AIR EMISSIONS TEST

BIBLER BROTHERS LUMBER COMPANY

SN-7G -- CONTINUOUS DRY KILN AND WOOD BURNER

PERMIT NO. 1628-AOP-R5
AFIN 58-00014

Russellville, Arkansas
March 12, 2009

Bibler Brothers Lumber Company
2401 South Arkansas Avenue
Russellville, Arkansas 72801

Performed by:

ENVIRONMENTAL MONITORING LABORATORIES, INC.

624 Ridgewood Road
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REPORT OF
AIR EMISSIONS TEST FOR

BIBLER BROTHERS LUMBER COMPANY

SN-7G -- CONTINUOUS DRY KILN
AND WOOD BURNER

Russellville, Arkansas
March 12, 2009

Bibler Brothers Lumber Company
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EXECUTIVE SUMMARY OF STACK EMISSIONS TEST

April 8, 2009

Subject: Bibler Brothers Lumber Company – Russellville, Arkansas
Triple Length Continuous Kiln

On March 12, 2009, Environmental Monitoring Laboratories performed air emissions tests for Bibler Brothers Lumber Mill in Russellville, Arkansas. Testing was performed to measure particulate, nitrogen oxide (NOx), carbon monoxide (CO), volatile organic compounds (VOC (as C)), and formaldehyde (HCHO) emissions from the SN-7G -- continuous dry kiln and wood burner. This testing was done in accordance with condition SC-28 of the Permit NO. 1628-AOP-R5 administered by the Arkansas Department of Environmental Quality (ADEQ).

Results of the test:

	#/hr	concentration	#/MBF
Particulate	1.053	0.0028 grains/dscf	0.112
CO	3.504	19	0.373
NOx	1.393	4.5	0.148
VOC (as C)	27.18	332	2.90
HCHO	0.298	1.5	0.032

Mr. Keith Zimmerman of Environmental Enterprise Group coordinated the testing project. Mr. Matt Hagenlocker of Bibler Brothers supervised on site efforts. Mr. Brent Day of the ADEQ was present to witness the testing. Danny Russell and Bill Norwood of Environmental Monitoring Laboratories were responsible for sample collection. Formaldehyde samples were shipped to Enthalpy Analytical in Durham, NC for analysis.

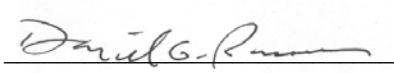
Following is a report of the test.

REPORT OF AIR EMISSIONS TEST
FOR BIBLER BROTHERS LUMBER COMPANY
CONTINUOUS KILN AND WOOD BURNER
RUSSELLVILLE, ARKANSAS
MARCH 12, 2009

CONTENTS

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 the measured flow parameters and test results for air emissions testing done on March 12, 2009, for the triple length continuous kiln and wood burner at Bibler Brothers Lumber Company in Russellville, Arkansas.

PM, CO, NOx, VOC and Formaldehyde Emissions Test - March 12, 2009

Run No.		1	2	3	AVG.
Date		03/12/09	03/12/09	03/12/09	-------
Time Start		1031	1229	1509	-----
Time End		1135	1331	1612	-----
PARTICULATE EMISSIONS	#/hr	1.367	0.801	0.990	1.053
PARTICULATE EMISSIONS, total	grains/dscf	0.0034	0.0022	0.0028	0.0028
PARTICULATE EMISSIONS, total	#/MBF	0.146	0.085	0.105	0.112
VOC EMISSIONS as Carbon	#/hr	32.243	29.926	19.384	27.184
VOC EMISSIONS as Carbon	ppm	372.6	373.7	250.9	332.4
VOC EMISSIONS as Carbon	#/MBF	3.436	3.189	2.066	2.897
NOx EMISSIONS	#/hr	1.127	1.419	1.635	1.393
NOx EMISSIONS	ppm	3.4	4.6	5.5	4.5
NOx EMISSIONS	#/MBF	0.120	0.151	0.174	0.148
CO EMISSIONS	#/hr	3.305	3.584	3.624	3.504
CO EMISSIONS	ppm	16.4	19.2	20.1	18.6
CO EMISSIONS	#/MBF	0.352	0.382	0.386	0.373
HCHO EMISSIONS	#/hr	0.293	0.292	0.309	0.298
HCHO EMISSIONS	ppm	1.4	1.5	1.6	0.0
HCHO EMISSIONS	#/MBF	0.0312	0.0312	0.0330	0.0318
FUEL BURN RATE	#/hr	5650	5297	5385	5444
HEAT INPUT	MM Btu/hr	22.21	20.82	21.17	21.40
THROUGHPUT	BF/hr	9384	9384	9384	9384
VOLUMETRIC FLOW RATE [1]	dscfm	46287	42829	41327	43481
VOLUMETRIC FLOW RATE	acfm	978	1081	1020	1026
VOLUMETRIC FLOW RATE	dscfm	765	833	801	800
VELOCITY	ft./sec.	15.6	17.3	16.3	16.4
STACK TEMPERATURE	^{o}F	131	131	129	130
MOISTURE	%	13.2	14.4	13.2	13.6
SAMPLE RATE	% Isokinetic	92.3	91.5	94.3	92.7

[1] Total volumetric flow rate was calculated from the measured oxygen content, measured fuel burn rate, and an F-Factor of 11936 for the mixed wood fuel.

2.0 SOURCE DESCRIPTION

Kiln

The kiln is 33' wide and 200' long with a 16'-0" high door opening. The two 8' wide lumber loads are pushed through the kiln on trams at a rate of about 10,000 board feet per hour. Actual throughput is dictated by moisture content of the green wood and the target ending moisture content. The two loads move in opposing directions. There are no vents. Fume and water vapor generated by the drying wood exhausts primarily through the ends of the kiln. Lumber is dried from its initial green lumber moisture content coming from the sawmill to a target of 13-17% average moisture content. Unlike typical batch dry kilns, this one operates continuously. Burner function and heat input vary only to maintain heat demand by the varying wood quality and moisture content.

Burner:

The heat source for the kiln is a 5 grate (245 square feet) wood burner with a sloped-grate design. It is nominally rated at 25 MM Btu/hr heat input. The sawdust is delivered from the sawmill and enters the burner at moisture contents ranging from 45-55% (wet basis). The sawdust is gasified in the burner box at temperatures in the 700 ^{O}F range, and the gas is combusted in firebrick-lined ductwork at temperatures in the 2000 ^{O}F range. The combustion gases are blended with return air from the kiln to produce a final heat supply temperature of approximately 500 ^{O}F; the supply air is then distributed inside the kiln to maintain a controlled dry bulb temperature. Wood fuel usage for the continuous drying process averaged 5444 pounds per hour during the test. Analysis of wood fuel samples were made to determine a source specific F-Factor of 11936 dscf/MM Btu and a heat value of 3931 Btu per pound. Heat input averaged 21.4 MM Btu per hour. A report of the wood fuel analysis done by Standard Laboratories is provided in Appendix F.

Temporary Test Stack

A temporary stack was installed in the kiln roof near one end of the kiln to provide a site with a consistent and laminar air flow for particulate sampling. A vertical rectangular stack was constructed over an existing but non functioning vent door. The vent door was removed and a housing was built to enclose that opening and funnel exhaust gases through the 33 inch tall stack extension that was 15.0 inches by 10.0 inches in cross section.

3.0 TEST PROCEDURES:

Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. All test parameters were measured simultaneously. Each test consisted of triplicate 60 minute sample runs.

Because it is impractical to capture the entire exhaust of a lumber kiln, a temporary test stack was constructed in which a measureable laminar flow was produced. The flow rate from the stack was measured for the purpose of making an isokinetic sample, but that measured flow rate could not be related to the total flow lost from the kiln. Rather, total flow rate from the kiln was determined by taking advantage of the predictable oxygen consumption of the direct fire burner supplying heat to the kiln. The oxygen content was continuously monitored as well as the fuel rate. Given those two factors and assuming air quality is relatively homogenous throughout the positive pressure kiln, total air loss can be calculated. It was that calculated total air loss that was used to calculate mass emission rates of the measured pollutants.

Sample and Velocity Traverses – EPA Method 1

Selection of sampling locations was as described in Method 1. Sample ports are installed at locations meeting requirements of the Method. Laminar air flow at sample locations was confirmed using the null Pitot technique.

Determination of Stack Gas Velocity and Volumetric Flowrate – EPA Method 2

Stack gas velocity was measured using an S-Type Pitot tube and Method 2. Pitot tube design and its orientation with respect to the sample probe and nozzle permitted the use of a correction factor (Cp) of 0.84 as described in Method 2. Stack temperature measurements were be made with a type K thermocouple and NBS calibration traceable digital thermometer.

Gas Analysis for the Determination of Dry Molecular Weight – EPA Method 3A

Oxygen and carbon dioxide content was measured by continuous monitoring with calibrated analyzers as described in Method 3A.

Determination of moisture content in stack gas – EPA Method 4

Moisture content was determined from volumetric and gravimetric analysis of impinger contents of the Method 5 sample train.

Determination of Particulate Emissions – EPA Method 5

Particulate emissions were measured as described in Method 5 with no significant departures from the prescribed procedures. Method 5 incorporates the use of Methods 1 through 4. The sample train used was identical to that described in Method 5 except that the cyclone was omitted. Glass fiber filters were used. A stainless steel probe liner and nozzle was used. Reagent grade acetone was used for sample recovery. All particulate measured is presumed to be less than 10 microns.

Determination of Nitrogen Oxides Emissions – EPA Method 7E

Nitrogen oxide was measured by continuously directing a conditioned gas sample to a TECO Model 42C chemiluminescence NOx analyzer as described in Method 7E. A sample was extracted from the source by way of a stainless steel probe, heated sample line, minimum contact moisture knockout trap, glass wool filter and vacuum sample pump. The NOx analyzer was calibrated prior to use in the appropriate range using zero, mid, and high range concentrations of NO in nitrogen. Zero and mid level span checks were performed following each 60 minute sample run. Calibrations and post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe.

Determination of Carbon Monoxide – EPA Method 10

Carbon monoxide was measured by continuously directing a conditioned gas sample to a TECO Model 48C gas filter correlation CO analyzer as described in the continuous monitoring technique described in Method 10. A sample was extracted from the source by way of a stainless steel probe, minimum contact moisture knockout trap, glass wool filter and vacuum sample pump. The CO analyzer was calibrated prior to use in the appropriate range using zero, low, mid range, and span concentrations of CO in nitrogen. Zero and mid range checks were performed following each 60 minute sample run. Pre test calibrations and post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe.

Determination of Total Volatile Organic Compounds – EPA Method 25A

VOC (as carbon) was measured using Method 25A. A calibrated TECO Model 51 heated flame ionization detector was used to continuously monitor VOC concentration on a wet basis. A sample was directed to the analyzers by way of a Teflon sample line heated to 250^{O} F. A helium/hydrogen fuel was used to reduce oxygen synergism impact on the measurements. The instrument was calibrated with known concentrations of propane. Since the instrument was calibrated to propane, instrument response was multiplied by three as described in Method 25A to correct the results to an "as carbon" basis. Triplicate 60 minute sampling periods constituted a test. A four point instrument calibration was performed initially, and a calibration check at zero and mid point followed each 60 minute test period. Any necessary adjustments to the calibration were made after recording the response of the mid range calibration gas which was introduced at the inlet to the VOC sampling probe.

Preparation of Calibration Gases – EPA Method 205

Calibration gas concentrations were prepared using cylinders of EPA Protocol 1 gas mixtures and an Environics gas diluter verified by Method 205.

Data Acquisition

Instrument data was recorded on a Fluke Hydra data logger at 5 second intervals reduced to 60 second averages. The arithmetic average of each instrument's output was used to calculate emissions.

Determination of Formaldehyde Emissions – EPA Method 316

Formaldehyde emissions were measured in accordance with Method 316. Samples were sent to Enthalpy Analytical in Durham, NC for analysis. A report of the analysis prepared by Enthalpy is provided in Appendix E.

4.0 DATA REDUCTION

PM, CO, NOx, VOC Emissions Test - March 12, 2009

Collected Test Data:		RUN 1	RUN 3	RUN 3
Date	:	03/12/09	03/12/09	03/12/09
Time start	:	1031	1229	1509
Time end	:	1135	1331	1612
1. As	: sq ft	1.0417	1.0417	1.0417
2. Dn	: in.	0.436	0.436	0.436
3. Cp	: dimensionless	0.84	0.84	0.84
4. Theta	: minutes	62.50	62.50	62.50
5. Y	: dimensionless	1.010	1.010	1.010
6. Pbar	: in. Hg	30.18	30.18	30.18
7. Pg	: in. H2O	-0.08	-0.08	-0.08
8. Vm	: cf (dry gas)	42.929	46.798	46.475
9. sqr(ΔP),avg	: in.H2O^.5	0.2587	0.2853	0.2705
10. ΔH	: in. H2O	1.5140	1.3668	1.8060
11. ts	: degrees F	130.72	130.92	128.56
12. tm	: degrees F	67.96	72.88	74.92
13. Vlc	: ml	142	170	152
14. CO2	: percent	1.94	2.12	2.24
15. O2	: percent	18.91	18.89	18.78
16. CO	: percent	0.00	0.00	0.00
17. C,CO	: ppm (dry)	16.4	19.2	20.1
18. C,NOx	: ppm	3.40	4.62	5.52
19. M,PM	: milligrams	9.8	6.7	8.5
20. C,VOC	: ppm as C (wet basis)	107.8	106.6	72.6
21. C,HCHO	: ppm (M316)	1.4	1.5	1.6
22. Fuel Rate	: lb/hr	5650	5297	5385
23. Heat Value	: Btu/lb	3931	3931	3931
24. F	: scf/MM Btu	11936	11936	11936
25. Through put	: BF/hr (board feet/hr)	9384	9384	9384

PM, CO, NOx, VOC Emissions Test - March 12, 2009

Calculations:		RUN 1	RUN 3	RUN 3	AVG.
1. Pm	: in.Hg (ΔH/13.6)+Pbar	30.2913	30.2805	30.3128	
2. Ps	: in. Hg (Pg/13.6)+Pbar	30.1741	30.1741	30.1741	
3. An	: sq ft ((Dn/24)^2)(3.1416)	1.04E-03	1.04E-03	1.04E-03	
4. Vmstd	: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	43.900	47.397	46.941	46.079
5. Vwstd	: scf (.04707cf/ml)(Vlc)	6.684	8.002	7.155	
6. Bws	: dimensionless Vwstd/(Vwstd+Vmstd)	0.1321	0.1444	0.1323	0.1363
7. Md	: mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.07	29.09	29.11	
8. Ms	: mol.wt. wet basis Md(1-Bws)+18 Bws	27.60	27.49	27.64	
9. Vs	: ft/sec Kp Cp (sqrΔP)sqr(Ts/(Ps Ms))	15.65	17.29	16.32	16.42
10. HeatInput	: MM Btu/hr (Fuel rate)(heat value)/1000000	22.210	20.823	21.168	21.400
11. $Qstd_T$	: dscfm *(total from kiln)* (Heat Input/60)*(F)*(20.8/(20.9-O2))	46287	42829	41327	43481
12. Q	: cfm *(from temporary stack)* Vs As(60 sec/min)	978	1081	1020	1026
13. Qstw	: scfm *(from temporary stack)* Q(Ps/Pstd)(Tstd/Ts)	881	974	923	926
14. Qstd	: dscfm *(from temporary stack)* Qstw(1-Bws)	765	833	801	800
15. I	: percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	92.26	91.45	94.25	92.65

