GEORGIA PACIFIC CORPORATION
BROWN STOCK WASHER LINES
CLEAN CONDENSATE ALTERNATIVE
REPORT

TOLEDO, OREGON
PAPER MILL

NOVEMBER 5-6, 2014

Permit #21-0005

Prepared: January 6, 2014

Prepared by:

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EXECUTIVE SUMMARY

The November 2014 results of Georgia Pacific's Brownstock Washers (BSW) testing are summarized below.

Brownstock Washers Testing Results

Source	MeOH (ppm)	Flow (dscfm)	MeOH (lb/day)	Production (ODT/day)	Emissions (lb/ODT)
Kraft Brownstock Washer #1 (EU 128-A)					
Washer Hood Vent	0.00	0	0.00		
Foam Breaker Vent	331.02	1,818	72.24		
Vacuum Pump Exhaust	29.52	1576	5.59		
#1 BSW Sum			**77.83**	386	
Kraft Brownstock Washer #2 (EU 128-B)					
Combined Vent	88.41	2,576	27.17		
#2 BSW Sum			**27.17**	352	
Kraft Brownstock Washer #3 (EU 128-C)					
Combined Vent	274.23	799	26.50		
#3 BSW Sum			**26.50**	399	
Totals for #1, #2, #3 Brownstock Washers			**131.50**	**1,137**	**0.116**

Detailed discussions and results from this emissions test project are included in the body of this report.

CONTENTS

1.0 SOURCE INFORMATION AND TEST DATE

Georgia Pacific's Toledo Paper Mill hired Bighorn Environmental to conduct source testing on its Brownstock Washers (BSW) to quantify their emissions of methanol. Bighorn conducted the source tests on November 5-6, 2014 to accurately quantify emissions from these sources. This testing was conducted to determine compliance with the CCA rules as outlined in their Title V permit.

Georgia Pacific's Dan Kunde and Karl Schumacher coordinated the project. Mr. Kunde and Mr. Schumacher oversaw the testing. Bighorn's Collin Rose, Clayton Krietzman and Tim Homer conducted three-one hour runs on each source on the three Brownstock Washers. Table 1 lists sources, test dates, and times.

TABLE 1. SOURCE TEST DATES AND TIMES

SOURCE	DATE	TIME
Kraft Brownstock Washer #1 (EU 128-A)		
Washer Hood Vent	11/6/14	Not tested, see note Section 2.0
Foam Breaker Vent	11/6/14	09:10-10:10; 10:35-11:35; 11:55-12:55
Vacuum Pump Exhaust	11/6/14	09:10-10:10; 10:35-11:35; 11:55-12:55
Kraft Brownstock Washer #2 (EU 128-B)		
Combined Vent	11/5/14	14:00-15:00; 15:10-16:10; 16:19-17:19
Kraft Brownstock Washer #3 (EU 128-C)		
Combined Vent	11/5/14	09:55-10:55; 11:00-12:00; 12:5-13:05

2.0 POLLUTANTS AND TEST METHODS

Bighorn Environmental conducted Methanol source tests on Georgia Pacific's Brownstock Washers using its source sampling equipment. After the samples were gathered, they were sent to ACC for analysis. Chain of custody forms can be found in the Appendix.

Bighorn performed velocity traverses to calculate flow rates and convert analytical data to emission concentrations and rates. Table 3 outlines the test methods Bighorn used.

TABLE 3. TEST METHODS

PARAMETER	TEST METHODS
Velocity & Flow	EPA Method 1, 1A & 2
Moisture	ODEQ Method 4
Methanol	NCASI CI/SG/PULP-94.03

When trying to obtain velocity readings on the #1 BSW combined vent, the flow readings were "backward", i.e. the flow was towards the BSW hood and away from the stack vent. This was verified with both the pitot tube and also inserting a rag into the stack and observing it "flutter" toward the BSW hood. Therefore no testing was conducted on this source. These reverse flows were verified at the beginning, middle and end of each test. An explanation by the engineer who designed the system outlining the reason for this can be found in the Appendix.

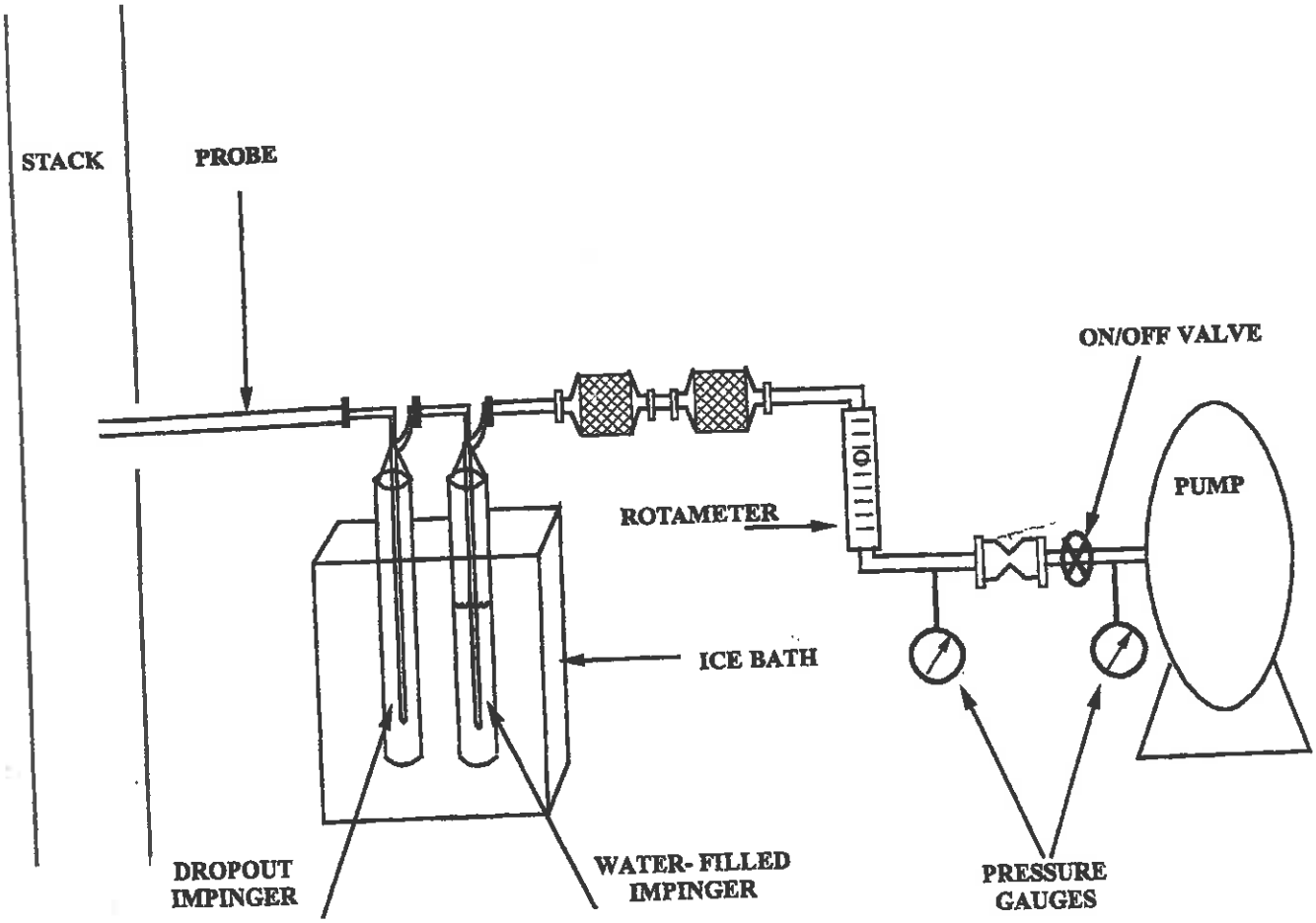
Georgia Pacific petitioned EPA to use the NCASI Method in place of EPA Method 308 for Methanol. EPA approved this deviation, and the associated letters can be found in the Appendix.

Stack moisture was measured using ODEQ Method 4 and two measurements were taken and recorded during each run.

3.0 SOURCE SAMPLING EQUIPMENT

Figure 1 is a schematic of Bighorns Sampling Train used for the testing of Methanol.

FIGURE 1. NCASI METHANOL SAMPLING TRAIN



4.0 RESULTS

Table 4 summarizes the results from the Brown Stock Washer Line testing.

Table 4. Brownstock Washers Emissions Results

Source	MeOH (ppm)	Flow (dscfm)	MeOH (lb/day)	Production (ODT/day)	Emissions (lb/ODT)
Kraft Brownstock Washer #1 (EU 128-A)					
Washer Hood Vent	0.00	0	0.00		
Foam Breaker Vent	331.02	1,818	72.24		
Vacuum Pump Exhaust	29.52	1576	5.59		
#1 BSW Sum			**77.83**	386	
Kraft Brownstock Washer #2 (EU 128-B)					
Combined Vent	88.41	2,576	27.17		
#2 BSW Sum			**27.17**	352	
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Combined Vent	274.23	799	26.50		
#3 BSW Sum			**26.50**	399	
Totals for #1, #2, #3 Brownstock Washers			**131.50**	**1,137**	**0.116**

Field data sheets, flow rate information, analytical data, calculated emissions data, and calculations are contained in Appendices A-B. Appendix D contains Georgia Pacific's production data for this project.

5.0 SUPPORTING DATA

Supporting data sheets are located in Appendix A while required support equipment quality control records are in Appendix C.

6.0 QUALITY ASSURANCE

Bighorn's QA procedures follow EPA's *Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. III, Stationary Source Specific Methods* September 1994 as revised and amended (#EPA/600/R-94/038c). Bighorn used EPA method specific quality assurance procedures. The following *July 1, 2013 40 CFR 60* sections were referenced for this project:

Appendix A - Methods 1, 2, 4 and NCASI CI/SG/PULP-94.03

Bighorn Environmental is zealous in our commitment to thorough quality practices. We conduct stringent quality assurance and quality control (QA and QC) procedures on all reference CEMS and support equipment.

Bighorn employs the latest CAI and Advanced Pollution Incorporated (API) CEMS that are considered state-of-the-art by environmental professionals. We've designed an effective primary sample conditioner that works in concert with Horiba's secondary conditioners. Together, they provide dry, clean sample gas to Bighorn's CEMS.

EPA Protocol No. 1 first order QA standards allow Bighorn to challenge equipment and methods to ensure that data is valid for determining monitor accuracy and precision. Before each test, Bighorn challenges its monitors and then entire system at the probe which simulates actual sampling. QA standards introduced at the sample probe traverse through all sample lines, conditioning chambers, and monitors to determine initial system integrity or bias. Following each test, Bighorn conducts QA of the entire monitoring system to determine final system bias and test calibration drift.

Bighorn's Mobile Air Emissions Laboratory contain two APC Model 1400 uninterruptible power supplies (UPS) to complement our QA/QC commitment. These QC devices continuously regulate and condition client-supplied 120 VAC power so Bighorn's electronic analyzers receive a consistent clean 115 $\pm$ 5 VAC signal. Chronic brownout and over-voltage conditions are eliminated thereby reducing hardware failures and data errors. Also, temporary power outages do not shut down our CEMS nor jeopardize data quality because the UPS' generate consistent pure sine wave signals for up to one hour with their built in batteries.

Cross checks such as manual calculations of Bighorn's automated DAS computer generated results allow test results verification. Bighorn files manufacturers' accuracy certificates and interference tables for CEMS, flow controllers, gases, etc. Additionally dry gas meters, pitot tubes, thermocouples, gas dividers, etc. are certified as per EPA

requirements and frequencies. Where EPA frequencies are not specified, Bighorn has established those based on state regulatory criteria.

Thorough chain-of-custody procedures and documentation provide proof of our QA/QC efforts. Relevant QA/QC documentation is included in this final report's Appendices for results support and regulatory review.

APPENDIX A
SUPPORTING DATA

Georgia Pacific				
#1 BSW Foam Breaker				
Emissions Rates Calculations				
6-Nov-14				
	#1 BSW Foam Breaker			
	Run #1	Run #2	Run #3	**Average**
	09:10-10:10	10:35-11:35	11:55-12:55	
MeOH (ppm)	278.3625	470.7149	243.9800	331.0191
Stack Flow:				
acfm:	2173	2250	2208	2211
dscfm:	1789	1839	1826	1818
Pulp Production:				
ODT/day:	386.00	386.00	386.00	386.0000
MeOH Emissions at Standard Conditions:				
lb/hr.:	2.48626	4.32066	2.22345	3.0101
lb/day.:	59.67023	103.69594	53.36284	72.2430
lb/ODT:	0.15459	0.26864	0.13825	0.1872

00001

Georgia Pacific				
#1 BSW Foam Breaker				
11/6/2014				
Total MeOH catch & DGM volume				
Run 1				
DGM Volume (l)	23.992			
Meter Y	1.006			
DGM Temp (C)	15.2			
Baro Pressure	29.81			
DGM Volume (dscl)	24.448			
			Total MeOH catch (mirco g)	9070
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	278.36253			
Run 2				
DGM Volume (l)	24.033			
Meter Y	1.006			
DGM Temp (C)	16.4			
Baro Pressure	29.81			
DGM Volume (dscl)	24.39			
			Total MeOH catch (mirco g)	15300
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	470.71489			
Run 3				
DGM Volume (l)	24.013			
Meter Y	1.006			
DGM Temp (C)	16.9			
Baro Pressure	29.81			
DGM Volume (dscl)	24.33			
			Total MeOH catch (mirco g)	7910
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	243.98001			

Georgia Pacific
#1 BSW Foam Breaker
Stack Gas Flow Rate Data and Calculations
6-Nov-14

