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Survey of Source Emissions
for
Bibler Brothers Lumber Company
Russellville, Arkansas

Operating Permit 1628-AOP-R8 AFIN 58-00014

SN-13G No. 1 Dry Kiln and Wood Burner (Formaldehyde and CO)

Test Date: October 26, 2010

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1.1 Scope of Work

At the request of Mr. Matt Hagenlocker of Bibler Brothers Lumber Company, Environmental Services Company, Inc. (ESC) performed air emissions testing on October 26, 2010 at the Bibler Brothers Lumber Company facility in Russellville, Arkansas. The scope of the work consisted of testing the No. 1 Dry Kiln and Wood Burner (SN-13G) for formaldehyde (HCHO) and carbon monoxide (CO). The testing performed on this source is required by the facility's Operating Permit (Permit #1628-AOP-R8 AFIN 58-00014). The purpose of the testing was to learn whether the source in question is in compliance with the emission rates as set forth in the permit.

1.2 Process Description

Kiln #1 is 33’ wide and 200’ long with a 16’ high 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 the 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% moisture content. Unlike typical batch dry kilns, the kiln operates continuously. Burner function and heat input vary only to maintain heat demand by the varying wood quality and moisture content.

The heat source for the kiln is a 5 grate wood burner with a sloped-grate design. It is nominally rated at 25 MMBtu/hr heat input. The sawdust is delivered from the sawmill and enters the burner at moisture contents ranging from 45-55%. The sawdust is gasified in the burner box at temperatures in the 700 °F range. The combustion gasses are blended with return air from the kiln to produce a final heat supply temperature of approximately 500 °F. The supply air is then distributed inside the kiln to maintain a controlled dry bulb temperature.

A temporary stack was installed in the kiln roof near one end of the kiln to provide a site with a consistent, laminar air flow for formaldehyde sampling. A vertical rectangular stack was constructed over an existing but non-functioning vent door. The vent door was removed and a housing built to enclose the opening and funnel exhaust gasses through the 33” tall stack extension. The temporary stack had a 10” by 15” cross section.

1.3 Facility, Test and Regulatory Contacts

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The testing team consisted of the following individuals:

Mr. Jeff Woosley
Mr. Parker Ferebee
Mr. Walker Dimassimo

Regulatory Contact
Mr. Brent Day
Arkansas Department of Environmental Quality
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North Little Rock, AR 72218
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Mr. Day of ADEQ was present to observe the testing.

1.4 Acknowledgements and Certification

The staff of Environmental Services Company, Inc. (ESC) sincerely wishes to thank all personnel involved in the success of the testing program, especially Mr. Matt Hagenlocker of Bibler Brothers Lumber Company.

Having worked on this project, reviewed all data, and prepared this report, I hereby certify that the information contained herein is accurate and true according to the methods and procedures used and take responsibility for the contents thereof. Additionally, this report shall not be reproduced, except in full, without the written approval of the testing organization.

Jeffrey N. Woosley

Digitally signed by Jeffrey N. Woosley
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Date: 2010.11.23 08:54:59 -06'00'

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Special Projects Manager

1.5 Discussion of Results

The results from this testing program are summarized in the attached table. The table provides a detail of the stack gas parameters during the testing along with a detail of the concentration, expressed in parts per million by volume dry (ppmvd), and emission rate, expressed in pounds per hour (lbs/hr) and pounds per thousand board feet (lbs/MBF – formaldehyde only). Also included is a detail of the calculated stack test values and pollutant concentration trends during the testing program. The nomenclature and calculations for each method employed are detailed in Section 3.3 of this report.

The flow rate from the temporary stack was measured for the purpose of isokinetic sampling required by USEPA Method 316. However, that measured flow rate could not be related to the total flow lost from the kiln. Rather, total kiln flow was determined by applying the predicted oxygen consumption of the burner supplying heat to the kiln and utilizing the principles described in USEPA Method 19 to calculate total kiln flow. The total kiln flow along with pollutant concentrations from the temporary stack were used to calculate total kiln emissions.

Wood fuel usage for the continuous drying process averaged 5,260 pounds per hour during the test. Analysis of sawdust samples were made to determine a source specific F-Factor of 9,364 dscf/MMBtu and a heat value of 4,138 Btu/lb (wet basis – actual). Heat input averaged 21.77 MMBtu/hr during the test. A report of the wood fuel analysis performed by Standard Laboratories is provided in the Laboratory Analysis section (Section 4.2) of this report.

1.6 Summary of Results

SUMMARY OF RESULTS BIBLER BROTHERS LUMBER COMPANY RUSSELLVILLE, ARKANSAS NO. 1 DRY KILN AND WOOD BURNER (SN-13G)					
	Run #1	Run #2	Run #3	Average	Regulatory Limit
Sample date	10/26/10	10/26/10	10/26/10		
Sample time	1139-1239	1250-1350	1358-1458		
Stack Parameters					
Flow, acfm	806.62	901.67	903.54	870.61	--
Flow, dscf/hr	34,181.09	40,620.28	43,613.32	39,471.56	--
O_2, % dry	18.96	19.41	19.93	19.44	--
CO_2, % dry	2.06	1.61	1.12	1.59	--
Moisture, %	19.34	15.67	11.47	15.49	--
Temperature, ^oF	145	135	123	134	--
Kiln Parameters					
Sawdust feed rate, lbs/hr	5,220	5,300	5,260	5,260	
Heat Input, MMBtu/hr	21.60	21.93	21.77	21.77	--
Flow, dscf/hr	2,183,096.39	2,885,148.83	4,402,977.14	3,157,074.12	--
Formaldehyde (kiln total)					
Concentration, ppmvd	0.26	0.16	0.10	0.17	--
Emission rate, lbs/hr	0.04	0.04	0.03	0.04	0.46
Emission rate, lbs/MBF	0.0039	0.0032	0.0030	0.0034	0.038
Carbon monoxide (kiln total)					
Concentration, ppmvd	50.40	38.06	25.02	37.83	--
Emission rate, lbs/hr	8.00	7.98	8.01	8.00	8.2

SUMMARY OF TEST DATA
USEPA METHODS 316 AND 19
Formaldehyde

		Run #1	Run #2	Run #3
	Identification:	No. 1 Dry Kiln and Wood Burner (SN-13G)		
	Date:	10/26/10	10/26/10	10/26/10
	Time:	1139-1239	1250-1350	1358-1458
C_p	Pitot correction factor, dimensionless	0.840	0.840	0.840
$\sqrt{\Delta P}$	Average of the square roots of the pressure heads, in. H_2O	0.2078	0.2358	0.2405
D_n	Probe tip diameter, inches	0.413	0.413	0.413
D_s	Stack diameter, ft.	0.0000	0.0000	0.0000
STK L	Stack length, ft.	1.2500	1.2500	1.2500
STK W	Stack width, ft.	0.8333	0.8333	0.8333
T_s	Average stack temperature, °F	145	135	123
T_m	Average meter temperature, °F	72	76	79
ΔH	Average pressure differential across the orifice meter, in. H_2O	0.9200	1.1333	1.2458
P_{bar}	Barometric pressure at sampling site, in Hg.	30.01	30.01	30.01
P_g	Stack static pressure, in. Hg	0.01	0.01	0.01
M_{hcho}	Total amount of formaldehyde collected in the sampling train, ug	282	196	128
Vic	Total volume of liquid collected in the impingers and silica gel, mls	155.2	134.0	101.4
V_m	Volume of gas sample as measured by the dry gas meter, cf	30.421	34.135	37.258
T_{min}	Total sampling time, minutes	60.0	60.0	60.0
$\%O_2$	Percent O_2 by volume, dry basis	18.96	19.41	19.93
$\%CO_2$	Percent CO_2 by volume, dry basis	2.06	1.61	1.12
$\%CO+N_2$	Percent $CO+N_2$ by volume, dry basis	78.98	78.98	78.95
Y	Dry gas meter calibration factor	1.004	1.004	1.004
F_d	Volume of combustion components per unit of heat content, dscf/MMBtu	9,364	9,364	9,364
$GCV_{sd(d)}$	Gross caloric value of sawdust, dry basis, Btu/lb	8914	8914	8914
$GCV_{sd(w)}$	Gross caloric value of sawdust, wet basis, Btu/lb	4,138	4,138	4,138
FF_{sd}	Feed rate of sawdust to kiln, lb/hr	5,220	5,300	5,260
PROD	Board feet per hour through the kiln, BF/hr	11,382	11,382	11,382
MW_{hcho}	Molecular weight of formaldehyde, g/g-mol	30.03	30.03	30.03
M_d	Dry molecular weight of stack gasses, lb/lb-mole	29.0875	29.0345	28.9758
$V_{w(std)}$	Volume of water vapor in the gas sample, dscf	7.3053	6.3074	4.7729
P_s	Absolute stack gas pressure, in. Hg	30.0200	30.0200	30.0200
$V_{m(std)}$	Volume of metered gas sample, dscf	30.4606	33.9420	36.8513

SUMMARY OF TEST DATA
USEPA METHODS 316 AND 19
Formaldehyde

		Run #1	Run #2	Run #3
	Identification:	No. 1 Dry Kiln and Wood Burner (SN-13G)		
	Date:	10/26/10	10/26/10	10/26/10
	Time:	1139-1239	1250-1350	1358-1458
B_{ws}	Water vapor in the gas stream, proportion by volume	0.1934	0.1567	0.1147
M_s	Wet molecular weight of stack gasses, lb/lb-mole	26.9432	27.3054	27.7169
A	Area of the stack, ft^2	1.0417	1.0417	1.0417
A_n	Area of the nozzle, ft^2	0.000930	0.000930	0.000930
V_s	Velocity in the stack, ft/sec	12.9059	14.4267	14.4566
V_{acfm}	Velocity in the stack, ACFM	806.62	901.67	903.54
Q_{std}	Average stack gas dry volumetric flow rate from the temporary stack, dscf/hr	34,181.09	40,620.28	43,613.32
I	Isokinetic ratio, %	99.86	93.63	94.68
HI_{kiln}	Heat input to kiln, MMBtu/hr	21.60	21.93	21.77
$Q_{std(kiln)}$	Average gas dry volumetric flow rate from the kiln, dscf/hr	2,183,096.39	2,885,148.83	4,402,977.14
C_{hcho}	Formaldehyde concentration, ppmvd	0.26	0.16	0.10
$E_{lbs/hr}$	Formaldehyde emission rate from kiln, lbs/hr	0.04	0.04	0.03
$E_{lbs/MBF}$	Formaldehyde emission rate from kiln, lbs/MBF	0.004	0.003	0.003

SUMMARY OF TEST DATA
USEPA METHOD 10
Carbon Monoxide (CO) Emissions

		Run #1	Run #2	Run #3
	Identification:	No. 1 Dry Kiln and Wood Burner (SN-13G)		
	Date:	10/26/10	10/26/10	10/26/10
	Time:	1139-1239	1250-1350	1358-1458
C	Average carbon monoxide concentration indicated by the gas analyzer, ppmvd	50.71	38.20	25.05
C_o	Average of initial and final system calibration bias check responses for the zero carbon monoxide gas, ppmvd	1.89	1.39	0.49
C_m	Average of initial and final system calibration bias check responses for the upscale carbon monoxide gas, ppmvd	118.13	117.45	118.29
C_{ma}	Actual concentration of the upscale calibration gas, ppmvd	120.00	120.00	120.00
$Q_{std(kiln)}$	Average stack gas dry volumetric flow rate from the kiln, dscf/hr	2,183,096.39	2,885,148.83	4,402,977.14
C_{co}	Carbon monoxide concentration, ppmvd	50.40	38.06	25.02
E_{co}	Carbon monoxide emission rate from kiln, lbs/hr	8.00	7.98	8.01

SUMMARY OF TEST DATA
USEPA METHOD 3A
Oxygen (O_2) and Carbon Dioxide (CO_2) Concentration

		Run #1	Run #2	Run #3
	Identification:	No. 1 Dry Kiln and Wood Burner (SN-13G)		
	Date:	10/26/10	10/26/10	10/26/10
	Time:	1139-1239	1250-1350	1358-1458
C	Average oxygen concentration indicated by the gas analyzer, % dry	18.85	19.29	19.75
C_o	Average of initial and final system calibration bias check responses for the zero oxygen gas, %	0.08	0.09	0.09
C_m	Average of initial and final system calibration bias check responses for the upscale oxygen calibration gas, %	10.04	10.04	10.01
C_{ma}	Actual concentration of the upscale oxygen calibration gas, %	10.06	10.06	10.06
C_{o2}	Oxygen concentration, % dry	18.96	19.41	19.93

		Run #1	Run #2	Run #3
	Identification:	No. 1 Dry Kiln and Wood Burner (SN-13G)		
	Date:	10/26/10	10/26/10	10/26/10
	Time:	1139-1239	1250-1350	1358-1458
C	Average carbon dioxide concentration indicated by the gas analyzer, % dry	2.10	1.67	1.14
C_o	Average of initial and final system calibration bias check responses for the zero carbon dioxide gas, %	0.06	0.07	0.03
C_m	Average of initial and final system calibration bias check responses for the upscale carbon dioxide calibration gas, %	5.19	5.20	5.18
C_{ma}	Actual concentration of the upscale carbon dioxide calibration gas, %	5.17	5.17	5.17
C_{co2}	Carbon dioxide concentration, % dry	2.06	1.61	1.12

SUMMARY OF TEST DATA
USEPA METHOD 19
"F_d" Calculations

	Identification:	No. 1 Dry Kiln and Wood Burner (SN-13G)
	Date:	10/26/10
K	Conversion factor, unitless	1.00E+06
$\%H_{sd}$	Concentration of hydrogen in sawdust from ultimate fuel analysis, percent by weight	6.32
$\%C_{sd}$	Concentration of carbon in sawdust from ultimate fuel analysis, percent by weight	51.89
$\%S_{sd}$	Concentration of sulfur in sawdust from ultimate fuel analysis, percent by weight	0.00
$\%N_{sd}$	Concentration of nitrogen in sawdust from ultimate fuel analysis, percent by weight	0.15
$\%O_{sd}$	Concentration of oxygen in sawdust from ultimate fuel analysis, percent by weight	41.18
K_{hd}	Constant, (dscf/lb)/%	3.64
K_c	Constant, (dscf/lb)/%	1.53
K_s	Constant, (dscf/lb)/%	0.57
K_n	Constant, (dscf/lb)/%	0.14
K_o	Constant, (dscf/lb)/%	0.46
$GCV_{sd(d)}$	Gross caloric value of sawdust from ultimate fuel analysis, dry basis, Btu/lb	8,914
$GCV_{sd(w)}$	Gross caloric value of sawdust from ultimate fuel analysis, wet basis, Btu/lb	4,138
F_d	Volume of combustion components per unit of heat content for sawdust, dscf/MMBtu	9,364

2.1 Operating Data

The following pages detail the production/throughput data maintained during the testing program.