Particulate Emissions		RUN 1	RUN 3	RUN 3	AVG.
16. E,PM	: pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	1.367	0.801	0.990	1.053
17. C,PM	: grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.0034	0.0022	0.0028	0.0028
18. E'PM	: pounds/MBF E,PM/(Throughput/1000)	0.146	0.085	0.105	0.112

Carbon Monoxide Emissions

19. E,CO	: pounds/hr (C,CO*7.2708e-8)(60)(Qstd)	3.30	3.58	3.62	3.50
20. E'CO	: pounds/MM Btu E,CO/Heat Input	0.1488	0.1721	0.1712	0.1640
21. C'CO	: ppm at 7% O2 C,CO (13.9/(21-O2))	114	133	132	126
22. E'CO	: pounds/MBF E,PM/(Throughput/1000)	0.352	0.382	0.386	0.373

NOx Emissions

23. E,NOx	: pounds/hr (C,NOx*1.194e-7)(60)(Qstd)	1.13	1.42	1.63	1.39
24. E'NOx	: pounds/MM Btu E,NOx/Heat Input	0.0507	0.0681	0.0772	0.0654
25. E'NOx	: pounds/MBF E,NOx/(Throughput/1000)	0.120	0.151	0.174	0.148

VOC Emissions as Carbon

26. C'VOC	: ppm as Carbon, dry ((C,VOC)*3)/(1-Bws)	372.58	373.73	250.88	332.40
27. E,VOC	: pounds/hr as C (C'VOC)(3.116e-8)(Qstd)(60)	32.243	29.926	19.384	27.184
28. E'VOC	: pounds/MBF as C E,VOC/(Throughput/1000)	3.436	3.189	2.066	2.897

Formaldehyde Emissions (Method 316)

29. E,HCHO	: #/hr ((ppm HCHO/1000000)*Qstd*60)/385.1)*30	0.29	0.29	0.31	0.30
30. E'HCHO	: pounds/MBF E,HCHO/(Throughput/1000)	0.0312	0.0312	0.0330	0.0318

DRIFT AND BIAS CORRECTIONS

Analyte, units	Level	Cal. Value	Pre-Test Cal. Reading	Pre-Test % Cal. Error	Pre-Test Bias Reading	Pre-Test % Bias	Run No. 1 Reading	Run No. 1 % Bias	Run No. 1 % Drift	Run No. 2 Reading	Run No. 2 % Bias	Run No. 2 % Drift	Run No. 3 Reading	Run No. 3 % Bias	Run No. 3 % Drift
% CO2	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	4.5	4.6	1.1	4.6	1.1	4.6	1.1	0.0	4.6	1.1	0.0	4.6	1.1	0.0
	High	9.0	9	0.0											
	SPAN =	9.0			Measured Result		2.0			2.2			2.3		
					Corrected Result		1.94			2.12			2.24		
% O2	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	10.5	10.5	0.0	10.5	0.0	10.5	0.0	0.0	10.4	0.5	0.5	10.4	0.5	0.0
	High	20.9	20.9	0.0											
	SPAN =	20.9			Measured Result		18.9			18.8			18.6		
					Corrected Result		18.91			18.89			18.78		
ppm CO	Low	0	0	0.0	0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
	Mid	35	34	1.3	34	1.3	35	0.0	1.3	35	0.0	0.0	35	0.0	0.0
	High	75	2000	2566.7											
	SPAN =	75			Measured Result		16.13			19.18			20.10		
					Corrected Result		16.37			19.18			20.10		
ppm NOx	Low	0.0	0	0.5	0.2	0.5	0.2	0.5	0.0	0.2	0.5	0.0	0.0	0.0	0.5
	Mid	9.6	9.3	0.7	8.8	2.0	9.6	0.0	2.0	9.5	0.2	0.2	9.1	1.2	1.0
	High	21.0	488	1139.0											
	SPAN =	41.0			Measured Result		3.42			4.75			5.39		
					Corrected Result		3.44			4.67			5.52		

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

M 316 Formaldehyde Emissions Test - March 12, 2009

Collected Test Data:			RUN 1	RUN 3	RUN 3
Date	:		03/12/09	03/12/09	03/12/09
Time start	:		1031	1229	1509
Time end	:		1135	1331	1612
1. As	:	sq ft	1.0417	1.0417	1.0417
2. Dn	:	in.	0.432	0.432	0.432
3. Cp	:	dimensionless	0.84	0.84	0.84
4. Theta	:	minutes	62.50	62.50	62.50
5. Y	:	dimensionless	1.019	1.019	1.019
6. Pbar	:	in. Hg	30.18	30.18	30.18
7. Pg	:	in. H2O	-0.08	-0.08	-0.08
8. Vm	:	cf (dry gas)	48.781	47.436	46.363
9. sqr(ΔP),avg	:	in.H2O^.5	0.3000	0.2701	0.4125
10. ΔH	:	in. H2O	2.1160	1.9240	1.7580
11. ts	:	degrees F	128.72	130.40	173.28
12. tm	:	degrees F	65.18	69.34	83.04
13. Vlc	:	ml	145	143	604
14. CO2	:	percent	1.94	2.12	2.24
15. O2	:	percent	18.91	18.89	18.78
16. CO	:	percent	0.00	0.00	0.00
17. C,HCHO	:	mg (M 316)	2.426	2.522	2.633

M 316 Formaldehyde Emissions Test - March 12, 2009

Calculations:			RUN 1	RUN 3	RUN 3	AVG.
1.	Pm : in.Hg (ΔH/13.6)+Pbar		30.3356	30.3215	30.3093	
2.	Ps : in. Hg (Pg/13.6)+Pbar		30.1741	30.1741	30.1741	
3.	An : sq ft ((Dn/24)^2)(3.1416)		1.02E-03	1.02E-03	1.02E-03	
4.	Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)		50.669	48.862	46.533	48.688
5.	Vwstd : scf (.04707cf/ml)(Vlc)		6.825	6.731	28.430	
6.	Bws : dimensionless Vwstd/(Vwstd+Vmstd)		0.1187	0.1211	0.3793	0.2063
7.	Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)		29.07	29.09	29.11	
8.	Ms : mol.wt. wet basis Md(1-Bws)+18 Bws		27.75	27.75	24.90	
9.	Vs : ft/sec Kp Cp (sqrΔP)sqr(Ts/(Ps Ms))		18.06	16.29	27.20	20.52
10.	I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)		92.20	99.16	85.90	92.42

Formaldehyde Emissions (Method 316)

11.	C,HCHO : ppm (M,HCHO/Vmstd)(849/mw)		1.4	1.5	1.6	1.5

Calculation of the site specific F-Factor

	R1	R2	R3	AVG		
Moisture	54.16	54.05	53.96	54.06	%	
Carbon	52.77	52.98	52.59	52.78	%	dry basis
Hydrogen	5.95	5.97	5.88	5.93	%	dry basis
Nitrogen	0.16	0.13	0.16	0.15	%	dry basis
Sulfur	0.01	0.01	0.01	0.01	%	dry basis
Ash	0.01	0.001	0.001	0.00	%	dry basis
Oxygen	0.53	0.57	0.58	0.56	%	dry basis
GCV	8136	8661	8870	8556	Btu/dry lb.	(heat value dry basis)
GCV	3730	3980	4084	3931	Btu/wet lb.	(heat value wet basis)

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

F =	12559	11841	11457	11936

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_2O	Pressure drop across meter orifice
ΔP (delta P)	in. H_2O	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
N2	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	^oF	Meter temperature (Tm denotes ^oR)
ts	^oF	Stack temperature (Ts denotes ^oR)
Tstd	^oR	Standard temperature = 528^oR
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 (delta P) and orifice pressure differential (delta H) 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. Calibration Data

C. Analyzers Data Log

D. Operating Records (Bibler Bros.)

E. Formaldehyde Analysis (Enthalpy Analytical)

F. Wood Fuel Analysis (Standard Labs)

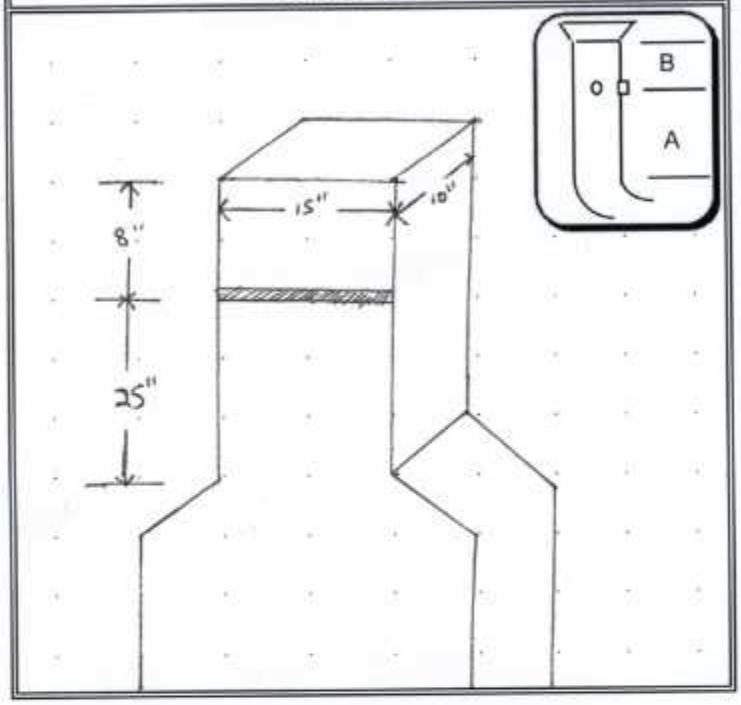
APPENDIX A

FIELD AND LABORATORY DATA

STACK CONFIGURATION AND SAMPLE POINT LAYOUT

PLANT: Bibler Brothers Russellville, AR **Date:** 3-11-09
SOURCE: Dry Kiln #3 SN-76
TEST FOR: PM Setup
TEST OPERATORS:

SKETCH OF STACK



PERCENT OF DIAMETER (for circular stacks)

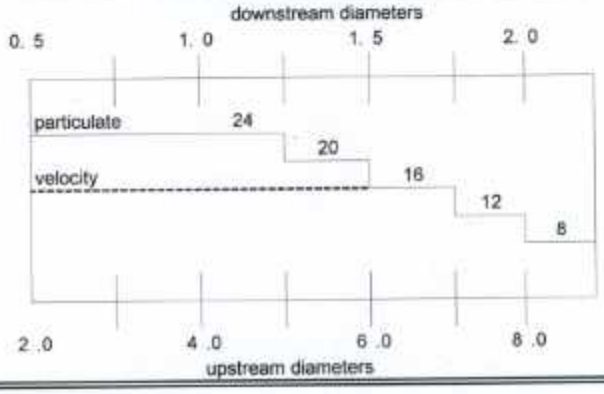
	points on a diameter							
	2	4	6	8	10	12	14	16
point no.								
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	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: De = 12

Distance from ports to disturbance:	
A. to upstream disturbance	2.1
B. to downstream disturbance	0.5
Upstream diameters:	25"
Downstream diameters:	8"
Minimum No. sample points required:	25
No. sample points selected:	5x5
Port Length:	0" slot
Port Type:	slot
Port Access:	board

Point No.	inches from wall	velocity head 1.5	4.5	7.5	10.5	13.5
		1	2	3	4	5
1	1.0					
2	3.0					
3	5.0					
4	7.0					
5	9.0					

MINIMUM NO. OF TRAVERSE POINTS



Pitot ID : Pitot Cp: Stack Temp: 130

Remarks:

Plant: Bibler Brothers Lumber Co. Russellville, AR
Source: Dry Kiln #3 SN-7G
Test For: Formaldehyde 316
Test Operators: Norwood / Thompson / Walker

RUN NO. 1
Date 3-12-09
Time start 1031 end 1135

Meter Box NT1 Y=1.019
Sample Box No. 1
Probe/Pitot 4'Ti
Pitot Cp 0.84
Nozzle Dia. 0.432 Q
Filter No. N/A

Amb. Temp. °F 31
Bar. Press. "Hg 30.18
Static Press. "H2O -0.08

No. Sample Pts. 5 X 5
Minutes/Pt 2.5

K FACTOR SETUP
ΔH@ 1.70
Meter Temp 75
% H2O 18
Stack Temp. 140
K Factor 22.54

GAS ANALYSIS: CEM

CO_2			
O_2			
CO			
Time			

CONDENSATE:
init. 200 final 335
SILICA GEL:
init. 757 final 767

Notes:

Nozzle:
0.432
0.432 / 0.432
0.432

Port Point	Elapsed Time Min/sec	DGM Reading Ft.³	Velocity Head ΔP in. H2O	Orifice ΔH in. H2O	Stack Temp °F	Meter Temp °F in	Meter Temp °F out	Oven Temp °F	Imp. Temp °F	VAC in Hg
1 1	000	999.526	0.08	1.80	128	66	64	N/A	40	1
2	230	001.3	0.17	3.85	128	64	64		40	2
3	500	004.0	0.15	3.40	128	63	64		41	2
4	730	006.3	0.08	1.80	128	62	63		41	2
5	1000	008.2	0.10	2.25	126	62	63		42	2
2 1	1230	010.288	0.10	2.25	127	62	63		43	2
2	1500	012.4	0.20	4.50	127	62	62		43	4
3	1730	015.2	0.09	2.05	129	61	62		47	2
4	2000	017.3	0.05	1.15	127	60	62		45	1
5	2230	018.7	0.18	4.05	126	64	63		46	3
3 1	2500	021.380	0.08	1.80	130	65	63		48	2
2	2730	023.3	0.08	1.80	129	66	63		48	2
3	3000	025.265	0.08	1.80	130	67	64		47	2
4	3230	027.0	0.07	1.60	129	68	64		47	2
5	3500	028.8	0.10	2.25	129	68	64		46	2
4 1	3730	030.810	0.14	3.15	130	68	65		48	2
2	4000	033.2	0.07	1.60	127	68	65		48	2
3	4230	035.0	0.07	1.60	131	69	65		47	2
4	4500	036.7	0.07	1.60	131	69	65		46	2
5	4730	038.4	0.07	1.60	131	69	65		47	2
5 1	5000	040.165	0.07	1.60	130	70	66		46	1
2	5230	041.9	0.06	1.35	130	70	66		48	1
3	5500	043.5	0.06	1.35	129	70	66		47	1
4	5730	045.1	0.06	1.35	129	70	66		46	1
5	6000	046.8	0.06	1.35	129	70	66		46	1
end	6230	048.307								
		48.781	0.3000	2.1160	128.72		65.18			