Run #1

Barometric Pressure:		29.81				
Stack Diameter or Dimensions (in.):			15.75			
Cross Sectional Area (sq ft):			1.3529699			
Pitot Tube Avg. Coeff.:		0.84				
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.2	115	575	-0.06	29.81	0.4472
2	0.21	115	575	-0.06	29.81	0.4583
3	0.21	115	575	-0.06	29.81	0.4583
4	0.19	115	575	-0.06	29.81	0.4359
5	0.22	115	575	-0.06	29.81	0.469
6	0.23	115	575	-0.06	29.81	0.4796
7	0.21	115	575	-0.06	29.81	0.4583
8	0.19	115	575	-0.06	29.81	0.4359
9	0.19	115	575	-0.06	29.81	0.4359
10	0.19	115	575	-0.06	29.81	0.4359
11	0.2	115	575	-0.06	29.81	0.4472
12	0.2	115	575	-0.06	29.81	0.4472
13	0.16	115	575	-0.06	29.81	0.4
14	0.19	115	575	-0.06	29.81	0.4359
15	0.2	115	575	-0.06	29.81	0.4472
16	0.2	115	575	-0.06	29.81	0.4472
AVG.		115.00	575.00		29.81	0.4462
wet bulb temp. (deg F):		115.00				
stack vapor pressure:		2.9774087		O2	CO2	N2
%H2O:		9.9894312		17.7	0	82.3
Molecular Density:		0.9001057				
Molecular weight of dry gas:			28.708	lb/lb mole dry		
Molecular weight of wet stack gas:			27.638332	lb/lb mole wet		
Stack gas velocity at stack conditions:				1606.34207	afpm	
Stack gas flow rate at std. conditions:				1789.45946	dscfm	
Stack gas flow rate at stack conditions:				2173.33249	acfm	

Georgia Pacific
#1 BSW Foam Breaker
Stack Gas Flow Rate Data and Calculations
6-Nov-14

Run #2

Barometric Pressure:	29.81					
Stack Diameter or Dimensions (in.):	15.75					
Cross Sectional Area (sq ft):	1.3529699					
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.2	116.5	576.5	-0.06	29.81	0.4472
2	0.2	116.5	576.5	-0.06	29.81	0.4472
3	0.2	116.5	576.5	-0.06	29.81	0.4472
4	0.23	116.5	576.5	-0.06	29.81	0.4796
5	0.21	116.5	576.5	-0.06	29.81	0.4583
6	0.24	116.5	576.5	-0.06	29.81	0.4899
7	0.22	116.5	576.5	-0.06	29.81	0.469
8	0.22	116.5	576.5	-0.06	29.81	0.469
9	0.23	116.5	576.5	-0.06	29.81	0.4796
10	0.23	116.5	576.5	-0.06	29.81	0.4796
11	0.25	116.5	576.5	-0.06	29.81	0.5
12	0.23	116.5	576.5	-0.06	29.81	0.4796
13	0.22	116.5	576.5	-0.06	29.81	0.469
14	0.19	116.5	576.5	-0.06	29.81	0.4359
15	0.16	116.5	576.5	-0.06	29.81	0.4
16	0.18	116.5	576.5	-0.06	29.81	0.4243
AVG.		116.5	576.5		29.81	0.461
wet bulb temp. (deg F):		116.50				
stack vapor pressure:		3.1091027		O2	CO2	N2
%H2O:		10.431275		17.58	0	82.42
Molecular Density:		0.8956873				
Molecular weight of dry gas:			28.7032	lb/lb mole dry		
Molecular weight of wet stack gas:			27.58672	lb/lb mole wet		
Stack gas velocity at stack conditions:				1663.27274	afpm	
Stack gas flow rate at std. conditions:				1838.98727	dscfm	
Stack gas flow rate at stack conditions:				2250.35798	acfm	

Georgia Pacific
#1 BSW Foam Breaker
Stack Gas Flow Rate Data and Calculations
6-Nov-14

Run #3

Barometric Pressure:	29.81					
Stack Diameter or Dimensions (in.):	15.75					
Cross Sectional Area (sq ft):	1.3529699					
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.19	114.5	574.5	-0.07	29.80	0.4359
2	0.23	114.5	574.5	-0.07	29.80	0.4796
3	0.23	114.5	574.5	-0.07	29.80	0.4796
4	0.23	114.5	574.5	-0.07	29.80	0.4796
5	0.22	114.5	574.5	-0.07	29.80	0.469
6	0.2	114.5	574.5	-0.07	29.80	0.4472
7	0.2	114.5	574.5	-0.07	29.80	0.4472
8	0.2	114.5	574.5	-0.07	29.80	0.4472
9	0.18	114.5	574.5	-0.07	29.80	0.4243
10	0.19	114.5	574.5	-0.07	29.80	0.4359
11	0.2	114.5	574.5	-0.07	29.80	0.4472
12	0.19	114.5	574.5	-0.07	29.80	0.4359
13	0.19	114.5	574.5	-0.07	29.80	0.4359
14	0.21	114.5	574.5	-0.07	29.80	0.4583
15	0.22	114.5	574.5	-0.07	29.80	0.469
16	0.22	114.5	574.5	-0.07	29.80	0.469
AVG.		114.5	574.5		29.80	0.4538
wet bulb temp. (deg F):		114.00				
stack vapor pressure:		2.8923602		O2	CO2	N2
%H2O:		9.6873009		17.7	0	82.3
Molecular Density:		0.903127				
Molecular weight of dry gas:			28.708	lb/lb mole dry		
Molecular weight of wet stack gas:			27.670684	lb/lb mole wet		
Stack gas velocity at stack conditions:				1632.12459	afpm	
Stack gas flow rate at std. conditions:				1825.82669	dscfm	
Stack gas flow rate at stack conditions:				2208.21546	acfm	

Average stack gas flow rate at standard conditions: ***1818 dscfm***
Average stack gas flow rate at stack conditions: ***2211 acfm***
Avg % Mois 10.04 ***Average Velocity*** 1633.91

00005

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/6/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: #2 Fiber Breaker

Run Number: 1
Start Time: 910 Stop Time: 1010
Ambient Temp at Start: 50 Ambient Temp at Stop: 50
Barometric Pressure: 29.81

Leak Test
Time: 930 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1012 Final Measurement (in Hga): 0 on DGM,
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 58 2. 58 3. 60 4. 60 5. 61 Avg: 15.12 C
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings 0

Time: 920	Flow: 3.946
Time: 930	Flow: 8.003
Time: 940	Flow: 12.013
Time: 950	Flow: 16.001
Time: 1000	Flow: 19.984
Time: 1010	Flow: 23.997

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: Bottle 2: Initial Weight:
Final Weight: Final Weight:

Notes/Comments
DGM used for sample volume collection

Bottle # 9

Box #2

	Dry Bulb	Wet bulb
1	115	115
2	115	115
Avg	115	115

Figure 2. Field Sampling Data Sheet

00006

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/6/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: #1 From Breaker

Run Number:
Start Time: 1035 Stop Time: 1135
Ambient Temp at Start: 50 Ambient Temp at Stop: 52
Barometric Pressure: 29.81

Leak Test

Time: 1030 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1136 Final Measurement (in Hga): 0 on DGM, no bubbles
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement

Average of 5 flow measurements for Pre-Sample FlowRate:
1. 60 2. 61 3. 62 4. 62 5. 63 Avg: 16.4C
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings Ø

Time: 1045 Flow: 4.072
Time: 1055 Flow: 8.009
Time: 1105 Flow: 12.017
Time: 1115 Flow: 16.034
Time: 1125 Flow: 20.021
Time: 1135 Flow: 24.033

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):

Bottle 1: Initial Weight: Bottle 2: Initial Weight:
Final Weight: Final Weight:

Notes/Comments

DGM used for sample volume collection

Bottle #11

Box #2

	Dry Bulb	Wet bulb
1	117	117
2	116	116
Avg	116.5	116.5

Figure 2. Field Sampling Data Sheet

00007

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/6/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: #1 Fcm Breaker

Run Number: 3
Start Time: 1155 Stop Time: 1255
Ambient Temp at Start: 50 Ambient Temp at Stop: 50
Barometric Pressure: 29.81

Leak Test
Time: 1151 Initial Measurement (in Hga): Ø on DGM, no bubbles
Time: 1257 Final Measurement (in Hga): Ø on DGM
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 62 2. 62 3. 62 4. 63 5. 63 Avg: 16.9
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings Ø

Time: 1205 Flow: 3.902
Time: 1215 Flow: 7.977
Time: 1225 Flow: ~~11.~~ 11.963
Time: 1235 Flow: 16.001
Time: 1245 Flow: 20.022
Time: 1255 Flow: 24.073

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: Bottle 2: Initial Weight:
Final Weight: Final Weight:

Notes/Comments
DGM used for sample volume collection

Bottle #13

	Dry Bulb	Wet bulb
1	114	113
2	115	115
Avg	114.5	114

Box #2

Figure 2. Field Sampling Data Sheet

GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	#1 Foam Breaker
Date	11/6/14 ~~1/0/1900~~	Operator:	Homer	Run No.:	1 & 2
Barometric Press.	29.81	Reading Location:	Lab	Ambient Temp:	
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)		% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:		Last Calibration:	

				Cyclonic Flow Check	
Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Vel. At 0 reference	Angle to get 0 Flow
RUN #1 1	.20	See Met	-.06	0	0
2	.21			0	0
3	.21			0	0
4	.19			0	0
5	.22			.02	5
6	.23			.03	4
7	.21			0	0
8	.19			0	0
9	.19			.03	5
10	.19			.03	5
11	.20			0	0
12	.20			0	0
13	.16			.01	2
14	.19			0	0
15	.20			0	0
16	.20			0	0
RUN #2 1	.20		-.06		
2	.20				
3	.20				
4	.23				
5	.21				
6	.24				
7	.22				
8	.22				

GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	#1 Foam Breaker
Date	11/6/14 ~~1/0/1900~~	Operator:	Homer	Run No.:	2&3
Barometric Press.	0	Reading Location:	Lab	Ambient Temp:	0
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)	0	% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:	0	Last Calibration:	1/0/1900

				Cyclonic Flow Check	
Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Vel. At 0 reference	Angle to get 0 Flow
RUN #2					
9	.23				
10	.23				
11	.25				
12	.23				
13	.22				
14	.19				
15	.16				
16	.18				
RUN #3					
1	.19		-.07		
2	.23				
3	.23				
4	.23				
5	.22				
6	.20				
7	.20				
8	.20				
9	.18				
10	.19				
11	.20				
12	.19				
13	.19				
14	.21				
15	.22				
16	.22				

TRAVERSE POINT LOCATION WORKSHEET
METHOD 1

DATA

Plant:	GP-Toledo	Location:	Toledo, OR
Source:	#1 Foam Breaker, Combinded Vent	Operator:	Homer
Date		Port Depth(in.):	0.125
Stack Dia. (in.)	15.75	Stack Area (ft2):	1.35
Distance to disturbance:			
Upstream(ft):		Downstream(ft):	
# of traverse points required:		16	

STACK CROSS SECTION DIAGRAM

See Diagram

Traverse point #	% of Stack Dia.	Stack Dia.	% of Stack Dia. X Stack Dia.	Port Depth	Taverse Point Location
1	0.032	15.75	0.5	0.125	0.63
2	0.105	15.75	1.7	0.125	1.78
3	0.194	15.75	3.1	0.125	3.18
4	0.323	15.75	5.1	0.125	5.21
5	0.677	15.75	10.7	0.125	10.79
6	0.806	15.75	12.7	0.125	12.82
7	0.895	15.75	14.1	0.125	14.22
8	0.968	15.75	15.2	0.125	15.37

NOTES: _____

Georgia Pacific				
#1 BSW Vacuum Pump Exhaust				
Emissions Rates Calculations				
6-Nov-14				
	#1 BSW Vacuum Pump Exhaust			
	Run #1	Run #2	Run #3	**Average**
	09:10-10:10	10:35-11:35	11:55-12:55	
MeOH (ppm)	28.9090	28.1061	31.5413	29.5188
Stack Flow:				
acfm:	1700	1783	1904	1795.6888
dscfm:	1500	1560	1670	1576.6000
Pulp Production:				
ODT/day:	386.00	386.00	386.00	386.0000
MeOH Emissions at Standard Conditions:				
lb/hr.:	0.21643	0.21885	0.26289	0.2327
lb/day.:	5.19424	5.25245	6.30934	5.5853
lb/ODT:	0.01346	0.01361	0.01635	0.0145

MeOH concentration

Georgia Pacific				
#1 BSW Vacuum Pump Exhaust				
11/6/2014				
Total MeOH catch & DGM volume				
Run 1				
DGM Volume (l)	24.029			
Meter Y	1.006			
DGM Temp (C)	13.2			
Baro Pressure	29.81			
DGM Volume (dscl)	24.657			
			Total MeOH catch (mirco g)	950.00
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	28.909029			
Run 2				
DGM Volume (l)	24.25			
Meter Y	1.006			
DGM Temp (C)	15.40			
Baro Pressure	29.81			
DGM Volume (dscl)	24.693			
			Total MeOH catch (mirco g)	925.00
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	28.106141			
Run 3				
DGM Volume (l)	24.01			
Meter Y	1.006			
DGM Temp (C)	17.60			
Baro Pressure	29.81			
DGM Volume (dscl)	24.264			
			Total MeOH catch (mirco g)	1020.00
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	31.5413			

Georgia Pacific
#1 BSW Vacuum Pump Exhaust
Stack Gas Flow Rate Data and Calculations
6-Nov-14

Run #1

Barometric Pressure:	29.81					
Stack Diameter or Dimensions (in.):	10					
Cross Sectional Area (sq ft):	0.5454149					
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.53	101.3	561.3	0	29.81	0.728
2	0.91	101.3	561.3	0	29.81	0.9539
3	0.94	101.3	561.3	0	29.81	0.9695
4	0.82	101.3	561.3	0	29.81	0.9055
5	0.44	101.3	561.3	0	29.81	0.6633
6	0.88	101.3	561.3	0	29.81	0.9381
7	0.9	101.3	561.3	0	29.81	0.9487
8	0.92	101.3	561.3	0	29.81	0.9592
AVG.		101.30	561.30		29.81	0.8833
wet bulb temp. (deg F):		97.70				
stack vapor pressure:		1.7836937		O2	CO2	N2
%H2O:		5.8569194		17.7	0	82.3
Molecular Density:		0.9414308				
Molecular weight of dry gas:			28.708	lb/lb mole dry		
Molecular weight of wet stack gas:			28.080841	lb/lb mole wet		
Stack gas velocity at stack conditions:				3116.8014	afpm	
Stack gas flow rate at std. conditions:				1499.90525	dscfm	
Stack gas flow rate at stack conditions:				1699.95002	acfm	