ADEQ Test Kiln 2 At Oct 26, 2010 Tuesday Morning

	Tons Of Sawsdust Per Hour		Boardfeet Per Hour	Boardfeet Per Ton
Test 1	**2.61**	**91%**	**11,382**	**4,361**
Test 2	**2.65**	**92%**	**11,382**	**4,295**
Test 3	**2.63**	**91%**	**11,382**	**4,328**

Green Package size

2 x 12	8	10	12	14	16
# Full Package	136	136	136	136	136
# Layers High	17	17	17	17	17
# Pcs Wide	8	8	8	8	8
Package BD FT	2176	2720	3264	3808	4352
5/4 x 6	8	10	12	14	16
# Full Package	336	336	336	336	336
# Layers High	21	21	21	21	21
# Pcs Wide	16	16	16	16	16
Package BD FT	1680	2100	2520	2940	3360

BDFT Per Foot	Feet Per 12 Min	Feet Per Hour	BDFT Per Hour
816	1.4	6.5	5,712
630	1.8	9	5,670
	Total Bdfeet per Hour		11,382

Sampling and Analysis Procedure

3.1 Sampling Methods

The emissions testing conducted on the source in question was performed in accordance with methodology as outlined in 40 CFR Part 60, Appendix A. Specifically, the following methods are referenced in this sampling program:

- ⇒ Method 1 — Sample and Velocity Traverses for Stationary Sources
- ⇒ Method 2 — Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
- ⇒ Method 3A — Determination of Oxygen and Carbon Dioxide Concentrations in Emissions From Stationary Sources (Instrumental Analyzer Procedure)
- ⇒ Method 10 — Determination of Carbon Monoxide Emissions From Stationary Sources
- ⇒ Method 316 — Sampling and Analysis for Formaldehyde Emissions from Stationary Sources in the Mineral Wool and Wool Fiberglass Industries
- ⇒ Method 19 — Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide and Nitrogen Oxide Emission Rates

The aforementioned methods were employed without deviation from prescribed procedures except as allowed by the Arkansas Department of Environmental Quality.

3.2 Sampling Procedure

Formaldehyde sampling was conducted using an Environmental Supply Company C-5000 Source Sampler.

Oxygen and carbon dioxide concentrations were determined according to Method 3A utilizing a Servomex 1400 O_2/CO_2 monitor. The O_2 monitor was calibrated on a range of 0-18.8% with a 0, 10.06 and 18.8% gas, while the CO_2 monitor was calibrated on a range of 0-10.2% with a 0, 5.17 and 10.2% gas.

Carbon monoxide concentrations were determined according to Method 10. A TECO Model 48C nondispersive infrared (NDIR) analyzer was utilized. The analyzer was calibrated on a range of 0-229 ppm with a 0, 120 and 229 ppm gas.

Output from the pollutant analyzers was directed to a DasyLab 6.0 Data Acquisition System and downloaded continuously to the hard drive of a personal computer (PC). Readings were taken every second, averaged and displayed every minute and averaged over the test run.

3.3 Source Test Nomenclature and Calculations

The following pages detail the source test nomenclature and calculations for each test method employed in this sampling program.

SOURCE TEST DEFINITIONS
USEPA Method 316 and 19 – Formaldehyde

C_p	Pitot correction factors, dimensionless
$\sqrt{\Delta P}$	Average of the square roots of the pressure heads, in. H_2O
D_n	Probe tip diameter, inches
D_s	Stack diameter or dimensions, ft
T_s	Average stack temperature, °F
T_m	Average meter temperature, °F
ΔH	Average pressure differential across the orifice meter, in. H_2O
P_{bar}	Barometric pressure at sampling site, in. Hg
P_g	Stack static pressure, in. Hg
M_{hcho}	Total amount of formaldehyde collected in the sampling train, ug
V_{ic}	Total volume of liquid collected in impingers and silica gel, mls
V_m	Volume of gas sample as measured by dry gas meter, ft^3
T_{min}	Total sampling time, minutes
$\%O_2$	Percent O_2 by volume, dry basis
$\%CO_2$	Percent CO_2 by volume, dry basis
$\%CO+\%N_2$	Percent $CO+N_2$ by volume, dry basis
Y	Dry gas meter calibration factor
F_d	Volume of combustion components per unit of heat content, dscf/MMBtu
$GCV_{sd(d)}$	Gross caloric value of sawdust, dry basis, Btu/lb
$GCV_{sd(w)}$	Gross caloric value of sawdust, wet basis, Btu/lb
FF_{sd}	Feed rate of sawdust to kiln, lbs/hr
PROD	Board feet per hour through the kiln, BF/hr
MW_{hcho}	Molecular weight of formaldehyde, g/g-mol

SOURCE TEST CALCULATIONS
USEPA Method 316 and 19 – Formaldehyde

M_d Dry molecular weight of stack gasses, lb/lb-mole
$= 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + N_2)$

$V_{w(std)}$ Volume of water vapor in the gas sample, dscf $= 0.04707 V_{ic}$

P_s Absolute stack gas pressure, in. Hg $= P_{bar} + P_g$

$V_{m(std)}$ Volume of metered gas sample, dscf $= 17.64 V_m Y \dfrac{P_{bar} + \left(\dfrac{\Delta H}{13.6}\right)}{460 + T_m}$

B_{ws} Water vapor in the gas stream, proportion by volume $= \dfrac{V_{w(std)}}{V_{m(std)} + V_{w(std)}}$

M_s Wet molecular weight of stack gasses, lb/lb-mole $= M_d(1 - B_{ws}) + 18.0 B_{ws}$

A Area of stack, $ft^2 = \left(\dfrac{D_s}{2}\right)^2 \times 3.1416$ or cross-section length x width

A_n Area of nozzle, $ft^2 = \left(\dfrac{D_n}{2}\right)^2 \times 3.1416$

V_s Velocity in the stack, ft/sec $= 85.49 C_p \sqrt{\Delta P}_{avg} \sqrt{\dfrac{460 + T_s}{P_s M_s}}$

V_{acfm} Velocity in the stack, acfm $= 60 \times A \times V_s$

Q_{std} Average stack gas dry volumetric flow rate from the temporary stack, dscf/hr $=$
$3600\,(1 - B_{ws}) V_s A \left[\dfrac{528}{460 + T_s} \times \dfrac{P_s}{29.92}\right]$

I Isokinetic ratio, % $= \dfrac{100(460 + T_s)\ (\ 0.002669 V_{ic} + \dfrac{V_m Y}{460 + T_m} \times (P_{bar} + \dfrac{\Delta H}{13.6}))}{60 T_{min} V_s P_s A_n}$

HI_{kiln} Heat input to kiln, MMBtu/hr $= \dfrac{FF_{sd} \times GCV_{sd(w)}}{1{,}000{,}000}$

$Q_{std(kiln)}$ Average gas dry volumetric flow rate from the kiln, dscf/hr $= \dfrac{HI_{kiln} \times F_d \times 20.9}{20.9 - \%O_2}$

C_{hcho} Formaldehyde concentration, ppmvd $= \dfrac{M_{hcho} \times 0.02404}{V_{m(std)} \times 0.028317 \times MW_{hcho}}$

$E_{lbs/hr}$ Formaldehyde emission rate from kiln, lbs/hr $= \dfrac{C_{hcho}\ MW_{hcho} \times Q_{std(kiln)}}{385.1E06}$

$E_{lbs/MBF}$ Formaldehyde emission rate from kiln, lbs/MBF $= \dfrac{1000 \times E_{lbs/hr}}{PROD}$

SOURCE TEST CALCULATIONS
USEPA Method 10 – Carbon Monoxide

Definitions	
C	Average carbon monoxide concentration indicated by gas analyzer, ppmvd
C_o	Average initial and final system calibration bias check responses for the zero carbon monoxide gas, ppmvd
C_m	Average of initial and final system calibration bias check responses for the upscale carbon monoxide gas, ppmvd
C_{ma}	Actual concentration of the upscale calibration gas, ppmvd
$Q_{std(kiln)}$	Average gas dry volumetric flow rate from the kiln, dscf/hr

Calculations	
C_{co}	Carbon monoxide concentration, ppmvd = $(C - C_o)\left(\frac{C_{ma}}{C_m - C_o}\right)$
E_{co}	Carbon monoxide emission rate from kiln, lbs/hr = $\frac{C_{co} \times 28 \times Q_{std(kiln)}}{385.1E06}$

SOURCE TEST CALCULATIONS
USEPA Method 3A – Oxygen and Carbon Dioxide

Definitions

C	Average gas concentration indicated by gas analyzer, % dry
C_0	Average initial and final system calibration bias check responses for the zero gas, %
C_m	Average of initial and final system calibration bias check responses for the upscale calibration gas, %
C_{ma}	Actual concentration of the upscale calibration gas, %

Calculations

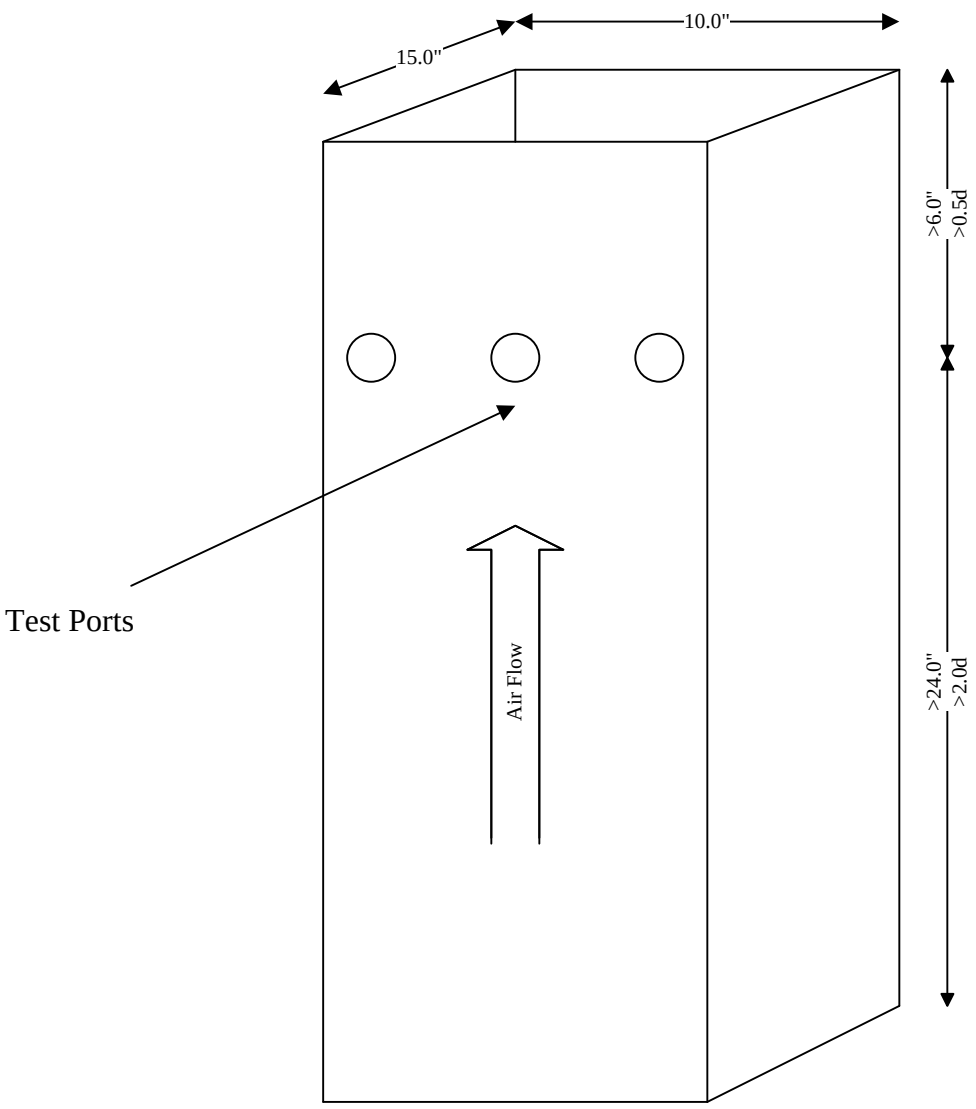
C_{gas} Gas concentration, % dry = $(C - C_o)\left(\frac{C_{ma}}{C_m - C_o}\right)$

SOURCE TEST CALCULATIONS
USEPA Method 19 – "F_d" Calculations

K	Conversion factor, unitless = 10^6 Btu/MMBtu
$\%H_{sd}$	Concentration of hydrogen in sawdust from ultimate fuel analysis, percent by weight
$\%C_{sd}$	Concentration of carbon in sawdust from ultimate fuel analysis, percent by weight
$\%S_{sd}$	Concentration of sulfur in sawdust from ultimate fuel analysis, percent by weight
$\%N_{sd}$	Concentration of nitrogen in sawdust from an ultimate fuel analysis, percent by weight
$\%O_{sd}$	Concentration of oxygen in sawdust from ultimate fuel analysis, percent by weight
K_{hd}	Constant, (dscf/lb)/% = (3.64 dscf/lb)/%
K_c	Constant, (dscf/lb)/% = (1.53 dscf/lb)/%
K_s	Constant, (dscf/lb)/% = (0.57 dscf/lb)/%
K_n	Constant, (dscf/lb)/% = (0.14 dscf/lb)/%
K_o	Constant, (dscf/lb)/% = (0.46 dscf/lb)/%
$GCV_{sd(d)}$	Gross caloric value of sawdust from ultimate fuel analysis, dry basis, Btu/lb
$GCV_{sd(w)}$	Gross caloric value of sawdust from ultimate fuel analysis, wet basis, Btu/lb
FF_i	Fuel feed rate, units/hr
F_d	Volume of combustion components per unit of heat content for sawdust, dscf/MMBtu = $\frac{K\left(K_{hd}\%H_{sd} + K_c\%C_{sd} + K_sS_{sd} + K_n\%N_{sd} - K_o\%O_{sd}\right)}{GCV_{sd(d)}}$

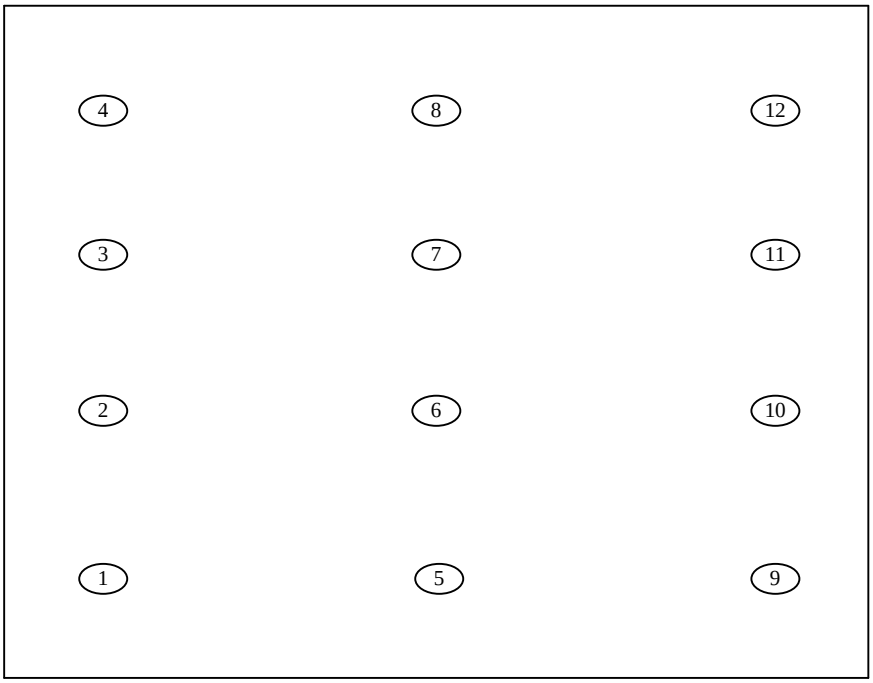
3.4 Stack Schematics

Traverse points were determined by Method 1 of 40 CFR Part 60, Appendix A - "Sample and Velocity Traverses for Stationary Sources." Method 1 implements the use of stack dimensions for the determination of the location of sample ports and traverse points. The diameter of the duct is taken into consideration in order to meet criteria concerning the location of test port openings. Traverse points are determined as a percentage of the stack diameter as measured from the inside wall of the stack. Method 1 provides guidelines for the calculation and location of each traverse point based on the stack diameter. Schematic drawings of the sample traverse points are detailed on the following pages.



