	14.9
02/09/10 11:05	18.1	10.6
02/09/10 11:06	17.3	10.7
02/09/10 11:07	6.6	15.9
02/09/10 11:08	3.4	19.4
02/09/10 11:09	16.4	12.9
02/09/10 11:10	18.1	10.6
02/09/10 11:11	17.8	10.6
02/09/10 11:12	10.0	14.4
02/09/10 11:13	9.0	15.8
02/09/10 11:14	6.3	14.3
02/09/10 11:15	0.1	2.8
02/09/10 11:16	0.0	0.5
02/09/10 11:17	5.6	4.1
02/09/10 11:18	17.7	10.6
02/09/10 11:19	17.8	10.6
02/09/10 11:20	3.7	17.0
02/09/10 11:21	0.2	20.8
02/09/10 11:22	0.2	20.8
02/09/10 11:23	0.2	20.8
02/09/10 11:24	0.1	20.9
02/09/10 11:46	3.5	17.5
02/09/10 11:47	3.7	17.4
02/09/10 11:48	4.1	17.0
02/09/10 11:49	4.2	16.7
02/09/10 11:50	4.5	16.7
02/09/10 11:51	4.6	16.4
02/09/10 11:52	4.8	16.3
02/09/10 11:53	4.7	16.2
02/09/10 11:54	4.1	16.8
02/09/10 11:55	4.3	16.7
02/09/10 11:56	4.2	16.9
02/09/10 11:57	4.1	16.9
02/09/10 11:58	4.0	17.0
02/09/10 11:59	4.2	16.9
02/09/10 12:00	4.6	16.6
02/09/10 12:01	4.7	16.3
02/09/10 12:02	4.5	16.5
02/09/10 12:03	3.7	17.2
02/09/10 12:04	3.5	17.5
02/09/10 12:05	3.8	17.3
02/09/10 12:06	3.7	17.3
02/09/10 12:07	3.5	17.5
02/09/10 12:08	3.9	17.2
02/09/10 12:09	3.5	17.4
02/09/10 12:10	3.5	17.6
02/09/10 12:11	4.1	17.0
02/09/10 12:12	4.6	16.5
02/09/10 12:13	4.7	16.3
02/09/10 12:14	4.9	16.1
02/09/10 12:15	4.7	16.3
02/09/10 12:16	4.7	16.3
02/09/10 12:17	4.7	16.3
02/09/10 12:18	4.6	16.4
02/09/10 12:19	4.6	16.4
02/09/10 12:20	4.5	16.5

02/09/10 12:21	4.8	16.2
02/09/10 12:22	5.0	16.0
02/09/10 12:23	4.7	16.1
02/09/10 12:24	3.9	17.1
02/09/10 12:25	4.1	17.0
02/09/10 12:26	4.4	16.7
02/09/10 12:27	4.6	16.5
02/09/10 12:28	4.8	16.2
02/09/10 12:29	4.8	16.2
02/09/10 12:30	4.9	16.0
02/09/10 12:31	4.9	16.0