Georgia Pacific
#1 BSW Vacuum Pump Exhaust
Stack Gas Flow Rate Data and Calculations
6-Nov-14

Run #2

Barometric Pressure:	29.81					
Stack Diameter or Dimensions (in.):	10					
Cross Sectional Area (sq ft):	0.5454149					
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.62	102.5	562.5	0	29.81	0.7874
2	0.9	102.5	562.5	0	29.81	0.9487
3	0.92	102.5	562.5	0	29.81	0.9592
4	0.88	102.5	562.5	0	29.81	0.9381
5	0.9	102.5	562.5	0	29.81	0.9487
6	0.89	102.5	562.5	0	29.81	0.9434
7	0.91	102.5	562.5	0	29.81	0.9539
8	0.84	102.5	562.5	0	29.81	0.9165
AVG.		102.5	562.5		29.81	0.9245
wet bulb temp. (deg F):	100.60					
stack vapor pressure:	1.9460891			O2	CO2	N2
%H2O:	6.4617748			17.58	0	82.42
Molecular Density:	0.9353823					
Molecular weight of dry gas:	28.7032 lb/lb mole dry					
Molecular weight of wet stack gas:	28.011583 lb/lb mole wet					
Stack gas velocity at stack conditions:	3269.69571 afpm					
Stack gas flow rate at std. conditions:	1560.03833 dscfm					
Stack gas flow rate at stack conditions:	1783.34086 acfm					

Georgia Pacific
#1 BSW Vacuum Pump Exhaust
Stack Gas Flow Rate Data and Calculations
6-Nov-14

Run #3

Barometric Pressure:	29.81					
Stack Diameter or Dimensions (in.):	10					
Cross Sectional Area (sq ft):	0.5454149					
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.84	102.5	562.5	0	29.81	0.9165
2	0.96	102.5	562.5	0	29.81	0.9798
3	1	102.5	562.5	0	29.81	1
4	1.1	102.5	562.5	0	29.81	1.0488
5	1	102.5	562.5	0	29.81	1
6	0.96	102.5	562.5	0	29.81	0.9798
7	0.98	102.5	562.5	0	29.81	0.9899
8	0.97	102.5	562.5	0	29.81	0.9849
AVG.		102.5	562.5		29.81	0.9875
wet bulb temp. (deg F):		99.50				
stack vapor pressure:		1.8828898		O2	CO2	N2
%H2O:		6.2110657		17.7	0	82.3
Molecular Density:		0.9378893				
Molecular weight of dry gas:			28.708	lb/lb mole dry		
Molecular weight of wet stack gas:			28.042919	lb/lb mole wet		
Stack gas velocity at stack conditions:				3490.50879	afpm	
Stack gas flow rate at std. conditions:				1669.85646	dscfm	
Stack gas flow rate at stack conditions:				1903.77561	acfm	

Average stack gas flow rate at standard conditions: ***1577 dscfm***
Average stack gas flow rate at stack conditions: ***1796 acfm***
Avg % Mois 6.18 ***Average Velocity*** 3292.34

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/6/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: #4 BSW - Vacuum Pump

Run Number: 1
Start Time: 910 Stop Time: 1010
Ambient Temp at Start: 50 Ambient Temp at Stop: 50
Barometric Pressure: 29.01

Leak Test
Time: 0905 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1012 Final Measurement (in Hga): 0 on DGM, No bubbles
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? (Yes) No

System Flow Rate Measurement °C
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 12 2. 12 3. 14 4. 14 5. 14 Avg: 13.2
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg: _____

DGM Temp / DGM Pressure

Rotameter Readings (0 CK)
Time: 920 Flow: 15 4.2.
Time: 930 Flow: 8.09
Time: 940 Flow: 12.04
Time: 950 Flow: 16.34
Time: 1000 Flow: 20.14
Time: 1010 Flow: 24.029

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for Sample Volume Collection

	Dry Bulb	Wet bulb
1	102.2	98.6
2.	100.4	96.8
Avg	101.3	97.7

Bottle #8

Box #2 Y=1.006

Figure 2. Field Sampling Data Sheet

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00017

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/6/14

City, State: Toledo, OR Sampler's Name: Hemer

Source Name/Description: BSLO #1 - Vacuum Pump

Run Number: 2

Start Time: 1035 Stop Time: 1135

Ambient Temp at Start: 50 Ambient Temp at Stop: _____

Barometric Pressure: _____

Leak Test

Time: 1025 Initial Measurement (in Hga): 0 on DGM, no bubbles

Time: 1137 Final Measurement (in Hga): 0 on DGM no bubbles

Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.

Meets Criteria? (Yes) No

System Flow Rate Measurement

Average of 5 flow measurements for Pre-Sample FlowRate: 15.4 missing used avg of Run 1 & 3

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ Avg: _____

Average of 5 flow measurements for Post-Sample Flow Rate:

1. 10 2. 10 3. 10 4. 10 5. 10 Avg: _____

Overall Average Sample Flow Rate: (indicate units!)

Avg: _____

DGM Temp DGM Pressure

Rotameter Readings		***QA/QC Measures***		
Time: 1045	Flow: 4.08	Train Spike Conducted?	Yes	No
Time: 1055	Flow: 2.04	Duplicate Conducted?	Yes	No
Time: 1105	Flow: 12.08	Spiked Duplicate Made?	Yes	No
Time: 1115	Flow: 16.2	Field Blank Made?	Yes	No
Time: 1125	Flow: 20.36	Field Spike Made?	Yes	No
Time: 1135	Flow: 24.25			

Sample Bottle Weight(s):

Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____

Final Weight: _____ Final Weight: _____

Notes/Comments

DGM used for sample volume collection

Bottle #10

Box #2

	Dry Bulb	Wet bulb
1	101	99
2	104	102
Avg	102.5	100.5

Figure 2. Field Sampling Data Sheet

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/6/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: #1 BSW Vacuum Pump

Run Number: 3
Start Time: 1155 Stop Time: 1255
Ambient Temp at Start: 50 Ambient Temp at Stop: 56
Barometric Pressure:

Leak Test
Time: 1150 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1257 Final Measurement (in Hga): 0 on DGM, no bubbles
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 17 2. 17 3. 18 4. 18 5. 18 Avg: 17.6
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings (0)
Time: 1205 Flow: 402
Time: 1215 Flow: 808
Time: 1225 Flow: 1215
Time: 1235 Flow: 1620
Time: 1245 Flow: 2015
Time: 1255 Flow: 2401

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for Sample volume collection

Bottle #12

Bar #2

	Dry Bulb	Wet bulb
1	102	99
2	103	101
Avg	102.5	99.5

Figure 2. Field Sampling Data Sheet

00019

GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant: GP-Toledo	Location: Toledo, OR	Source: #1 Vacuum Pump
Date	Operator: Homer	Run No.: 1 & 2&3
Barometric Press.	Reading Location: Lab	Ambient Temp:
Elevation: 0	Elevation Corr.: 0	Corr. Bar. Press.: 0
Avg. wet bulb temp (F)	% O2	% CO2:
Pitot tube ID #: 4' Stype	Pitot Cp:	Last Calibration:

Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Cyclonic Flow Check	
				Vel. At 0 reference	Angle to get 0 Flow
1	.53	102.2	0	.07	5
2	.91			.06	2
3	.94			.17	5
4	.82			.11	3
5	.94			0	0
6	.88			.14	3
7	.90			.17	3
8	.92			.06	3
1	.62			.06	5
2	.90			.07	3
3	.92			.10	5
4	.88			.11	5
5	.90			.02	3
6	.89			.07	5
7	.91			.06	5
8	.84	100.4		-.01	3
1	.84				
2	.96				
3	1.0				
4	1.1				
5	1.0				
6	.96				
7	.98				
8	.97				

Horizontal traverse only Bottom port poured black liquor everywhere.

TRAVERSE POINT LOCATION WORKSHEET
METHOD 1

DATA

Plant:	GP-Toledo	Location:	Toledo, OR
Source:	#1 BSW Vacuum Pump	Operator:	Homer
Date		Port Depth(in.):	0.125
Stack Dia. (in.)	10	Stack Area (ft2):	0.55
Distance to disturbance:			
Upstream(ft):		Downstream(ft):	
# of traverse points required:		8	

STACK CROSS SECTION DIAGRAM

See Diagram

Traverse point #	% of Stack Dia.	Stack Dia.	% of Stack Dia. X Stack Dia.	Port Depth	Taverse Point Location
1	0.067	10	0.7	0.125	0.80
2	0.25	10	2.5	0.125	2.63
3	0.75	10	7.5	0.125	7.63
4	0.854	10	8.5	0.125	8.67

NOTES: _____

_____

Georgia Pacific				
Kraft BSW #2 Combined Vent				
Emissions Rates Calculations				
5-Nov-14				
	Kraft BSW #2 Combined Vent			
	Run #1	Run #2	Run #3	**Average**
	14:00-15:00	15:10-16:09	16:19-17:19	
MeOH (ppm)	118.4989	92.7630	53.9736	88.4118
Stack Flow:				
acfm:	3301	3308	3401	3337
dscfm:	2540	2561	2628	2576
Pulp Production:				
ODT/day:	352.00	352.00	352.00	352.00
MeOH Emissions at Standard Conditions:				
lb/hr.:	1.50240	1.18554	0.70792	**1.13195**
lb/day.:	36.05751	28.45294	16.99003	**27.16683**
lb/ODT:	0.10244	0.08083	0.04827	0.07718

Georgia Pacific				
Kraft BSW #2 Combined Vent				
11/5/2014				
Total MeOH catch & DGM volume				
Run 1				
DGM Volume (l)	24.007			
Meter Y	1.01			
DGM Temp (C)	25.4			
Baro Pressure	29.76			
DGM Volume (dscl)	23.68			
			Total MeOH catch (mirco g)	3740
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	118.49885			
Run 2				
DGM Volume (l)	24.051			
Meter Y	1.01			
DGM Temp (C)	24.7			
Baro Pressure	29.76			
DGM Volume (dscl)	23.78			
			Total MeOH catch (mirco g)	2940
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	92.762971			
Run 3				
DGM Volume (l)	24.126			
Meter Y	1.01			
DGM Temp (C)	24			
Baro Pressure	29.76			
DGM Volume (dscl)	23.91			
			Total MeOH catch (mirco g)	1720
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	53.973576			

Georgia Pacific
Kraft BSW #2 Combined Vent
Stack Gas Flow Rate Data and Calculations
5-Nov-14

Run #1

Barometric Pressure:	29.76					
Stack Diameter or Dimensions (in.):		16				
Cross Sectional Area (sq ft):		1.3962622				
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.5	130.1	590.1	-0.74	29.71	0.7071
2	0.52	130.1	590.1	-0.74	29.71	0.7211
3	0.53	130.1	590.1	-0.74	29.71	0.728
4	0.29	130.1	590.1	-0.74	29.71	0.5385
5	0.31	130.1	590.1	-0.74	29.71	0.5568
6	0.38	130.1	590.1	-0.74	29.71	0.6164
7	0.4	130.1	590.1	-0.74	29.71	0.6325
8	0.34	130.1	590.1	-0.74	29.71	0.5831
9	0.38	130.1	590.1	-0.74	29.71	0.6164
10	0.41	130.1	590.1	-0.74	29.71	0.6403
11	0.35	130.1	590.1	-0.74	29.71	0.5916
12	0.27	130.1	590.1	-0.74	29.71	0.5196
13	0.51	130.1	590.1	-0.74	29.71	0.7141
14	0.55	130.1	590.1	-0.74	29.71	0.7416
15	0.44	130.1	590.1	-0.74	29.71	0.6633
16	0.53	130.1	590.1	-0.74	29.71	0.728
AVG.		130.10	590.10		29.71	0.6437
wet bulb temp. (deg F):		125.60				
stack vapor pressure:		4.0208647		O2	CO2	N2
%H2O:		13.388152		19.49	0	80.51
Molecular Density:		0.8661185				
Molecular weight of dry gas:			28.7796	lb/lb mole dry		
Molecular weight of wet stack gas:			27.336411	lb/lb mole wet		
Stack gas velocity at stack conditions:				2364.43494	afpm	
Stack gas flow rate at std. conditions:				2540.13345	dscfm	
Stack gas flow rate at stack conditions:				3301.37118	acfm	

Georgia Pacific
Kraft BSW #2 Combined Vent
Stack Gas Flow Rate Data and Calculations
5-Nov-14

Run #2
Barometric Pressure: 29.76
Stack Diameter or Dimensions (in.): 16
Cross Sectional Area (sq ft): 1.3962622
Pitot Tube Avg. Coeff.: 0.84

Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.51	128.6	588.6	-0.77	29.70	0.7141
2	0.54	128.6	588.6	-0.77	29.70	0.7348
3	0.55	128.6	588.6	-0.77	29.70	0.7416
4	0.31	128.6	588.6	-0.77	29.70	0.5568
5	0.31	128.6	588.6	-0.77	29.70	0.5568
6	0.33	128.6	588.6	-0.77	29.70	0.5745
7	0.41	128.6	588.6	-0.77	29.70	0.6403
8	0.36	128.6	588.6	-0.77	29.70	0.6
9	0.51	128.6	588.6	-0.77	29.70	0.7141
10	0.5	128.6	588.6	-0.77	29.70	0.7071
11	0.5	128.6	588.6	-0.77	29.70	0.7071
12	0.36	128.6	588.6	-0.77	29.70	0.6
13	0.25	128.6	588.6	-0.77	29.70	0.5
14	0.39	128.6	588.6	-0.77	29.70	0.6245
15	0.46	128.6	588.6	-0.77	29.70	0.6782
16	0.47	128.6	588.6	-0.77	29.70	0.6856
AVG.		128.6	588.6		29.70	0.646

wet bulb temp. (deg F): 124.70
stack vapor pressure: 3.9216231

	O2	CO2	N2
%H2O: 13.074289	19.22	0	80.78

Molecular Density: 0.8692571
Molecular weight of dry gas: 28.7688 lb/lb mole dry
Molecular weight of wet stack gas: 27.360856 lb/lb mole wet
Stack gas velocity at stack conditions: 2368.94023 afpm
Stack gas flow rate at std. conditions: 2560.51501 dscfm
Stack gas flow rate at stack conditions: 3307.66174 acfm