BIBLER BROTHERS LUMBER COMPANY
RUSSELLVILLE, ARKANSAS

SN-13G No. 1 Dry Kiln and Wood Burner
Side View



Sample Point	Location
1, 5 and 9	3.0"
2, 6 and 10	6.0"
3, 7 and 11	9.0"
4, 8 and 12	12.0"

BIBLER BROTHERS LUMBER COMPANY
RUSSELLVILLE, ARKANSAS

SN-13G No. 1 Dry Kiln and Wood Burner
Sample Points

Field and Laboratory Data

4.1 Field Data

The following pages represent the field data for the source tested during this testing program.

Environmental Services Company, Inc.

STACK SAMPLING FIELD DATA

Plant Name: Bibler Brothers Stack Name: SN-136

Operator: WPF / JNW Run Number: 1 EPA Method: 316

Date: 10/26/10 Start Time: 1139 Stop Time: 1239

Stack Dia. (ft): 1.2500 + 0.83333 Bar. Pres. (in. Hg): 30.01 Static Pres. (in Hg): + 0.01

Probe Tip Diameter (in): ~~0.350~~ 0.413 Pitot Factor: 0.840 Meter Factor: SN 1226 → 1.004

Control Number: K Factor:

Percent O_2: Percent CO_2: Percent $CO+N_2$:

Pre-Leak Checks: Pitots: OK System: OK @ 19" Hg ≤ 0.005

Post-Leak Checks: Pitots: OK System: OK @ 19" Hg ≤ 0.005

Point	Sample Time	Dry Gas Meter Reading	ΔP Inches H_2O	ΔH Inches H_2O	Dry Gas Meter Temperature °F		L. VAC. In. Hg Gauge	Dryer Temp. °F	Probe Temp. °F	Oven Temp. °F	Stack Temp. °F
		861.700			Inlet	Outlet					
1	5/1139	863.8	0.03	0.47	69	68	3.0	60	249	248	142
2	5/1144	866.1	0.06	0.94	69	68	2.5	59	248	250	146
3	5/1149	867.9	0.03	0.47	70	69	2.5	56	246	245	143
4	5/1154	869.6	0.02	0.32	71	69	2.5	57	243	246	147
5	5/1159	871.9	0.04	0.74	72	69	3.5	52	249	246	148
6	5/1204	874.7	0.05	1.10	73	70	4.0	48	248	249	142
7	5/1209	877.3	0.04	0.90	74	70	3.5	47	246	249	142
8	5/1214	879.8	0.04	0.90	75	71	3.5	48	242	252	145
9	5/1219	882.5	0.05	1.00	76	71	3.5	48	243	253	144
10	5/1224	885.4	0.05	1.00	76	72	3.5	48	243	255	148
11	5/1229	888.6	0.06	1.50	77	72	4.0	49	241	253	148
12	5/1234	892.124	0.06	1.70	78	73	5.0	51	242	254	146
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
	60	30.421	0.2078	0.9200	72						

Environmental Services Company, Inc.

IMPINGER CATCH

Customer: Bibler Brothers

Sampling Location: SD-136 Sample Date: 10/26/10

Run Number: 1 Control Number: _____

Impinger Number	Solution Used	Amount of Solution (milliliters)	Weight (grams)
1	Milli Q	100	Final 943.2 Initial 764.6 Weight gain 178.6
2	Milli Q	100	Final 754.5 Initial 785.5 Weight gain (31.0)
3	Empty	0	Final 660.1 Initial 655.2 Weight gain 4.9
4	Silica Gel	200 g	Final 918.5 Initial 915.8 Weight gain 2.7

TOTAL WEIGHT GAIN OF IMPINGERS (GRAMS) 155.2

Date: 10/26/10

Signature: [signature]

Environmental Services Company, Inc.

STACK SAMPLING FIELD DATA

Plant Name: Bibler Brothers Stack Name: SN-136

Operator: WPF / JAW Run Number: 2 EPA Method: 316

Date: 10/26/10 Start Time: 1250 Stop Time: 1350

Stack Dia. (ft): 1.2500 / 0.83333 Bar. Pres. (in. Hg): 30.01 Static Pres. (in Hg): +0.01

Probe Tip Diameter (in): 0.413 Pitot Factor: 0.840 Meter Factor: SN 1226 → 1.004

Control Number: K Factor: ~21.3

Percent O_2: Percent CO_2: Percent $CO+N_2$:

Pre-Leak Checks: Pitots: ok System: ok @ 15" Hg ≤ 0.005

Post-Leak Checks: Pitots: ok System: ok @ 17" Hg ≤ 0.005

Point	Sample Time	Dry Gas Meter Reading	ΔP Inches H_2O	ΔH Inches H_2O	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	L. VAC In. Hg Gauge	Dryer Temp. °F	Probe Temp. °F	Oven Temp. °F	Stack Temp. °F
		892.305									
1	5/1250	895.4	0.05	1.20	75	73	3.0	64	251	253	134
2	5/1255	898.1	0.05	1.00	76	73	3.0	61	245	252	135
3	5/1300	900.7	0.05	1.00	76	74	3.0	62	243	253	134
4	5/1305	903.4	0.05	1.00	76	74	3.0	64	241	247	134
5	5/1310	906.1	0.05	1.00	77	74	3.0	62	244	258	135
6	5/1315	908.8	0.06	1.20	77	74	3.0	61	242	257	137
7	5/1320	911.7	0.07	1.40	77	74	3.0	55	246	249	137
8	5/1325	914.6	0.05	1.00	78	74	3.0	53	247	253	140
9	5/1330	917.4	0.05	1.00	78	74	3.0	53	245	253	135
10	5/1335	920.4	0.07	1.40	78	74	3.0	53	241	245	136
11	5/1340	923.4	0.06	1.20	79	75	3.0	52	245	253	133
12	5/1345	926.435	0.04	1.20	79	75	3.0	53	246	253	134
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
	60	34.135	0.2358	1.1353		74					135

Environmental Services Company, Inc.

IMPINGER CATCH

Customer: Bible Brothers

Sampling Location: SW-136 Sample Date: 10/26/16

Run Number: 2 Control Number:

Impinger Number	Solution Used	Amount of Solution (milliliters)	Weight (grams)
			Final 867.1
			Initial 760.2
1	Milli Q	100	Weight gain 106.9
			Final 770.5
			Initial 749.9
2	Milli Q	100	Weight gain 20.1
			Final 658.4
			Initial 653.8
3	Empty	0	Weight gain 4.6
			Final 884.9
			Initial 882.5
4	Silica Gel	200g	Weight gain 2.4

TOTAL WEIGHT GAIN OF IMPINGERS (GRAMS) 134.0g

Date: 10/26/16

Signature:

Environmental Services Company, Inc.

STACK SAMPLING FIELD DATA

Plant Name: Bibler Brothers Stack Name: SN-136

Operator: JDF / JNW Run Number: 3 EPA Method: 316

Date: 10/26/10 Start Time: 1358 Stop Time: 1458

Stack Dia. (ft): 1.2500 / 0.83333 Bar. Pres. (in. Hg): 30.01 Static Pres. (in Hg): +0.01

Probe Tip Diameter (in): 0.413 Pitot Factor: 0.846 Meter Factor: SN 1226 → 1.004

Control Number: K Factor:

Percent O_2: Percent CO_2: Percent $CO+N_2$:

Pre-Leak Checks: Pitots: OK System: OK @ 14" Hg < 0.005

Post-Leak Checks: Pitots: OK System: OK @ 15" Hg < 0.001

Point	Sample Time	Dry Gas Meter Reading (926.500)	ΔP Inches H_2O	ΔH Inches H_2O	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	L. VAC In. Hg Gauge	Dryer Temp. °F	Probe Temp. °F	Oven Temp. °F	Stack Temp. °F
1	5/1358	930.3	0.06	1.60	74	76	4.0	66	242	245	115
2	5/1403	934.1	0.07	1.70	78	76	2.0	62	238	245	131
3	5/1408	936.7	0.07	1.70	79	76	2.0	54	247	246	129
4	5/1413	939.4	0.05	1.20	80	76	2.0	51	245	241	123
5	5/1418	942.9	0.04	1.00	80	77	2.0	50	246	245	117
6	5/1423	946.5	0.05	1.20	81	77	2.5	47	242	255	120
7	5/1428	949.1	0.06	1.20	82	77	2.5	48	243	252	128
8	5/1433	951.5	0.08	0.80	82	78	2.5	50	242	253	124
9	5/1438	954.4	0.05	0.75	82	78	2.5	51	249	254	125
10	5/1443	957.3	0.06	1.10	82	78	2.5	50	245	253	125
11	5/1448	960.8	0.05	1.20	82	78	2.5	50	244	255	121
12	5/1453	964.058	0.06	1.60	83	79	3.0	50	244	253	117
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
	60	37.258	1.2405	1.2458	79						23

Project No. 1008520006

Environmental Services Company, Inc.

ANALYZER CALIBRATION DATA

Plant Name: BOILER BOOSTERS Source Identification: SW-136

Reference Method: 10 Data for Sampling Runs: 1-3

Test Personnel: JM

Date: 10/26/10 Span: 229

	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference (% of span)
Zero gas	0.00	10:35:01 0.11	0.11	0.05 J
Mid-range gas	120	10:38:05 119.3	0.70	0.31 J
High-range gas	229	10:52:41 227.4	1.60 ~~2.27.4~~	0.70 J

$$\text{Analyzer Calibration Error} = \frac{\text{Analyzer Calibration Response - Cylinder Value}}{\text{Span}} \times 100 = \pm 2 \text{ percent of span}$$

Environmental Services Company, Inc.

ANALYZER BIAS/DRIFT DATA

Plant Name: Beaver Brothers Source Identification: SW-136

Reference Method: 10 Data for Sampling Runs: 1-3

Test Personnel: JM

Date: 10/26/10 Span: 225

Run #	Analyzer Calibration Response	Initial System Calibration Response	Initial System Bias (% of span)	Final System Calibration Response	Final System Bias (% of span)	Drift (% of span)
1	0.11	11:02:25 1.85	0.78%	12:41:38 1.85	0.78%	0.00%
	119.3	11:00:25 118.64	0.29%	12:45:39 117.42	0.73%	0.45%
2	0.11	12:41:38 1.85	0.78%	13:54:04 0.85	0.34%	0.44%
	119.3	12:45:39 117.42	0.73%	13:51:29 117.28	0.88%	0.15%
3	0.11	13:54:04 0.85	0.34%	15:00:46 0.09	0.01%	0.35%
	119.3	13:51:29 117.28	0.88%	15:03:12 119.3	0.00%	0.88%

$$\text{System Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100 = \pm 5 \text{ percent of span}$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100 = \pm 3 \text{ percent of span}$$

Environmental Services Company, Inc.

ANALYZER CALIBRATION DATA

Plant Name: Bibler Brothers Source Identification: SW-136

Reference Method: 3A O2 Data for Sampling Runs: 1-3

Test Personnel: JNW

Date: 10/24/13 Span: 18.8

	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference (% of span)
Zero gas	0.0	10:38:05 0.03	0.03	0.16
Mid-range gas	10.06	10:40:14 10.02	0.04	0.21
High-range gas	18.8	10:35:01 18.77	0.03	0.16

$$\text{Analyzer Calibration Error} = \frac{\text{Analyzer Calibration Response - Cylinder Value}}{\text{Span}} \times 100 = \pm 2 \text{ percent of span}$$

Environmental Services Company, Inc.

ANALYZER BIAS/DRIFT DATA

Plant Name: Bibler Brothers Source Identification: SW-136

Reference Method: 3A O_2 Data for Sampling Runs: 1-3

Test Personnel: JW

Date: 10/26/12 Span: 18.8

Run #	Analyzer Calibration Response	Initial System Calibration Response	Initial System Bias (% of span)	Final System Calibration Response	Final System Bias (% of span)	Drift (% of span)
1	0.03	11:00:45 0.06	0.16 %	12:45:35 0.05	0.32 %	0.16 %
	10.02	11:03:05 9.97	0.27 %	12:47:38 10.10	0.43 %	0.69 %
2	0.03	12:45:35 0.05	0.32 %	13:51:29 0.05	0.32 %	0.00 %
	10.02	12:47:38 10.10	0.43 %	13:54:04 9.98	0.21 %	0.64 %
3	0.03	13:51:29 0.05	0.32 %	15:02:12 0.04	0.27 %	0.05 %
	10.02	13:54:04 9.98	0.21 %	15:00:46 10.04	0.11 %	0.21 %

$$\text{System Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100 = \pm 5 \text{ percent of span}$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100 = \pm 3 \text{ percent of span}$$

Environmental Services Company, Inc.

ANALYZER CALIBRATION DATA

Plant Name: Bibler Brothers Source Identification: SN-136

Reference Method: 3A CO_2 Data for Sampling Runs: 1-3

Test Personnel: JW

Date: 10/24/12 Span: 10.2

	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference (% of span)
Zero gas	0.00	10:38:09 0.02	0.02	0.20%
Mid-range gas	5.17	10:40:14 5.12	0.05	0.49%
High-range gas	10.2	10:35:01 10.19	0.01	0.10%

$$\text{Analyzer Calibration Error} = \frac{\text{Analyzer Calibration Response - Cylinder Value}}{\text{Span}} \times 100 = \pm 2 \text{ percent of span}$$

Environmental Services Company, Inc.

ANALYZER BIAS/DRIFT DATA

Plant Name: Beeler Brothers Source Identification: SN-13 6

Reference Method: 3A CO_2 Data for Sampling Runs: 1-3

Test Personnel: JW

Date: 10/26/10 Span: 20.2

Run #	Analyzer Calibration Response	Initial System Calibration Response	Initial System Bias (% of span)	Final System Calibration Response	Final System Bias (% of span)	Drift (% of span)
1	0.02	11:00:25 0.04	0.10%	12:45:39 0.11	0.88%	0.10%
	5.12	11:03:05 5.14	0.59%	12:41:38 5.20	0.78%	0.20%
2	0.02	12:45:39 0.11	0.88%	13:51:25 0.03	0.10%	0.78%
	5.12	12:41:38 5.20	0.78%	13:54:04 5.20	0.78%	0.00%
3	0.02	13:51:25 0.03	0.10%	15:03:12 0.03	0.10%	0.00%
	5.12	13:54:04 5.20	0.78%	15:00:46 5.15	0.29%	0.49%

$$\text{System Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100 = \pm 5 \text{ percent of span}$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100 = \pm 3 \text{ percent of span}$$

Environmental Services Company, Inc.