Leak Checks:
Sample Train: 0.040 -> 0.042 = 0.002 cfm @ 5 "Hg
Pitot Tubes: High ☑ @ 6.4 "H2O || Low ☑ @ 5.8 "H2O

Pretest: Sample Train ☑
Pitot Tubes ☑

Plant: Bibler Brothers Lumber Co. Russellville, AR
Source: Dry Kiln # 3 SN-7G
Test For: HCHO 316
Test Operators: Norwood / Thompson / Walker

RUN NO. 2
Date 3-12-09
Time start 1229 end 1331

Meter Box NT1 Y=1.019
Sample Box No. 1
Probe/Pitot 4'Ti
Pitot Cp 0.84
Nozzle Dia. 0.432 Q
Filter No. N/A

No. Sample Pts. 5 X 5
Minutes/Pt. 2.5

K FACTOR SETUP
ΔH@ 1.70
Meter Temp 70
% H_2O 12
Stack Temp. 130
K Factor 26.16

GAS ANALYSIS: CEM

CO_2			
O_2			
CO			
Time			

CONDENSATE:
init. 200 final 335
SILICA GEL:
init. 767 final 975

Amb. Temp. °F 31
Bar. Press. "Hg 30.18
Static Press. "H_2O -0.08

Notes:

Port Point	Elapsed Time Min/sec	DGM Reading Ft^3	Velocity Head ΔP in. H_2O	Orifice ΔH in. H_2O	Stack Temp °F	Meter Temp °F in	Meter Temp °F out	Oven Temp. °F	Imp. Temp °F	VAC in. Hg
1 1	0 00	048.397	0.06	1.55	130	71	69	N/A	41	1
2	230	050.1	0.06	1.55	131	71	69		41	1
3	500	051.9	0.06	1.55	130	70	68		40	1
4	730	053.5	0.07	1.85	130	69	68		41	1
5	1000	055.7	0.08	2.10	130	70	68		43	1
6										
7 2 1	1230	057.505	0.08	2.10	130	70	68		44	1
8 2	1500	059.3	0.08	2.10	130	70	68		44	1
9 3	1730	061.2	0.07	1.85	131	70	68		45	1
10 4	2000	063.1	0.07	1.85	132	70	68		45	1
11 5	2230	065.0	0.08	2.10	131	70	68		47	1
12										
13 3 1	2500	066.918	0.08	2.10	131	70	68		47	1
14 2	2730	069.0	0.08	2.10	128	69	68		47	1
15 3	3000	071.1	0.07	1.85	130	70	68		48	1
16 4	3230	072.7	0.10	2.60	130	70	68		48	1
17 5	3500	074.9	0.07	1.85	130	70	68		49	1
18										
19 4 1	3730	076.905	0.07	1.85	129	70	68		49	1
20 2	4000	078.7	0.08	2.10	132	71	68		49	1
21 3	4230	080.7	0.08	2.10	132	71	68		49	1
22 4	4500	082.6	0.07	1.85	131	70	68		50	1
23 5	4730	084.5	0.07	1.85	131	70	68		49	1
24										
25 5 1	5000	086.380	0.07	1.85	130	71	69		49	1
26 2	5230	088.2	0.07	1.85	131	71	69		50	1
27 3	5500	090.1	0.07	1.85	130	72	69		51	1
28 4	5730	092.0	0.07	1.85	130	72	69		51	1
29 5	6000	093.9	0.07	1.85	130	72	69		51	1
30 end	6230	095.833								
31										
32										
33		47.436	0.2701	1.9240	130.40		69.34			

Leak Checks: Sample Train 0.065 -> 0.068 = 0.003 cfm @ 5 "Hg
Pitot Tubes: High ☑ @ 6.2 "H_2O || Low ☑ @ 5.6 "H_2O

Pretest: Sample Train ☑ Pitot Tubes ☑

Plant: Bibler Brothers Lumber Co. Russellville, AR
Source: Dry Kiln #3 SN-7G
Test For: HCHO
Test Operators: Norwood / Thompson / Walker

RUN NO. 3
Date 3-12-09
Time start 1509 end 1612

Meter Box	NT1Y-1.019
Sample Box	No. 1
Probe/Pitot	4'T; 1-1805-2
Pitot Cp	0.84
Nozzle Dia.	0.432 Q
Filter No.	N/A

No. Sample Pts.	5 X 5
Minutes/Pt.	2.5

K FACTOR SETUP

ΔH@	1.70
Meter Temp	70
% H_2O	12
Stack Temp.	130
K Factor	26.16

GAS ANALYSIS: CEM

CO_2			
O_2			
CO			
Time			

CONDENSATE: init. 200 final 320
SILICA GEL: init. 775 final 783

Amb. Temp. °F	35
Bar. Press. "Hg	30.15
Static Press. "H_2O	-008

Notes:

Port Point	Elapsed Time Min/sec	DGM Reading Ft³	Velocity Head ΔP in. H_2O	Orifice ΔH in. H_2O	Stack Temp °F	Meter Temp °F in	Meter Temp °F out	Oven Temp. °F	Imp. Temp °F	VAC in. Hg
1 1	0 00	095.926	0.07	1.85	128	73	71	N/A	44	1
2	230	098.1	0.07	1.85	128	73	71		43	1
3	500	100.0	0.07	1.85	127	73	71		44	1
4	730	101.8	0.08	2.10	127	73	71		45	1
5	1000	103.8	0.07	1.85	128	73	71		47	1
2 1	1230	105.680	0.07	1.85	128	73	71		47	1
2	1500	107.6	0.07	1.85	128	73	71		48	1
3	1730	109.5	0.08	2.10	128	73	71		48	1
4	2000	111.5	0.08	2.10	128	72	71		48	1
5	2230	113.5	0.06	1.55	128	72	71		49	1
3 1	2500	115.274	0.06	1.55	128	73	71		48	1
2	2730	117.0	0.07	1.85	128	73	71		48	1
3	3000	118.9	0.07	1.85	129	73	71		49	1
4	3230	120.7	0.07	1.85	129	73	71		49	1
5	3500	122.7	0.07	1.85	129	74	71		49	1
4 1	3730	124.632	0.06	1.55	129	74	71		50	1
2	4000	126.2	0.08	2.10	129	74	71		50	1
3	4230	128.2	0.06	1.55	130	75	71		50	1
4	4500	129.9	0.09	2.35	129	75	72		50	1
5	4730	132.1	0.09	2.35	129	75	72		50	1
5 1	5000	134.186	0.06	1.55	129	75	72		50	1
2	5230	135.8	0.08	2.10	130	75	72		50	1
3	5500	137.8	0.06	1.55	130	75	72		51	1
4	5730	139.8	0.06	1.55	130	75	72			
5	6000	141.3	0.06	1.55	128	75	72			
end	6230	143.061								
		47.135	0.2648	1.8440	12856		72.48			

Leak Checks: Sample Train: _____ -> _____ = _____ cfm @ _____ "Hg
Pitot Tubes: High ☐ @ _____ "H_2O || Low ☐ @ _____ "H_2O

Pretest: Sample Train ☑ Pitot Tubes ☑

PARTICULATE CATCH ANALYSIS

SAMPLES: Bibbler Lumber Counter

DATE TAKEN: 3.12.09 DATE ANALYZED: 3/13.09

DELIVERED BY: DGR RECEIVED BY: OE

ANALYZED BY: DGR

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	3294	3295	3296	
FILTER TARE, gms.	.4025	.4049	.4069	
	0.4058	0.4084	0.4099	
	0.4058	0.4082	0.4103	
FINAL WEIGHT, gms.	0.4058	0.4082	0.4103	
NET GAIN, gms.	.0033	.0033	.0034	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	BBL R1	BBL R2	BBL R3	
VOLUME INTACT?	Yes	Yes	Yes	
VOLUME, ml	100	110	140	
	(19)	(DUA)	(27)	( )
TARE WEIGHT, gms.	97.6219	117.4611	107.6655	
	97.6284	117.6645	107.6706	
	97.6284	117.6645	107.6706	
FINAL WEIGHT, gms	97.6284	117.6645	107.6706	
NET GAIN, gms.	.0065	.0034	.0051	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	9.8	6.7	8.5	

Plant: Bibler Brothers Lumber Co. Russellville, AR
Source: Dry Kiln #3 SN-7G
Test For: PM
Test Operators: Russell / Wilkes / Thompson

RUN NO. 1
Date 03/12/09
Time start 1031 end 1135

Meter Box NT3Y=1.010
Sample Box No. 2
Probe/Pitot ST1 1-18-05-4
Pitot Cp 0.84
Nozzle Dia. ~~0.440~~ .436
Filter No. 3294

No. Sample Pts. 5 X 5
Minutes/Pt. 2.5

K FACTOR SETUP
ΔH@ 1.56
Meter Temp 75
% H_2O 18
Stack Temp. 140
K Factor 22.26

GAS ANALYSIS: C&A

CO_2			
O_2			
CO			
Time			

CONDENSATE:
init. 200 final 332
SILICA GEL:
init. 703 final 713

Notes:
D .435
1D .427
2D .430

Amb. Temp. °F 31
Bar. Press. "Hg 30.18
Static Press. "H_2O -.08

ADEQ Brett Day
Gary Burtz

Port Point	Elapsed Time Min/sec	DGM Reading Ft^3	Velocity Head ΔP in. H_2O	Orifice ΔH in. H_2O	Stack Temp °F	Meter Temp °F in	Meter Temp °F out	Oven Temp. °F	Imp. Temp °F	VAC in Hg
2 1	000	317.739	0.08	1.70	132	67	67	262	41	2
2	230	319.5	0.08	1.70	121	66	67	264	43	2
3	500	320.8	0.07	1.70	131	66	67	257	42	2
4	730	322.6	0.07	1.70	131	66	67	250	41	2
5	1000	324.0	0.07	1.70	131	65	67	242	44	2
3 1	1230	326.0	0.07	1.70	130	64	67	259	44	2
2	1500	328.0	0.07	1.70	130	64	67	250	45	2
3	1730	329.8	0.09	1.95	130	65	66	261	46	2
4	2000	331.5	0.06 06	1.80	130	65	67	273	46	2
5	2230	333.3	0.07	1.70	130	66	67	271	49	2
4 1	2500	335.1	0.07	1.70	131	66	67	270	50	2
2	2730	337.1	0.07	1.70	131	66	68	241	52	2
3	3000	339.2	0.07	1.70	131	68	68	239	53	2
4	3230	340.8	0.07	1.70	131	68	68	241	54	2
5	3500	342.7	0.08	1.70	131	68	68	253	54	2
5 1	3730	344.6	0.06	1.30	131	70	68	253	54	2
2	4000	346.1	0.06	1.30	132	70	69	256	53	2
3	4230	348.0	0.06	1.30	133	70	69	255	53	2
4	4500	349.7	0.06	1.30	133	70	69	256	53	2
5	4730	331.0	0.06	1.30	133	71	69	256	49	2
8 1	5000	352.586	0.06	1.30	128	71	70	253	48	2
2	5230	354.2	0.06	1.30	128	71	70	253	48	2
3	5500	355.7	0.06	1.30	129	71	70	259	48	2
4	5730	357.5	0.05	1.05	130	71	70	252	47	2
5	6000	359.1	0.06	1.05	130	71	70	253	47	2
end	6230	360.664								
		42.929	.2587	1.5140	130.72		69.96			

Leak Checks:
Sample Train: .366 -> .0006 = 0.200 cfm @ 9 " Hg
Pitot Tubes: High ✓ @ ____ " H_2O || Low ✓ @ ____ " H_2O

Pretest: Sample Train ✓
Pitot Tubes ✓

Plant: Bibler Brothers Lumber Co. Russellville, AR
Source: SN 76 No.3 Kiln
Test For: PM · CO · NOx · HCHO
Test Operators: Russell / Walker / Thompson

RUN NO. 2
Date 3-12-09
Time start 1229 end ~~1326~~ 1331

Meter Box	NT3Y: 1.010	No. Sample Pts	5 X 5
Sample Box	No. 2	Minutes/Pt.	2.5
Probe/Pitot			
Pitot Cp	0.84		
Nozzle Dia.	.436		
Filter No.	3295		

K FACTOR SETUP: ΔH@ 1.56; Meter Temp 70; % H_2O 13; Stack Temp. 132; K Factor 24.26

GAS ANALYSIS: Calm

CO_2			
O_2			
CO			
Time			

CONDENSATE: init. 200 final 361
SILICA GEL: init. 713 final 722

Amb. Temp. °F 31
Bar. Press. "Hg 30.18
Static Press. "H_2O -.08

Notes:

Port Point	Elapsed Time Min/sec	DGM Reading Ft^3	Velocity Head ΔP in. H_2O	Orifice ΔH in. H_2O	Stack Temp °F	Meter Temp °F in	Meter Temp °F out	Oven Temp. °F	Imp. Temp °F	VAC in. Hg
2 1	000	360.880	0.06	1.45	132	73	73	246	35	3
2	230	362.7	0.06	1.45	132	72	73	249	39	3
3	500	364.6	0.08	1.95	131	71	73	252	41	3
4	730	366.1	0.12	2.90	130	71	73	255	41	3
5	1000	368.2	0.07	1.70	131	72	73	254	44	3
3 1	1230	371.0	0.06	1.45	130	72	73	257	45	3
2	1500	372.8	0.06	1.45	129	72	73	261	45	3
3	1730	374.7	0.06	1.45	128	72	73	261	46	3
4	2000	376.1	0.08	1.95	131	72	73	255	46	3
5	2230	378.3	0.06	1.45	130	72	73	256	47	3
4 1	2500	379.9	0.07	1.70	133	72	73	245	47	3
2	2730	381.8	0.08	1.95	131	72	73	251	47	3
3	3000	383.9	0.08	1.95	132	72	73	253	47	3
4	3230	386.1	0.06	1.45	132	72	73	251	47	3
5	3500	387.8	0.06	1.45	131	72	73	259	47	3
5 1	3730	389.4	0.08	1.95	132	73	73	256	47	3
2	4000	391.3	0.08	1.95	132	73	73	252	47	3
3	4230	393.3	0.06	1.45	132	73	73	249	48	3
4	4500	395.2	0.06	1.45	132	73	73	255	48	3
5	4730	396.8	0.06	1.45	133	73	73	249	48	3
~~6~~ 1	5000	398.775	0.06	1.45	132	74	74	263	48	3
2	5230	400.3	0.06	1.45	130	74	74	267	48	3
3	5500	402.0	0.06	1.45	130	74	74	264	48	3
4	5730	403.8	0.08	1.95	127	74	74	261	49	3
5	6000	405.7	0.06	1.45	130	74	74	258	49	3
end	62/30	407.678								
		46.798	.2853	1.6480	130.92		72.88			

Leak Checks: Sample Train: .074 - .074 = 0.000 cfm @ 10 " Hg
Pitot Tubes: High ✓ @ ____ "H_2O || Low ✓ @ 3.6 "H_2O
Pretest: Sample Train ✓ Pitot Tubes ✓