Run 1	%CO2	%O2
02/09/10 12:32	4.2	16.5
02/09/10 12:33	3.0	18.0
02/09/10 12:34	4.1	17.1
02/09/10 12:35	4.7	16.5
02/09/10 12:36	4.9	16.0
02/09/10 12:37	4.9	16.1
02/09/10 12:38	4.9	16.1
02/09/10 12:39	4.7	16.2
02/09/10 12:40	4.5	16.5
02/09/10 12:41	4.6	16.4
02/09/10 12:42	4.1	16.8
02/09/10 12:43	3.6	17.4
02/09/10 12:44	4.0	17.1
02/09/10 12:45	4.4	16.7
02/09/10 12:46	4.6	16.4
02/09/10 12:47	4.9	16.1
02/09/10 12:48	5.1	15.8
02/09/10 12:49	4.6	16.0
02/09/10 12:50	2.7	18.1
02/09/10 12:51	3.4	17.9
02/09/10 12:52	4.2	16.9
02/09/10 12:53	4.4	16.7
02/09/10 12:54	4.7	16.4
02/09/10 12:55	5.1	15.8
02/09/10 12:56	4.1	16.5
02/09/10 12:57	2.1	18.7
02/09/10 12:58	3.6	17.8
02/09/10 12:59	4.3	16.8
02/09/10 13:00	4.6	16.5
02/09/10 13:01	4.9	16.0
02/09/10 13:02	4.4	16.2
02/09/10 13:03	2.6	18.7
02/09/10 13:04	3.5	17.2
02/09/10 13:05	2.1	18.8
02/09/10 13:06	3.5	17.8
02/09/10 13:07	4.4	16.7
02/09/10 13:08	4.5	16.4
02/09/10 13:09	4.2	16.9
02/09/10 13:10	4.6	16.4
02/09/10 13:11	5.0	16.0
02/09/10 13:12	4.7	16.0
02/09/10 13:13	3.2	17.6
02/09/10 13:14	3.6	17.6
02/09/10 13:15	4.3	16.8
02/09/10 13:16	5.0	16.1
02/09/10 13:17	5.1	15.7
02/09/10 13:18	4.2	16.3
02/09/10 13:19	2.4	18.5
02/09/10 13:20	2.3	18.5
02/09/10 13:21	0.2	20.6
02/09/10 13:22	0.1	20.8
02/09/10 13:23	0.1	20.8
02/09/10 13:24	0.1	20.8
02/09/10 13:25	0.1	20.8
02/09/10 13:26	0.1	20.8
02/09/10 13:27	3.3	18.2
02/09/10 13:28	4.3	16.7
02/09/10 13:29	4.2	16.7
02/09/10 13:30	4.3	16.8
02/09/10 13:31	4.6	16.4
02/09/10 13:32	4.5	16.4
02/09/10 13:33	4.6	16.3
02/09/10 13:34	4.6	16.4
02/09/10 13:35	4.7	16.3
02/09/10 13:36	4.8	16.0
02/09/10 13:37	2.8	17.8
02/09/10 13:38	3.6	17.7
02/09/10 13:39	3.8	17.2
02/09/10 13:40	4.3	16.8
02/09/10 13:41	4.5	16.5
02/09/10 13:42	4.0	16.6
AVG 1	4.16	16.81

02/09/10 13:43	0.3	3.7
02/09/10 13:44	0.0	0.0
02/09/10 13:45	0.0	0.0
02/09/10 13:46	5.2	3.7
02/09/10 13:47	17.7	10.5

02/09/10 13:48	18.0	10.5
02/09/10 13:49	18.0	10.5
02/09/10 13:50	11.9	12.6
02/09/10 13:51	0.2	20.5
02/09/10 13:52	0.1	20.8
02/09/10 13:53	0.1	20.8
02/09/10 13:54	0.1	20.8
02/09/10 13:55	0.1	20.8
02/09/10 13:56	0.1	20.7
RUN 2		
02/09/10 13:57	3.3	18.3
02/09/10 13:58	4.4	16.7
02/09/10 13:59	4.5	16.5
02/09/10 14:00	4.7	16.2
02/09/10 14:01	4.7	16.2
02/09/10 14:02	4.7	16.3
02/09/10 14:03	4.8	16.1
02/09/10 14:04	4.8	16.1
02/09/10 14:05	4.9	16.1
02/09/10 14:06	5.0	15.8
02/09/10 14:07	3.8	16.8
02/09/10 14:08	2.3	18.6
02/09/10 14:09	3.6	17.6
02/09/10 14:10	4.1	16.9
02/09/10 14:11	4.8	16.2
02/09/10 14:12	5.0	15.9
02/09/10 14:13	4.4	16.1
02/09/10 14:14	2.4	18.4
02/09/10 14:15	3.7	17.6
02/09/10 14:16	4.5	16.6
02/09/10 14:17	5.0	16.0
02/09/10 14:18	5.0	15.8
02/09/10 14:19	3.6	17.0
02/09/10 14:20	3.7	17.5
02/09/10 14:21	4.3	16.8
02/09/10 14:22	4.8	16.3
02/09/10 14:23	4.9	16.1
02/09/10 14:24	4.8	16.2
02/09/10 14:25	4.9	16.0
02/09/10 14:26	4.2	16.6
02/09/10 14:27	4.4	16.6
02/09/10 14:28	3.1	17.6
02/09/10 14:29	4.3	16.8
02/09/10 14:30	4.5	16.5
02/09/10 14:31	4.6	16.4
02/09/10 14:32	4.6	16.3
02/09/10 14:33	4.8	16.2
02/09/10 14:34	4.8	16.1
02/09/10 14:35	4.8	16.2
02/09/10 14:36	4.8	16.1
02/09/10 14:37	4.2	16.7
02/09/10 14:38	4.4	16.6
02/09/10 14:39	4.4	16.5
02/09/10 14:40	4.5	16.5
02/09/10 14:41	4.3	16.6
02/09/10 14:42	4.0	16.9
02/09/10 14:43	4.1	16.9
02/09/10 14:44	3.7	17.1
02/09/10 14:45	3.7	17.3
02/09/10 14:46	4.1	16.9
02/09/10 14:47	4.1	16.9
02/09/10 14:48	4.3	16.7
02/09/10 14:49	4.6	16.3
02/09/10 14:50	4.8	16.1
02/09/10 14:51	4.7	16.2
02/09/10 14:52	3.9	17.1
02/09/10 14:53	4.3	16.8
02/09/10 14:54	4.7	16.2
02/09/10 14:55	4.8	16.1
02/09/10 14:56	4.8	15.9
02/09/10 14:57	3.3	17.3
02/09/10 14:58	3.7	17.5
AVG 2	4.34	16.61
02/09/10 14:59	1.8	9.3
02/09/10 15:00	0.0	0.1
02/09/10 15:01	0.0	0.0
02/09/10 15:02	0.0	0.0
02/09/10 15:03	1.2	0.8
02/09/10 15:04	15.9	9.9
02/09/10 15:05	17.9	10.6
02/09/10 15:06	17.9	10.6
02/09/10 15:07	4.2	16.7
02/09/10 15:08	0.1	20.8
02/09/10 15:09	0.1	20.8
02/09/10 15:10	2.1	19.7
02/09/10 15:11	4.9	16.6
02/09/10 15:12	5.0	16.8
02/09/10 15:13	4.2	16.9
02/09/10 15:14	3.2	17.8