IMPINGER CATCH

Customer: Bibler Brothers

Sampling Location: SV-136 Sample Date: 10/26/10

Run Number: 3 Control Number:

Impinger Number	Solution Used	Amount of Solution (milliliters)	Weight (grams)
			Final 839.6
			Initial 757.1
1	Mill. Q	100	Weight gain 82.5
			Final 765.9
			Initial 751.0
2	Mill. Q	100	Weight gain 14.9
			Final 657.7
			Initial 655.7
3	Empty	0	Weight gain 2.0
			Final 920.6
			Initial 918.6
4	Silica Gel	200g	Weight gain 2.0

TOTAL WEIGHT GAIN OF IMPINGERS (GRAMS) 101.4 g

Date: 10/26/10

Signature:

DASYLab - V 7.00.04
WORKSHEET : o2-co2-co
Recording Date : 10/26/2010, 10:35:01 AM
Block Length : 1
Delta : 1 sec.
Number of Channels : 3

Date	Time	CO [ppm]	O2 [ppm]	CO2 [ppm]
10/26/2010	10:35:01	0.11	18.77	10.19
10/26/2010	10:38:09	119.3	0.03	0.02
10/26/2010	10:40:14	1.9	10.02	5.12
10/26/2010	10:52:41	227.4	0	0
10/26/2010	11:00:25	118.64	0.06	0.01
10/26/2010	11:02:56	3.89	9.97	5.17
10/26/2010	11:03:05	1.89	9.97	5.18
10/26/2010	11:39:15	30.04	19.6	1.35
10/26/2010	11:40:15	42.18	19.01	1.93
10/26/2010	11:41:15	53.4	18.68	2.25
10/26/2010	11:42:15	60.09	18.37	2.51
10/26/2010	11:43:15	66.16	18.27	2.61
10/26/2010	11:44:15	67.36	18.24	2.62
10/26/2010	11:45:15	68.97	18.21	2.66
10/26/2010	11:46:15	68.76	18.14	2.72
10/26/2010	11:47:15	70.97	18.04	2.83
10/26/2010	11:48:15	74.05	17.91	2.97
10/26/2010	11:49:15	77	17.76	3.12
10/26/2010	11:50:15	79.42	17.68	3.21
10/26/2010	11:51:15	80.46	17.77	3.13
10/26/2010	11:52:15	72.61	17.99	2.89
10/26/2010	11:53:15	77.63	17.7	3.18
10/26/2010	11:54:15	79.43	17.91	2.99
10/26/2010	11:55:15	64.51	18.55	2.39
10/26/2010	11:56:15	54.61	18.8	2.15
10/26/2010	11:57:15	49.96	18.97	2
10/26/2010	11:58:15	43.92	19.14	1.83
10/26/2010	11:59:15	43.15	19.12	1.85
10/26/2010	12:00:15	45.18	18.99	1.97
10/26/2010	12:01:15	44.03	19.13	1.85
10/26/2010	12:02:15	42.41	19.17	1.8
10/26/2010	12:03:15	42.05	19.19	1.78
10/26/2010	12:04:15	43.78	19.12	1.85
10/26/2010	12:05:15	43.98	19.19	1.79
10/26/2010	12:06:15	42.51	19.19	1.79
10/26/2010	12:07:15	43.82	19.12	1.85
10/26/2010	12:08:15	44.75	19.12	1.85
10/26/2010	12:09:15	43.75	19.2	1.78
10/26/2010	12:10:15	42.12	19.13	1.83
10/26/2010	12:11:15	46.51	19.04	1.92
10/26/2010	12:12:15	47.51	18.99	1.96
10/26/2010	12:13:15	48.34	18.95	2
10/26/2010	12:14:15	47.91	18.93	2.02
10/26/2010	12:15:15	47.57	18.95	2.01
10/26/2010	12:16:15	47.51	18.92	2.04

10/26/2010	12:17:15	46.41	18.98	1.98
10/26/2010	12:18:15	46.14	19.03	1.94
10/26/2010	12:19:15	45.58	18.92	2.04
10/26/2010	12:20:15	48.71	18.9	2.06
10/26/2010	12:21:15	45.98	18.99	1.97
10/26/2010	12:22:15	44.42	19.05	1.92
10/26/2010	12:23:15	42.78	19.1	1.87
10/26/2010	12:24:15	38.95	19.33	1.65
10/26/2010	12:25:15	39.31	19.13	1.84
10/26/2010	12:26:15	40.65	19.24	1.73
10/26/2010	12:27:15	41.54	19.09	1.88
10/26/2010	12:28:15	44.35	19.06	1.9
10/26/2010	12:29:15	45.84	19.03	1.94
10/26/2010	12:30:15	43.63	19.19	1.78
10/26/2010	12:31:15	42.22	19.21	1.76
10/26/2010	12:32:15	43.67	19.12	1.85
10/26/2010	12:33:15	44.87	19.1	1.86
10/26/2010	12:34:15	44.45	19.21	1.76
10/26/2010	12:35:15	40.9	19.3	1.67
10/26/2010	12:36:15	41.65	19.16	1.79
10/26/2010	12:37:15	44.33	19.3	1.68
10/26/2010	12:38:15	38.01	19.31	1.66
10/26/2010	12:41:34	2.89	10.12	5.2
10/26/2010	12:41:38	1.89	10.1	5.2
10/26/2010	12:45:39	117.62	0.09	0.11
10/26/2010	12:49:55	39.04	19.3	1.6
10/26/2010	12:50:55	39.38	19.2	1.75
10/26/2010	12:51:55	38.88	19.29	1.68
10/26/2010	12:52:55	36.55	19.47	1.51
10/26/2010	12:53:55	32.22	19.47	1.5
10/26/2010	12:54:55	34.22	19.46	1.53
10/26/2010	12:55:55	34.04	19.46	1.52
10/26/2010	12:56:55	34.88	19.38	1.6
10/26/2010	12:57:55	31.22	19.64	1.32
10/26/2010	12:58:55	34.71	19.32	1.64
10/26/2010	12:59:55	38.54	19.24	1.73
10/26/2010	13:00:55	39.87	19.18	1.79
10/26/2010	13:01:55	40.71	19.03	1.92
10/26/2010	13:02:55	45.72	18.85	2.1
10/26/2010	13:03:55	44.38	19.03	1.94
10/26/2010	13:04:55	44.21	18.9	2.06
10/26/2010	13:05:55	44.71	18.94	2.02
10/26/2010	13:06:55	44.38	18.9	2.06
10/26/2010	13:07:55	41.87	19.03	1.94
10/26/2010	13:08:55	43.88	18.92	2.04
10/26/2010	13:09:55	44.05	18.89	2.07
10/26/2010	13:10:55	44.88	18.88	2.08
10/26/2010	13:11:55	42.88	19.02	1.95
10/26/2010	13:12:55	40.38	19.1	1.87
10/26/2010	13:13:55	41.05	19.06	1.92
10/26/2010	13:14:55	33.38	19.58	1.41
10/26/2010	13:15:55	35.65	19.25	1.73

10/26/2010	13:16:55	37.51	19.31	1.68
10/26/2010	13:17:55	34.9	19.36	1.62
10/26/2010	13:18:55	37.33	19.35	1.64
10/26/2010	13:19:55	31.33	19.58	1.4
10/26/2010	13:20:55	32.96	19.41	1.58
10/26/2010	13:21:55	32.19	19.51	1.47
10/26/2010	13:22:55	34.24	19.4	1.57
10/26/2010	13:23:55	37.82	19.17	1.8
10/26/2010	13:24:55	43.63	18.96	2
10/26/2010	13:25:55	46.82	19	1.97
10/26/2010	13:26:55	45.07	19.05	1.93
10/26/2010	13:27:55	40.84	19.24	1.74
10/26/2010	13:28:55	43.43	19.08	1.89
10/26/2010	13:29:55	40.95	19.32	1.67
10/26/2010	13:30:55	40.43	19.2	1.77
10/26/2010	13:31:55	38.77	19.37	1.62
10/26/2010	13:32:55	42.2	19.03	1.94
10/26/2010	13:33:55	40.56	19.34	1.65
10/26/2010	13:34:55	30.07	19.77	1.2
10/26/2010	13:35:55	30.68	19.49	1.5
10/26/2010	13:36:55	30.15	19.71	1.37
10/26/2010	13:37:55	30.96	19.5	1.63
10/26/2010	13:38:55	34.16	19.5	1.45
10/26/2010	13:39:55	27.74	19.86	1.07
10/26/2010	13:40:55	17.9	20.04	0.87
10/26/2010	13:41:55	36.21	19.24	1.68
10/26/2010	13:42:55	43.85	19.5	1.4
10/26/2010	13:43:55	39.41	19.35	1.51
10/26/2010	13:44:55	44.91	19.28	1.59
10/26/2010	13:45:55	44.95	19.34	1.54
10/26/2010	13:46:55	42.08	19.48	1.37
10/26/2010	13:47:55	34.34	19.74	1.1
10/26/2010	13:51:29	117.28	0.09	0.03
10/26/2010	13:54:04	0.89	9.98	5.2
10/26/2010	13:58:12	19.23	20.06	0.81
10/26/2010	13:59:12	21.39	19.86	1
10/26/2010	14:00:12	25.72	19.77	1.1
10/26/2010	14:01:12	25.89	19.78	1.08
10/26/2010	14:02:12	25.89	19.78	1.08
10/26/2010	14:03:12	25.89	19.8	1.05
10/26/2010	14:04:12	25.89	19.7	1.15
10/26/2010	14:05:12	25.89	19.8	1.05
10/26/2010	14:06:12	24.39	19.71	1.13
10/26/2010	14:07:12	27.56	19.63	1.23
10/26/2010	14:08:12	26.72	19.65	1.21
10/26/2010	14:09:12	25.71	19.71	1.15
10/26/2010	14:10:12	25.22	19.73	1.13
10/26/2010	14:11:12	22.06	19.85	0.99
10/26/2010	14:12:12	19.89	20.09	0.77
10/26/2010	14:13:12	14.57	20.14	0.71
10/26/2010	14:14:12	17.56	20.03	0.8
10/26/2010	14:15:12	18.4	20.17	0.73

10/26/2010	14:16:12	6.56	20.65	0.31
10/26/2010	14:17:12	8.22	20.38	0.51
10/26/2010	14:18:12	12.23	20.5	0.46
10/26/2010	14:19:12	6.05	20.46	0.46
10/26/2010	14:20:12	9.82	20.41	0.5
10/26/2010	14:21:12	14.55	19.99	0.88
10/26/2010	14:22:12	19.94	19.88	0.99
10/26/2010	14:23:12	23.41	19.73	1.13
10/26/2010	14:24:12	26.77	19.55	1.32
10/26/2010	14:25:12	26.64	19.69	1.18
10/26/2010	14:26:12	28.87	19.33	1.54
10/26/2010	14:27:12	33.4	19.28	1.6
10/26/2010	14:28:12	33.01	19.35	1.54
10/26/2010	14:29:12	30.89	19.42	1.46
10/26/2010	14:30:12	30.79	19.58	1.71
10/26/2010	14:31:12	28.42	19.55	1.68
10/26/2010	14:32:12	27.62	19.75	1.66
10/26/2010	14:33:12	22.03	19.66	1.71
10/26/2010	14:34:12	32.25	19.37	2.07
10/26/2010	14:35:12	34.78	19.2	1.96
10/26/2010	14:36:12	37.09	19.11	1.73
10/26/2010	14:37:12	37.53	19.42	1.43
10/26/2010	14:38:12	25.19	19.77	1.03
10/26/2010	14:39:12	27.97	19.54	1.25
10/26/2010	14:40:12	35.05	19.37	1.44
10/26/2010	14:41:12	30.12	19.65	1.16
10/26/2010	14:42:12	27.52	19.51	1.3
10/26/2010	14:43:12	31.04	19.49	1.31
10/26/2010	14:44:12	32.15	19.55	1.27
10/26/2010	14:45:12	29.94	19.52	1.28
10/26/2010	14:46:12	33.21	19.44	1.38
10/26/2010	14:47:12	26.59	19.82	0.99
10/26/2010	14:48:12	20.79	19.95	0.85
10/26/2010	14:49:12	29.48	19.62	1.2
10/26/2010	14:50:12	21.89	20	0.8
10/26/2010	14:51:12	14.79	20.44	0.43
10/26/2010	14:52:12	16.06	19.88	0.91
10/26/2010	14:53:12	33.88	19.44	1.38
10/26/2010	14:54:12	28.45	19.7	1.08
10/26/2010	14:55:12	33.91	19.38	1.44
10/26/2010	14:56:12	30.39	19.76	1.04
10/26/2010	14:57:12	26.09	19.66	1.13
10/26/2010	15:00:46	0.09	10.04	5.15
10/26/2010	15:03:12	119.3	0.08	0.03

4.2 Laboratory Data

Attached is a copy of the laboratory report from the analysis of the samples from this testing program.

Environmental Services Company, Inc.

13715 West Markham
Little Rock, AR 72211

SN-13G
Client # 1511

Analytical Report
(1110-42)

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 deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains ??? pages.

Summary of Results

Company	ESC
Analyst	KHB
Parameters	EPA Method 316
# Samples	3 Runs, 1 Blank

Client #	1511
Job #	1110-42
PO #	Verbal
Report Date	11/10/10

Compound	Sample ID / Catch Weight (µg)		
	SN-13G Run #1	***SN-13G Run #2***	***SN-13G Run #3***
Formaldehyde	282	196	128
	Water Blank		
Formaldehyde	0.810 ND		

Results

Company	ESC	Client #	1511
Analyst	KHB	Job #	1110-42
Parameters	EPA Method 316	PO #	Verbal
# Samples	3 Runs, 1 Blank	Report Date	11/10/10

MDL	0.0200	(µg/mL)	Lower Curve Limit	0.271	(µg/mL)
LOQ	0.271	(µg/mL)	Upper Curve Limit	3.25	(µg/mL)

Compound Formaldehyde

Sample ID	Lab ID	Absorbance	Analytical Concentration (µg/mL)	Dilution	Volume (mL)	Catch Weight (ug)	Qual
SN-13G Run #1	15	0.6251	1.3773	5	41.0	282	
SN-13G Run #2	16	0.4500	0.9916	5	39.5	196	
SN-13G Run #3	17	0.3007	0.6626	5	38.5	128	
Water Blank	19	0.0047	0.0200	1	40.5	0.810	ND
Method Blank	10	0.0020	0.0200	1	1.00	0.0200	ND
LD / SN-13G Run #1	20	0.6211	1.3687	5	41.0	281	
					% Difference	0.6%	
AD / SN-13G Run #1	21	0.3132	0.6902	10	41.0	283	
					% Difference	0.2%	
MS / SN-13G Run #1	20	1.2897	2.8419	1	2.50	7.10	
					spike amount (ug)	5.41	
					native amount (ug)	1.69	
					Spike recovery	100%	
Spec34pg74 SS#1	8	0.6194	1.3648	1	1.00	1.36	
					Tag amount (ug)	1.31	
					Spike recovery	104%	
Spec34pg74 SS#2	9	0.6186	1.3631	1	1.00	1.36	
					Tag amount (ug)	1.31	
					Spike recovery	104%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	ESC, Inc.
Analyst	KHB
Parameters	EPA Method 316
# Samples	3 runs and 1 blank

Client #	1511
Job #	1110-42
PO #	Verbal
Report Date	November 9, 2010

Custody	Heather Tarjeft received the samples on 11/8/10 after being relinquished by Environmental Services Company, Inc. The samples were received at 17.3°C in good condition. Prior to, during, and after 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 sodium sulfite reagent was used within 24 hours of preparation. Formaldehyde standards were made by diluting a certified solution with DIUF-grade water. Samples and standards were 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 pararosaniline reagent. The Hewlett Packard Model 8453A, Diode Array Spectrophotometer ("Gomez" S/N US53400446) was operated at 570 nm.
Calibration	The calibration curve is located in the Calibration Curve Spectra section of this report.
QC Notes	The following Quality Control Samples (9.0) were analyzed: field blank (9.2.1), method blank (9.2.3) and an alternate dilution (not required by the method). 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. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and 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 letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID 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. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

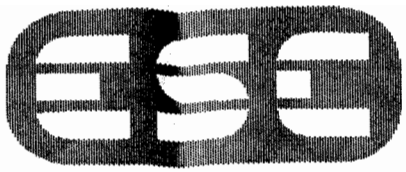
General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole 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 displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Sample Custody

Environmental Services Company, Inc.
Corporate Office
13715 West Markham
Little Rock, AR 72211
P.O. Box 55146
Little Rock, AR 72215
website: www.esclabs.com
Phone: 501-221-2565
Fax: 501-221-1341



Environmental Services Company, Inc.
Northwest Branch
1107 Century
Springdale, AR 72764
Phone : 479-750-1170
Fax: 479-750-1172

CHAIN OF CUSTODY

Client Information		Project Information	
Company Name:	Environmental Services Co., Inc.	Permit/Project #:	
Address:	13715 West Markham	Purchase Order #:	
	Little Rock, AR 72211	Work Order #	
Telephone:	501-221-2565	Sampler Name(s):	Jeff Woosley
FAX:			
Contact:	Jeff Woosley	and Signature(s):	
ESC Client Number:	1511		

Sample Identification	Sample Collection				Sample Containers				Requested Parameters
Identification	Date	Time	Type	Matrix	Type	Volume	Preservative	#	Formaldehyde per Method 316
SN-13G Run #1	10/26/10	1139-1239	Comp.	Liquid	VOA	~40 ml	N/A	1	X
SN-13G Run #2	"	1250-1350	"	"	"	"	"	1	X
SN-13G Run #3 HLT 11/8/10	"	1358-1458	"	"	"	"	"	1	X
Water Blank	"	1330	Grab	"	"	"	"	1	X

Relinquished By: (Signature and Printed Name)	Date	Time	Received By: (Signature and Printed Name)	Date	Time
Jeff Woosley	11/05/10	1600	FEDERAL EXPRESS	11/05/10	1600
Relinquished By: (Signature and Printed Name)	Date	Time	Received By: (Signature and Printed Name)	Date	Time
				11/8/10	1020am
Relinquished By: (Signature and Printed Name)	Date	Time	Received for Lab By: (Signature and Printed Name)	Date	Time
			Heather Tarbet		

Custody Seals: Used? ☐ Intact? ☐
Turnaround: Regular X Special ☐
Were samples properly preserved: Yes ☐ No ☐

Cool all samples to 4 degrees C with ice.