Plant: Bibler Brothers Lumber Co. Russellville, AR
Source: SN 76 No.3 Kiln
Test For: PM · CO · NOx · HCHO · VOC
Test Operators: Russell / Dellar / Thompson

RUN NO. 3
Date 3-12-09
Time start 1509 end 1612

Meter Box	NT3 Y=1.010
Sample Box	No.2
Probe/Pitot	1-18·0
Pitot Cp	0.84
Nozzle Dia.	.436
Filter No.	3296

No. Sample Pts.	5 X 5
Minutes/Pt.	2.5

K FACTOR SETUP

ΔH@	1.56
Meter Temp	73
% H_2O	13
Stack Temp	130
K Factor	24.48

GAS ANALYSIS: Cgm

CO_2			
O_2			
CO			
Time			

CONDENSATE: init. 200 final 344
SILICA GEL: init. 722 final 730

Notes: 01-26

	Amb. Temp. °F	Bar. Press. "Hg	Static Press. "H_2O
	31	30.15	-.08

Port Point	Elapsed Time Min/sec	DGM Reading Ft.³	Velocity Head ΔP in. H_2O	Orifice ΔH in. H_2O	Stack Temp °F	Meter Temp °F in	Meter Temp °F out	Oven Temp. °F	Imp. Temp °F	VAC in. Hg
1	2 1 000	408·130	0·17	4·10	124	75	75	255	43	3
2	2 230	410·7	0·08	1·95	127	74	75	256	45	3
3	3 500	413·6	0·08	1·95	128	74	75	254	45	3
4	4 730	415·7	0·10	2·45	128	74	75	254	49	3
5	5 1000	417·7	0·10	2·45	128	74	75	253	49	3
6		·	·	·						
7	31 1230	419·3	0·06	~~2~~·45	129	74	75	250	50	3
8	2 1500	421·9	0·07	1·70	127	74	75	254	53	3
9	3 1730	427·6	0·07	1·70	125	74	75	255	54	3
10	4 2000	426·2	0·07	1·70	125	74	75	255	54	3
11	5 2230	428·3	0·06	1·45	128	74	75	250	55	3
12		·	·	·						
13	1 1 2500	429·8	0·06	1·45	129	74	75	253	55	3
14	2 2730	431·7	0·06	1·45	128	74	75	255	55	3
15	3 3000	433·3	0·06	1·45	129	75	75	258	56	3
16	4 3230	435·0	0·06	1·45	129	75	75	257	56	3
17	5 3500	436·6	0·06	1·45	127	75	75	255	56	3
18		·	·	·						
19	5 1 3730	438·0	0·07	1·70	130	75	75	256	57	3
20	2 4000	440·0	0·07	1·70	130	75	75	260	58	3
21	3 4230	441·8	0·06	1·45	130	75	75	256	58	3
22	4 4500	443·6	0·08	1·95	130	76	75	257	59	3
23	5 4730	445·8	0·09	2·20	131	76	75	260	59	3
24		·	·	·						
25	1 #1 5000	447·719	0·09	2·20	131	76	75	256	60	3
26	2 5230	449·6	0·06	1·45	130	76	75	262	61	3
27	3 5500	450·3	0·06	1·45	130	76	75	255	62	3
28	4 5730	452·1	0·05	1·20	130	76	75	255	62	3
29	5 6000	453·5	0·07	1·70	131	76	75	255	62	2
30	end 6230	454·605	·	·	·					
31		·	·	·						
32		46·475	·2705	1·80660	128.54		74.92			
33		·	·	·						

Leak Checks: Sample Train: _____ > _____ = _____ cfm @ _____ "Hg
Pitot Tubes: High ☑ @ _____ "H_2O || Low ☐ @ _____ "H_2O

Pretest: Sample Train ☑ Pitot Tubes ☐

APPENDIX B

CALIBRATION DATA

DRY GAS METER CALIBRATION

By Critical Orifice

Meter ID	Nutech 3	**Date**	01/05/09
Orifice ID	1312	**By**	Norwood
T, Amb	72	**Pbar**	29.90

Orifice			ΔH	VAC	Time	Meter						Vmstd	Vcrstd	Y	ΔH@
No.	K'	Q' cfm	in. H_2O	in. Hg	min.	Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final				
12	0.3169	0.42	0.46	19	13.00	434.500	439.871	69	70	69	70	5.352	5.415	1.012	1.479
17	0.4391	0.58	0.92	17.5	10.00	439.871	445.633	70	71	70	70	5.734	5.753	1.003	1.548
23	0.6091	0.80	1.85	15	7.00	445.633	451.211	71	71	70	70	5.548	5.554	1.001	1.632
26	0.6905	0.92	2.40	14	6.00	451.211	456.655	71	72	71	71	5.407	5.475	1.013	1.596
31	0.8293	1.10	3.35	12	5.00	456.655	462.042	72	74	71	71	5.343	5.455	1.021	1.555
														1.010	1.56

Calculations:

Vm = [Vf-Vi]

Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]

Vcrstd = K'[(Pbar)(θ)/(T,amb)]

Y = [(Vcrstd/Vmstd)]

Q = [(Vm/θ)(Tm out/Tm)(Y)]

K = [Q(sqrt((Pm Mm)/((Tm out)(ΔH))]

ΔH@ = [$0.921/K^2$]

Where:

Pbar = Barometric pressure; in. Hg

Tm = Average Temp. at meter, ^oR

Pm = Meter pressure, (Pbar +ΔH/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**	04/06/09
Orifice ID	1312	**By**	Rayburn
T, Amb	60	**Pbar**	29.85

Orifice			ΔH	VAC	Time	Meter						Vmstd	Vcrstd	Y	ΔH@
No.	K'	Q' cfm	in. H_2O	in. Hg	min.	Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final				
17	0.4391	0.58	0.89	19	9.00	791.666	796.821	60	62	60	61	5.215	5.288	1.014	1.459
23	0.6091	0.80	1.80	18	8.00	796.821	803.150	62	63	61	61	6.390	6.483	1.015	1.546
26	0.6905	0.92	2.40	15	7.00	803.150	809.507	63	64	61	62	6.409	6.524	1.018	1.555
														1.016	1.52

Calculations:

Vm = [Vf-Vi]

Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]

Vcrstd = K'[(Pbar)(θ)/(T,amb)]

Y = [(Vcrstd/Vmstd)]

Q = [(Vm/θ)(Tm out/Tm)(Y)]

K = [Q(sqrt((Pm Mm)/((Tm out)(ΔH))]

ΔH@ = [$0.921/K^2$]

Where:

Pbar = Barometric pressure; in. Hg

Tm = Average Temp. at meter, ^oR

Pm = Meter pressure, (Pbar +ΔH/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 1	**Date**	01/05/09
Orifice ID	1312	**By**	Norwood
T, Amb	70	**Pbar**	29.93

Orifice			ΔH	VAC	Time	Meter						Vmstd	Vcrstd	Y	Q	K	ΔH@
No.	K'	Q'	in.	in.	min.	Vi	Vf	Temp. in		Temp out							
		cfm	H_2O	Hg		ft^3	ft^3	init.	final	init.	final						
12	0.3169	0.42	0.52	21	13.00	304.200	309.568	70	72	68	69	5.352	5.441	1.017	0.42	0.74	1.660
17	0.4391	0.58	0.98	19	11.00	309.568	315.904	72	72	69	69	6.308	6.358	1.008	0.58	0.75	1.637
23	0.6091	0.80	1.95	16	9.00	315.904	323.022	72	73	69	69	7.083	7.175	1.013	0.80	0.73	1.709
26	0.6905	0.92	2.60	14.5	7.00	323.022	329.330	73	74	69	70	6.269	6.418	1.024	0.92	0.73	1.718
31	0.8293	1.10	3.90	12	5.00	329.330	334.676	74	75	70	70	5.305	5.481	1.033	1.10	0.72	1.795
														1.019			**1.70**

Calculations:

Vm = [Vf-Vi]

Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]

Vcrstd = K'[(Pbar)(θ)/(T,amb)]

Y = [(Vcrstd/Vmstd)]

Q = [(Vm/θ)(Tm out/Tm)(Y)]

K = [Q(sqrt((Pm Mm)/((Tm out)(ΔH))]

ΔH@ = $[0.921/K^2]$

Where:

Pbar = Barometric pressure; in. Hg

Tm = Average Temp. at meter, ^oR

Pm = Meter pressure, (Pbar + ΔH/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 1	**Date**	04/06/09
Orifice ID	1312	**By**	Rayburn
T, Amb	60	**Pbar**	29.85

Orifice			ΔH	VAC	Time	Meter						Vmstd	Vcrstd	Y	ΔH@
No.	K'	Q' cfm	in. H_2O	in. Hg	min.	Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final				
17	0.4391	0.58	1.10	20	9.00	979.303	984.456	64	65	41	62	5.240	5.288	1.009	1.834
23	0.6091	0.80	2.05	16	8.00	984.456	990.799	65	65	62	62	6.383	6.483	1.016	1.756
26	0.6905	0.92	2.65	14	7.00	990.799	997.125	65	66	62	62	6.362	6.524	1.025	1.714
														1.017	**1.77**

Calculations:

Vm = [Vf-Vi]

Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]

Vcrstd = K'[(Pbar)(θ)/(T,amb)]

Y = [(Vcrstd/Vmstd)]

Q = [(Vm/θ)(Tm out/Tm)(Y)]

K = [Q(sqrt((Pm Mm)/((Tm out)(ΔH))]

ΔH@ = [$0.921/K^2$]

Where:

Pbar = Barometric pressure; in. Hg

Tm = Average Temp. at meter, ^oR

Pm = Meter pressure, (Pbar +ΔH/13.6); in. Hg

Mm = molecular weight of air (29)

Y = Meter correction factor; dimensionless

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

DATE	3-11-09

PROJECT: Bibler Brothers Lumber

ANALYST: Norwood SIGNATURE: Geo Norwood

DILUTION SYSTEM

MAKE	Environics
MODEL	4040
NO. OF DIL. DEVICES	4
TYPE OF DIL. DEVICE	MFC

REFERENCE MONITOR

TYPE	Oxygen
MAKE	Servomex
MODEL	1400
SPAN	20.9

HIGH LEVEL SUPPLY GAS CONC.	20.9	20.9	CYLINDER ID	Zero Air
MID LEVEL SUPPLY GAS CONC.	10.4	10.4	CYLINDER ID	CC217422
DILUTION GAS	0.0	0.0	CYLINDER ID	N_2

MFC No.	1								
Target Value	10.5	15.7							

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

1st	10.4	15.6							
2nd	10.4	15.6							
3rd	10.5	15.6							
Average	10.4	15.6							

% Difference = ((target conc. - Avg. conc.)/target conc.)*100 Must be within 2% of avg.

1st inject	1.0	0.6							
2nd inject	1.0	0.6							
3rd inject	0.0	0.6							

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

	Response	% Difference
1st	10.4	0.0
2nd	10.4	0.0
3rd	10.4	0.0
Average	10.4	0.0

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

ANALYZER CALIBRATION RECORD

			Run No	1	2	3
Plant	Biblar Brothers Lumber		Date	3-12-09	3-12-09	3-12-09
Source	Dry Kiln #3 SN-7G		Time Start	1031	1225	1509
Test For	CO/NO_x/VOC		Time End	1135	1331	1612
Operators	Norwood / Russell					

Analyte, units / Analyzer ID / Span / DAQ Channel	Level	Cal. Value	Cyl. Ref.	Diluted Y/N	Pre-Test Cal. Reading	Pre-Test % Cal. Error	Pre-Test Bias Reading	Pre-Test % Bias	Run No. 1 Reading	Run No. 1 % Bias	Run No. 1 % Drift	Run No. 2 Reading	Run No. 2 % Bias	Run No. 2 % Drift	Run No. 3 Reading	Run No. 3 % Bias	Run No. 3 % Drift
CO_2, %	Zero	0.0	N_2		0.1		0.1		0.1			0.1			0.1		
	Low																
	Mid	4.5	1		4.6		4.6		4.6			4.6			4.6		
2	High	9.0	1		9.1		9.0										
O_2, %	Zero	0.0	N_2		0.0		0.1		0.1			0.1			0.1		
	Low																
	Mid	10.5	N_2/Air		10.5		10.5		10.5			10.4			10.4		
3	High	20.9	Air		20.9				20.9			20.9			20.9		
CO, ppm	Zero	0	N_2		0		-1		1			-1			-1		
	Low	35	2		34		34		35			35			35		
150	Mid	75	2		75												
4	High	150	2		151												
NO_x, ppm	Zero	0	N_2		0.2		0.2		0.2			0.2			0.0		
	Low	9.6	2		9.3		8.8		~~9.8~~ 9.6			9.5			9.1		
41	Mid	21	2		19												
~~45~~ 5	High	41	2		40												
C_3H_8, ppmw	Zero	0	Air		0				5			3			2		
	Low	~~100~~ 77	3		103												
375	Mid	150	3		153				154			150			149		
7	High	300	3		297												
	Zero																
	Low																
	Mid																
	High																

Cylinder Ref.	Cylinder No.	Contents	Expiration Date	Notes:
1	CC217422	10.4% O_2, 18.0% CO_2	1-7-12	NOy Converter Efficiency:
2	CC196457	2003 ppm CO, 550 ppm NO	12-20-09	60 ppm NO_2 = 55.3 ppm
3	CC236990	2003 ppm C_3H_8	1-20-12	

Analyst's signature: _____

Method Specifications:

Methods 3A, 6C, 7E, 10	Method 25A
Low < 20% of span (can be zero)	Zero < 0.1 % of span
Mid = 40 to 60% of span	Low = 25 to 35 % of span
High = span	Mid = 45 to 60 % of span
	High = 80 to 90 % of span

Error Specifications:

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

AIR LIQUIDE

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cylinder Number: CC217422

Customer:	Environmental Monitoring Lab	**Shipping Order #:**	32014514
P.O. Number:	EML-2008	**Transfer #:**	32014514
Item Number:		**LOT #:**	LPX246599
Notes:		**Valve:**	CGA590
		Cyl. Pressure:*	1900psig
Assay Date:	7-Jan-09	**Expiration Date: 7-Jan-12**	

*Cylinder should not be used when gas pressure is below 150 psig

Component	Requested Concentration	Assay Concentration
Carbon Dioxide	18 %	18.0 ±0.1 %
Oxygen	10.5 %	10.4 ±0.1 %
Nitrogen	Balance	Balance

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc	Units	Std. Error	Comp.	Balance	Cyl. No	Exp. Date	Sample No
GMIS329	GMIS329	18.58	%	0.1	CO2	N2	AL2058	8/1/2010	N.A.
GMIS413	GMIS413	10.0	%	0.1	O2	N2	CC204761	4/2/2010	N.A.