00025

Georgia Pacific
Kraft BSW #2 Combined Vent
Stack Gas Flow Rate Data and Calculations
5-Nov-14

Run #3

Barometric Pressure:	29.76					
Stack Diameter or Dimensions (in.):		16				
Cross Sectional Area (sq ft):		1.3962622				
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.47	130.1	590.1	-0.79	29.70	0.6856
2	0.37	130.1	590.1	-0.79	29.70	0.6083
3	0.4	130.1	590.1	-0.79	29.70	0.6325
4	0.41	130.1	590.1	-0.79	29.70	0.6403
5	0.42	130.1	590.1	-0.79	29.70	0.6481
6	0.36	130.1	590.1	-0.79	29.70	0.6
7	0.51	130.1	590.1	-0.79	29.70	0.7141
8	0.62	130.1	590.1	-0.79	29.70	0.7874
9	0.49	130.1	590.1	-0.79	29.70	0.7
10	0.5	130.1	590.1	-0.79	29.70	0.7071
11	0.41	130.1	590.1	-0.79	29.70	0.6403
12	0.36	130.1	590.1	-0.79	29.70	0.6
13	0.4	130.1	590.1	-0.79	29.70	0.6325
14	0.32	130.1	590.1	-0.79	29.70	0.5657
15	0.48	130.1	590.1	-0.79	29.70	0.6928
16	0.58	130.1	590.1	-0.79	29.70	0.7616
AVG.		130.1	590.1		29.70	0.6635
wet bulb temp. (deg F):		124.70				
stack vapor pressure:		3.9216231		O2	CO2	N2
%H2O:		13.025587		19.26	0	80.74
Molecular Density:		0.8697441				
Molecular weight of dry gas:			28.7704	lb/lb mole dry		
Molecular weight of wet stack gas:			27.367492	lb/lb mole wet		
Stack gas velocity at stack conditions:				2436.11765	afpm	
Stack gas flow rate at std. conditions:				2627.77316	dscfm	
Stack gas flow rate at stack conditions:				3401.45904	acfm	

Average stack gas flow rate at standard conditions: ***2576 dscfm***
Average stack gas flow rate at stack conditions: ***3337 acfm***
Avg % Mois 13.16 ***Average Velocity*** 2389.83

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/5/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: BSW vent #2

Run Number: 1
Start Time: 1400 Stop Time: 1500
Ambient Temp at Start: 60 Ambient Temp at Stop: 60
Barometric Pressure: 29.76

Leak Test
Time: 1356 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1501 Final Measurement (in Hga): 0 on DGM, no bubbles
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 74 2. 76 3. 78 4. 80 5. 81 Avg: 25.4 C
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. (c) 4. 10 5. (c) Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings D

Time: 1410	Flow: 3.941
Time: 1420	Flow: 7.991
Time: 1430	Flow: 12.044
Time: 1440	Flow: 15.973
Time: 1450	Flow: 19.875
Time: 1500	Flow: 24.007

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for sample volume collection

Bottle #4

	Dry Bulb	Wet bulb
	113.1	127.4
	2.129.2	123.8

Figure 2. Field Sampling Data Sheet

Box #1 Y21.01

Avg 130.11 125.6

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/5/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: BSU vent #2

Run Number: 2
Start Time: 1510 Stop Time: 1610
Ambient Temp at Start: 60 Ambient Temp at Stop: 56
Barometric Pressure: 29.76

Leak Test
Time: 1505 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1612 Final Measurement (in Hga): 0 on DGM, no bubbles
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 78 2. 76 3. 76 4. 76 5. 76 Avg: 24.17 c
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg: _____

DGM Temp / DGM Pressure

Rotameter Readings D

Time: 1520	Flow: 4.139
Time: 1530	Flow: 8.007
Time: 1540	Flow: 11.905
Time: 1550	Flow: 16.157
Time: 1600	Flow: 20.009
Time: 1610	Flow: 24.051

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for sample volume collection

Bottle #2 CR 5

Figure 2. Field Sampling Data Sheet

Dry Bulb	wet bulb
1127.9	123.8
2.1292	125.6

Box #1

Ave 128.6 124.7

00023

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/5/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: BSW vent #2

Run Number: 3
Start Time: 1620 Stop Time: 1720
Ambient Temp at Start: 56 Ambient Temp at Stop: 55
Barometric Pressure: 29.76

Leak Test
Time: 1615 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1725 Final Measurement (in Hga): 0 on DGM, no bubbles
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 74 2. 74 3. 76 4. 76 5. 76 Avg: 24.0
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings
Time: 1630 Flow: 3.859
Time: 1640 Flow: 7.920
Time: 1650 Flow: 11.918
Time: 1700 Flow: 16.1009
Time: 1710 Flow: 20.0500
Time: 1720 Flow: 24.1260

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for sample volume collection

Bottle #6

Box #1

BK	Dry Bulb	Wet bulb
1	~~132.2~~ 129.2	123.8
2	131	125.6
Avg	130.1	124.7

Figure 2. Field Sampling Data Sheet

00023

GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	~~1 + 2 + 3~~ BSW Combined Vent
Date	11-5-14	Operator:	Homer	Run No.:	1 & 2
Barometric Press.	29.76	Reading Location:	Lab	Ambient Temp:	55
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)	127.4	% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:	0.84	Last Calibration:	

	Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Cyclonic Flow Check: Vel. At 0 reference	Cyclonic Flow Check: Angle to get 0 Flow
RUN #1	1	.50	131	-.74	0	0
	2	.52			0	0
	3	.53			0	0
	4	.29			0	0
	5	.31			.15	5
	6	.38			0	0
	7	.40			0	0
	8	.34			0	0
	9	.38			0	0
	10	.41			.09	3
	11	.35			.06	4
	12	.27			0	0
	13	.51			0	0
	14	.55			0	0
	15	.44			0	0
	16	.53			0	0
RUN #2	1	.51	127.4	-.77		
	2	.54				
	3	.55				
	4	.31				
	5	.31				
	6	.33				
	7	.41				
	8	.36				

Run 2
Dry 127.4 | ~~#2~~ 129.2
Wet 123.8 | 125.6

Run 3
Dry 129.2 | 131
Wet 123.8 | 125.6

Run 1
Dry 131 | 129.2
Wet 127.4 | 123.8

00030

GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	~~1245~~ BSW Combined Vent
Date	11-5-14 ~~1/0/1900~~	Operator:	Homer	Run No.:	2&3
Barometric Press.	29.76 ~~0~~	Reading Location:	Lab	Ambient Temp:	55 0
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)	0	% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:	0.84	Last Calibration:	

	Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Cyclonic Flow Check: Vel. At 0 reference	Cyclonic Flow Check: Angle to get 0 Flow
RUN #2	9	.51				
	10	.50				
	11	.50				
	12	.36				
	13	.25				
	14	.39				
	15	.46				
	16	.47				
RUN #3	1	.47	130	-.79		
	2	.37				
	3	.40				
	4	.41				
	5	.42				
	6	.36				
	7	.51				
	8	.62				
	9	.49				
	10	.50				
	11	.41				
	12	.36				
	13	.40				
	14	.32				
	15	.48				
	16	.58				

TRAVERSE POINT LOCATION WORKSHEET
METHOD 1

DATA

STACK CROSS SECTION DIAGRAM

Plant:	GP-Toledo	Location:	Toledo, OR
Source:	#2 BSW Combined Vent	Operator:	Homer
Date		Port Depth(in.):	1.5
Stack Dia. (in.)	16	Stack Area (ft2):	1.40
Distance to disturbance:			
Upstream(ft):		Downstream(ft):	
# of traverse points required:		16	

See Diagram

Traverse point #	% of Stack Dia.	Stack Dia.	% of Stack Dia. X Stack Dia.	Port Depth	Taverse Point Location
1	0.032	16	0.5	1.5	2.01
2	0.105	16	1.7	1.5	3.18
3	0.194	16	3.1	1.5	4.60
4	0.323	16	5.2	1.5	6.67
5	0.677	16	10.8	1.5	12.33
6	0.806	16	12.9	1.5	14.40
7	0.895	16	14.3	1.5	15.82
8	0.968	16	15.5	1.5	16.99

NOTES: _____

_____

Georgia Pacific				
Karft BSW #3 Combined Vent				
Emissions Rates Calculations				
5-Nov-14				
	Karft BSW #3 Combined Vent			
	Run #1	Run #2	Run #3	**Average**
	09:55-10:55	11:00-12:00	12:05-13:05	
MeOH (ppm)	251.0819	298.5045	273.1132	274.2332
Stack Flow:				
acfm:	865	1226	1252	1114
dscfm:	627	888	884	799
Pulp Production:				
ODT/day:	399.00	399.00	399.00	399.00
MeOH Emissions at Standard Conditions:				
lb/hr.:	0.78552	1.32261	1.20464	**1.10426**
lb/day.:	18.85249	31.74256	28.91137	**26.50214**
lb/ODT:	0.04725	0.07956	0.07246	0.06642

MeOH concentration

Georgia Pacific				
Karft BSW #3 Combined Vent				
11/5/2014				
Total MeOH catch & DGM volume				
Run 1				
DGM Volume (l)	23.995			
Meter Y	1.01			
DGM Temp (C)	21.7			
Baro Pressure	29.76			
DGM Volume (dscl)	23.97			
			Total MeOH catch (mirco g)	8020
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	251.08188			
Run 2				
DGM Volume (l)	24.036			
Meter Y	1.01			
DGM Temp (C)	25.8			
Baro Pressure	29.76			
DGM Volume (dscl)	23.68			
			Total MeOH catch (mirco g)	9420
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	298.50453			
Run 3				
DGM Volume (l)	23.988			
Meter Y	1.01			
DGM Temp (C)	27.6			
Baro Pressure	29.76			
DGM Volume (dscl)	23.49			
			Total MeOH catch (mirco g)	8550
MW of MeOH	32.04		Correction Factor	1
MeOH (ppmvd)	273.11319			

Georgia Pacific
Karft BSW #3 Combined Vent
Stack Gas Flow Rate Data and Calculations
5-Nov-14

Run #1
Barometric Pressure: 29.76
Stack Diameter or Dimensions (in.): 16
Cross Sectional Area (sq ft): 1.3962622
Pitot Tube Avg. Coeff.: 0.84

Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.06	141.6	601.6	-0.01	29.76	0.2449
2	0.06	141.6	601.6	-0.01	29.76	0.2449
3	0.04	141.6	601.6	-0.01	29.76	0.2
4	0.03	141.6	601.6	-0.01	29.76	0.1732
5	0.04	141.6	601.6	-0.01	29.76	0.2
6	0.02	141.6	601.6	-0.01	29.76	0.1414
7	0.02	141.6	601.6	-0.01	29.76	0.1414
8	0.01	141.6	601.6	-0.01	29.76	0.1
9	0.01	141.6	601.6	-0.01	29.76	0.1
10	0.01	141.6	601.6	-0.01	29.76	0.1
11	0.01	141.6	601.6	-0.01	29.76	0.1
12	0.02	141.6	601.6	-0.01	29.76	0.1414
13	0.03	141.6	601.6	-0.01	29.76	0.1732
14	0.03	141.6	601.6	-0.01	29.76	0.1732
15	0.03	141.6	601.6	-0.01	29.76	0.1732
16	0.06	141.6	601.6	-0.01	29.76	0.2449
AVG.		141.60	601.60		29.76	0.1657

wet bulb temp. (deg F): 134.60
stack vapor pressure: 5.1325697
%H2O: 17.026291
Molecular Density: 0.8297371

	O2	CO2	N2
	9.98	0	90.02

Molecular weight of dry gas: 28.6624 lb/lb mole dry
Molecular weight of wet stack gas: 26.846989 lb/lb mole wet
Stack gas velocity at stack conditions: 619.774873 afpm
Stack gas flow rate at std. conditions: 626.798805 dscfm
Stack gas flow rate at stack conditions: 865.368242 acfm

Georgia Pacific
Karft BSW #3 Combined Vent
Stack Gas Flow Rate Data and Calculations
5-Nov-14

Run #2

Barometric Pressure:	29.76					
Stack Diameter or Dimensions (in.):	16					
Cross Sectional Area (sq ft):	1.3962622					
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.1	141.6	601.6	-0.01	29.76	0.3162
2	0.07	141.6	601.6	-0.01	29.76	0.2646
3	0.04	141.6	601.6	-0.01	29.76	0.2
4	0.05	141.6	601.6	-0.01	29.76	0.2236
5	0.06	141.6	601.6	-0.01	29.76	0.2449
6	0.08	141.6	601.6	-0.01	29.76	0.2828
7	0.01	141.6	601.6	-0.01	29.76	0.1
8	0.01	141.6	601.6	-0.01	29.76	0.1
9	0.06	141.6	601.6	-0.01	29.76	0.2449
10	0.07	141.6	601.6	-0.01	29.76	0.2646
11	0.08	141.6	601.6	-0.01	29.76	0.2828
12	0.05	141.6	601.6	-0.01	29.76	0.2236
13	0.06	141.6	601.6	-0.01	29.76	0.2449
14	0.07	141.6	601.6	-0.01	29.76	0.2646
15	0.04	141.6	601.6	-0.01	29.76	0.2
16	0.08	141.6	601.6	-0.01	29.76	0.2828
AVG.		141.6	601.6		29.76	0.2338
wet bulb temp. (deg F):	134.60					
stack vapor pressure:	5.1325697			O2	CO2	N2
%H2O:	17.026291			10.01	0	89.99
Molecular Density:	0.8297371					
Molecular weight of dry gas:	28.4004	lb/lb mole dry				
Molecular weight of wet stack gas:	26.629598	lb/lb mole wet				
Stack gas velocity at stack conditions:	877.751734	afpm				
Stack gas flow rate at std. conditions:	887.699326	dscfm				
Stack gas flow rate at stack conditions:	1225.57159	acfm				