Comments:
Run #1: Total sample volume = 675 ml
Run #2: Total sample volume = 745 ml
Run #3: Total sample volume = 760 ml
Report blank volume in concentration

Flow Data	Field Test	Time	Analyst	Result	Result	Units
Analyst:	pH:					
Time:	DO:					
Reading:	Temp:					C F
Units:	Debris					
Chlorinated? Y N	Fecal Start:			This Document is Page 1 of 1		

Temp= 17.3C Raytek gun #7

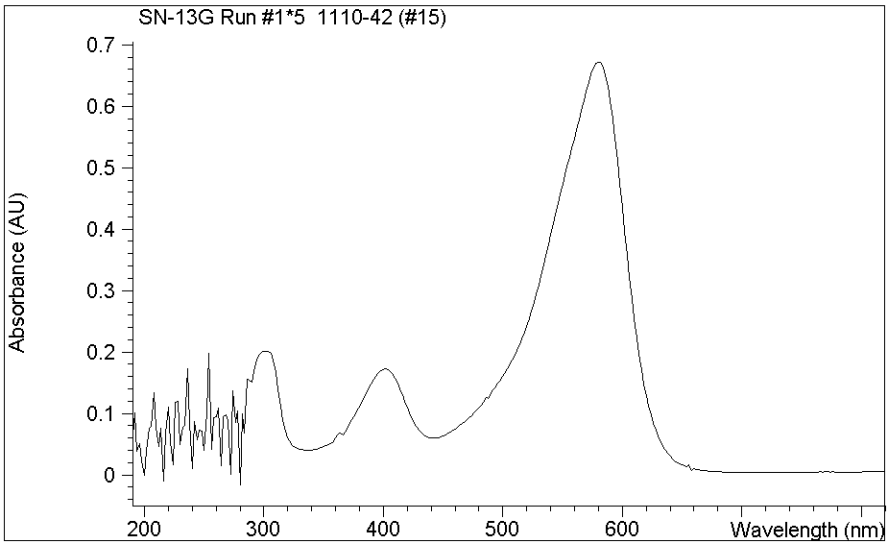
Sample Spectra

*** Results Report ***

Method file (modified)
NAIMA.M
Number of Samples 8
Operator KHB

Sample 1

Processed Sample Spectrum

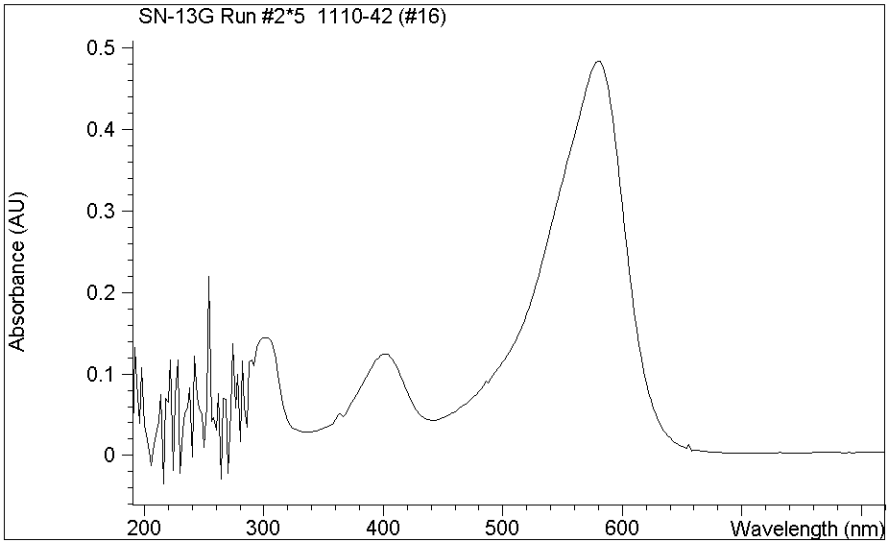


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	1.37730	0.01635	ug/mL

Sample 2

Processed Sample Spectrum

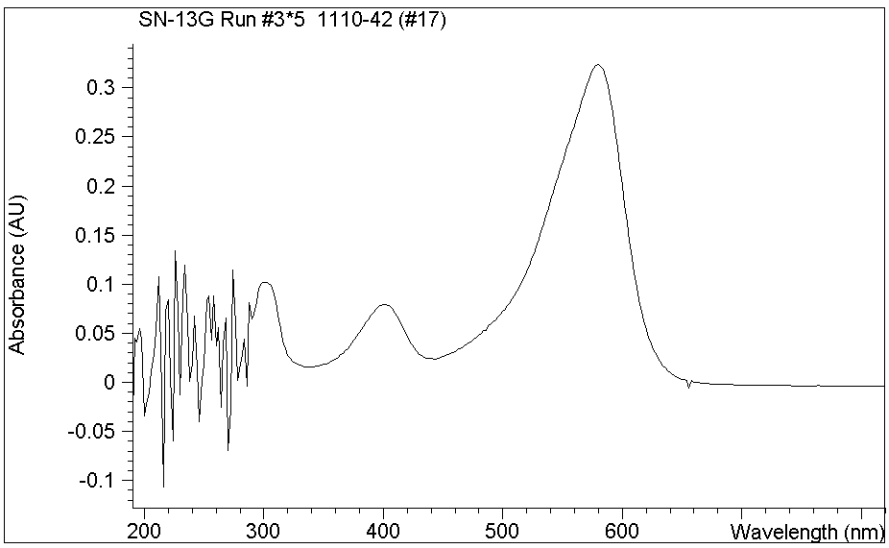


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	0.99156	0.01595	ug/mL

Sample 3

Processed Sample Spectrum

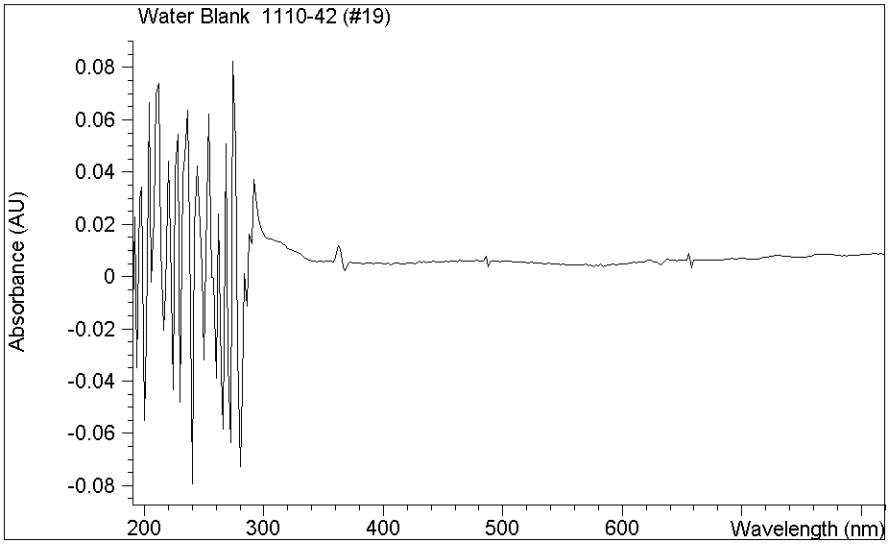


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	0.66255	0.01570	ug/mL

Sample 4

Processed Sample Spectrum

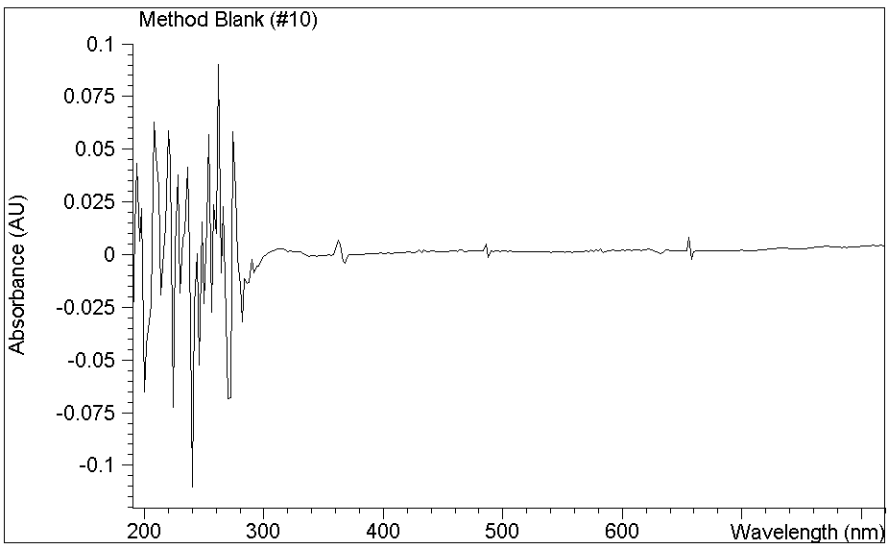


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	0.01025	0.01550	ug/mL

Sample 5

Processed Sample Spectrum

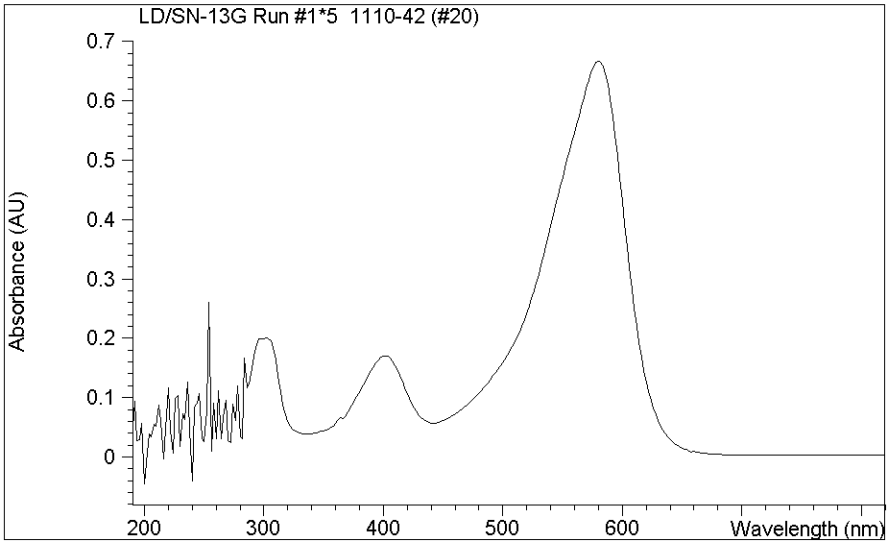


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	0.00440	0.01550	ug/mL

Sample 6

Processed Sample Spectrum

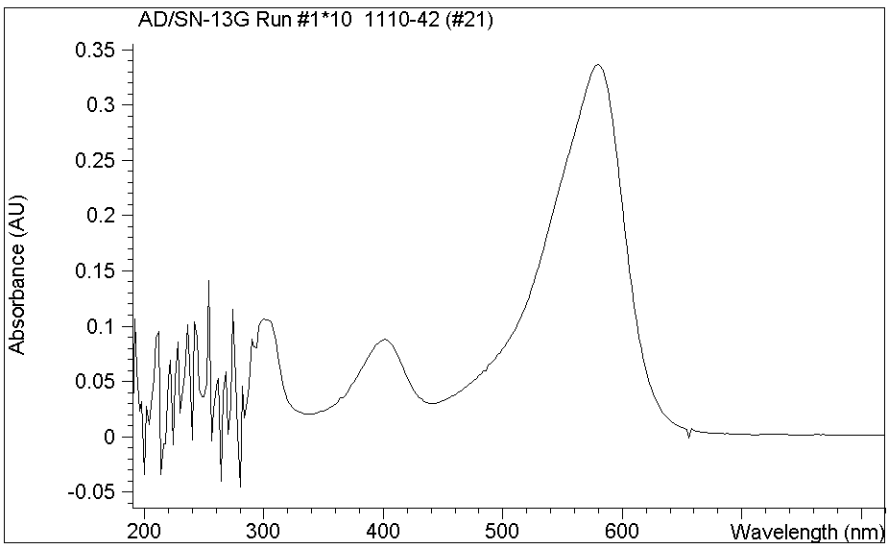


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	1.36868	0.01634	ug/mL

Sample 7

Processed Sample Spectrum

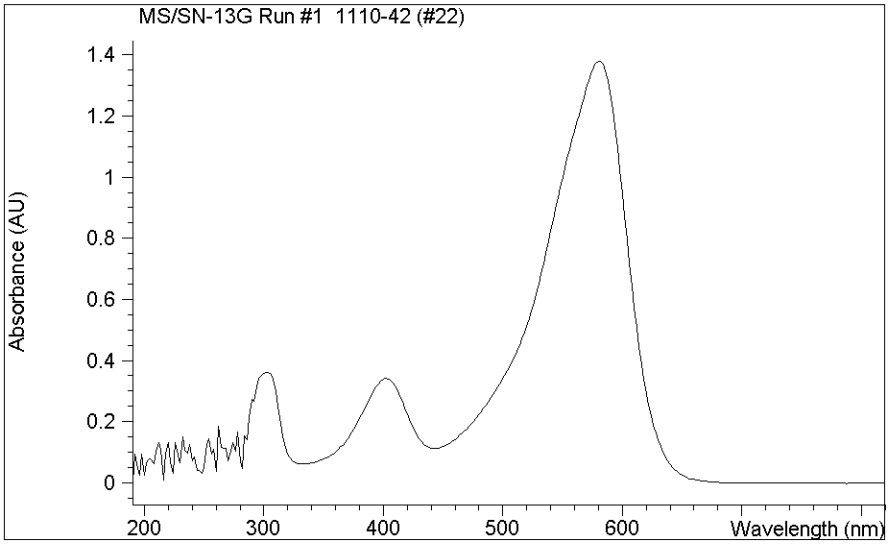


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	0.69016	0.01572	ug/mL

Sample 8

Processed Sample Spectrum



Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	2.84185	0.01887	ug/mL

*** End Results Report ***

SCA Quantification Results

#	Sample Name	WL Result	Std.Dev.	Value(ug/mL)	Std.Dev.	95% PI
1	SN-13G Run #1*5 111	0.62505	1.0059E-4	1.37730	1.6354E-2	4.2040E-2
2	SN-13G Run #2*5 111	0.45000	7.7102E-5	0.99156	1.5948E-2	4.0997E-2
3	SN-13G Run #3*5 111	0.30068	7.7091E-5	0.66255	1.5702E-2	4.0363E-2
4	Water Blank 1110-42	4.6520E-3	6.3348E-5	1.0251E-2	1.5500E-2	3.9845E-2
5	Method Blank (#10)	1.9965E-3	5.4457E-5	4.3993E-3	1.5500E-2	3.9845E-2
6	LD/SN-13G Run #1*5	0.62114	1.2462E-4	1.36870	1.6344E-2	4.2013E-2
7	AD/SN-13G Run #1*10	0.31321	7.2346E-5	0.69016	1.5719E-2	4.0407E-2
8	MS/SN-13G Run #1 11	1.28970	6.0253E-4	2.84190	1.8870E-2	4.8506E-2