RUN 3	%CO2	%O2
02/09/10 15:15	4.5	16.8
02/09/10 15:16	4.8	16.3
02/09/10 15:17	5.0	15.9
02/09/10 15:18	4.5	16.3
02/09/10 15:19	3.3	17.5
02/09/10 15:20	3.9	17.4
02/09/10 15:21	4.6	16.6
02/09/10 15:22	4.6	16.6
02/09/10 15:23	4.9	16.3
02/09/10 15:24	5.0	16.4
02/09/10 15:25	4.9	16.8
02/09/10 15:26	4.9	16.5
02/09/10 15:27	3.3	18.1
02/09/10 15:28	4.2	17.8
02/09/10 15:29	4.9	17.0
02/09/10 15:30	5.0	16.8
02/09/10 15:31	4.6	16.7
02/09/10 15:32	2.9	18.3
02/09/10 15:33	3.8	18.0
02/09/10 15:34	4.5	16.7
02/09/10 15:35	4.7	16.3
02/09/10 15:36	4.9	15.9
02/09/10 15:37	3.9	16.6
02/09/10 15:38	2.2	18.6
02/09/10 15:39	3.5	17.8
02/09/10 15:40	4.3	16.7
02/09/10 15:41	4.6	16.8
02/09/10 15:42	4.5	17.3
02/09/10 15:43	4.5	16.7
02/09/10 15:44	4.5	16.4
02/09/10 15:45	3.2	17.9
02/09/10 15:46	4.8	16.1
02/09/10 15:47	4.8	16.2
02/09/10 15:48	3.6	17.9
02/09/10 15:49	4.1	17.6
02/09/10 15:50	4.8	16.8
02/09/10 15:51	4.8	16.9
02/09/10 15:52	3.3	17.9
02/09/10 15:53	3.7	17.9
02/09/10 15:54	4.4	17.1
02/09/10 15:55	4.6	16.8
02/09/10 15:56	4.7	16.7
02/09/10 15:57	4.9	16.4
02/09/10 15:58	4.0	17.0
02/09/10 15:59	2.5	18.8
02/09/10 16:00	4.2	17.4
02/09/10 16:01	4.8	16.4
02/09/10 16:02	4.8	16.5
02/09/10 16:03	4.9	16.3
02/09/10 16:04	4.8	16.4
02/09/10 16:05	4.9	16.4
02/09/10 16:06	4.9	16.3
02/09/10 16:07	4.0	17.1
02/09/10 16:08	4.5	17.0
02/09/10 16:09	4.9	16.2
02/09/10 16:10	4.2	16.8
02/09/10 16:11	3.4	17.8
02/09/10 16:12	4.4	16.9
02/09/10 16:13	4.9	16.0
02/09/10 16:14	4.4	16.3
AVG 3	4.35	16.91