Analysis Information:

Component 1: Carbon Dioxide

Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FT/R
MPC Calibrated:	12/31/08

	First Triad Analysis On: 1/5/2009			
	Trial 1	Trial 2	Trial 3	Units
Zero	0.31	0.21	0.30	
Reference	19.54	19.47	19.97	
Candidate	18.99	18.92	19.05	
Result	18.03	17.96	18.09	%
Mean Result:			18.03	%

	Second Triad Analysis On:			
	Trial 1	Trial 2	Trial 3	Units
Zero				
Reference				
Candidate				
Result				
Mean Result:				

Component 2: Oxygen

Analyzer Information	
Manufacturer:	Servomex
Model Number:	4605C
Serial Number:	1101
Analytical Principle:	Paramag.
MPC Calibrated:	12/22/08

	First Triad Analysis On: 1/7/2009			
	Trial 1	Trial 2	Trial 3	Units
Zero	0.01	0.01	0.05	
Reference	9.82	9.83	9.87	
Candidate	10.22	10.23	10.25	
Result	10.39	10.40	10.42	%
Mean Result:			10.40	%

	Second Triad Analysis On:			
	Trial 1	Trial 2	Trial 3	Units
Zero				
Reference				
Candidate				
Result				
Mean Result:				

Analyst Signature: Warren Pereira **Calculated by:** Warren Pereira

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

AIR LIQUIDE

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cylinder Number: CC196457

Customer:
P.O. Number:
Item Number:
Notes:

Shipping Order #: PTSAMPLE
Transfer #: PTSAMPLE
LOT #: LPX230993
Valve: CGA660
Cyl. Pressure:* 1900psig

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 21-Dec-07 **Expiration Date: 20-Dec-09**

Component	Requested Concentration	Assay Concentration
Nitric Oxide	**550 ppm**	**550 ±5 ppm**
Carbon Monoxide	**2003 ppm**	**2005 ±10 ppm**
Total NOX		**560 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS336	GMIS336	498.7	ppm	2.2	NO	N2	CC55824	7/26/2008	0
GMIS293	GMIS293	2496.0	ppm	6.0	CO	N2	CC66645	3/14/2009	N.A.

Analysis Information:

Component 1:	Nitric Oxide
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	12/13/07

	First Triad Analysis On:	12/14/2007		
	Trial 1	Trial 2	Trial 3	Units
Zero	-0.08	-0.12	-0.12	
Reference	517.04	517.01	518.93	
Candidate	569.37	571.12	569.88	
Result	548.29	550.84	549.74	ppm
		Mean Result:	549.66	ppm

	Second Triad Analysis On:	12/21/2007		
	Trial 1	Trial 2	Trial 3	Units
Zero	0.19	0.19	0.08	
Reference	515.70	516.38	517.08	
Candidate	568.56	570.48	571.48	
Result	549.10	550.97	551.82	ppm
		Mean Result:	550.88	ppm

Component 2:	Carbon Monoxide
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	11/21/07 & 12/20

	First Triad Analysis On:	12/14/2007		
	Trial 1	Trial 2	Trial 3	Units
Zero	-0.13	0.17	0.14	
Reference	2948.58	2954.25	2949.79	
Candidate	2377.08	2381.29	2374.36	
Result	2002.36	2005.91	2000.08	ppm
		Mean Result:	2002.78	ppm

	Second Triad Analysis On:	12/21/2007		
	Trial 1	Trial 2	Trial 3	Units
Zero	0.02	0.12	0.25	
Reference	2941.08	2954.01	2953.00	
Candidate	2386.82	2377.83	2382.64	
Result	2011.82	2004.07	2008.29	ppm
		Mean Result:	2008.06	ppm

Analyst Signature: Warren Pereira **Calculated by:** Warren Pereira

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

Scott Specialty Gases

AIR LIQUIDE

Certificate of Accuracy

ENVIRONMENTAL MONITORING

PO NO. ALAS-39769

CAS REG. NO.	COMPONENT	CERTIFIED ANALYSIS	
74-98-6	PROPANE	2003.	PPM/
132259-10-0	AIR		BAL

ANALYSIS DATE 20JAN2009
ANALYST DAVID KELLY

PROJECT NO 04-70772
CYLINDER # CC236950
ITEM NO.04023413 RAL

EXPIRATION DATE 20JAN2012
GRADE RATA CLASS

REORDER/SERVICE CONTACT (281)474-5800 PASADENA TX 77507

APPENDIX C

ANALYZERS DATA LOG

	% CO2	% O2	ppm CO	ppm NOx	PPMw C3
03/11/09 15:54	0.3	21.1	10.0	0.4	0.0
03/11/09 15:55	0.2	21.1	7.0	0.3	0.0
03/12/09 6:26	0.1	11.3	22.0	0.3	0.0
03/12/09 6:27	0.1	0.0	20.0	0.2	0.0
03/12/09 6:28	0.1	0.0	19.0	0.2	0.0
03/12/09 6:29	0.1	0.0	16.0	0.2	0.0
03/12/09 6:30	0.1	1.1	15.0	0.1	0.0
03/12/09 6:31	0.1	19.0	12.0	0.0	0.0
03/12/09 6:32	0.1	20.8	25.0	0.0	0.0
03/12/09 6:33	0.1	20.9	19.0	0.0	0.0
03/12/09 6:34	0.1	20.9	38.0	0.0	0.0
03/12/09 6:35	0.1	20.9	5.0	0.0	0.0
03/12/09 6:36	0.1	20.9	-1.0	0.0	0.0
03/12/09 6:37	0.1	20.9	0.0	0.0	0.0
03/12/09 6:38	9.4	16.0	-2.0	0.3	0.0
03/12/09 6:39	17.9	10.5	-2.0	0.0	0.0
03/12/09 6:40	16.1	11.3	-3.0	0.0	0.0
03/12/09 6:41	9.2	15.6	-2.0	0.0	0.0
03/12/09 6:42	9.1	15.7	-2.0	0.0	0.0
03/12/09 6:43	8.5	15.9	0.0	0.5	0.0
03/12/09 6:44	0.9	17.1	35.5	118.2	0.0
03/12/09 6:45	0.1	16.7	40.8	113.2	0.0
03/12/09 9:51	1.2	19.6	9.0	2.3	112.0
03/12/09 9:52	0.3	20.7	1.0	0.5	109.0
03/12/09 9:53	4.4	18.6	0.0	0.7	106.0
03/12/09 9:54	4.7	18.3	0.0	0.0	104.0
03/12/09 9:55	4.1	18.5	0.0	0.3	101.0
03/12/09 9:56	0.4	20.2	53.0	12.8	101.0
03/12/09 9:57	0.1	20.1	72.0	18.1	101.0
03/12/09 9:58	0.1	20.2	72.0	19.1	102.0
03/12/09 9:59	0.1	20.2	74.0	19.4	100.0
03/12/09 10:00	0.1	20.2	73.0	19.1	100.0
03/12/09 10:01	0.1	20.5	40.0	10.6	101.0
03/12/09 10:02	0.1	20.6	34.0	9.0	100.0
03/12/09 10:03	0.1	20.6	22.0	4.6	100.0
03/12/09 10:04	1.2	20.0	10.0	3.6	108.0
03/12/09 10:05	0.9	19.8	22.0	8.8	145.0
03/12/09 10:06	0.1	20.9	-3.0	0.5	154.0
03/12/09 10:07	0.1	20.9	-4.0	0.3	153.0
03/12/09 10:08	0.1	20.9	-4.0	0.2	109.0
03/12/09 10:09	0.1	20.8	-4.0	0.2	104.0
03/12/09 10:10	0.6	20.4	2.0	2.3	77.0
03/12/09 10:11	3.4	18.8	1.0	0.9	8.0
03/12/09 10:12	4.6	18.2	-5.0	0.2	20.0
03/12/09 10:13	2.6	19.0	2.0	1.7	27.0
03/12/09 10:14	0.2	20.5	21.0	6.2	5.0
03/12/09 10:15	0.1	20.5	33.0	8.2	5.0
03/12/09 10:16	0.1	20.5	33.0	8.3	17.0
03/12/09 10:17	1.2	19.7	20.0	5.4	105.0
03/12/09 10:18	1.8	19.1	14.0	4.6	109.0
03/12/09 10:19	1.8	19.0	14.0	4.8	102.0
03/12/09 10:20	1.8	19.0	14.0	4.7	108.0
03/12/09 10:21	1.9	18.9	15.0	5.0	109.0
03/12/09 10:22	2.0	18.9	15.0	5.0	110.0
03/12/09 10:23	1.9	19.0	15.0	4.8	105.0
03/12/09 10:24	1.9	19.0	15.0	4.7	105.0
03/12/09 10:25	1.9	19.0	15.0	4.7	108.0
03/12/09 10:26	1.9	19.0	15.0	4.6	106.0
03/12/09 10:27	1.8	19.1	14.0	4.4	105.0
03/12/09 10:28	1.8	19.1	13.0	4.2	101.0
03/12/09 10:29	1.8	19.1	14.0	4.3	106.0
03/12/09 10:30	1.8	19.1	15.0	4.5	107.0

START RUN 1	% CO2	% O2	ppm CO	ppm NOx	PPMw C3
03/12/09 10:31	1.9	19.0	15.0	4.6	110.0
03/12/09 10:32	1.9	19.0	14.0	4.5	109.0
03/12/09 10:33	1.9	19.0	15.0	4.5	109.0
03/12/09 10:34	1.9	19.0	15.0	4.3	106.0
03/12/09 10:35	1.8	19.1	14.0	4.3	105.0
03/12/09 10:36	1.8	19.1	14.0	4.3	108.0
03/12/09 10:37	1.9	19.0	15.0	4.4	109.0
03/12/09 10:38	1.8	19.0	14.0	4.3	109.0
03/12/09 10:39	1.8	19.1	14.0	4.3	109.0
03/12/09 10:40	1.8	19.1	13.0	4.3	108.0
03/12/09 10:41	1.8	19.1	14.0	4.3	108.0
03/12/09 10:42	1.8	19.1	12.0	4.3	105.0
03/12/09 10:43	1.8	19.1	12.0	4.4	106.0
03/12/09 10:44	1.8	19.1	13.0	4.5	108.0
03/12/09 10:45	1.9	19.0	12.0	4.7	112.0
03/12/09 10:46	1.9	18.9	12.0	4.8	100.0
03/12/09 10:47	1.9	19.0	14.0	4.9	99.0
03/12/09 10:48	1.9	19.0	3.0	4.8	102.0
03/12/09 10:49	1.9	19.0	9.0	4.9	106.0
03/12/09 10:50	1.9	18.9	1.0	4.9	100.0
03/12/09 10:51	2.0	18.9	10.0	5.2	97.0
03/12/09 10:52	2.0	18.8	13.0	5.1	111.0
03/12/09 10:53	2.0	18.8	11.0	4.9	113.0
03/12/09 10:54	2.1	18.8	13.0	5.1	113.0
03/12/09 10:55	2.1	18.7	19.0	4.8	112.0
03/12/09 10:56	2.0	18.8	9.0	4.2	114.0

03/12/09 10:57	2.0	18.8	10.0	4.1	115.0
03/12/09 10:58	2.1	18.7	13.0	4.0	110.0
03/12/09 10:59	2.1	18.7	11.0	3.8	115.0
03/12/09 11:00	2.1	18.7	19.0	3.2	115.0
03/12/09 11:01	2.1	18.7	14.0	2.7	113.0
03/12/09 11:02	2.1	18.7	22.0	2.5	114.0
03/12/09 11:03	2.1	18.7	25.0	2.0	111.0
03/12/09 11:04	2.1	18.7	21.0	1.8	112.0
03/12/09 11:05	2.1	18.8	22.0	1.6	111.0
03/12/09 11:06	2.1	18.7	19.0	1.2	110.0
03/12/09 11:07	2.1	18.8	26.0	1.2	110.0
03/12/09 11:08	2.0	18.8	22.0	0.9	109.0
03/12/09 11:09	2.0	18.8	20.0	0.5	109.0
03/12/09 11:10	2.0	18.8	20.0	0.4	111.0
03/12/09 11:11	2.0	18.8	20.0	0.4	109.0
03/12/09 11:12	2.0	18.8	20.0	0.2	111.0
03/12/09 11:13	2.1	18.7	13.0	0.0	112.0
03/12/09 11:14	2.2	18.6	20.0	0.0	116.0
03/12/09 11:15	2.2	18.6	21.0	0.0	119.0
03/12/09 11:16	2.1	18.7	22.0	0.0	117.0
03/12/09 11:17	2.0	18.8	21.0	0.0	112.0
03/12/09 11:18	1.9	18.9	20.0	0.0	113.0
03/12/09 11:19	2.0	18.9	12.0	2.7	107.0
03/12/09 11:20	2.1	18.7	12.0	5.0	105.0
03/12/09 11:21	2.2	18.8	35.0	5.1	101.0
03/12/09 11:22	2.2	19.1	14.0	5.2	96.0
03/12/09 11:23	2.1	19.3	21.0	5.1	105.0
03/12/09 11:24	2.0	19.3	20.0	4.7	102.0
03/12/09 11:25	1.9	19.3	19.0	4.6	100.0
03/12/09 11:26	1.9	19.2	19.0	4.6	101.0
03/12/09 11:27	1.9	19.0	19.0	4.4	97.0
03/12/09 11:28	1.9	19.0	19.0	4.5	98.0
03/12/09 11:29	1.9	19.0	19.0	4.6	98.0
03/12/09 11:30	1.9	19.0	18.0	4.4	95.0
AVG R 1	2.0	18.9	16.1	3.4	107.8
03/12/09 11:31	1.9	19.0	19.0	4.4	95.0
03/12/09 11:32	1.8	19.3	19.0	4.4	94.0
03/12/09 11:33	1.9	19.1	19.0	4.5	94.0
03/12/09 11:34	1.9	19.0	19.0	4.5	97.0
03/12/09 11:35	1.9	18.9	24.0	4.7	65.0
03/12/09 11:36	0.4	4.6	12.0	1.6	13.0
03/12/09 11:37	0.1	0.1	1.0	0.4	9.0
03/12/09 11:38	0.1	0.1	1.0	0.3	8.0
03/12/09 11:39	0.1	0.1	1.0	0.2	7.0
03/12/09 11:40	0.1	0.1	1.0	0.2	6.0
03/12/09 11:41	0.1	0.1	1.0	0.2	6.0
03/12/09 11:42	0.1	0.1	1.0	0.2	5.0
03/12/09 11:43	0.1	0.1	1.0	0.2	5.0
03/12/09 11:44	0.1	0.1	1.0	0.2	4.0
03/12/09 11:45	0.1	0.1	1.0	0.2	4.0
03/12/09 11:46	0.1	0.1	1.0	0.2	5.0
03/12/09 11:47	0.1	8.9	2.0	0.2	6.0
03/12/09 11:48	0.1	20.6	2.0	0.0	8.0
03/12/09 11:49	1.1	19.9	13.0	3.2	102.0
03/12/09 11:50	1.6	17.3	16.0	3.3	31.0
03/12/09 11:51	0.1	10.5	1.0	0.3	6.0
03/12/09 11:52	0.3	11.0	5.0	1.5	61.0
03/12/09 11:53	2.1	18.2	24.0	5.2	101.0
03/12/09 11:54	2.6	18.0	11.0	2.4	16.0
03/12/09 11:55	0.5	20.5	1.0	0.3	9.0
03/12/09 11:56	2.0	20.0	1.0	0.2	7.0
03/12/09 11:57	4.6	18.3	0.0	0.2	6.0
03/12/09 11:58	4.4	18.3	27.0	1.2	52.0
03/12/09 11:59	2.1	19.0	172.0	4.0	81.0
03/12/09 12:00	1.1	19.9	60.0	2.5	12.0
03/12/09 12:01	0.2	20.5	35.0	4.4	8.0
03/12/09 12:02	0.1	20.6	42.0	8.2	7.0
03/12/09 12:03	0.1	20.2	77.0	16.7	7.0
03/12/09 12:04	0.1	20.1	78.0	19.7	6.0
03/12/09 12:05	0.1	20.1	77.0	20.6	6.0
03/12/09 12:06	0.1	20.1	66.0	17.4	6.0
03/12/09 12:07	0.1	20.5	38.0	10.0	5.0
03/12/09 12:08	0.1	20.4	35.0	9.6	5.0
03/12/09 12:09	0.1	20.5	35.0	9.6	15.0
03/12/09 12:10	1.3	19.6	42.0	7.3	103.0
03/12/09 12:11	1.3	19.4	40.0	11.2	154.0
03/12/09 12:12	0.2	20.8	6.0	1.3	108.0
03/12/09 12:13	1.9	19.1	31.0	5.5	110.0
03/12/09 12:14	2.3	18.7	34.0	6.1	110.0
03/12/09 12:15	2.3	18.6	31.0	6.1	112.0
03/12/09 12:16	2.3	18.6	30.0	6.2	114.0
03/12/09 12:17	2.4	18.5	30.0	6.4	116.0
03/12/09 12:18	2.4	18.6	28.0	6.3	115.0
03/12/09 12:19	2.3	18.7	26.0	6.1	116.0
03/12/09 12:20	2.3	18.7	25.0	6.1	116.0
03/12/09 12:21	2.3	18.7	24.0	6.1	120.0
03/12/09 12:22	2.3	18.6	24.0	6.3	124.0
03/12/09 12:23	2.4	18.6	24.0	6.5	123.0
03/12/09 12:24	2.4	18.6	23.0	6.4	124.0
03/12/09 12:25	2.3	18.6	23.0	6.2	120.0