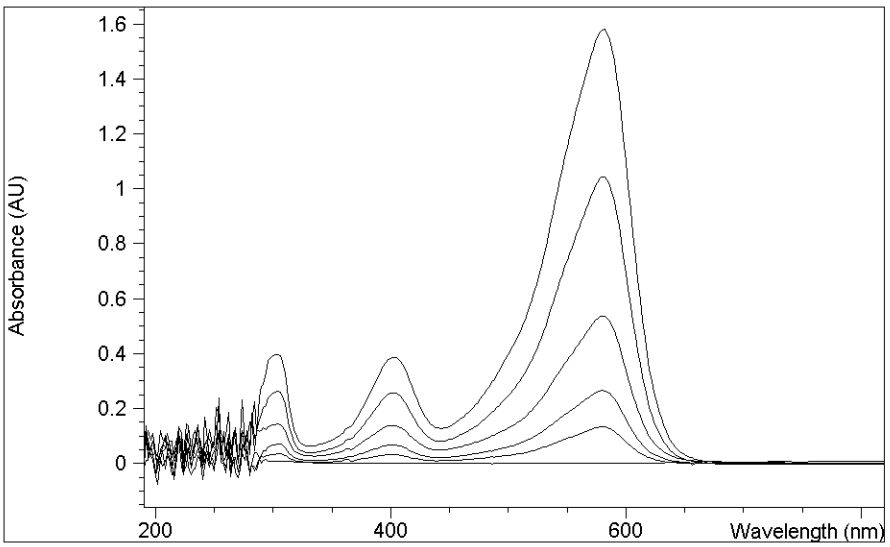
*** End Hardcopy window ***

Calibration Curve Spectra

*** Calibration Report ***

Number of Standards 6

Standard Spectra



#	Standard	Path Length Unit	Date	Time
1	Spec34pg74 #1 (#	1.000 cm	11/8/10	17:26:29
2	Spec34pg74 #2 (#	1.000 cm	11/8/10	17:26:38
3	Spec34pg74 #3 (#	1.000 cm	11/8/10	17:26:48
4	Spec34pg74 #4 (#	1.000 cm	11/8/10	17:26:59
5	Spec34pg74 #5 (#	1.000 cm	11/8/10	17:27:13
6	Spec34pg74 #6 (#	1.000 cm	11/8/10	17:27:29

Data Analysis:

Spectral Processing:

Absorbance

Use Wavelength(s):

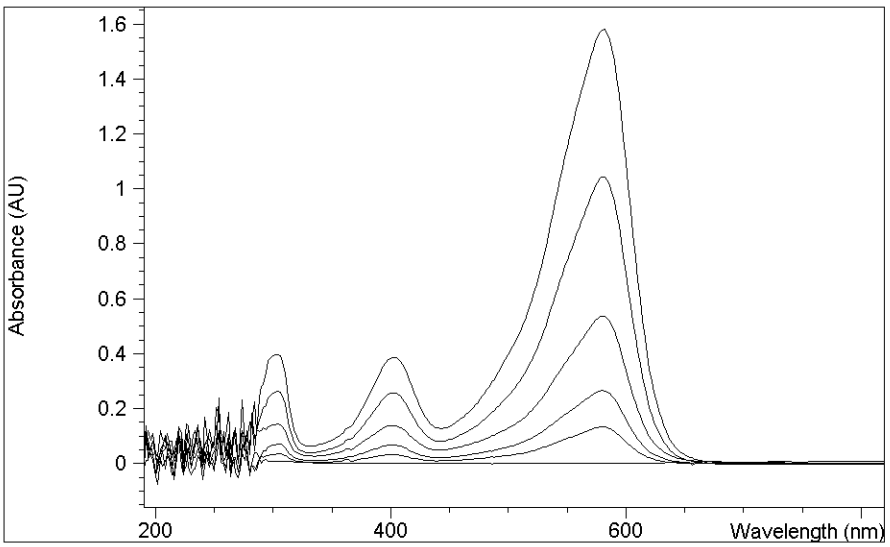
Single (nm): 570

Evaluation: SCA

Calibrated at: Date 11/9/2010 Time 10:41:49 AM
Operator: KHB

Weighting Method: Least squares
Calibration Curve: C = k1 * A

Analyte Name	Unit
Formaldehyde	ug/mL



Coefficients

k#	Value
1	2.20349

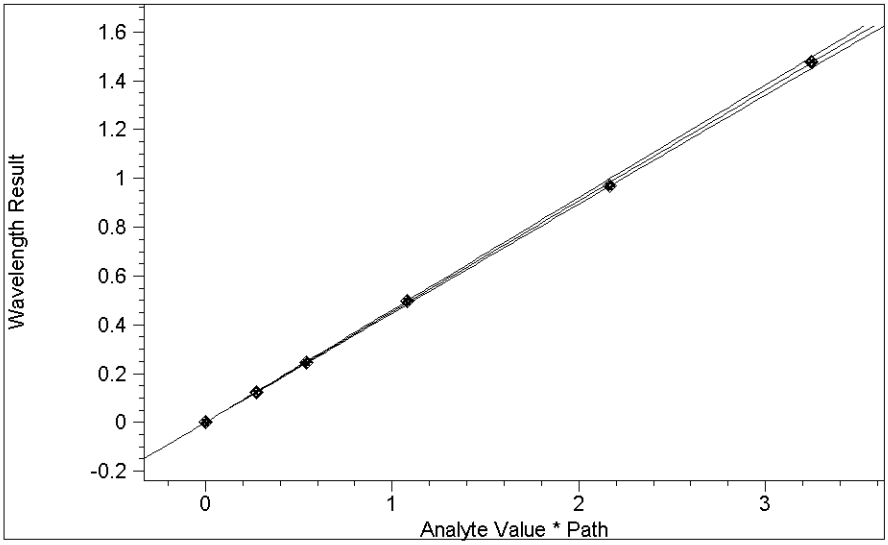
Used Wavelength Results (Absorbance (AU))

#	Value
1	0.00002
2	0.12313
3	0.24595
4	0.49839
5	0.96942
6	1.47885

Calibration Table of Formaldehyde (ug/mL)

#	Standard Name	Value	Fitted Val.	Error (%)
1	Spec34pg74 #1 (#	0.00000	0.00004	-100.0
2	Spec34pg74 #2 (#	0.27100	0.27132	-0.1
3	Spec34pg74 #3 (#	0.54100	0.54194	-0.2
4	Spec34pg74 #4 (#	1.08200	1.09820	-1.5
5	Spec34pg74 #5 (#	2.16400	2.13611	1.3
6	Spec34pg74 #6 (#	3.24600	3.25864	-0.4

Calibration Curve



SCA Summary

Analyte Name	Formaldehyde
Number of Standards	6
Calculation Method	LSQ
Calibration Curve	C = k1 * A
Coefficient k1	2.20350 ug/mL
Std.Dev. of k1	8.3440E-3 ug/mL
Std.Dev. of Calibration	1.5500E-2 ug/mL
Correl. Coeff. (R^2)	0.99993
Uncertainty	1.56 %

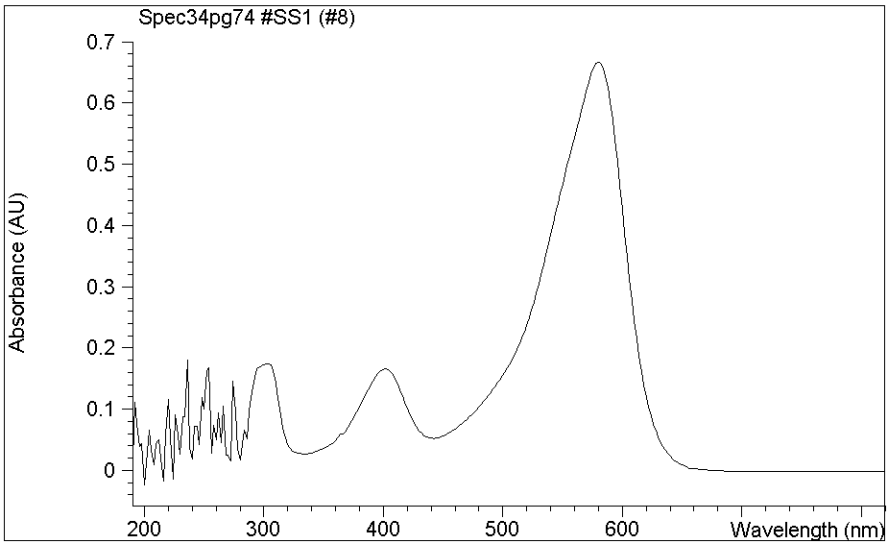
*** End Calibration Report ***

*** Results Report ***

Method file (modified)
NAIMA.M
Number of Samples 2
Operator KHB

Sample 1

Processed Sample Spectrum

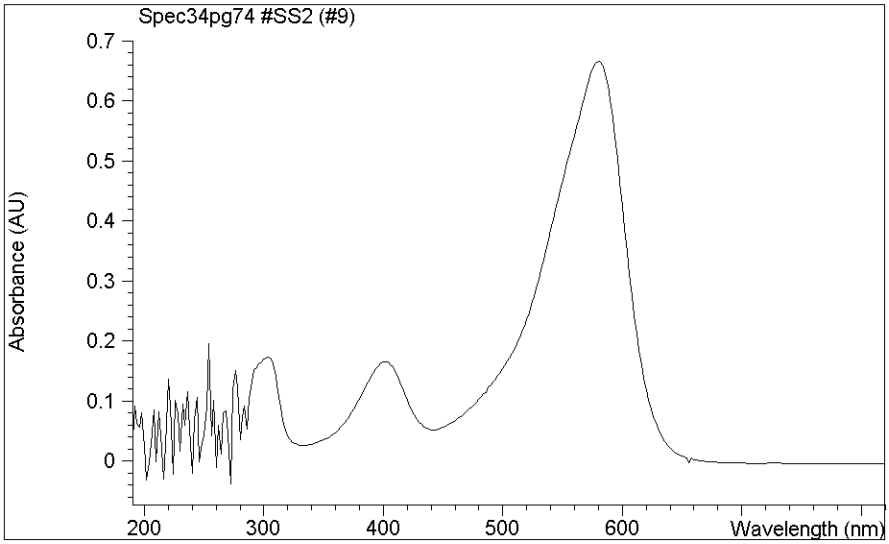


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	1.36479	0.01634	ug/mL

Sample 2

Processed Sample Spectrum



Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	1.36309	0.01634	ug/mL

*** End Results Report ***

SCA Quantification Results

#	Sample Name	WL Result	Std.Dev.	Value(ug/mL)	Std.Dev.	95% PI
1	Spec34pg74 #SS1 (#8)	0.61938	1.6538E-4	1.36480	1.6339E-2	4.2001E-2
2	Spec34pg74 #SS2 (#9)	0.61861	1.1682E-4	1.36310	1.6337E-2	4.1996E-2

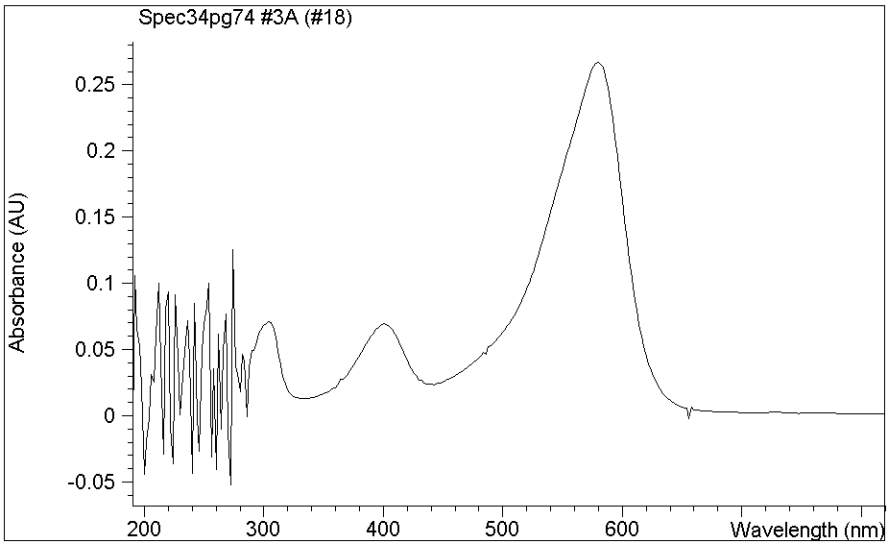
*** End Hardcopy window ***

*** Results Report ***

Method file (modified)
NAIMA.M
Number of Samples 2
Operator KHB

Sample 1

Processed Sample Spectrum

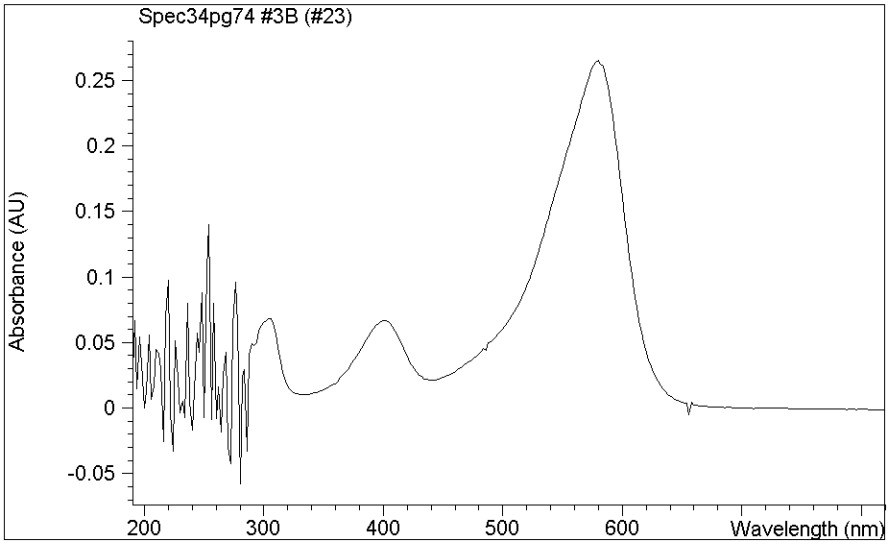


Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	0.54691	0.01564	ug/mL

Sample 2

Processed Sample Spectrum



Data Analysis Result

Analyte Name	Value	Std.Dev.	Unit
Formaldehyde	0.54175	0.01564	ug/mL

*** End Results Report ***

SCA Quantification Results

#	Sample Name	WL Result	Std.Dev.	Value(ug/mL)	Std.Dev.	95% PI
1	Spec34pg74 #3A (#18)	0.24820	9.3312E-5	0.54691	1.5638E-2	4.0199E-2
2	Spec34pg74 #3B (#23)	0.24586	5.9996E-5	0.54175	1.5635E-2	4.0192E-2

*** End Hardcopy window ***

Automation Table: S:\UV2010Q4\NOV\AUTOMAT\1110-42E.A

Run Automation From Line: 1 To Line: 23

#	Srce	Sample Name	Action	Parameter
1	1	Lab Blank H2O	Measure Blank	
2	2	Spec34pg74 #1	Measure Standard	
3	3	Spec34pg74 #2	Measure Standard	
4	4	Spec34pg74 #3	Measure Standard	
5	5	Spec34pg74 #4	Measure Standard	
6	6	Spec34pg74 #5	Measure Standard	
7	7	Spec34pg74 #6	Measure Standard	
8	8	Spec34pg74 #SS1	Measure Sample	
9	9	Spec34pg74 #SS2	Measure Sample	
10	10	Method Blank	Measure Sample	
11	11	KHB BS 1*2	Measure Sample	
12	12	KHB BS 2*2	Measure Sample	
13	13	KHB BS 3*2	Measure Sample	
14	14	KHB BS 4*2	Measure Sample	
15	15	SN-13G Run #1*5	1 Measure Sample	
16	16	SN-13G Run #2*5	1 Measure Sample	
17	17	SN-13G Run #3*5	1 Measure Sample	
18	18	Spec34pg74 #3A	Measure Sample	
19	19	Water Blank 1110-	Measure Sample	
20	20	LD/SN-13G Run #1*5	Measure Sample	
21	21	AD/SN-13G Run #1*1	Measure Sample	
22	22	MS/SN-13G Run #1	Measure Sample	
23	23	Spec34pg74 #3B	Measure Sample	

*** End Automation Table ***

This Is The Last Page Of This Report.