02/09/10 16:15	2.6	15.6
02/09/10 16:16	0.1	0.6
02/09/10 16:17	0.0	0.0
02/09/10 16:18	1.1	0.5
02/09/10 16:19	15.8	9.5
02/09/10 16:20	18.0	10.5
02/09/10 16:21	18.0	10.5
02/09/10 16:22	6.8	15.2
02/09/10 16:23	0.1	20.8
02/09/10 16:24	0.1	20.8
02/09/10 16:25	0.1	20.8
02/09/10 16:26	0.1	20.8
02/09/10 16:27	0.1	20.8
02/09/10 16:28	0.1	20.8

APPENDIX D

OPERATING AND OPACITY (COM) RECORDS

Steam Flow 12.0 kpph Steam Press 104 psig SteamTemp 406 deg 02/09/10 15:38:46

STEAM
TOTALS

Today 166 klbs
24-hr 189 klbs

ENERGY
TOTALS

Today 215 MMBTU
24-hr 245 MMBTU

As Supplied
FUEL

Moisture Content 31 %

Heat Value 5891 BTU/lb

Density Factor 1.30

FUEL
USAGE

Today 47440 lbs

24-hr 53972 lbs

Max 26 MMBTU/hr

1AM	14	1PM	19	1AM	3150	1PM	4272
2AM	12	2PM	20	2AM	2593	2PM	4402
3AM	17	3PM	21	3AM	3740	3PM	4724
4AM	15	4PM	18	4AM	3250	4PM	4015
5AM	8	5PM	16	5AM	1723	5PM	3560
6AM	7	6PM	13	6AM	1480	6PM	2877
7AM	6	7PM	11	7AM	1288	7PM	2501
8AM	5	8PM	13	8AM	1208	8PM	2912
9AM	10	9PM	18	9AM	2237	9PM	3891
10AM	12	10PM	17	10AM	2679	10PM	3791
11AM	17	11PM	17	11AM	3805	11PM	3730
12PM	20	12AM	14	12PM	4489	12AM	3106