Georgia Pacific
Karft BSW #3 Combined Vent
Stack Gas Flow Rate Data and Calculations
5-Nov-14

Run #3

Barometric Pressure:	29.76					
Stack Diameter or Dimensions (in.):	16					
Cross Sectional Area (sq ft):	1.3962622					
Pitot Tube Avg. Coeff.:	0.84					
Traverse Point	Velocity Head ^P (in. H2O)	Stack Temperature (deg F)	(deg R)	Stack Static Pressure (in. H2O)	(in Hg.)	Sqrt ^P
1	0.08	140.6	600.6	-0.01	29.76	0.2828
2	0.06	140.6	600.6	-0.01	29.76	0.2449
3	0.05	140.6	600.6	-0.01	29.76	0.2236
4	0.06	140.6	600.6	-0.01	29.76	0.2449
5	0.05	140.6	600.6	-0.01	29.76	0.2236
6	0.04	140.6	600.6	-0.01	29.76	0.2
7	0.04	140.6	600.6	-0.01	29.76	0.2
8	0.04	140.6	600.6	-0.01	29.76	0.2
9	0.06	140.6	600.6	-0.01	29.76	0.2449
10	0.04	140.6	600.6	-0.01	29.76	0.2
11	0.05	140.6	600.6	-0.01	29.76	0.2236
12	0.08	140.6	600.6	-0.01	29.76	0.2828
13	0.08	140.6	600.6	-0.01	29.76	0.2828
14	0.06	140.6	600.6	-0.01	29.76	0.2449
15	0.07	140.6	600.6	-0.01	29.76	0.2646
16	0.06	140.6	600.6	-0.01	29.76	0.2449
AVG.		140.6	600.6		29.76	0.238
wet bulb temp. (deg F):		139.00				
stack vapor pressure:		5.7601395		O2	CO2	N2
%H2O:		19.306524		10.03	0	89.97
Molecular Density:		0.8069348				
Molecular weight of dry gas:			28.4012	lb/lb mole dry		
Molecular weight of wet stack gas:			26.39309	lb/lb mole wet		
Stack gas velocity at stack conditions:				896.987301	afpm	
Stack gas flow rate at std. conditions:				883.691965	dscfm	
Stack gas flow rate at stack conditions:				1252.42948	acfm	

Average stack gas flow rate at standard conditions: ***799*** ***dscfm***
Average stack gas flow rate at stack conditions: ***1114*** ***acfm***
Avg % Mois 17.79 ***Average Velocity*** 798.17

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/5/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: BSW Vent # 3

Run Number: 1
Start Time: 0955 Stop Time: 1055
Ambient Temp at Start: 58 Ambient Temp at Stop: 58
Barometric Pressure: 29.76

Leak Test
Time: 945 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1055 Final Measurement (in Hga): 0 on DGM, no BUBBLES
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 65 2. 68 3. 71 4. 75 5. 76 Avg: 71 ≈ 2117

DGM Temp / DGM Pressure

Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

Rotameter Readings		***QA/QC Measures***		
Time: 1005	Flow: 4.154	Train Spike Conducted?	Yes	No
Time: 1015	Flow: 8.086	Duplicate Conducted?	Yes	No
Time: 1025	Flow: 11.802	Spiked Duplicate Made?	Yes	No
Time: 1035	Flow: 16.083	Field Blank Made?	Yes	No
Time: 1045	Flow: 20.017	Field Spike Made?	Yes	No
Time: 1055	Flow: 23.995			

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for sample volume collection

Bottle #1

	Dry Bulb	Wet bulb
	141.8	131
	141.4	138.2
Avg	141.6	134.6

Figure 2. Field Sampling Data Sheet

Box #1 Y1.61

00038

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/5/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: BSW Vent #3

Run Number: 2
Start Time: 1100 Stop Time: 1200
Ambient Temp at Start: 58 Ambient Temp at Stop: 60
Barometric Pressure: 29.76

Leak Test
Time: 1158 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1201 Final Measurement (in Hga): 0 on DGM, NO BUBBLES
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 78 2. 78 3. 78 4. 78 5. 80 Avg: 78.4
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings 0
Time: 1110 Flow: 3.919
Time: 1120 Flow: 8.037
Time: 1130 Flow: 11.817
Time: 1140 Flow: 16.135
Time: 1150 Flow: 19.815
Time: 1200 Flow: 24.036

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for Sample volume collection

Bottle #2

Box #2

	Dry Bulb	Wet bulb
Pre	1.147.2	2.147.2
Wet	2.140	2.141.8

Pre Dry 147.2
140.9 wet

Figure 2. Field Sampling Data Sheet

00039

NCASI Chilled Impinger/Silica Gel Tube Test Method At Pulp Mill Sources For Methanol, Acetone, Acetaldehyde, Methyl Ethyl Ketone And Formaldehyde

Field Sampling Data Sheet

Mill Name: GP-Toledo Date: 11/5/14
City,State: Toledo, OR Sampler's Name: Homer
Source Name/Description: RSW Vent #3

Run Number: 3
Start Time: 1205 Stop Time: 1305
Ambient Temp at Start: 60 Ambient Temp at Stop: 60
Barometric Pressure: 29.76

Leak Test
Time: 1203 Initial Measurement (in Hga): 0 on DGM, no bubbles
Time: 1307 Final Measurement (in Hga): 0 on DGM, no bubbles
Leak Check Criteria- Must not lose more than 1 inch of Hg (vacuum) in 2 minutes.
Meets Criteria? Yes No

System Flow Rate Measurement
Average of 5 flow measurements for Pre-Sample FlowRate:
1. 79 2. 81 3. 82 4. 83 5. 83 Avg: 27.6c
Average of 5 flow measurements for Post-Sample Flow Rate:
1. 10 2. 10 3. 10 4. 10 5. 10 Avg: 10
Overall Average Sample Flow Rate: (indicate units!)
Avg:

DGM Temp / DGM Pressure

Rotameter Readings 0
Time: 1215 Flow: 4.065
Time: 1225 Flow: 8.095
Time: 1235 Flow: 12.07
Time: 1245 Flow: 16.14
Time: 1255 Flow: 9.913
Time: 1305 Flow: 23988

QA/QC Measures

Train Spike Conducted?	Yes	No
Duplicate Conducted?	Yes	No
Spiked Duplicate Made?	Yes	No
Field Blank Made?	Yes	No
Field Spike Made?	Yes	No

Sample Bottle Weight(s):
Bottle 1: Initial Weight: _____ Bottle 2: Initial Weight: _____
Final Weight: _____ Final Weight: _____

Notes/Comments
DGM used for sample volume collection

Bottle #3

Box #2

Figure 2. Field Sampling Data Sheet

Dry Bulb	wet bulb
190.00	136.4
219.8	141.6
140.6	139

00040

GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	#3 BSW Combined Vent
Date	11-5-14	Operator:	Homer	Run No.:	1 & 2
Barometric Press.	29.76	Reading Location:	Lab	Ambient Temp:	55°
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)	131	% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:	.84	Last Calibration:	

				Cyclonic Flow Check	
Traverse Point #	Velocity Head BG	Stack Temp (F)	Static Press.	Vel. At 0 reference RG	Angle to get 0 Flow
RUN #1 1	.06 ~~.03~~ .06	141.8	-.01	.02 ~~.02~~ .06	~~30~~ 15
2	.06			0	0
3	.04			0	0
4	.03			0	0
5	.04			0	0
6	.02			0	0
7	.02			0	0
8	.01			0	0
9	.01			0	0
10	.01			0	0
11	.01			0	0
12	.02			0	0
13	.03			0	0
14	.03			0	0
15	.03			0	0
16	.06	145.4		0	0
RUN #2 1	.10	147.2	-.01		
2	.07				
3	.04				
4	.05				
5	.06				
6	.08				
7	.01				
8	.01				

GAS VELOCITY AND VOLUMETRIC FLOW FORM Page 2
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	#3 BSW Combined Vent
Date 11-5-14	~~1/0/1900~~	Operator:	Homer	Run No.:	2&3
Barometric Press. 29.76	0	Reading Location:	Lab	Ambient Temp: 55	0
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)	0	% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:	0	Last Calibration:	

	Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Cyclonic Flow Check: Vel. At 0 reference	Cyclonic Flow Check: Angle to get 0 Flow
RUN #2	9	.06		-.01		
	10	.07				
	11	.09				
	12	.05				
	13	.06				
	14	.07				
	15	.04				
	16	.08	147.2			
RUN #3	1	.08	140	-.01		
	2	.06				
	3	.05				
	4	.06				
	5	.05				
	6	.04				
	7	.04				
	8	.04				
	9	.06	141.80	-.01		
	10	.04				
	11	.05				
	12	.08				
	13	.08				
	14	.06				
	15	.07				
	16	.06				

TRAVERSE POINT LOCATION WORKSHEET
METHOD 1

DATA

Plant:	GP-Toledo	Location:	Toledo, OR
Source:	#3 BSW Combined Vent	Operator:	Homer
Date		Port Depth(in.):	0.125
Stack Dia. (in.)	16	Stack Area (ft2):	1.40
Distance to disturbance:			
Upstream(ft):		Downstream(ft):	
# of traverse points required:		16	

STACK CROSS SECTION DIAGRAM

See Diagram

Traverse point #	% of Stack Dia.	Stack Dia.	% of Stack Dia. X Stack Dia.	Port Depth	Taverse Point Location
1	0.032	16	0.5	0.125	0.64
2	0.105	16	1.7	0.125	1.81
3	0.194	16	3.1	0.125	3.23
4	0.323	16	5.2	0.125	5.29
5	0.677	16	10.8	0.125	10.96
6	0.806	16	12.9	0.125	13.02
7	0.895	16	14.3	0.125	14.45
8	0.968	16	15.5	0.125	15.61

NOTES: _____

GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	#1 BSW Combined Vent
Date	11/6/2014	Operator:	Homer	Run No.:	1 & 2
Barometric Press.		Reading Location:	Lab	Ambient Temp:	
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)		% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:		Last Calibration:	

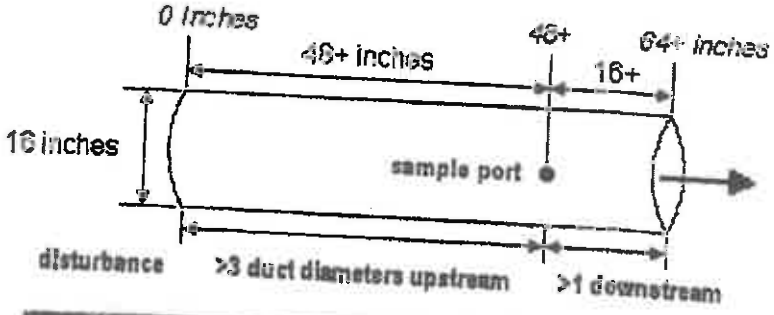
	Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Cyclonic Flow Check: Vel. At 0 reference	Cyclonic Flow Check: Angle to get 0 Flow
RUN #1	1					
	2					
	3					
	4					
	5	Flow on #1 BSW is "backward" toward the				
	6	Weather head. This was verified by inserting caution tape and				
	7	seeing it flutter toward the head. Therefore source was not				
	8	tested and emissions assumed to be 0.				
	9					
	10					
	11	The reverse flow was checked during			each run	
	12					
	13					
	14					
	15					
	16					
RUN #2	1					
	2					
	3	Reverse flow				
	4					
	5					
	6					
	7					
	8					

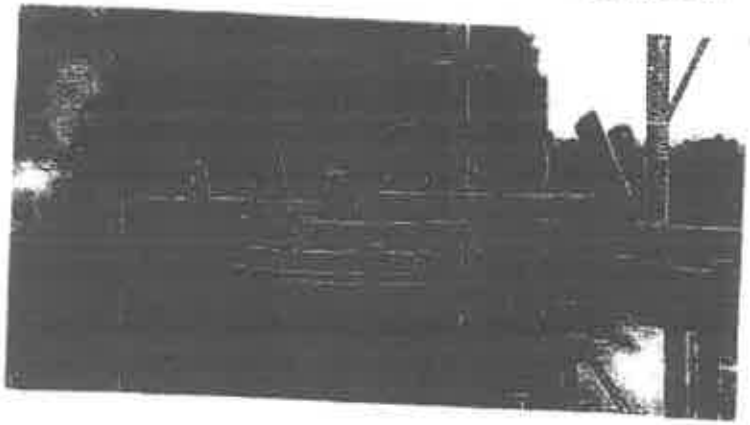
GAS VELOCITY AND VOLUMETRIC FLOW FORM
METHOD 2

Plant	GP-Toledo	Location:	Toledo, OR	Source:	#1 BSW Combined Vent
Date	11/6/2014	Operator:	Homer	Run No.:	2&3
Barometric Press.	0	Reading Location:	Lab	Ambient Temp:	0
Elevation:	0	Elevation Corr.:	0	Corr. Bar. Press.:	0
Avg. wet bulb temp (F)	0	% O2		% CO2:	
Pitot tube ID #:	4' Stype	Pitot Cp:	0	Last Calibration:	1/0/1900

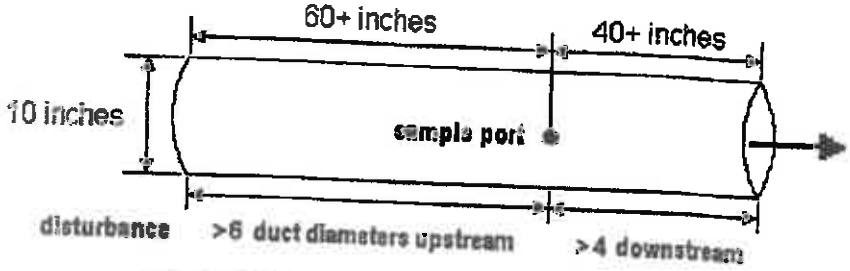
				Cyclonic Flow Check	
Traverse Point #	Velocity Head	Stack Temp (F)	Static Press.	Vel. At 0 reference	Angle to get 0 Flow
RUN #2					
9					
10					
11					
12					
13					
14					
15					
16					
RUN #3					
1					
2					
3					
4					
5					
6					
7	Reverse Flow				
8					
9					
10					
11					
12					
13					
14					
15					
16					