03/12/09 12:26	2.3	18.7	22.0	6.2	108.0
03/12/09 12:27	2.2	18.7	22.0	6.0	111.0
03/12/09 12:28	2.2	18.8	22.0	5.9	115.0
START RUN	% CO2	% O2	ppm CO	ppm NOx	PPMw C3
03/12/09 12:29	2.2	18.8	22.0	5.7	111.0
03/12/09 12:30	2.1	18.8	21.0	5.4	110.0
03/12/09 12:31	2.1	18.8	21.0	5.1	106.0
03/12/09 12:32	2.1	18.9	21.0	5.0	91.0
03/12/09 12:33	2.1	18.9	20.0	4.9	101.0
03/12/09 12:34	2.0	18.9	21.0	4.7	102.0
03/12/09 12:35	2.0	18.9	20.0	4.5	100.0
03/12/09 12:36	2.0	19.0	20.0	4.5	101.0
03/12/09 12:37	2.0	19.0	20.0	4.4	101.0
03/12/09 12:38	2.1	18.9	20.0	4.6	103.0
03/12/09 12:39	2.1	18.9	20.0	4.9	106.0
03/12/09 12:40	2.1	18.9	20.0	4.9	105.0
03/12/09 12:41	2.1	18.9	20.0	4.8	104.0
03/12/09 12:42	2.1	18.9	19.0	4.9	106.0
03/12/09 12:43	2.1	18.8	20.0	5.1	109.0
03/12/09 12:44	2.2	18.7	21.0	5.3	110.0
03/12/09 12:45	2.3	18.6	22.0	5.6	116.0
03/12/09 12:46	2.4	18.6	22.0	5.9	117.0
03/12/09 12:47	2.4	18.5	22.0	6.0	117.0
03/12/09 12:48	2.4	18.6	21.0	6.0	112.0
03/12/09 12:49	2.3	18.6	22.0	5.9	119.0
03/12/09 12:50	2.3	18.6	21.0	5.8	116.0
03/12/09 12:51	2.3	18.7	20.0	5.7	111.0
03/12/09 12:52	2.2	18.7	20.0	5.6	113.0
03/12/09 12:53	2.2	18.8	19.0	5.5	107.0
03/12/09 12:54	2.2	18.8	19.0	5.7	112.0
03/12/09 12:55	2.2	18.8	18.0	5.7	104.0
03/12/09 12:56	2.1	18.9	18.0	5.6	104.0
03/12/09 12:57	2.1	18.9	18.0	5.6	104.0
03/12/09 12:58	2.1	18.9	18.0	5.6	107.0
03/12/09 12:59	2.1	18.9	18.0	5.6	106.0
03/12/09 13:00	2.1	18.9	18.0	5.7	107.0
03/12/09 13:01	2.2	18.8	19.0	5.9	112.0
03/12/09 13:02	2.2	18.7	19.0	6.0	112.0
03/12/09 13:03	2.2	18.8	18.0	6.0	109.0
03/12/09 13:04	2.2	18.8	18.0	5.9	110.0
03/12/09 13:05	2.2	18.8	18.0	5.8	106.0
03/12/09 13:06	2.2	18.7	18.0	6.1	109.0
03/12/09 13:07	2.3	18.7	19.0	5.9	110.0
03/12/09 13:08	2.3	18.6	19.0	6.0	116.0
03/12/09 13:09	2.4	18.5	20.0	5.9	120.0
03/12/09 13:10	2.5	18.5	21.0	5.8	119.0
03/12/09 13:11	2.5	18.5	20.0	5.6	124.0
03/12/09 13:12	2.4	18.5	20.0	5.5	115.0
03/12/09 13:13	2.2	18.7	18.0	4.9	107.0
03/12/09 13:14	2.1	18.8	17.0	4.3	99.0
03/12/09 13:15	2.1	18.9	17.0	3.8	103.0
03/12/09 13:16	2.1	18.9	17.0	3.5	101.0
03/12/09 13:17	2.1	18.9	17.0	3.4	100.0
03/12/09 13:18	2.0	18.9	17.0	2.7	101.0
03/12/09 13:19	2.1	18.9	17.0	2.7	104.0
03/12/09 13:20	2.1	18.9	17.0	3.4	100.0
03/12/09 13:21	2.1	18.9	18.0	3.3	104.0
03/12/09 13:22	2.2	18.8	18.0	2.8	106.0
03/12/09 13:23	2.1	18.8	18.0	2.3	98.0
03/12/09 13:24	2.1	18.9	18.0	2.0	99.0
03/12/09 13:25	2.1	18.9	19.0	1.5	96.0
03/12/09 13:26	2.0	18.9	18.0	1.6	93.0
03/12/09 13:27	2.0	19.0	17.0	1.3	92.0
03/12/09 13:28	1.9	19.1	17.0	1.0	92.0
AVG R 2	2.2	18.8	19.2	4.8	106.6
03/12/09 13:29	1.9	19.1	17.0	0.8	87.0
03/12/09 13:30	1.7	19.2	14.0	0.6	59.0
03/12/09 13:31	1.2	19.8	10.0	2.4	66.0
03/12/09 13:32	1.4	19.6	11.0	3.6	62.0
03/12/09 13:33	1.3	19.7	10.0	3.4	59.0
03/12/09 13:34	1.2	19.1	12.0	3.3	49.0
03/12/09 13:35	0.2	7.6	0.0	0.5	6.0
03/12/09 13:36	0.1	6.3	-1.0	0.2	4.0
03/12/09 13:37	0.1	6.2	-1.0	0.2	3.0
03/12/09 13:38	0.1	5.8	-1.0	0.2	2.0
03/12/09 13:39	0.1	6.0	-1.0	0.2	2.0
03/12/09 13:40	0.1	5.3	-1.0	0.2	2.0
03/12/09 13:41	0.1	5.3	-1.0	0.2	1.0
03/12/09 13:42	0.1	5.3	-1.0	0.0	1.0
03/12/09 13:43	0.1	5.3	-1.0	0.0	1.0
03/12/09 13:44	0.1	5.3	-1.0	0.1	1.0
03/12/09 13:45	0.1	2.8	-1.0	0.2	1.0
03/12/09 13:46	0.1	3.6	-1.0	0.1	1.0
03/12/09 13:47	0.1	0.0	-1.0	0.0	1.0
03/12/09 13:48	0.1	1.7	-1.0	0.0	1.0
03/12/09 13:49	0.1	2.8	-1.0	0.0	1.0
03/12/09 13:50	0.1	2.8	-1.0	0.0	4.0
03/12/09 13:51	0.1	2.8	-1.0	0.0	4.0
03/12/09 13:52	0.1	1.6	-1.0	0.0	4.0
03/12/09 13:53	0.1	5.0	1.0	0.1	9.0
03/12/09 13:54	0.2	5.0	6.0	0.3	11.0

START RUN	% CO2	% O2	ppm CO	ppm NOx	PPMw C3
03/12/09 13:55	0.1	5.0	-1.0	0.0	12.0
03/12/09 13:56	0.2	19.5	-2.0	0.0	14.0
03/12/09 13:57	0.2	3.1	-3.0	0.0	11.0
03/12/09 13:58	0.3	3.1	-1.0	0.0	11.0
03/12/09 13:59	1.3	3.1	155.0	1.3	29.0
03/12/09 14:00	0.1	3.1	10.0	0.1	3.0
03/12/09 14:01	0.1	2.0	-1.0	0.0	1.0
03/12/09 14:02	0.1	0.1	0.0	0.0	0.0
03/12/09 14:03	0.1	0.1	0.0	0.0	0.0
03/12/09 14:04	0.1	0.1	1.0	0.0	0.0
03/12/09 14:05	0.1	2.0	8.0	0.0	2.0
03/12/09 14:06	0.1	10.2	1.0	0.0	0.0
03/12/09 14:07	0.1	10.4	0.0	0.0	0.0
03/12/09 14:08	0.1	10.4	0.0	0.0	0.0
03/12/09 14:09	0.1	10.4	0.0	0.0	0.0
03/12/09 14:10	0.1	10.4	9.0	0.1	27.0
03/12/09 14:11	1.9	16.3	95.0	0.5	8.0
03/12/09 14:12	4.6	18.2	0.0	0.0	1.0
03/12/09 14:13	4.0	18.5	70.0	0.5	75.0
03/12/09 14:14	0.9	20.2	199.0	1.1	36.0
03/12/09 14:15	0.2	20.6	29.0	4.2	4.0
03/12/09 14:16	0.1	20.5	34.0	8.4	3.0
03/12/09 14:17	0.1	20.5	35.0	8.5	2.0
03/12/09 14:18	0.1	20.5	35.0	9.4	2.0
03/12/09 14:19	0.2	20.5	54.0	10.3	69.0
03/12/09 14:20	0.2	20.6	37.0	6.3	150.0
03/12/09 14:21	0.3	20.7	102.0	0.9	98.0
03/12/09 14:22	0.6	20.3	219.0	1.2	112.0
03/12/09 14:23	0.6	20.4	222.0	1.1	113.0
03/12/09 14:24	0.6	20.4	261.0	1.2	108.0
03/12/09 14:25	0.5	20.4	373.0	1.3	114.0
03/12/09 14:26	0.5	20.4	513.0	1.1	125.0
03/12/09 14:27	0.5	20.4	626.0	1.0	130.0
03/12/09 14:28	0.5	20.5	673.0	1.2	124.0
03/12/09 14:29	0.5	20.5	715.0	1.0	131.0
03/12/09 14:30	0.5	20.5	740.0	1.0	128.0
03/12/09 14:31	0.5	20.5	689.0	1.0	122.0
03/12/09 14:32	0.5	20.5	607.0	1.0	118.0
03/12/09 14:33	0.5	20.5	549.0	1.0	115.0
03/12/09 14:34	0.5	20.4	510.0	1.0	113.0
03/12/09 14:35	0.5	20.4	496.0	1.0	107.0
03/12/09 14:36	0.5	20.4	541.0	1.0	116.0
03/12/09 14:37	0.5	20.4	659.0	1.0	131.0
03/12/09 14:38	0.5	20.4	830.0	1.1	162.0
03/12/09 14:39	0.5	20.4	967.0	1.0	191.0
03/12/09 14:40	0.5	20.5	999.0	1.1	214.0
03/12/09 14:41	0.4	20.5	999.0	1.1	228.0
03/12/09 14:42	0.4	20.5	999.0	1.2	244.0
03/12/09 14:43	0.4	20.5	999.0	1.2	242.0
03/12/09 14:44	0.4	20.5	999.0	1.2	232.0
03/12/09 14:45	0.4	20.5	999.0	1.1	226.0
03/12/09 14:46	0.4	20.5	999.0	1.2	215.0
03/12/09 14:47	0.4	20.5	969.0	1.0	200.0
03/12/09 14:48	0.4	20.5	922.0	1.1	196.0
03/12/09 14:49	0.4	20.5	872.0	1.0	183.0
03/12/09 14:50	0.4	20.5	810.0	1.2	162.0
03/12/09 14:51	0.4	20.5	760.0	1.1	157.0
03/12/09 14:52	0.4	20.5	668.0	1.0	148.0
03/12/09 14:53	0.4	20.5	557.0	1.2	134.0
03/12/09 14:54	0.4	20.5	477.0	1.1	129.0
03/12/09 14:55	0.5	20.4	455.0	1.3	124.0
03/12/09 14:56	0.7	20.2	395.0	2.0	113.0
03/12/09 14:57	1.1	19.9	324.0	3.0	104.0
03/12/09 14:58	1.3	19.6	254.0	3.8	98.0
03/12/09 14:59	1.5	19.4	199.0	4.4	95.0
03/12/09 15:00	1.7	19.2	156.0	4.8	87.0
03/12/09 15:01	1.8	19.1	122.0	5.2	87.0
03/12/09 15:02	1.9	19.0	96.0	5.3	83.0
03/12/09 15:03	2.0	18.9	78.0	5.8	81.0
03/12/09 15:04	2.1	18.8	64.0	6.3	79.0
03/12/09 15:05	2.1	18.8	53.0	6.1	80.0
03/12/09 15:06	2.1	18.8	45.0	6.2	79.0
03/12/09 15:07	2.1	18.7	39.0	6.1	81.0
03/12/09 15:08	2.1	18.7	34.0	6.1	79.0
03/12/09 15:09	2.1	18.8	30.0	5.8	80.0
03/12/09 15:10	2.1	18.7	27.0	5.6	79.0
03/12/09 15:11	2.1	18.7	25.0	5.4	77.0
03/12/09 15:12	2.1	18.7	24.0	5.1	76.0
03/12/09 15:13	2.0	18.9	21.0	4.6	72.0
03/12/09 15:14	2.1	18.8	21.0	4.6	71.0
03/12/09 15:15	2.1	18.8	20.0	4.6	71.0
03/12/09 15:16	2.0	18.9	19.0	4.3	67.0
03/12/09 15:17	2.0	18.9	19.0	4.3	67.0
03/12/09 15:18	2.0	18.9	18.0	4.9	68.0
03/12/09 15:19	2.1	18.8	18.0	5.1	68.0
03/12/09 15:20	2.2	18.7	19.0	5.1	69.0
03/12/09 15:21	2.2	18.7	19.0	5.1	69.0
03/12/09 15:22	2.2	18.7	19.0	5.1	69.0
03/12/09 15:23	2.2	18.6	19.0	4.9	70.0
03/12/09 15:24	2.2	18.7	20.0	4.7	67.0