FR Loop

BTU Loop

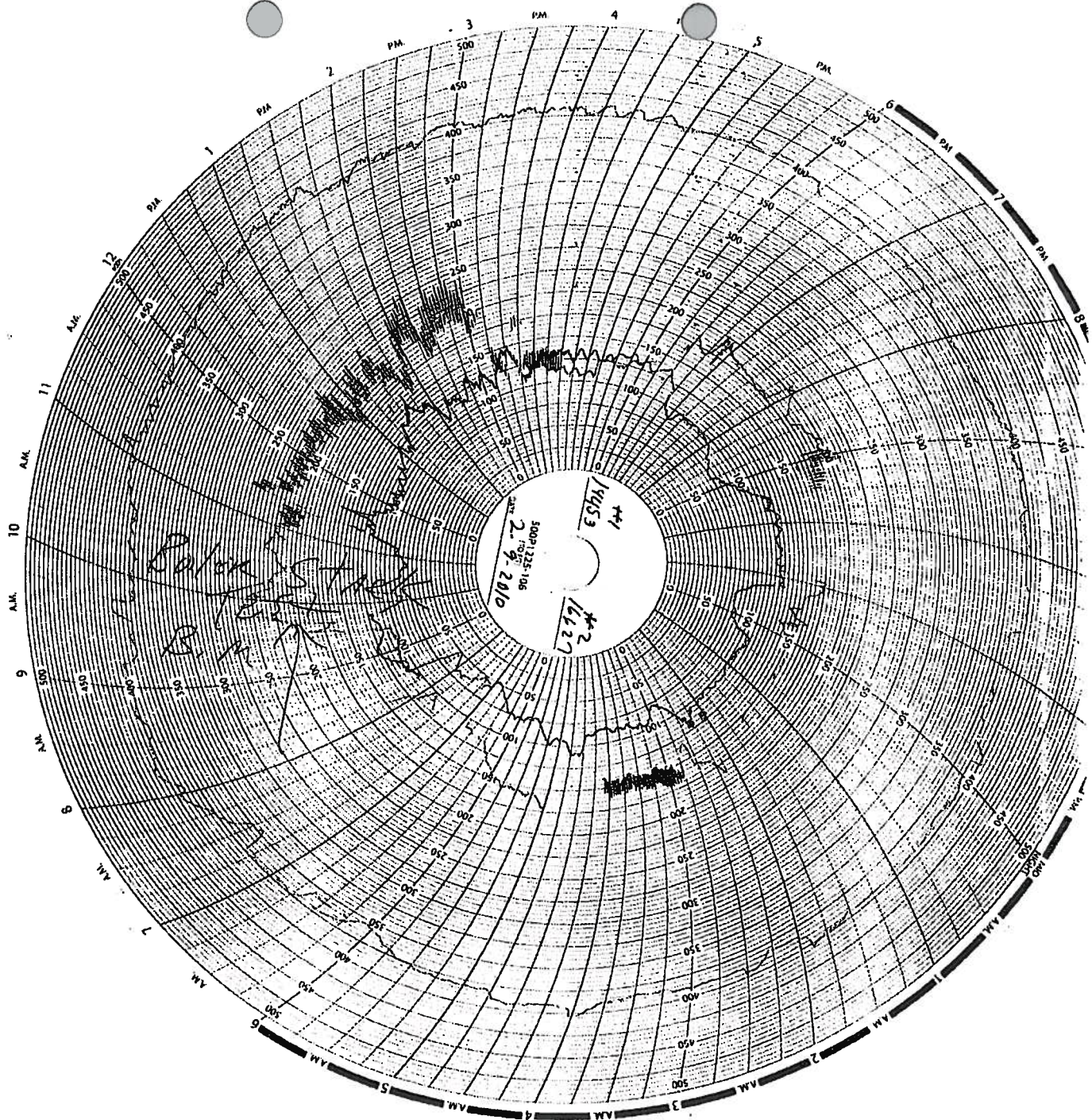
DL Loop

TREND



W I P E

0



Enertec NTDHS®
Average Values Report
Generated : 02/10/10 13:56

Company: Koppers Industries Plant: Tie Plant Road City/St: Tie Plant, Miss. 38960 Source: CEMS	Period Start: 02/09/10 11:32 Period End: 02/09/10 12:43 Validation Type: 1/1 min Averaging Period: 1 min Type: Block Avg
---	--

Period Start	Average Opac %
02/09/10 11:32	4.4
02/09/10 11:33	4.2
02/09/10 11:34	4.0
02/09/10 11:35	5.2
02/09/10 11:36	5.8
02/09/10 11:37	13.9
02/09/10 11:38	28.6
02/09/10 11:39	35.5
02/09/10 11:40	14.9
02/09/10 11:41	3.9
02/09/10 11:42	4.1
02/09/10 11:43	17.1
02/09/10 11:44	16.5
02/09/10 11:45	16.6
02/09/10 11:46	19.3
02/09/10 11:47	11.4
02/09/10 11:48	5.1
02/09/10 11:49	8.1
02/09/10 11:50	5.8
02/09/10 11:51	3.8

02/09/10	11:52	3.8
02/09/10	11:53	6.1
02/09/10	11:54	10.2
02/09/10	11:55	26.0
02/09/10	11:56	56.3
02/09/10	11:57	29.6
02/09/10	11:58	6.0
02/09/10	11:59	4.0
02/09/10	12:00	3.9
02/09/10	12:01	4.3
02/09/10	12:02	31.1
02/09/10	12:03	51.4
02/09/10	12:04	21.0
02/09/10	12:05	4.0
02/09/10	12:06	4.3
02/09/10	12:07	4.4
02/09/10	12:08	8.3
02/09/10	12:09	24.6
02/09/10	12:10	56.2
02/09/10	12:11	48.1
02/09/10	12:12	15.1
02/09/10	12:13	3.9
02/09/10	12:14	4.2
02/09/10	12:15	15.6
02/09/10	12:16	10.0
02/09/10	12:17	10.0
02/09/10	12:18	30.5
02/09/10	12:19	53.0
02/09/10	12:20	23.2
02/09/10	12:21	4.3
02/09/10	12:22	4.2
02/09/10	12:23	14.3
02/09/10	12:24	58.1
02/09/10	12:25	65.0