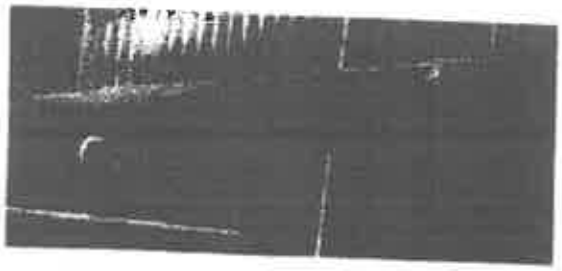
Kraft Washer #1 – Foam Breaker Vent

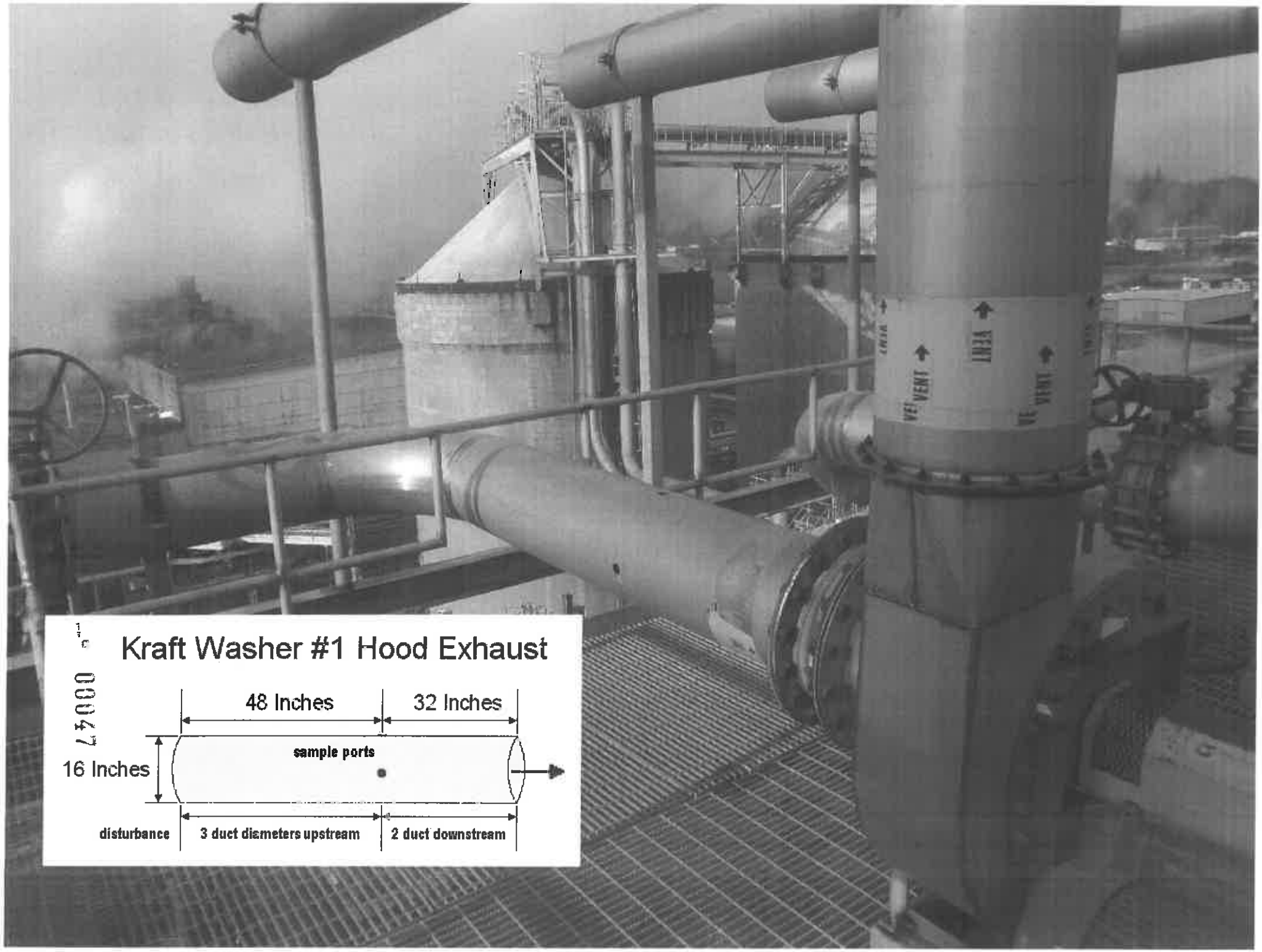


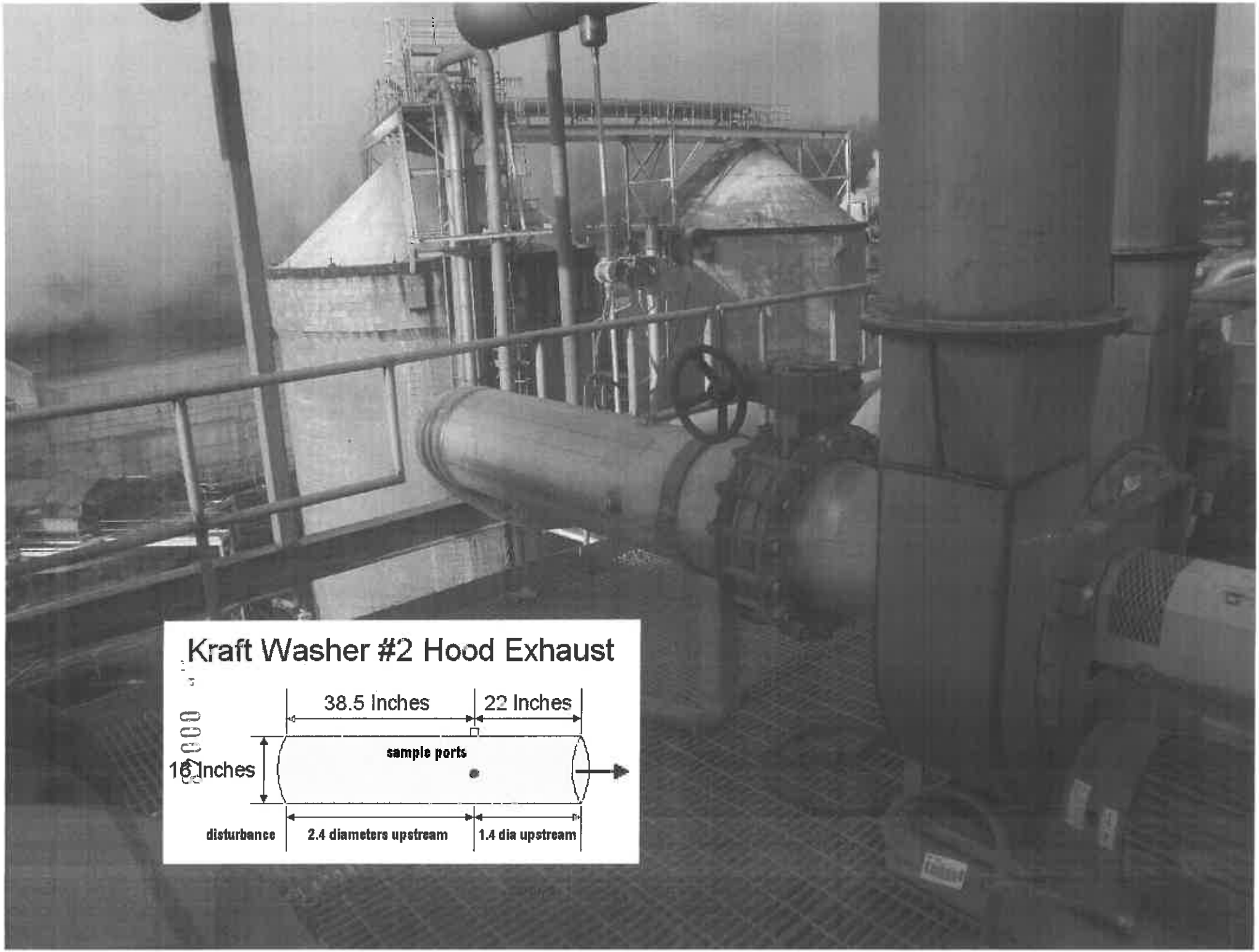


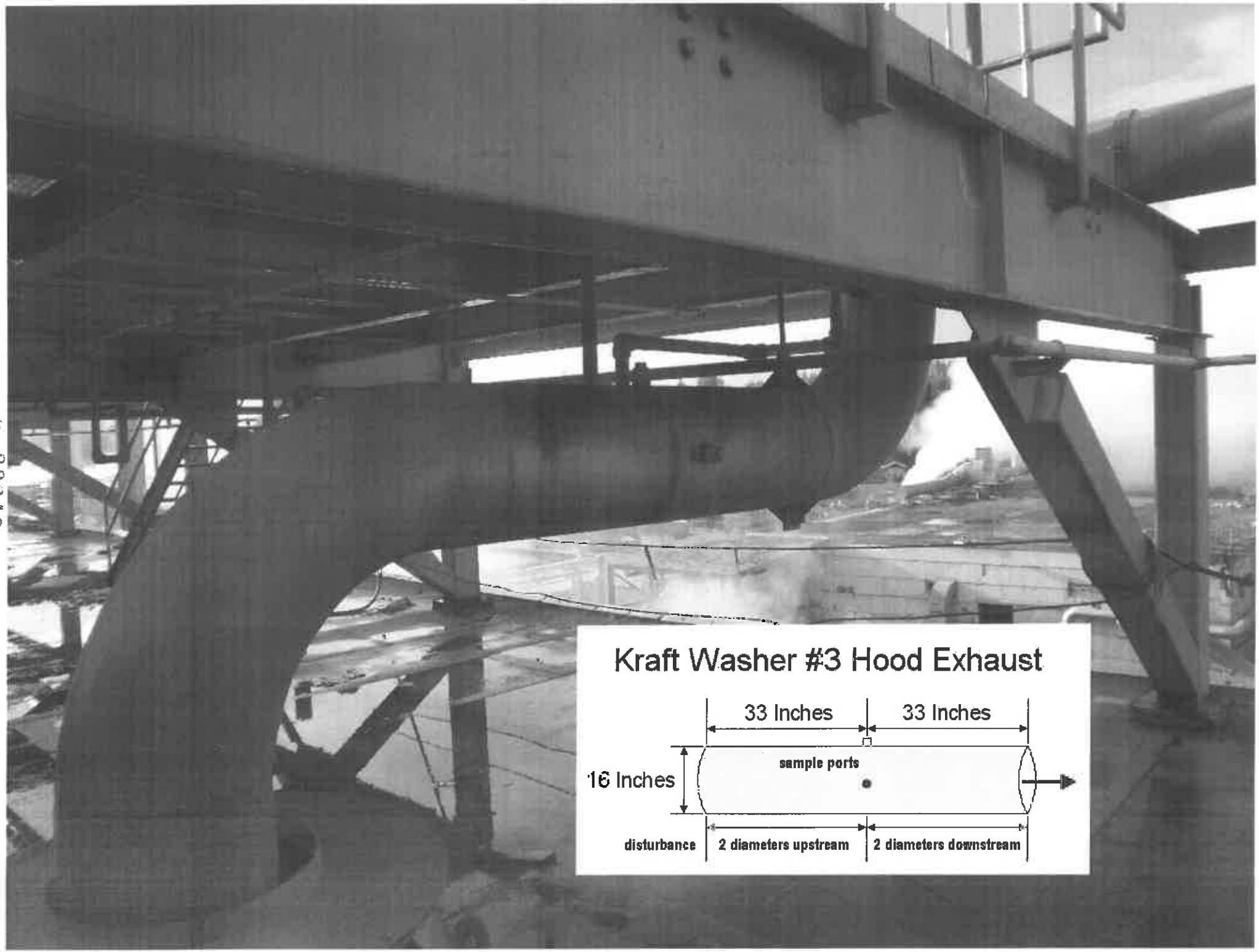
Kraft Washer #1 – Vacuum Pump Exhaust






Kraft Washer #1 Hood Exhaust
48 Inches
32 Inches
16 Inches
sample ports
disturbance
3 duct diameters upstream
2 duct downstream


Kraft Washer #2 Hood Exhaust
38.5 Inches
22 Inches
16 Inches
sample ports
disturbance
2.4 diameters upstream
1.4 dia upstream


Kraft Washer #3 Hood Exhaust
33 Inches
33 Inches
16 Inches
sample ports
disturbance
2 diameters upstream
2 diameters downstream

BIGHORN ENVIRONMENTAL - FIELD DATA CALIBRATION SHEET

Plant Name	GP-Toledo	**Date**	11/6/14
Source	U1 BSW Exam Brick	**Project #**	2014 CEA
Stack Diameter	16	**Probe Length**	8'

QA Checks			
Gas Divider	NO2 Conv	Leak Check	Response Time
✓	NA	Pre ✓ / Post ✓	2:00

Cylinder ID		O_2 (%)	CO_2 (%)	NO_x (ppm)	CO (ppm)	SO_2 (ppm)	VOC (as Propane)	H_2S (ppm)
	Mid							
	High		11%					

Analyzer Calibration	O_2 (%)		CO_2 (%)		NO_x (ppm)		CO (ppm)		SO_2 (ppm)		VOC (as Propane)		H_2S (ppm)	
	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}
Zero (UPN)	0	-.10	0	-.15										
Low														
Mid	9.09	9.26	2.2	2.25										
Span	20.93	21.01	4.33	4.43										

All zero values from Grade 5.0 UPN

Run Data	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14	Run #15	Run #16	Run #17
Start Time	910	1035	1155														
End Time	1010	1135	1255														
O_2 Run Average																	
CO_2 Run Average																	
NO_x Run average																	
CO Run Average																	
SO_2 Run Average																	
TRS Run Average																	
VOC Run Average																	