03/12/09 15:25	2.2	18.6	20.0	4.7	69.0
03/12/09 15:26	2.2	18.6	20.0	4.5	66.0
03/12/09 15:27	2.2	18.7	20.0	4.3	67.0
03/12/09 15:28	2.2	18.6	22.0	4.2	68.0
03/12/09 15:29	2.2	18.6	22.0	4.0	68.0
03/12/09 15:30	2.3	18.6	22.0	4.0	66.0
03/12/09 15:31	2.3	18.7	22.0	4.0	67.0
03/12/09 15:32	2.3	18.8	22.0	3.8	69.0
03/12/09 15:33	2.3	18.7	21.0	3.8	71.0
03/12/09 15:34	2.3	18.6	21.0	3.8	67.0
03/12/09 15:35	2.3	18.6	20.0	3.7	69.0
03/12/09 15:36	2.3	18.7	20.0	3.7	69.0
03/12/09 15:37	2.3	18.6	20.0	3.7	71.0
03/12/09 15:38	2.3	18.5	20.0	3.5	70.0
03/12/09 15:39	2.3	18.6	20.0	3.3	71.0
03/12/09 15:40	2.3	18.6	20.0	3.1	71.0
03/12/09 15:41	2.4	18.5	20.0	3.0	72.0
03/12/09 15:42	2.4	18.5	20.0	2.8	73.0
03/12/09 15:43	2.3	18.6	20.0	2.6	72.0
03/12/09 15:44	2.4	18.5	20.0	2.6	75.0
03/12/09 15:45	2.4	18.5	19.0	6.2	74.0
03/12/09 15:46	2.4	18.5	19.0	7.1	73.0
03/12/09 15:47	2.4	18.5	18.0	7.0	73.0
03/12/09 15:48	2.4	18.5	19.0	7.0	74.0
03/12/09 15:49	2.4	18.5	19.0	7.2	74.0
03/12/09 15:50	2.4	18.5	19.0	7.2	75.0
03/12/09 15:51	2.4	18.5	19.0	7.2	75.0
03/12/09 15:52	2.4	18.5	18.0	7.2	75.0
03/12/09 15:53	2.4	18.5	18.0	7.3	74.0
03/12/09 15:54	2.4	18.5	18.0	7.2	73.0
03/12/09 15:55	2.3	18.6	18.0	7.1	73.0
03/12/09 15:56	2.3	18.6	18.0	7.2	75.0
03/12/09 15:57	2.4	18.5	18.0	7.2	76.0
03/12/09 15:58	2.4	18.5	19.0	7.2	76.0
03/12/09 15:59	2.4	18.5	19.0	7.2	75.0
03/12/09 16:00	2.4	18.5	19.0	7.2	77.0
03/12/09 16:01	2.4	18.5	19.0	7.2	76.0
03/12/09 16:02	2.4	18.5	20.0	7.2	78.0
03/12/09 16:03	2.5	18.4	20.0	7.2	79.0
03/12/09 16:04	2.5	18.4	20.0	7.1	77.0
03/12/09 16:05	2.5	18.4	20.0	7.2	80.0
03/12/09 16:06	2.5	18.4	20.0	7.2	80.0
03/12/09 16:07	2.5	18.4	20.0	7.2	81.0
03/12/09 16:08	2.5	18.4	20.0	7.2	80.0
AVG R 3	2.3	18.6	20.1	5.4	72.6
03/12/09 16:09	2.5	18.4	20.0	7.3	79.0
03/12/09 16:10	2.5	18.4	20.0	7.2	81.0
03/12/09 16:11	2.5	18.4	21.0	7.2	80.0
03/12/09 16:12	0.9	8.4	10.0	2.3	9.0
03/12/09 16:13	0.1	0.1	1.0	0.4	5.0
03/12/09 16:14	0.1	0.1	1.0	0.2	4.0
03/12/09 16:15	0.1	0.1	0.0	0.2	7.0
03/12/09 16:16	0.1	11.9	1.0	0.3	3.0
03/12/09 16:17	0.1	18.6	1.0	0.2	3.0
03/12/09 16:18	0.1	18.7	1.0	0.2	2.0
03/12/09 16:19	0.1	18.7	1.0	0.2	2.0
03/12/09 16:20	0.1	18.7	1.0	0.1	2.0
03/12/09 16:21	0.1	18.5	0.0	0.0	1.0
03/12/09 16:22	0.1	11.6	1.0	0.0	1.0
03/12/09 16:23	0.1	10.4	1.0	0.0	1.0
03/12/09 16:24	0.3	14.5	1.0	0.1	2.0
03/12/09 16:25	4.1	17.9	1.0	0.1	1.0
03/12/09 16:26	4.6	18.0	1.0	0.0	1.0
03/12/09 16:27	4.6	18.1	0.0	0.0	1.0
03/12/09 16:28	4.6	18.1	1.0	0.1	1.0
03/12/09 16:29	2.7	19.2	1.0	0.2	1.0
03/12/09 16:30	0.2	20.8	1.0	0.2	1.0
03/12/09 16:31	0.1	20.9	1.0	0.2	1.0
03/12/09 16:32	0.1	20.9	2.0	0.0	1.0
03/12/09 16:33	0.1	20.9	1.0	0.0	1.0
03/12/09 16:34	0.1	20.9	1.0	0.2	2.0
03/12/09 16:35	0.1	20.9	1.0	0.2	2.0
03/12/09 16:36	0.1	20.8	1.0	0.2	2.0
03/12/09 16:37	0.1	20.8	1.0	0.2	2.0
03/12/09 16:38	0.2	20.6	16.0	2.0	2.0
03/12/09 16:39	0.1	20.7	7.0	0.9	2.0
03/12/09 16:40	0.1	20.8	3.0	0.3	2.0
03/12/09 16:41	0.1	20.5	27.0	7.8	2.0
03/12/09 16:42	0.1	20.5	35.0	9.4	2.0
03/12/09 16:43	0.1	20.7	36.0	9.1	2.0
03/12/09 16:44	0.1	20.4	34.0	9.2	5.0
03/12/09 16:45	0.1	20.6	23.0	3.4	142.0
03/12/09 16:46	0.1	20.9	2.0	0.5	149.0
03/12/09 16:47	0.1	21.0	2.0	0.3	114.0
03/12/09 16:48	0.1	20.8	0.0	0.1	2.0
03/12/09 16:49	0.1	20.7	0.0	0.0	0.0
03/12/09 16:50	0.1	20.7	-1.0	0.0	0.0
03/12/09 16:51	0.2	20.8	0.0	0.0	0.0
03/12/09 16:52	0.2	21.0	1.0	0.0	-1.0
03/12/09 16:53	0.2	20.9	1.0	0.0	-1.0

APPENDIX D

OPERATING RECORDS

(BIBLER BROS.)

BIBLER BROS. LUMBER COMPANY

MANUFACTURERS OF QUALITY LUMBER PRODUCTS

2401 South Arkansas
P.O. Box 490
Russellville, AR 72811-0490
Telephone: (479) 968-4986
Fax: (479) 968-5281

Sales Dept. (479) 968-4990
Sales Fax (479) 967-8139
Timber Dept. (479) 968-1825
Timber Fax (479) 968-1732

March 12, 2009

To Whom It May Concern:

In an attempt to determine how many pounds of sawdust that our USNR Burner for the dry kiln was burning, I took five samples. These samples were taken from the sawdust auger that feeds the leveling screws going into the burner. I disconnected the flow of sawdust and put it in five separate containers at 15-second intervals.

I then took an average weight of the five samples and determined that when the auger was running, it was delivering 249.1 pounds per minute.

My method for calculating was as follows: I put 15 seconds of sawdust in each container. I then weighed it, deducted the weight of the container, and multiplied that weight by 4 to determine the pounds per minute for a feed rate on the auger.

Please feel free to contact me if you have any questions about my method.

Sincerely,

Kevin R. Freeman

Kevin R. Freeman
Vice-President

3/12/2009

Bibler Bros. Lumber Co.

Stack Testing Kiln #3

	Sawdust used (lbs)	lumber throughput (bdft)
Stack test #1	5650	9384
Stack test #2	5297	9384
Stack test #3	5385	9384

APPENDIX E

FORMALDEHYDE ANALYSIS

(ENTHALPY)

This Appendix contains the first 13 pages of a 58 page report prepared by Enthalpy Analytical. The remaining pages are copies of spectra. The entire report can be provided upon request

Environmental Monitoring Labs

624 Ridgewood Rd.
Ridgeland, MS 39158

Bibler Brothers Lumber Co.
Dry Kiln #3 SN-7G
Russellville, AR

Project # BBL

Analytical Report
(0309-53F)

EPA Method 316

Formaldehyde

Enthalpy Analytical, Inc.

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road Durham, NC 27703 - 5518

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all dev iations and analytical problems are summarized in the appropriate narrative(s)
- This analytical report was prepared in Portable Document Format (.PDF) and contains 48 pages.

Michael Steven Schapira

QA Review Performed by: Michael Steven Schapira

Summary of Results

Company	EML
Analyst	EO
Parameters	EPA Method 316
# Samples	3 Runs & 1 blank

Client #	BBL
Job #	0309-53
PO #	Verbal
Report Date	3/26/2009

Compound	Sample ID / Catch Weight (µg)		
	R1 M316	***R2 M316***	***R3 M316***
Formaldehyde	2,426	2,522	2,633
	Blank		
Formaldehyde	0.400 ND		

Results

Company	EML
Analyst	EO
Parameters	EPA Method 316
# Samples	3 Runs & 1 blank

Client #	BBL
Job #	0309-53
PO #	Verbal
Report Date	3/26/2009

MDL 0.0100 (µg/mL)
LOQ 0.202 (µg/mL)
Compound Formaldehyde

Lower Curve Limit 0.202 (µg/mL)
Upper Curve Limit 2.00 (µg/mL)

Sample ID	Lab ID	Absorbance	Analytical Concentration (µg/mL)	Dilution	Volume (mL)	Catch Weight (µg)	Qual
R1 M316	7	0.7251	1.4481	5	335	2,426	
R2 M316	8	0.6700	1.3381	5	377	2,522	
R3 M316	9	0.7756	1.5489	5	340	2,633	
Blank	10	0.0000	0.0100	1	40.0	0.400	ND
Method Blank	10	0.0000	0.0100	1	1	0.0100	ND
Method Blank	3	0.0000	0.0100	1	1	0.0100	ND
Method Blank	3	0.0037	0.0100	1	1	0.0100	ND
Method Blank	3	0.0009	0.0100	1	1	0.0100	ND
MS/R1 M316	6	1.2957	2.5589	1	2.50	6.40	
					spike amount (ug)	2.50	
					native amount (ug)	3.58	
					Spike recovery	113%	
second source 1	8	0.6102	1.2187	1	1.00	1.22	
					spike amount (ug)	1.20	
					Spike recovery	102%	
second source 2	9	0.6122	1.2226	1	1.00	1.22	
					spike amount (ug)	1.20	
					Spike recovery	102%	
second source 1	8	0.6252	1.2348	1	1.00	1.23	
					spike amount (ug)	1.20	
					Spike recovery	103%	
second source 2	9	0.6259	1.2360	1	1.00	1.24	
					spike amount (ug)	1.20	
					Spike recovery	103%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	EML
Analyst	EO
Parameters	EPA Method 316
# Samples	3 and 1 blank

Client #	BBL
Job #	0309-53
PO #	Verbal
Report Date	March 29, 2009

Custody	Tara Grayson of Enthalpy Analytical, Inc. received the samples on 3/16/09 at 5.6 °C after being relinquished by Environmental Monitoring Labs. The samples were received in good condition. Prior to and during analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.
Analysis	The samples were analyzed for formaldehyde using the analytical procedures in EPA Method 316, Sampling and Analysis for Formaldehyde Emissions from Stationary Sources in the Mineral Wool and Wool Fiberglass Industries (40 CFR Part 63, Appendix A). The reagents (pararosaniline, sodium sulfite, standards) were made following the procedures in Section 7.5. The sodium sulfite reagent was used within 24 hours of preparation. Formaldehyde standards were made by diluting a certified 37% solution with DIUF-grade water. Samples and standards are analyzed following the procedures in Section 11.0. Any sample dilutions were performed on an aliquot of the original sample prior to the addition of acetylacetone reagent. The Hewlett Packard Model 8453A, Diode Array Spectrophotometer ("Gomez" S/N US53400446) was operated at 570 nm.
Calibration	The calibration curves are located in the Curve/QA section of this report.
Chromatographic Conditions	The acquisition method NAIMA.M is included in the Curve/QA Chromatograms section of this report.
QC Notes	The following Quality Control Samples (9.0) were analyzed: field blank (9.2.1) and method blanks (9.2.3). All samples met the method-specified quality control limits. All sample preparation and analytical holding times specified in the method were met.
Reporting Notes	The results presented in this report are representative of the samples as provided to the laboratory. Enthalpy Analytical, Inc. is accredited to perform this method for compliance purposes by the National Environmental Laboratory Accreditation Conference (NELAC) through the Louisiana Environmental Laboratory Accreditation Program (LELAP), certificate number 04010.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. reports, unless specifically noted otherwise.

- The symbol ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot confim the presence of the analyte of interest reliably.
- The symbol ***LOQ*** represents the Limit of Quantification. Below this value the la boratory cannot quantitate the analyte of interest within the criteria of the method.
- The symbol ***ND*** following a value indicates a non -detect or analytical result below the MDL.
- The symbol ***J*** following a value indicates an analytical result between the MDL a nd the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The symbol ***E*** following a value indicates an analytical result exceeding 100% of the highest calib ration point.
- The symbol ***DF*** represents a Dilution Factor. This number represents dilutions during the extraction and/or laboratory stages of sample treatment. The analytical result taken from a laboratory instrument is multiplied by the DF to get final res ults.
- The Sample ID ***MS*** represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whet her or not anything in the sample matrix prohibits analysis for the analyte(s).
- The Sample ID ***MSD*** represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory qualit y by showing the consistency of results gained by performing the same steps multiple times. Most methods performed by Enthalpy do not require analysis of an MSD.
- The Sample ID ***BS*** represents a Blind Spike. A member of the Quality Assurance department has created BS samples for many of the analytes Enthalpy tests for, and only QA and the Enthalpy Analytical ownership have access to the actual values of these samples. The laboratory analyzes them without knowledge of the actual value, and the spreadsheets get completed for these samples solely by the QA group.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Whenever spikes are prepared for our clients more spikes are prepared than needed. The extras (randomly chosen) are kept in -house at the appropria te temperature conditions. When the spike samples come back from the client for analysis, the LCSs (usually two are saved) are analyzed to confirm that the analyte could be recovered from the media, separate from the spike samples which were used on the pr oject and which may have had issues caused during collection and/or transport.
- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed (specifically values of 1,000 or greater), the number is rounded to a whol e number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits reported, but no confidence should be placed on more than three significant digits.