02/09/10 12:26	27.8
02/09/10 12:27	8.6
02/09/10 12:28	5.4
02/09/10 12:29	5.2
02/09/10 12:30	41.7
02/09/10 12:31	38.9
02/09/10 12:32	12.1
02/09/10 12:33	4.3
02/09/10 12:34	7.6
02/09/10 12:35	5.9
02/09/10 12:36	8.0
02/09/10 12:37	6.5
02/09/10 12:38	8.5
02/09/10 12:39	18.1
02/09/10 12:40	28.3
02/09/10 12:41	24.0
02/09/10 12:42	15.0
02/09/10 12:43	42.2
Final Average *	17.4
Maximum *	65.0
Minimum *	3.8

* Does not include Invalid Averaging Periods ("N/A")

Enertec NTDHSH®
Average Values Report
Generated : 02/10/10 13:51

Company: Koppers Industries
Plant: Tie Plant Road
City/St: Tie Plant, Miss. 38960
Source: CEMS

Period Start: 02/09/10 12:57
Period End: 02/09/10 14:00
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

Period Start	Average Opac %
02/09/10 12:57	4.9
02/09/10 12:58	4.9
02/09/10 12:59	5.4
02/09/10 13:00	11.7
02/09/10 13:01	14.6
02/09/10 13:02	22.5
02/09/10 13:03	22.1
02/09/10 13:04	11.1
02/09/10 13:05	6.2
02/09/10 13:06	10.5
02/09/10 13:07	22.3
02/09/10 13:08	22.1
02/09/10 13:09	11.1
02/09/10 13:10	14.1
02/09/10 13:11	15.3
02/09/10 13:12	14.6
02/09/10 13:13	47.7
02/09/10 13:14	51.8
02/09/10 13:15	18.1
02/09/10 13:16	4.3

02/09/10	13:17	4.5
02/09/10	13:18	5.1
02/09/10	13:19	24.7
02/09/10	13:20	51.9
02/09/10	13:21	24.5
02/09/10	13:22	4.6
02/09/10	13:23	4.1
02/09/10	13:24	17.4
02/09/10	13:25	45.6
02/09/10	13:26	28.1
02/09/10	13:27	8.6
02/09/10	13:28	5.6
02/09/10	13:29	12.5
02/09/10	13:30	26.6
02/09/10	13:31	23.9
02/09/10	13:32	30.1
02/09/10	13:33	24.2
02/09/10	13:34	11.3
02/09/10	13:35	9.7
02/09/10	13:36	9.7
02/09/10	13:37	8.8
02/09/10	13:38	9.5
02/09/10	13:39	11.6
02/09/10	13:40	13.0
02/09/10	13:41	22.0
02/09/10	13:42	20.7
02/09/10	13:43	31.4
02/09/10	13:44	25.3
02/09/10	13:45	11.4
02/09/10	13:46	8.8
02/09/10	13:47	8.0
02/09/10	13:48	11.2
02/09/10	13:49	10.5
02/09/10	13:50	9.3

02/09/10 13:51	8.8
02/09/10 13:52	6.9
02/09/10 13:53	8.3
02/09/10 13:54	19.4
02/09/10 13:55	18.3
02/09/10 13:56	22.6
02/09/10 13:57	24.3
02/09/10 13:58	38.0
02/09/10 13:59	22.3
02/09/10 14:00	8.8
Final Average*	17.0
Maximum*	51.9
Minimum*	4.1

*Does not include Invalid Averaging Periods ("N/A")

Enertec NTDASH®
Average Values Report
Generated : 02/10/10 14:00

Company: Koppers Industries
Plant: Tie Plant Road
City/St: Tie Plant, Miss. 38960
Source: CEMS

Period Start: 02/09/10 14:15
Period End: 02/09/10 15:16
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