Bias Checks	O_2 (%)		CO_2 (%)		NO_x (ppm)		CO (ppm)		SO_2 (ppm)		VOC (as Propane)		H_2S (ppm)	
	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale
Pre Run #1	-.10	20.87	-.10	2.25										
Post #1/Pre #2	-.12	20.96	-.09	2.27										
Post #2/Pre #3														
Post #3/Pre #4														
Post #4/Pre #5														
Post #5/Pre #6														
Post #6/Pre #7														
Post #7/Pre #8														
Post #8/Pre #9														
Post #9/Pre #10														
Post #10/Pre #11														
Post #11/Pre #12														
Post #12/Pre #13														
Post #13/Pre #14														
Post #14/Pre #15														
Post #15/Pre #16														
Post #16														

All zero values from Grade 5.0 UPN

BIGHORN ENVIRONMENTAL - FIELD DATA CALIBRATION SHEET

Plant Name	Cap - Velarde	Date	11/5/15
Source	Washers	Project #	2014
Stack Diameter	16	Probe Length	8

QA Checks			
Gas Divider	NO2 Conv	Leak Check	Response Time
✓	NA	Pre 15" Post 15"	2:00

Cylinder ID	O_2 (%)	CO_2 (%)	NO_x (ppm)	CO (ppm)	SO_2 (ppm)	VOC (as Propane)	H_2S (ppm)
Mid			X	X	X	X	X
High	20.93	21.65					

Analyzer Calibration	O_2 (%)		CO_2 (%)		NO_x (ppm)		CO (ppm)		SO_2 (ppm)		VOC (as Propane)		H_2S (ppm)	
	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}	C_v	C_{dir}
Zero (UPN)	.0	-.11	0	-.15		X		X		X		X		X
Low														
Mid	10.47	10.70	2.16	2.02										
Span	18.64	19.04	4.32	4.43										

All zero values from Grade 5.0 UPN

#3 BSW #2 BSW

Run Data	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14	Run #15	Run #16	Run #17
Start Time	0955	1100	1205	1400	1510	1619											
End Time	1051	1155	1304	1500	1609	1718											
O_2 Run Average																	
CO_2 Run Average																	
NO_x Run average																	
CO Run Average																	
SO_2 Run Average																	
TRS Run Average																	
VOC Run Average																	

Bias Checks	O_2 (%)		CO_2 (%)		NO_x (ppm)		CO (ppm)		SO_2 (ppm)		VOC (as Propane)		H_2S (ppm)	
	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale
Pre-Run #1	-.11	18.93	-.13	2.02										
Post #1/Pre #2	-.12	18.99	-.09	2.06										
Post #2/Pre #3														
Post #3/Pre #4	-.12	18.99	-.09	2.06										
Post #4/Pre #5	-.11	18.89	-.12	2.06										
Post #5/Pre #6														
Post #6/Pre #7														
Post #7/Pre #8														
Post #8/Pre #9														
Post #9/Pre #10														
Post #10/Pre #11														
Post #11/Pre #12														
Post #12/Pre #13														
Post #13/Pre #14														
Post #14/Pre #15														
Post #15/Pre #16														
Post #16														

All zero values from Grade 5.0 UPN

#3 BSW

#2 BSW

#1, #2 and #3 BSW				Run Averages						
Run	Start	End	Minutes	O2	CO2					
1	11/5/2014 9:55	10:54	60	9.98	-0.11	#3 BSW, Run 1				
2	11/5/2014 11:00	11:59	60	10.01	-0.11	#3 BSW, Run 2				
3	11/5/2014 12:05	13:04	60	10.03	-0.11	#3 BSW, Run 3				
4	11/5/2014 14:00	14:59	60	19.49	-0.07	#2 BSW, Run1				
5	11/5/2014 15:10	16:09	60	19.22	-0.06	#2 BSW, Run2				
6	11/5/2014 16:19	17:18	60	19.26	-0.05	#2 BSW, Run3				
7	11/6/2014 9:10	10:09	60	17.70	-0.10	#1 BSW, Run 1				
8	11/6/2014 10:35	11:34	60	17.58	-0.09	#1 BSW, Run 2				
9	11/6/2014 11:55	12:54	60	17.70	-0.09	#1 BSW, Run 3				

#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/5/2014	6:30	20.9	-0.06
11/5/2014	6:31	20.9	-0.06
11/5/2014	6:32	20.9	-0.06
11/5/2014	6:33	20.91	-0.06
11/5/2014	6:34	20.9	-0.06
11/5/2014	6:35	20.9	-0.06
11/5/2014	6:36	20.9	-0.07
11/5/2014	6:37	20.9	-0.06
11/5/2014	6:38	20.9	-0.06
11/5/2014	6:39	16.17	-0.06
11/5/2014	6:40	0.05	-0.11
11/5/2014	6:41	-0.11	-0.13
11/5/2014	6:42	-0.12	-0.13
11/5/2014	6:43	0.75	-0.03
11/5/2014	6:44	1.84	1.57
11/5/2014	6:45	1.84	2.03
11/5/2014	6:46	1.84	2.03
11/5/2014	6:47	1.84	2.04
11/5/2014	6:48	16.92	14.42
11/5/2014	6:49	18.99	19.39
11/5/2014	6:50	18.98	19.38
11/5/2014	6:51	18.98	19.38
11/5/2014	6:52	18.98	19.39
11/5/2014	6:53	20.64	7.25
11/5/2014	6:54	20.98	0.39
11/5/2014	6:55	20.96	0.2
11/5/2014	6:56	20.94	0.12
11/5/2014	6:57	20.93	0.06
11/5/2014	6:58	20.93	0.01
11/5/2014	6:59	20.92	0
11/5/2014	7:00	20.92	-0.02
11/5/2014	7:01	20.91	-0.04
11/5/2014	7:02	20.9	-0.05
11/5/2014	7:03	20.9	-0.05
11/5/2014	7:04	20.9	-0.05
11/5/2014	7:05	20.89	-0.05
11/5/2014	7:06	20.89	-0.05
11/5/2014	7:07	20.89	-0.05
11/5/2014	7:08	20.89	-0.05
11/5/2014	7:09	20.9	0
11/5/2014	7:10	20.87	-0.02
11/5/2014	7:11	20.86	-0.05
11/5/2014	7:12	20.85	-0.06
11/5/2014	7:13	20.85	-0.06
11/5/2014	7:14	20.85	-0.06
11/5/2014	7:15	20.85	-0.06
11/5/2014	7:16	20.86	-0.06
11/5/2014	7:17	20.85	-0.06
11/5/2014	7:18	20.85	-0.06
11/5/2014	7:19	20.86	-0.06
11/5/2014	7:20	20.85	-0.05
11/5/2014	7:21	20.86	-0.05
11/5/2014	7:22	20.87	-0.06
11/5/2014	7:23	20.87	-0.06
11/5/2014	7:24	20.87	-0.06
11/5/2014	7:25	20.81	-0.03
11/5/2014	7:26	20.69	0.46
11/5/2014	7:27	20.85	0
11/5/2014	7:28	20.84	-0.06
11/5/2014	7:29	20.85	-0.06
11/5/2014	7:30	20.86	-0.07
11/5/2014	7:31	20.86	-0.06
11/5/2014	7:32	20.86	-0.06
11/5/2014	7:33	20.86	-0.06
11/5/2014	7:34	20.87	-0.06
11/5/2014	7:35	20.87	-0.06
11/5/2014	7:36	20.87	-0.06

Date	Time	O2	CO2
11/5/2014	7:37	20.87	-0.07
11/5/2014	7:38	20.88	-0.07
11/5/2014	7:39	20.87	-0.06
11/5/2014	7:40	20.88	-0.07
11/5/2014	7:41	20.87	-0.07
11/5/2014	7:42	20.87	-0.07
11/5/2014	7:43	20.87	-0.06
11/5/2014	7:44	20.87	-0.07
11/5/2014	7:45	20.88	-0.07
11/5/2014	7:46	20.88	-0.07
11/5/2014	7:47	20.89	-0.07
11/5/2014	7:48	20.89	-0.07
11/5/2014	7:49	20.89	-0.07
11/5/2014	7:50	20.9	-0.07
11/5/2014	7:51	20.9	-0.07
11/5/2014	7:52	20.91	-0.07
11/5/2014	7:53	20.92	-0.07
11/5/2014	7:54	20.92	-0.06
11/5/2014	7:55	20.92	-0.07
11/5/2014	7:56	20.92	-0.06
11/5/2014	7:57	20.92	-0.06
11/5/2014	7:58	20.92	-0.06
11/5/2014	7:59	20.92	-0.06
11/5/2014	8:00	20.92	-0.06
11/5/2014	8:01	20.93	-0.06
11/5/2014	8:02	20.93	-0.06
11/5/2014	8:03	20.92	-0.07
11/5/2014	8:04	20.92	-0.06
11/5/2014	8:05	20.93	-0.06
11/5/2014	8:06	20.93	-0.07
11/5/2014	8:07	20.93	-0.06
11/5/2014	8:08	20.92	-0.06
11/5/2014	8:09	20.91	-0.05
11/5/2014	8:10	20.9	-0.06
11/5/2014	8:11	20.9	-0.06
11/5/2014	8:12	20.9	-0.06
11/5/2014	8:13	20.91	-0.06
11/5/2014	8:14	20.91	-0.06
11/5/2014	8:15	20.92	-0.07
11/5/2014	8:16	20.92	-0.06
11/5/2014	8:17	20.92	-0.07
11/5/2014	8:18	20.92	-0.05
11/5/2014	8:19	20.93	-0.06
11/5/2014	8:20	20.92	-0.06
11/5/2014	8:21	20.93	-0.07
11/5/2014	8:22	20.93	-0.06
11/5/2014	8:23	20.94	-0.06
11/5/2014	8:24	20.94	-0.07
11/5/2014	8:25	20.94	-0.06
11/5/2014	8:26	20.94	-0.07
11/5/2014	8:27	20.94	-0.07
11/5/2014	8:28	20.94	-0.07
11/5/2014	8:29	20.95	-0.07
11/5/2014	8:30	20.94	-0.07
11/5/2014	8:31	20.94	-0.07
11/5/2014	8:32	20.94	-0.07
11/5/2014	8:33	20.93	-0.07
11/5/2014	8:34	20.39	-0.03
11/5/2014	8:35	17.59	3.65
11/5/2014	8:36	20.74	0.27
11/5/2014	8:37	20.86	0.04
11/5/2014	8:38	20.89	-0.02
11/5/2014	8:39	20.91	-0.05
11/5/2014	8:40	20.91	-0.07
11/5/2014	8:41	20.9	-0.07
11/5/2014	8:42	20.91	-0.07
11/5/2014	8:43	20.9	-0.07

00054

Date	Time	O2	CO2
11/5/2014	8:44	20.9	-0.06
11/5/2014	8:45	20.9	-0.07
11/5/2014	8:46	20.91	-0.06
11/5/2014	8:47	20.91	-0.07
11/5/2014	8:48	20.91	-0.06
11/5/2014	8:49	20.91	-0.07
11/5/2014	8:50	20.91	-0.07
11/5/2014	8:51	20.91	-0.07
11/5/2014	8:52	20.9	-0.07
11/5/2014	8:53	20.9	-0.06
11/5/2014	8:54	20.9	-0.07
11/5/2014	8:55	20.91	-0.06
11/5/2014	8:56	20.9	-0.06
11/5/2014	8:57	20.89	-0.06
11/5/2014	8:58	20.9	-0.06
11/5/2014	8:59	20.9	-0.06
11/5/2014	9:00	20.9	-0.06
11/5/2014	9:01	20.9	-0.06
11/5/2014	9:02	20.9	-0.06
11/5/2014	9:03	20.9	-0.06
11/5/2014	9:04	20.9	-0.06
11/5/2014	9:05	20.89	-0.07
11/5/2014	9:06	20.9	-0.06
11/5/2014	9:07	20.89	-0.06
11/5/2014	9:08	20.88	-0.06
11/5/2014	9:09	20.88	-0.06
11/5/2014	9:10	20.89	-0.06
11/5/2014	9:11	20.89	-0.06
11/5/2014	9:12	20.89	-0.06
11/5/2014	9:13	20.76	-0.06
11/5/2014	9:14	20.87	-0.06
11/5/2014	9:15	20.88	-0.06
11/5/2014	9:16	20.88	-0.06
11/5/2014	9:17	20.88	-0.07
11/5/2014	9:18	20.88	-0.06
11/5/2014	9:19	20.87	-0.06
11/5/2014	9:20	20.87	-0.06
11/5/2014	9:21	20.88	-0.06
11/5/2014	9:22	20.87	-0.06
11/5/2014	9:23	20.87	-0.06
11/5/2014	9:24	20.87	-0.06
11/5/2014	9:25	20.87	-0.07
11/5/2014	9:26	20.88	-0.06
11/5/2014	9:27	20.87	-0.06
11/5/2014	9:28	20.84	-0.06
11/5/2014	9:29	20.87	-0.06
11/5/2014	9:30	20.86	-0.06
11/5/2014	9:31	20.87	-0.06
11/5/2014	9:32	20.82	-0.06
11/5/2014	9:33	20.87	-0.06
11/5/2014	9:34	20.87	-0.06
11/5/2014	9:35	20.87	-0.06
11/5/2014	9:36	20.88	-0.06
11/5/2014	9:37	20.87	-0.06
11/5/2014	9:38	20.87	-0.06
11/5/2014	9:39	20.87	-0.06
11/5/2014	9:40	20.87	-0.06
11/5/2014	9:41	20.87	-0.06
11/5/2014	9:42	20.88	-0.06
11/5/2014	9:43	20.88	-0.06
11/5/2014	9:44	20.88	-0.06
11/5/2014	9:45	15.79	-0.07
11/5/2014	9:46	11.43	-0.1
11/5/2014	9:47	12.47	-0.1
11/5/2014	9:48	11.35	-0.11
11/5/2014	9:49	11.16	-0.1
11/5/2014	9:50	11.09	-0.11