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

Lab No. 2010-02790-001

Date Rec'd. 11/01/2010

Date Sampled 10/26/2010 to 10/26/2010

Sampled By Client

Date: 11/05/2010 10:40:05

Sample ID: 20100279001

BIBLER BROS LUMBER CO

P.O.#

PO BOX 490
RUSSELLVILLE, AR 72811
ATTN: MATT HAGENLOCKER

Remark: SOUTHERN YELLOW PINE SAWDUST - DRY KILNS STACK TEST

PROXIMATE ANALYSIS		As Received	Dry Basis
% Moisture	D3302	53.58	*****
% Ash	D3174	0.23	0.49
% Volatile	D3175	*****	*****
% Fixed Carbon	D3172	*****	*****
BTU	D5865	4138	8914
MAF-BTU	D3180	8958	
% 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	53.58	*****
% Carbon	D5373	24.09	51.89
% Hydrogen	D5373	2.93	6.32
% Nitrogen	D5373	0.07	0.15
% Chlorine	D6721	*****	*****
% Sulfur	D4239B	< 0.01	< 0.01
% Ash	D3174	0.23	0.49
% Oxygen (Diff.)	D3176	19.11	41.18
(Chlorine D6721 Dry Basis ug/g		*****	)

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	0.55
lb SO2/mm BTU	< 0.01
Fouling Index ASME1974	*****
Slagging Index ASME1974	*****
(Mercury D6722 Dry Basis ug/g	*****)

Respectfully Submitted,

Project No. 1008520006

5.1 Probe Nozzles

The probe nozzles were measured with a micrometer and inspected prior to use as outlined in 40 CFR Part 60, Method 5, Section 10.1.

Environmental Services Co., Inc.
Nozzle Calibration
Per 40 CFR Part 60, Appendix A, Method 5, Section 10.1

Customer:	Bibler Brothers Lumber Company
Project No:	1008520006
Source No:	SN-13G

Visual Inspection

1.	Is nozzle nicked?	N	(Y/N)
2.	Is nozzle dented?	N	(Y/N)
3.	Is nozzle corroded?	N	(Y/N)

Measurement Calibration

1.	Measurement #1	0.413	in.
2.	Measurement #2	0.413	in.
3.	Measurement #3	0.413	in.
4.	Difference between low and high measurement	0.000	in.
5.	Average diameter	0.413	in.

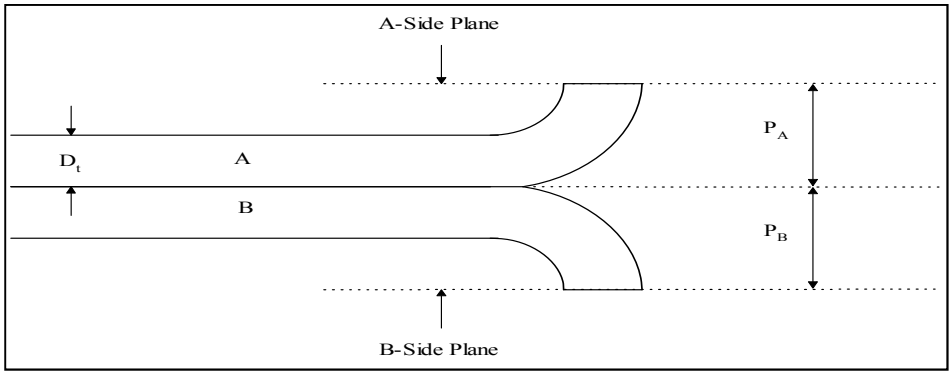
In order to meet the specifications of Section 10.1, the nozzle must not be nicked, dented or corroded and the difference between the low and high measurements must be ≤0.004 inches.

5.2 Pitot Tubes

The pitot tubes used during this test program were fabricated according to the specifications described and illustrated in 40 CFR Part 60, Appendix A, Method 2. The pitot tubes were recalibrated before field use as prescribed in Method 2, Section 6.1.1.

Environmental Services Co., Inc.
Pitot Calibration
Per 40 CFR Part 60, Appendix A, Method 2, Section 6.1.1

Customer:	Bibler Brothers Lumber Company
Project No:	1008520006
Source No:	SN-13G
Pitot ID:	3-G1



Measurements

D_t	0.375	in.
P_A	0.500	in.
P_B	0.500	in.

Calculations

$1.05D_t$	0.3938	in.
$1.50D_t$	0.5625	in.

Calibration:

In order to meet the specifications of Section 6.1.1, the following criteria must be met:

1. D_t must be between 3/16 and 3/8 inch
2. $P_A = P_B$
3. $1.05\ D_t < P < 1.50\ D_t$

Do pitots meet calibration specifications? Y (Y/N)

5.3 Metering Systems

The test meters were calibrated according to Method 5, Section 10.3. A copy of the pre-test and post-test calibration for the test meter used in this test program is attached.

Environmental Services Co., Inc.

EPA Method 5

ESC Meter Box Calibration

Post-Test Orifice Method

English Meter Box Units, English K' Factor

Model #: C-5000

Serial #: 1226

Date: ---------- 09/17/10

Barometric Pressure: ----------> 30.06 in. Hg

Theoretical Critical Vacuum: -----> 14.18 in. Hg

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3)*(°R)^{0.05}/((in\ .\ Hg)*(min))$.

---------- DRY GAS METER READINGS ----------									-CRIT. ORIFICE READINGS-		AMBIENT TEMPERATURE			
dH	Time	Volume Initial	Volume Final	Volume Total	Initial Temps Inlet	Initial Temps Outlet	Final Temps. Inlet	Final Temps. Outlet	Orifice Serial #	K' Orifice Coeff.	Actual Vacuum	Initial	Final	Average
(in H2O)	(min)	(ft^3)	(ft^3)	(ft^3)	(°F)	(°F)	(°F)	(°F)	(number)	(above)	(in. Hg)	(°F)	(°F)	(°F)
0.64	10.00	669.000	673.308	4.308	75.0	75.0	75.0	75.0	CT48	0.3297	23.0	74.6	73.6	74.1
1.20	10.00	673.700	679.446	5.746	75.0	75.0	76.0	75.0	CT55	0.4379	21.0	74.6	75.2	74.9
1.90	10.00	679.800	687.152	7.352	76.0	75.0	77.0	76.0	CT63	0.5613	19.5	75.6	73.6	75.4
3.60	5.25	710.900	716.196	5.296	82.0	77.0	82.0	77.0	CT73	0.7738	18.0	75.8	76.0	75.9
5.20	11.50	696.400	710.565	14.165	80.0	76.0	74.0	69.0	CT81	0.9652	16.0	76.2	70.4	73.4

---------- DRY GAS METER ----------			---------- ORIFICE ----------		DRY GAS METER	---------- ORIFICE ----------			
VOLUME CORRECTED Vm(std) (ft^3)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (ft^3)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (ft^3)	CALIBRATION FACTOR "Y" Value (number)	CALIBRATION FACTOR "Y" Variation (number)	CALIBRATION FACTOR dH@ Value (in H2O)	CALIBRATION FACTOR dH@ Value (mm H2O)	CALIBRATION FACTOR dH@ Variation (in H2O)
4.277	121.1	4.288	121.4	4.319	1.003	-0.001	1.941	49.30	-0.024
5.709	161.7	5.692	161.2	5.741	0.997	-0.007	2.066	52.48	0.101
7.307	206.9	7.292	206.5	7.363	0.998	-0.006	1.991	50.57	0.026
5.251	148.7	5.275	149.4	5.331	1.005	0.001	1.981	50.33	0.016
14.225	402.8	14.447	409.1	14.533	1.016	0.012	1.846	46.90	-0.119
				Average Y ----------	1.004				
				Average dH@ ---------->			1.965	49.91	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68°F and 29.92" Hg, acceptable tolerance of individual values from the average is ±0.2.

Environmental Services Co., Inc.

EPA Method 5

ESC Meter Box Calibration

Post-Test Orifice Method

English Meter Box Units, English K' Factor

Model #: C-5000

Serial #: 1226

Date: ----------> 10/15/10

Barometric Pressure: ----------> 30.10 in. Hg

Theoretical Critical Vacuum: ------> 14.20 in. Hg

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3)*(°R)^{0.05}/((in\ .\ Hg)*(min))$.

---------- DRY GAS METER READINGS ----------									-CRIT. ORIFICE READINGS-		AMBIENT TEMPERATURE		
		Volume	Volume	Volume	Initial Temps		Final Temps.		Orifice	K' Orifice	Actual			
dH	Time	Initial	Final	Total	Inlet	Outlet	Inlet	Outlet	Serial #	Coeff.	Vacuum	Initial	Final	Average
(in H2O)	(min)	(ft^3)	(ft^3)	(ft^3)	(°F)	(°F)	(°F)	(°F)	(number)	(above)	(in. Hg)	(°F)	(°F)	(°F)
1.20	9.50	833.100	838.591	5.491	86.0	85.0	87.0	85.0	CT55	0.4379	20.5	79.6	79.4	79.5
2.10	8.00	839.000	844.893	5.893	87.0	85.0	88.0	85.0	CT63	0.5613	18.5	79.4	80.0	79.7
3.70	5.50	845.100	850.678	5.578	88.0	85.0	89.0	86.0	CT73	0.7738	16.5	79.8	79.4	79.6

---------- DRY GAS METER ----------		---------- ORIFICE ----------		DRY GAS METER	---------- ORIFICE ----------				
VOLUME	VOLUME	VOLUME	VOLUME	VOLUME	CALIBRATION		CALIBRATION FACTOR		
CORRECTED	CORRECTED	CORRECTED	CORRECTED	NOMINAL	FACTOR "Y"		dH@		
Vm(std)	Vm(std)	Vcr(std)	Vcr(std)	Vcr	Value	Variation	Value	Value	Variation
(ft^3)	(liters)	(ft^3)	(liters)	(ft^3)	(number)	(number)	(in H2O)	(mm H2O)	(in H2O)
5.358	151.736	5.391	152.673	5.478	1.006	-0.003	2.043	51.89	-0.036
5.757	163.052	5.818	164.766	5.914	1.011	0.002	2.177	55.29	0.098
5.463	154.724	5.515	156.176	5.604	1.009	0.001	2.016	51.20	-0.063
				Average Y ---------->	1.009				
				Average dH@ ---------->			2.078	52.79	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68°F and 29.92" Hg, acceptable tolerance of individual values from the average is ±0.2.

Environmental Services Co., Inc.

EPA Method 5

ESC Meter Box Calibration

Post-Test Orifice Method

English Meter Box Units, English K' Factor

Model #: C-5000

Serial #: 1226

Date: ---------- 10/26/10

Barometric Pressure: ----------> 30.01 in. Hg

Theoretical Critical Vacuum: ----------> 14.16 in. Hg

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3)*(°R)^{0.05}/((in\ .\ Hg)*(min))$.

---------- DRY GAS METER READINGS ----------									-CRIT. ORIFICE READINGS-		AMBIENT TEMPERATURE		
		Volume	Volume	Volume	Initial Temps		Final Temps.		Orifice	K' Orifice	Actual			
dH	Time	Initial	Final	Total	Inlet	Outlet	Inlet	Outlet	Serial #	Coeff.	Vacuum	Initial	Final	Average
(in H2O)	(min)	(ft^3)	(ft^3)	(ft^3)	(°F)	(°F)	(°F)	(°F)	(number)	(above)	(in. Hg)	(°F)	(°F)	(°F)
1.20	9.25	964.500	969.792	5.292	74.0	74.0	75.0	74.0	CT55	0.4379	20.5	72.4	72.8	72.6
2.10	7.25	970.000	975.271	5.271	75.0	74.0	75.0	75.0	CT63	0.5613	17.5	72.8	73.4	73.1
3.80	5.25	975.500	980.715	5.215	75.0	74.0	77.0	74.0	CT73	0.7738	16.5	73.2	73.8	73.5

---------- DRY GAS METER ----------		---------- ORIFICE ----------		DRY GAS METER	---------- ORIFICE ----------				
VOLUME	VOLUME	VOLUME	VOLUME	VOLUME	CALIBRATION		CALIBRATION FACTOR		
CORRECTED	CORRECTED	CORRECTED	CORRECTED	NOMINAL	FACTOR "Y"		dH@		
Vm(std)	Vm(std)	Vcr(std)	Vcr(std)	Vcr	Value	Variation	Value	Value	Variation
(ft^3)	(liters)	(ft^3)	(liters)	(ft^3)	(number)	(number)	(in H2O)	(mm H2O)	(in H2O)
5.259	148.939	5.267	149.168	5.299	1.002	-0.006	2.064	52.44	-0.056
5.245	148.535	5.289	149.792	5.326	1.008	0.001	2.199	55.85	0.079
5.208	147.497	5.278	149.479	5.319	1.013	0.006	2.097	53.27	-0.023
				Average Y ---------->	1.008				
				Average dH@ ---------->			2.120	53.85	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68°F and 29.92" Hg, acceptable tolerance of individual values from the average is ±0.2.

5.4 Temperature Gauges

All thermocouples were calibrated against a reference thermocouple that was certified against a National Bureau of Standards (NSB) traceable mercury-in-glass thermometer as outlined in Approved Alternative Method ALT-011.