<u>Period Start</u>	<u>Average Opac %</u>
02/09/10 14:15	6.4
02/09/10 14:16	8.3
02/09/10 14:17	22.3
02/09/10 14:18	17.3
02/09/10 14:19	43.7
02/09/10 14:20	54.8
02/09/10 14:21	22.1
02/09/10 14:22	9.7
02/09/10 14:23	16.1
02/09/10 14:24	39.1
02/09/10 14:25	55.0
02/09/10 14:26	24.0
02/09/10 14:27	6.8
02/09/10 14:28	6.9
02/09/10 14:29	7.0
02/09/10 14:30	22.0
02/09/10 14:31	22.6
02/09/10 14:32	21.7
02/09/10 14:33	41.7
02/09/10 14:34	23.7

02/09/10 14:35	7.2
02/09/10 14:36	8.1
02/09/10 14:37	24.9
02/09/10 14:38	62.4
02/09/10 14:39	32.7
02/09/10 14:40	7.4
02/09/10 14:41	5.9
02/09/10 14:42	6.4
02/09/10 14:43	30.3
02/09/10 14:44	46.6
02/09/10 14:45	20.1
02/09/10 14:46	5.5
02/09/10 14:47	5.7
02/09/10 14:48	5.8
02/09/10 14:49	6.1
02/09/10 14:50	5.9
02/09/10 14:51	9.5
02/09/10 14:52	20.9
02/09/10 14:53	28.3
02/09/10 14:54	43.7
02/09/10 14:55	17.9
02/09/10 14:56	6.8
02/09/10 14:57	22.2
02/09/10 14:58	36.7
02/09/10 14:59	21.9
02/09/10 15:00	6.7
02/09/10 15:01	5.5
02/09/10 15:02	8.3
02/09/10 15:03	14.9
02/09/10 15:04	35.8
02/09/10 15:05	33.9
02/09/10 15:06	14.7
02/09/10 15:07	5.4
02/09/10 15:08	16.2

02/09/10 15:09	13.4
02/09/10 15:10	18.0
02/09/10 15:11	28.1
02/09/10 15:12	20.8
02/09/10 15:13	56.4
02/09/10 15:14	30.1
02/09/10 15:15	9.5
02/09/10 15:16	45.8
Final Average*	21.3
Maximum*	62.4
Minimum*	5.4

* Does not include Invalid Averaging Periods ("N/A")

APPENDIX E

FUEL ANALYSIS

Lab No 00222063
Date Rec'd. 2/22/2010
Date Sampled 2/09/2010
Sampled By YOURSELVES



Box 606
Whitesburg, KY 41858
Tel (606) 633-9373
Fax (606) 633-8136

ENVIRONMENTAL MONITORING LABORATORIES
P O BOX 655
RIDGELAND, MS 39158

Koppers

BULK SAWDUST SAMPLE

	%Moisture	%Ash	%Volatile	Fixed Carbon	BTU/LB	%Sulfur
As Rec'd.	27.22	0.90	XXXX	XXXX	6037	XXXX
Dry Basis	-----	1.23	XXXX	XXXX	8295	XXXX
M-A-Free					8398	

LBS SO₂ / MMBTU XXXX

LBS ASH / MMBTU 1.48

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED
PAPER STOCK. NOT VALID IF ALTERED

Respectfully Submitted,

Billy Mullins
Rick Champion / Billy Mullins, Mgrs



STANDARD LABORATORIES, INC.

Lab No 00222063

Date Rec'd 02/22/10

Date Sampled 02/09/10

Sampled By YOURSELVES

PO BOX 606
WHITESBURG, KY 41858
TEL: 606-633-9373
FAX: 606-633-8136

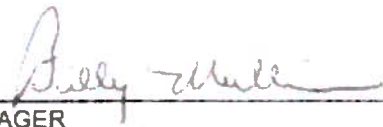
ENVIRONMENTAL MONITORING LABORATORIES
PO BOX 655
RIDGELAND, MISSISSIPPI 39158

Sample ID: BULK SAWDUST SAMPLE

ULTIMATE ANALYSIS OF COAL

% DRY BASIS

ASH	1.23
HYDROGEN	5.84
CARBON	49.53
NITROGEN	0.06
SULFUR	0.01
OXYGEN	43.33

Respectfully Submitted 
RICK CHAMPION / MANAGER
BILLY MULLINS / ASSISTANT MANAGER

***THIS IS THE LAST PAGE
OF THIS REPORT***