Sample Custody

CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS

PAGE 1 OF 1

ENVIRONMENTAL MONITORING LABORATORIES POST OFFICE BOX 655 RIDGELAND, MISSISSIPPI 39158 PHONE: 601/856-3092 FAX: 601/853-2151 Attention: Danny Russell	Laboratory: Enthalpy Analytical, Inc. 2202 Ellis Road Durham, NC 27703-5518 PHONE: 919/850-4392 Attention: Bryan Tyler

Project: Bibler Brothers Lumber Co.
Dry Kiln #3 SN-76
Russellville, AR

Rush ☐ Routine ☑ Fax Results ☐

No. of containers	SAMPLE ID	time	sample aqu. Volume	ANALYSES REQUESTED UNITS
1	Blank	1135	40 ml	HCHO
1	BBL R1 M5	1135	342 ml	HCHO
1	BBL R1 M316	1135	335 ml	HCHO
1	BBL R2 M5	1331	361 ml	HCHO
1	BBL R2 M316	1331	377 ml	HCHO
1	BBL R3 M5	1612	344 ml	HCHO
1	BBL R3 M316	1612	340 ml	HCHO

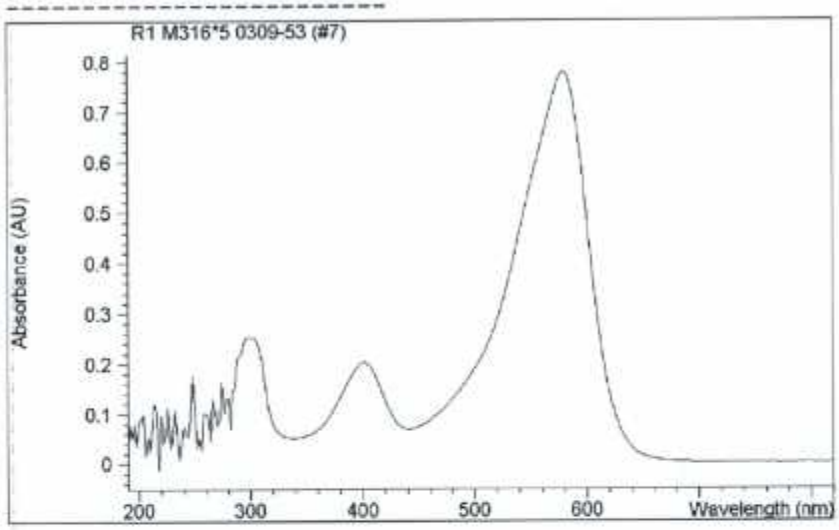
Relinquished by: (print name; initial) Daniel G. Russell B. Ill Norwood	Date/time 3-13-09	Received by: (print name; initial)	Date/time
Relinquished by: (print name; initial)	Date/time 3-13-09	Received by: (print name; initial) KMalone	Date/time 3-14-09 10:00 AM
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER FED EX	Date Shipped 3-13-09	Received for lab by	Date/time

5.6°C

COC not received w/ samples
KAW 3-14-09

Sample Spectra

Processed Sample Spectrum

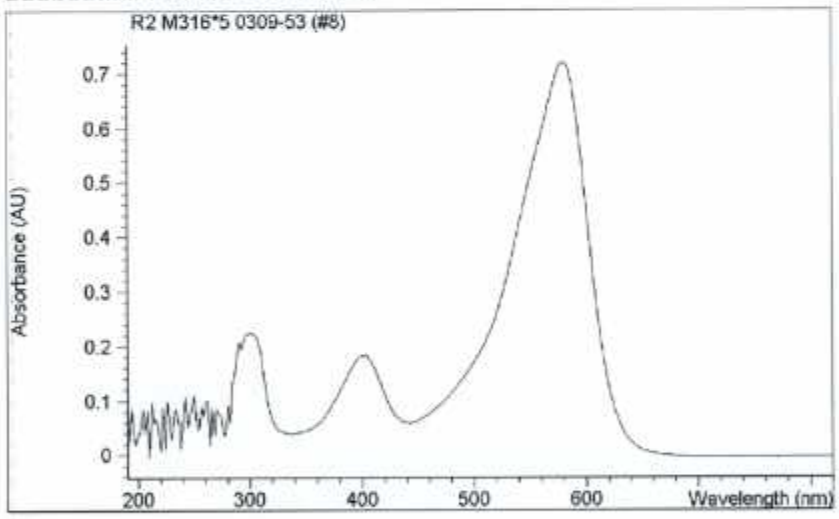


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	1.44814	0.01941	ug/mL

Sample 5

Processed Sample Spectrum



Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	1.33814	0.01923	ug/mL

Sample 6

APPENDIX F

WOOD FUEL ANALYSIS

(STANDARD LAB)

STANDARD LABORATORIES, INC.
8451 River King Drive
Freeburg , IL 62243

Lab No. 2009-00740-001

Date Rec'd. 3/18/2009

Date Sampled 3/12/2009 to 3/12/2009

Sampled By Client

Date: 03/31/2009 14:09:13

Sample ID: 20090074001

P.O.#

BIBLER BROS LUMBER CO

PO BOX 490
RUSSELLVILLE, AR 72811
ATTN: MATT HAGENLOCKER

Remark: SAWDUST - STACK TEST #1 9:30AM

PROXIMATE ANALYSIS		As Received	Dry Basis
% Moisture	D3302	54.16	*****
% Ash	D3174	0.24	0.53
% Volatile	D3175	*****	*****
% Fixed Carbon	D3172	*****	*****
BTU	D5865	3730	8136
MAF-BTU	D3180	8179	
% Total Sulfur	D4239B	< 0.01	< 0.01

SULFUR FORMS			
% Pyritic	D2492	*****	*****
% Sulfate	D2492	*****	*****
% Organic	D2492	*****	*****
% Total Sulfur	D4239B	< 0.01	< 0.01

WATER SOLUBLE			
% Na2O	ASME1974	*****	*****
% K2O	ASME1974	*****	*****
% Chlorine	ASME1974	*****	*****

Alkalies as Na2O ASME1974 ***** *****

FUSION TEMP. OF ASH D1857	Reducing	Oxidizing
I.D.	*****	*****
H=W	*****	*****
H=1/2W	*****	*****
Fluid	*****	*****

GRINDABILITY INDEX D409 ***** @ ***** % Moist.
GRIND INDEX UNCONDITIONED ***** @ ***** % Moist.

FREE SWELLING INDEX D720 *****

Apparent Specific Gravity of Coal ModIC7113 *****

% Equilibrium Moisture D1412 *****

ULTIMATE ANALYSIS		Weight % As Received	Dry Basis
% Moisture	D3302	54.16	*****
% Carbon	D5373	24.19	52.77
% Hydrogen	D5373	2.73	5.95
% Nitrogen	D5373	0.07	0.16
% Chlorine	D6721	< 0.01	< 0.01
% Sulfur	D4239B	< 0.01	< 0.01
% Ash	D3174	0.24	0.53
% Oxygen (Diff.)	D3176	18.62	40.62
(Chlorine D6721 Dry Basis ug/g			22)

MINERAL ANALYSIS D6349	% Ignited	Basis
Phos. Pentoxide, P2O5		*****
Silica, SiO2		*****
Ferric Oxide, Fe2O3		*****
Alumina, Al2O3		*****
Titania, TiO2		*****
Lime, CaO		*****
Magnesia, MgO		*****
Sulfur Trioxide, SO3		*****
Potassium Oxide, K2O		*****
Sodium Oxide, Na2O		*****
Barium Oxide, BaO		*****
Strontium Oxide, SrO		*****
Manganese Dioxide, MnO2		*****
Undetermined		*****
Type of Ash	ASME1974	*****
Silica Value	ASME1974	*****
T250 Deg	B&W	*****
Base/Acid Ratio	ASME1974	*****
lb Ash/mm BTU		0.65
lb SO2/mm BTU		< 0.01
Fouling Index	ASME1974	*****
Slagging Index	ASME1974	*****
(Mercury D6722 Dry Basis ug/g		*****)

Respectfully Submitted,

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STANDARD LABORATORIES, INC.
8451 River King Drive
Freeburg , IL 62243

Lab No. 2009-00740-002

Date Rec'd. 3/18/2009

Date Sampled 3/12/2009 to 3/12/2009

Sampled By Client

Date: 03/30/2009 12:18:24

Sample ID: 20090074002

P.O.#

BIBLER BROS LUMBER CO

PO BOX 490
RUSSELLVILLE, AR 72811
ATTN: MATT HAGENLOCKER

Remark: SAWDUST - STACK TEST #2 11:30AM

PROXIMATE ANALYSIS		As Received	Dry Basis
% Moisture	D3302	54.05	*****
% Ash	D3174	0.26	0.57
% Volatile	D3175	*****	*****
% Fixed Carbon	D3172	*****	*****
BTU	D5865	3980	8661
MAF-BTU	D3180	8711	
% Total Sulfur	D4239B	< 0.01	<.001

SULFUR FORMS			
% Pyritic	D2492	*****	*****
% Sulfate	D2492	*****	*****
% Organic	D2492	*****	*****
% Total Sulfur	D4239B	< 0.01	<.001

WATER SOLUBLE			
% Na2O	ASME1974	*****	*****
% K2O	ASME1974	*****	*****
% Chlorine	ASME1974	*****	*****

Alkalies as Na2O	ASME1974	*****	*****

FUSION TEMP. OF ASH D1857	Reducing	Oxidizing
I.D.	*****	*****
H=W	*****	*****
H=1/2W	*****	*****
Fluid	*****	*****

GRINDABILITY INDEX D409 ***** @ ***** % Moist.
GRIND INDEX UNCONDITIONED ***** @ ***** % Moist.

FREE SWELLING INDEX D720 *****

Apparent Specific Gravity of Coal ModIC7113 *****

% Equilibrium Moisture D1412 *****

ULTIMATE ANALYSIS		Weight % As Received	Dry Basis
% Moisture	D3302	54.05	*****
% Carbon	D5373	24.34	52.98
% Hydrogen	D5373	2.74	5.97
% Nitrogen	D5373	0.06	0.13
% Chlorine	D6721	< 0.01	< 0.01
% Sulfur	D4239B	< 0.01	<.001
% Ash	D3174	0.26	0.57
% Oxygen (Diff.)	D3176	18.56	40.37
(Chlorine D6721 Dry Basis ug/g			20)

MINERAL ANALYSIS D6349	% Ignited Basis
Phos. Pentoxide, P2O5	*****
Silica, SiO2	*****
Ferric Oxide, Fe2O3	*****
Alumina, Al2O3	*****
Titania, TiO2	*****
Lime, CaO	*****
Magnesia, MgO	*****
Sulfur Trioxide, SO3	*****
Potassium Oxide, K2O	*****
Sodium Oxide, Na2O	*****
Barium Oxide, BaO	*****
Strontium Oxide, SrO	*****
Manganese Dioxide, MnO2	*****
Undetermined	*****
Type of Ash ASME1974	*****
Silica Value ASME1974	*****
T250 Deg B&W	*****
Base/Acid Ratio ASME1974	*****
lb Ash/mm BTU	0.66
lb SO2/mm BTU	< 0.01
Fouling Index ASME1974	*****
Slagging Index ASME1974	*****
(Mercury D6722 Dry Basis ug/g	*****)

Respectfully Submitted,

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STANDARD LABORATORIES, INC.
8451 River King Drive
Freeburg , IL 62243

Lab No. 2009-00740-003

Date Rec'd. 3/18/2009

Date Sampled 3/12/2009 to 3/12/2009

Sampled By Client

Date: 03/30/2009 12:18:25

Sample ID: 20090074003

BIBLER BROS LUMBER CO

P.O.#

PO BOX 490
RUSSELLVILLE, AR 72811
ATTN: MATT HAGENLOCKER

Remark: SAWDUST - STACK TEST #3 1:30PM

PROXIMATE ANALYSIS		As Received	Dry Basis
% Moisture	D3302	53.96	*****
% Ash	D3174	0.27	0.58
% Volatile	D3175	*****	*****
% Fixed Carbon	D3172	*****	*****
BTU	D5865	4084	8870
MAF-BTU	D3180	8922	
% Total Sulfur	D4239B	< 0.01	<.001

SULFUR FORMS			
% Pyritic	D2492	*****	*****
% Sulfate	D2492	*****	*****
% Organic	D2492	*****	*****
% Total Sulfur	D4239B	< 0.01	<.001

WATER SOLUBLE			
% Na2O	ASME1974	*****	*****
% K2O	ASME1974	*****	*****
% Chlorine	ASME1974	*****	*****
Alkalies as Na2O	ASME1974	*****	*****

FUSION TEMP. OF ASH D1857	Reducing	Oxidizing
I.D.	*****	*****
H=W	*****	*****
H=1/2W	*****	*****
Fluid	*****	*****

GRINDABILITY INDEX D409 ***** @ ***** % Moist.
GRIND INDEX UNCONDITIONED ***** @ ***** % Moist.

FREE SWELLING INDEX D720 *****

Apparent Specific Gravity of Coal ModIC7113 *****

% Equilibrium Moisture D1412 *****

ULTIMATE ANALYSIS		Weight % As Received	Dry Basis
% Moisture	D3302	53.96	*****
% Carbon	D5373	24.21	52.59
% Hydrogen	D5373	2.71	5.88
% Nitrogen	D5373	0.07	0.16
% Chlorine	D6721	< 0.01	< 0.01
% Sulfur	D4239B	< 0.01	<.001
% Ash	D3174	0.27	0.58
% Oxygen (Diff.)	D3176	18.79	40.81
(Chlorine D6721 Dry Basis ug/g			18)

MINERAL ANALYSIS D6349	% Ignited	Basis
Phos. Pentoxide, P2O5		*****
Silica, SiO2		*****
Ferric Oxide, Fe2O3		*****
Alumina, Al2O3		*****
Titania, TiO2		*****
Lime, CaO		*****
Magnesia, MgO		*****
Sulfur Trioxide, SO3		*****
Potassium Oxide, K2O		*****
Sodium Oxide, Na2O		*****
Barium Oxide, BaO		*****
Strontium Oxide, SrO		*****
Manganese Dioxide, MnO2		*****
Undetermined		*****
Type of Ash	ASME1974	*****
Silica Value	ASME1974	*****
T250 Deg	B&W	*****
Base/Acid Ratio	ASME1974	*****
lb Ash/mm BTU		0.65
lb SO2/mm BTU		< 0.01
Fouling Index	ASME1974	*****
Slagging Index	ASME1974	*****
(Mercury D6722 Dry Basis ug/g		*****)

Respectfully Submitted,

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