METHOD 5 THERMOCOUPLE CALIBRATION FORM
APPROVED ALTERNATIVE METHOD ALT-011
THERMOCOUPLE CALIBRATION FORM

Type of Thermocouple Type K	Standard Fluke-52 SN 5820128	
Identification Console 1226, Probe 3-G1, #4 Adapter ESC002	Job ID 1008520006	
METER INLET		
Standard Temperature °F	Test Thermocouple Temperature °F	Temperature Difference*
68.4	69	0.88%
METER OUTLET		
Standard Temperature °F	Test Thermocouple Temperature °F	Temperature Difference*
67.0	68	1.49%
STACK TEMPERATURE		
Standard Temperature °F	Test Thermocouple Temperature °F	Temperature Difference*
144.8	143	1.24%
DRYER IMPINGER		
Standard Temperature °F	Test Thermocouple Temperature °F	Temperature Difference*
58.4	59	1.03%
PROBE TEMPERATURE		
Standard Temperature °F	Test Thermocouple Temperature °F	Temperature Difference*
249.4	248	0.56%
OVEN TEMPERATURE		
Standard Temperature °F	Test Thermocouple Temperature °F	Temperature Difference*
248.2	250	0.73%

$$\text{Temperature Difference} = \frac{\left|\text{Standard Temperature - Test Thermocouple Temperature}\right|}{\text{Standard Temperature}} \text{ x } 100 = \leq 2.0\%$$

Complies with the requirements of ANSI/NCSL Z540.1-1994 (R2002)

FLUKE ® Everett Service Center

1420 75th St. SW
Everett, Washington 98203
USA

Calibration Certificate

NQA ISO 9001:2000 (10100/2)

Description:	K/J THERMOMETER	**Certificate Number:**	762716-5820128:1279179569
Manufacturer:	FLUKE	**Date of Calibration:**	15 July 2010
Model:	52	**Date of Certificate:**	15 July 2010
Serial Number:	5820128	**Recommended Due Date:**	15 July 2011
Customer Name:	ENVIRONMENTAL SERVICES COMPANY INC	**Procedure Name:**	FLUKE 52: (1 YEAR) CAL VER
City, State:	LITTLE ROCK, AR	**Procedure Revision:**	1.4
Customer Item ID:	5820128	**Data Type:**	FOUND-LEFT
PO Number:	WOOSLEY CCS	**Temperature:**	22.30 °Celsius
RMA Number:	4515729	**Relative Humidity:**	37 %
Result Summary:	PASS		
Received Date:			

In the attached measurement measurement results, deviation may be expressed with units, Measured Value (MV) - Nominal Value (NV) or as a proportion of the nominal value ((MV-NV)/NV), expressed without units with a scalar multiplier such as % (0.01), or as a ratio of the units (mA/A, µV/V, etc.) Descriptions such as µA/A, µV/V, and others, where used to annotate results or column headings are the preferred replacements for what was historically labeled as "ppm" or parts-per-million and described the results in that column, unless otherwise noted by units symbols.

The Data type that could be found in this certificate must be interpreted as:

- As-Found - Calibration data collected before the unit is adjusted and/or repaired.
- As-Left - Calibration data collected after the unit is adjusted and/or repaired.
- Found-Left - Calibration data collected without any adjustment and/or repair performed.

Unless otherwise stated the TUR (Test Uncertainty Ratio) of this calibration is 4:1 or greater.

This Calibration conforms to ANSI/NCSL Z540.1-1994(R2002)

Results are reviewed to establish where any measurement results exceeded the manufacturer's specifications.
Measured values greater than the Manufacturer's specification (Spec) are indicated by "!".

This certificate applies only to the item identified and shall not be reproduced other than in full, without the specific written approval by Fluke Corporation. The user is obliged to have the object recalibrated at appropriate intervals. Calibration certificates without signature are not valid.

Comments:

Long Le
Metrology Technician

Dennis Destefan
Lead Metrologist

Traceability Information
For each parameter listed below the calibration was conducted using an unbroken chain of standards to:

DC Voltage
The Voltage Reference standard group, traceable to the Fluke Primary Standards Laboratory, which is traceable to the U.S. representation of the volt, through the internationally accepted value of the Josephson constant Kj=483597.9 GHz/V and a 10 Volt Josephson Array Voltage Standard.

Frequency and Period
The GPS-Rubidium Disciplined oscillator frequency standard, traceable to the United States Naval Observatory (USNO), which is traceable to the National Institute of Standards and Technology.

AC Voltage, Resistance, DC Current, AC Current, Capacitance, Inductance, Phase
The Fluke Primary Standards Laboratory, which is traceable to the National Institute of Standards and Technology.

AC Voltage Flatness
The Fluke Primary Standards Laboratory, or Agilent Technologies Standards Laboratory which are traceable to the National Institute of Standards and Technology.

Humidity
The Vaisala Measurement Standards Laboratory Primary Salt calibration bath, with traceability based on the physical phenomena in which the equilibrium relative humidity values associated with certain saturated salt solutions are known.

Rise Time
The Tektronix GmbH Calibration Laboratory which is traceable to the Physikalisch-Tecnische Bundensanstalt.

Radiation Temperature
The National Institute of Standards and Technology, the Physikalisch-Tecnische Bundensanstalt, or Hart Scientific.

Contact Temperature
The Fluke Primary Standards Laboratory, Hart Scientific, which are traceable to the National Institute of Standards and Technology.

Gas Flow
The DHI Calibration Laboratory, which is traceable to the National Institute of Standards and Technology.

Pressure
The DHI Calibration Laboratory, which is traceable to the Laboratoire National D'Essais, Physikalisch-Technische Bundesanstalt and National Institute of Standards and Technology, or traceable to the Mensor or Ashcroft Calibration Laboratories, which are traceable to the National Institute of Standards and Technology.

Standards Used

Asset #	Instrument Model	Cal Date	Cal Due
10054	FLUKE 5500A CALIBRATOR	02 November 2009	02 November 2010

Calibration Results

Function/Range	Nominal Value	Measured Value	TUR	Manufacturer's Specifications Lower Limit	Upper Limit
The UUT Offset Adjustment has been adjusted prior to this procedure.					
DISPLAY TEST					
Result of Operator Evaluation		PASS			
MEASUREMENT TEST					
INPUT 1 (K-TYPE)					
Was UUT Zero reading 0.0 +/- 0.4U?		PASS			
-182.0 °C	-182.00	-182.3		-182.9	-181.1
The preceding test uses a guardbanding technique					

Calibration Results

Function/Range	Nominal Value	Measured Value	TUR	Manufacturer's Specifications Lower Limit	Upper Limit
to maintain the same Consumer Risk as a 4:1 TUR.					
-89.0 °C	-89.00	-89.0		-89.8	-88.2
530.0 °C	530.00	530.6		528.8	531.2
1355.0 °C	1355.00	1356.6		1352.9	1357.1
-295.6 °F	-295.60	-296.0		-297.2	-294.0
The preceding test uses a guardbanding technique to maintain the same Consumer Risk as a 4:1 TUR.					
-128.2 °F	-128.20	-128.0		-129.6	-126.8
986.0 °F	986.00	987.2		983.7	988.3
2471.0 °F	2471.00	2474.0		2467.2	2474.8
INPUT 2 (K-TYPE)					
Was UUT Zero reading 0.0 +/- 0.4U?		PASS			
-182.0 °C	-182.00	-182.4		-182.9	-181.1
The preceding test uses a guardbanding technique to maintain the same Consumer Risk as a 4:1 TUR.					
-89.0 °C	-89.00	-89.1		-89.8	-88.2
530.0 °C	530.00	530.3		528.8	531.2
1355.0 °C	1355.00	1356.4		1352.9	1357.1
-295.6 °F	-295.60	-296.6		-297.2	-294.0
The preceding test uses a guardbanding technique to maintain the same Consumer Risk as a 4:1 TUR.					
-128.2 °F	-128.20	-128.2		-129.6	-126.8
986.0 °F	986.00	986.8		983.7	988.3
2471.0 °F	2471.00	2473.4		2467.2	2474.8
INPUT 1 (J-TYPE)					
Was UUT Zero reading 0.0 +/- 0.4U?		PASS			
-197.0 °C	-197.00	-197.4		-198.0	-196.0
258.0 °C	258.00	258.3		256.9	259.1
705.0 °C	705.00	705.5		703.5	706.5
-322.6 °F	-322.60	-323.4		-324.3	-320.9
496.4 °F	496.40	496.8		494.5	498.3
1301.0 °F	1301.00	1302.2		1298.3	1303.7
INPUT 2 (J-TYPE)					

FLUKE ®

Certificate Number:
762716-5820128:1279179569

Calibration Date:
15-Jul-10

Calibration Results

Function/Range	Nominal Value	Measured Value	TUR	Manufacturer's Specifications Lower Limit	Upper Limit
Was UUT Zero reading 0.0 +/- 0.4U?		PASS			
-197.0 °C	-197.00	-197.0		-198.0	-196.0
258.0 °C	258.00	258.4		256.9	259.1
705.0 °C	705.00	705.7		703.5	706.5
-322.6 °F	-322.60	-323.2		-324.3	-320.9
496.4 °F	496.40	497.0		494.5	498.3
1301.0 °F	1301.00	1302.4		1298.3	1303.7

End of Report

5.5 Calibration Gasses

All calibration standards are guaranteed and certified by the manufacturer to be prepared in accordance to regulations set forth by the United States Environmental Protection Agency concerning the production of calibration standards. A copy of the manufacturer's certificate for each cylinder used in this testing program is attached.

LIQUID TECHNOLOGY CORPORATION

"INDUSTRY LEADER IN SPECIALTY GASES"

Certificate of Analysis

- EPA PROTOCOL GAS -

Customer	Environmental Services Company, Inc. (Little Rock, AR)
Date	July 14, 2010
Delivery Receipt	DR-29982
Gas Standard	10.0% CO2, 19.0% Oxygen/Nitrogen
Final Analysis Date	July 08, 2010
Expiration Date	July 08, 2013

DO NOT USE BELOW 150 psig

Cylinder Data

Cylinder Serial Number:	CC-166364	Cylinder Outlet:	CGA 590
Cylinder Volume:	140 Cubic Feet	Cylinder Pressure:	2000 psig, 70°F
Expiration Date:	July 08, 2013		

Analytical Data

EPA Protocol, Section No. 2.2, Procedure G-1

Replicate Concentrations
Carbon Dioxide: 10.2% +/- 0.10%
Oxygen: 18.8% +/- 0.18%
Nitrogen: Balance

Reference Standard(s):

GMIS/SRM:	GMIS	GMIS/GMIS
Cylinder Number:	CC-165377	CC-231332/CC-85458
Concentration:	10.05% CO2/Nitrogen	10.10% Oxygen/20.97% O2/Nitrogen
Expiration Date:	04/06/11	03/04/11 - 04/15/11

Certification Instrumentation

Component:	Carbon Dioxide	Oxygen
Make/Model:	Agilent 7890A	Servomex 244a
Serial Number:	CN10736166	1847
Principal of Measurement:	GC-TCD	Paramagnetic
Last Calibration:	June 09, 2010	June 28, 2010

Analytical uncertainty and NIST Traceability are in compliance with EPA-600/R-97/121.

Certified by:

Adam Strickland

2564 PEMBERTON DRIVE APOPKA, FLORIDA 32703 ~ PHONE (407)-292-2990 FAX (407)-292-3313

Liquid Technology Corporation

Industry Leader in Specialty Gases, Equipment and Service

Certificate of Analysis

- EPA PROTOCOL GAS -

Customer	Environmental Services Company (Little Rock, AR)
Date	July 21, 2009
Delivery Receipt	DR-25418
Gas Standard	5.00% CO2, 10.00% Oxygen/Nitrogen-EPA PROTOCOL
Final Analysis Date	July 20, 2009
Expiration Date	July 20, 2012
Component	Carbon Dioxide, Oxygen
Balance Gas	Nitrogen

Analytical Data: **DO NOT USE BELOW 150 psig**

EPA Protocol, Section No. 2.2, Procedure G-1

Reported Concentrations

Carbon Dioxide: 5.17% +/- 0.05%

Oxygen: 10.06% +/- 0.10%

Nitrogen: Balance

Reference Standards:

SRM/GMIS:	GMIS	GMIS
Cylinder Number:	CC-159026	CC-231332
Concentration:	5.14% CO2/Nitrogen	10.1% Oxygen/Nitrogen
Expiration Date:	March 31, 2011	March 04, 2011

Certification Instrumentation

Component:	Carbon Dioxide	Oxygen
Make/Model:	Agilent 7890A	Servomex 244a
Serial Number:	CN10736166	1847
Principal of Measurement:	GC-TCD	Paramagnetic
Last Calibration:	July 07, 2009	July 01, 2009

Cylinder Data

Cylinder Serial Number:	CC-231376	Cylinder Outlet:	CGA 590
Cylinder Volume:	140 Cubic Feet	Cylinder Pressure:	2000 psig, 70°F

Analytical Uncertainty and NIST Traceability are in compliance with EPA-600/R-97/121.

Certified by: Mike Duncan

Mike Duncan

Unmatched Excellence

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET, TROY, MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

P.O. No.: 57768-71-65000

AIR LIQUIDE AMERICA SPECIALTY GASES LLC Project No.: 05-81734-001
1290 COMBERMERE STREET
TROY, MI 48083

Customer

CLEAN AIR ENGINEERING
DON ALLEN
500 W. WOOD STREET
PALATINE IL 60067

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: ALM000250 Certification Date: 09Nov2009 Exp. Date: 08Nov2012
Cylinder Pressure***: 2015 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
CARBON MONOXIDE	120	PPM	+/- 1%	Direct NIST and VSL
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.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2636	02Oct2011	KAL003802	240.8 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0928621	05Nov2009	FTIR

ANALYZER READINGS

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

First Triad Analysis

CARBON MONOXIDE

Date: 02Nov2009 Response Unit:PPM
Z1 = -0.02028 R1 = 101.0930 T1 = 120.7415
R2 = 101.1020 Z2 = 0.14906 T2 = 120.8168
Z3 = 0.24118 T3 = 120.8474 R3 = 101.3177
Avg. Concentration: 120.6 PPM

Second Triad Analysis

Date: 09Nov2009 Response Unit: PPM
Z1 = 0.01587 R1 = 240.3707 T1 = 119.9290
R2 = 241.0337 Z2 = 0.27852 T2 = 120.5082
Z3 = 0.57619 T3 = 120.5388 R3 = 241.1454
Avg. Concentration: 120.1 PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 9.99995E-1
Constants: A = 0.00000E+0
B = 9.86984E-1 C = 6.38000E-4
D = 1.00000E-6 E = 0.00000E+0

APPROVED BY: _____
JEFF CROTEAU

LIQUID TECHNOLOGY CORPORATION

"INDUSTRY LEADER IN SPECIALTY GASES"

Certificate of Analysis

- EPA PROTOCOL GAS -

Customer	Environmental Services Company (Little Rock, AR)
Date	October 28, 2010
Delivery Receipt	DR-31087
Gas Standard	45-55 ppm Nitric Oxide, 200-250 ppm Carbon Monoxide/Nitrogen
Final Analysis Date	October 25, 2010
Expiration Date	October 25, 2012

DO NOT USE BELOW 150 psig

Analytical Data:
EPA Protocol, Section No. 2.2, Procedure G-1.

Reported Concentrations:
Nitric Oxide: 48.4 ppm +/- 0.48 ppm
Carbon Monoxide: 229 ppm +/- 2.2 ppm
Nitrogen: Balance
Total NOx: 48.8 ppm
** Total NOx for Reference Use Only **

Reference Standards

SRM/GMIS	GMIS	GMIS/GMIS
Cylinder Number:	CC-159111	CC-185093/CC-251549
Concentration:	48.86 ppm NO	100.48 ppm CO/267.38 ppm CO
Expiration Date:	09/20/12	01/28/12 - 11/01/11

Certification Instrumentation

Component:	Nitric Oxide	Carbon Monoxide
Make/Model:	Horiba - CLA 510	Horiba - VIA 510
Serial Number:	43331870031	UUBKWXYV
Principal of Measurement:	Chemiluminescence	NDIR
Last Calibration:	October 04, 2010	October 01, 2010

Cylinder Data

Cylinder Number:	EB-0027125	Cylinder Volume:	140 Cubic Feet
Cylinder Outlet:	CGA 660	Cylinder Pressure:	2000 psig, 70°F
Expiration Date:	October 25, 2012		

Analytical Uncertainty and NIST Traceability are in compliance with EPA-600/R-97/121.

Certified by:

Adam Strickland

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