Date	Time	O2	CO2
11/5/2014	9:51	11.03	-0.11
11/5/2014	9:52	10.96	-0.11
11/5/2014	9:53	10.93	-0.11
11/5/2014	9:54	10.99	-0.1
11/5/2014	9:55	11.05	-0.11
11/5/2014	9:56	10.89	-0.1
11/5/2014	9:57	10.79	-0.1
11/5/2014	9:58	10.76	-0.11
11/5/2014	9:59	10.66	-0.11
11/5/2014	10:00	10.51	-0.11
11/5/2014	10:01	10.35	-0.1
11/5/2014	10:02	10.26	-0.11
11/5/2014	10:03	10.26	-0.12
11/5/2014	10:04	10.27	-0.11
11/5/2014	10:05	10.22	-0.11
11/5/2014	10:06	10.17	-0.12
11/5/2014	10:07	10.16	-0.1
11/5/2014	10:08	10.16	-0.1
11/5/2014	10:09	10.16	-0.12
11/5/2014	10:10	10.14	-0.12
11/5/2014	10:11	10.12	-0.12
11/5/2014	10:12	10.07	-0.12
11/5/2014	10:13	10.02	-0.11
11/5/2014	10:14	9.97	-0.11
11/5/2014	10:15	9.98	-0.12
11/5/2014	10:16	9.94	-0.11
11/5/2014	10:17	9.9	-0.12
11/5/2014	10:18	9.9	-0.11
11/5/2014	10:19	9.88	-0.11
11/5/2014	10:20	9.84	-0.1
11/5/2014	10:21	9.77	-0.11
11/5/2014	10:22	9.76	-0.1
11/5/2014	10:23	9.77	-0.11
11/5/2014	10:24	9.74	-0.11
11/5/2014	10:25	9.67	-0.11
11/5/2014	10:26	9.66	-0.11
11/5/2014	10:27	9.68	-0.12
11/5/2014	10:28	9.68	-0.11
11/5/2014	10:29	9.74	-0.11
11/5/2014	10:30	9.79	-0.12
11/5/2014	10:31	9.86	-0.12
11/5/2014	10:32	9.95	-0.11
11/5/2014	10:33	10.04	-0.11
11/5/2014	10:34	10.1	-0.11
11/5/2014	10:35	10.1	-0.12
11/5/2014	10:36	10.02	-0.12
11/5/2014	10:37	9.91	-0.11
11/5/2014	10:38	9.75	-0.11
11/5/2014	10:39	9.67	-0.11
11/5/2014	10:40	9.67	-0.12
11/5/2014	10:41	9.68	-0.12
11/5/2014	10:42	9.65	-0.12
11/5/2014	10:43	9.66	-0.12
11/5/2014	10:44	9.67	-0.12
11/5/2014	10:45	9.69	-0.12
11/5/2014	10:46	9.73	-0.12
11/5/2014	10:47	9.77	-0.12
11/5/2014	10:48	9.78	-0.12
11/5/2014	10:49	9.79	-0.12
11/5/2014	10:50	9.78	-0.12
11/5/2014	10:51	9.74	-0.12
11/5/2014	10:52	9.66	-0.12
11/5/2014	10:53	9.62	-0.11
11/5/2014	10:54	9.61	-0.11
11/5/2014	10:55	9.61	-0.12
11/5/2014	10:56	9.56	-0.12
11/5/2014	10:57	9.53	-0.12

#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/5/2014	10:58	9.49	-0.12
11/5/2014	10:59	9.51	-0.11
11/5/2014	11:00	9.5	-0.11
11/5/2014	11:01	9.47	-0.12
11/5/2014	11:02	9.47	-0.12
11/5/2014	11:03	9.46	-0.12
11/5/2014	11:04	9.43	-0.12
11/5/2014	11:05	9.42	-0.12
11/5/2014	11:06	9.48	-0.11
11/5/2014	11:07	9.57	-0.12
11/5/2014	11:08	9.67	-0.12
11/5/2014	11:09	9.77	-0.11
11/5/2014	11:10	9.9	-0.11
11/5/2014	11:11	10.04	-0.11
11/5/2014	11:12	10.11	-0.11
11/5/2014	11:13	10.19	-0.11
11/5/2014	11:14	10.21	-0.11
11/5/2014	11:15	10.11	-0.11
11/5/2014	11:16	10.05	-0.1
11/5/2014	11:17	10.02	-0.11
11/5/2014	11:18	10	-0.11
11/5/2014	11:19	9.97	-0.11
11/5/2014	11:20	9.98	-0.11
11/5/2014	11:21	10.02	-0.11
11/5/2014	11:22	10.05	-0.12
11/5/2014	11:23	10.03	-0.1
11/5/2014	11:24	10.04	-0.1
11/5/2014	11:25	10.03	-0.1
11/5/2014	11:26	10.01	-0.1
11/5/2014	11:27	9.99	-0.1
11/5/2014	11:28	10.02	-0.1
11/5/2014	11:29	10.05	-0.1
11/5/2014	11:30	10.06	-0.1
11/5/2014	11:31	10.1	-0.1
11/5/2014	11:32	10.18	-0.1
11/5/2014	11:33	10.23	-0.1
11/5/2014	11:34	10.28	-0.1
11/5/2014	11:35	10.28	-0.1
11/5/2014	11:36	10.26	-0.1
11/5/2014	11:37	10.21	-0.1
11/5/2014	11:38	10.21	-0.1
11/5/2014	11:39	10.22	-0.1
11/5/2014	11:40	10.21	-0.1
11/5/2014	11:41	10.22	-0.1
11/5/2014	11:42	10.19	-0.1
11/5/2014	11:43	10.15	-0.1
11/5/2014	11:44	10.12	-0.1
11/5/2014	11:45	10.1	-0.1
11/5/2014	11:46	10.11	-0.1
11/5/2014	11:47	10.08	-0.1
11/5/2014	11:48	10.09	-0.1
11/5/2014	11:49	10.13	-0.1
11/5/2014	11:50	10.14	-0.1
11/5/2014	11:51	10.14	-0.11
11/5/2014	11:52	10.13	-0.1
11/5/2014	11:53	10.11	-0.11
11/5/2014	11:54	10.08	-0.1
11/5/2014	11:55	10.08	-0.1
11/5/2014	11:56	10.08	-0.1
11/5/2014	11:57	10.07	-0.11
11/5/2014	11:58	10.05	-0.11
11/5/2014	11:59	10.03	-0.1
11/5/2014	12:00	10.03	-0.1
11/5/2014	12:01	10.04	-0.11
11/5/2014	12:02	10.05	-0.1
11/5/2014	12:03	10.05	-0.11
11/5/2014	12:04	10.06	-0.11

Date	Time	O2	CO2
11/5/2014	12:05	10.08	-0.1
11/5/2014	12:06	10.06	-0.1
11/5/2014	12:07	10.04	-0.1
11/5/2014	12:08	10.02	-0.1
11/5/2014	12:09	10.04	-0.1
11/5/2014	12:10	10.03	-0.1
11/5/2014	12:11	10.02	-0.1
11/5/2014	12:12	10.04	-0.1
11/5/2014	12:13	10.05	-0.1
11/5/2014	12:14	10.05	-0.11
11/5/2014	12:15	10.06	-0.11
11/5/2014	12:16	10.09	-0.1
11/5/2014	12:17	10.13	-0.1
11/5/2014	12:18	10.16	-0.1
11/5/2014	12:19	10.2	-0.11
11/5/2014	12:20	10.23	-0.11
11/5/2014	12:21	10.24	-0.1
11/5/2014	12:22	10.25	-0.11
11/5/2014	12:23	10.24	-0.1
11/5/2014	12:24	10.22	-0.11
11/5/2014	12:25	10.22	-0.11
11/5/2014	12:26	10.23	-0.1
11/5/2014	12:27	10.26	-0.1
11/5/2014	12:28	10.27	-0.11
11/5/2014	12:29	10.22	-0.1
11/5/2014	12:30	10.19	-0.1
11/5/2014	12:31	10.2	-0.1
11/5/2014	12:32	10.2	-0.11
11/5/2014	12:33	10.19	-0.11
11/5/2014	12:34	10.16	-0.1
11/5/2014	12:35	10.1	-0.11
11/5/2014	12:36	10.08	-0.11
11/5/2014	12:37	10.06	-0.1
11/5/2014	12:38	10.04	-0.11
11/5/2014	12:39	10.03	-0.1
11/5/2014	12:40	10.03	-0.1
11/5/2014	12:41	10.05	-0.1
11/5/2014	12:42	10	-0.11
11/5/2014	12:43	9.95	-0.11
11/5/2014	12:44	9.94	-0.1
11/5/2014	12:45	9.93	-0.11
11/5/2014	12:46	9.9	-0.1
11/5/2014	12:47	9.85	-0.11
11/5/2014	12:48	9.84	-0.1
11/5/2014	12:49	9.81	-0.1
11/5/2014	12:50	9.78	-0.1
11/5/2014	12:51	9.8	-0.1
11/5/2014	12:52	9.82	-0.11
11/5/2014	12:53	9.85	-0.11
11/5/2014	12:54	9.85	-0.11
11/5/2014	12:55	9.82	-0.11
11/5/2014	12:56	9.81	-0.11
11/5/2014	12:57	9.83	-0.11
11/5/2014	12:58	10.05	-0.11
11/5/2014	12:59	10.02	-0.11
11/5/2014	13:00	9.94	-0.11
11/5/2014	13:01	9.85	-0.11
11/5/2014	13:02	9.82	-0.11
11/5/2014	13:03	9.82	-0.11
11/5/2014	13:04	9.81	-0.11
11/5/2014	13:05	9.76	-0.1
11/5/2014	13:06	9.67	-0.1
11/5/2014	13:07	9.58	-0.11
11/5/2014	13:08	9.56	-0.11
11/5/2014	13:09	9.56	-0.11
11/5/2014	13:10	9.57	-0.11
11/5/2014	13:11	9.59	-0.11

Date	Time	O2	CO2
11/5/2014	13:12	9.6	-0.11
11/5/2014	13:13	9.59	-0.11
11/5/2014	13:14	9.61	-0.11
11/5/2014	13:15	9.62	-0.1
11/5/2014	13:16	9.61	-0.1
11/5/2014	13:17	9.61	-0.1
11/5/2014	13:18	9.62	-0.1
11/5/2014	13:19	9.64	-0.1
11/5/2014	13:20	7.84	-0.09
11/5/2014	13:21	3.78	3.87
11/5/2014	13:22	3.9	4.46
11/5/2014	13:23	4.09	4.48
11/5/2014	13:24	3.11	2.42
11/5/2014	13:25	1.85	2.06
11/5/2014	13:26	1.84	2.06
11/5/2014	13:27	7.38	1.98
11/5/2014	13:28	15.18	4.5
11/5/2014	13:29	18.99	0.03
11/5/2014	13:30	18.98	-0.1
11/5/2014	13:31	9.73	-0.1
11/5/2014	13:32	0.03	-0.1
11/5/2014	13:33	-0.12	-0.09
11/5/2014	13:34	-0.13	-0.1
11/5/2014	13:35	11.02	0.03
11/5/2014	13:36	4.44	2.51
11/5/2014	13:37	9.03	0.17
11/5/2014	13:38	9.24	-0.05
11/5/2014	13:39	9.22	-0.09
11/5/2014	13:40	9.21	-0.09
11/5/2014	13:41	9.23	-0.09
11/5/2014	13:42	9.25	-0.1
11/5/2014	13:43	9.26	-0.1
11/5/2014	13:44	9.31	-0.1
11/5/2014	13:45	9.38	-0.1
11/5/2014	13:46	9.46	-0.1
11/5/2014	13:47	9.51	-0.1
11/5/2014	13:48	9.58	-0.1
11/5/2014	13:49	9.57	-0.1
11/5/2014	13:50	9.56	-0.1
11/5/2014	13:51	9.53	-0.1
11/5/2014	13:52	10.1	-0.1
11/5/2014	13:53	19.44	-0.08
11/5/2014	13:54	19.98	-0.06
11/5/2014	13:55	19.51	-0.07
11/5/2014	13:56	19.53	-0.08
11/5/2014	13:57	19.54	-0.08
11/5/2014	13:58	19.59	-0.08
11/5/2014	13:59	19.63	-0.08
11/5/2014	14:00	19.64	-0.07
11/5/2014	14:01	19.63	-0.07
11/5/2014	14:02	19.61	-0.08
11/5/2014	14:03	19.62	-0.07
11/5/2014	14:04	19.6	-0.08
11/5/2014	14:05	19.6	-0.07
11/5/2014	14:06	19.6	-0.08
11/5/2014	14:07	19.6	-0.08
11/5/2014	14:08	19.6	-0.08
11/5/2014	14:09	19.6	-0.08
11/5/2014	14:10	19.6	-0.07
11/5/2014	14:11	19.61	-0.08
11/5/2014	14:12	19.6	-0.08
11/5/2014	14:13	19.6	-0.07
11/5/2014	14:14	19.59	-0.08
11/5/2014	14:15	19.6	-0.07
11/5/2014	14:16	19.6	-0.08
11/5/2014	14:17	19.58	-0.08
11/5/2014	14:18	19.57	-0.07

Date	Time	O2	CO2
11/5/2014	14:19	19.57	-0.07
11/5/2014	14:20	19.56	-0.08
11/5/2014	14:21	19.56	-0.08
11/5/2014	14:22	19.53	-0.07
11/5/2014	14:23	19.51	-0.07
11/5/2014	14:24	19.5	-0.07
11/5/2014	14:25	19.48	-0.07
11/5/2014	14:26	19.47	-0.07
11/5/2014	14:27	19.47	-0.07
11/5/2014	14:28	19.46	-0.07
11/5/2014	14:29	19.44	-0.07
11/5/2014	14:30	19.42	-0.07
11/5/2014	14:31	19.4	-0.07
11/5/2014	14:32	19.41	-0.07
11/5/2014	14:33	19.41	-0.08
11/5/2014	14:34	19.42	-0.07
11/5/2014	14:35	19.4	-0.07
11/5/2014	14:36	19.46	-0.08
11/5/2014	14:37	19.46	-0.08
11/5/2014	14:38	19.47	-0.08
11/5/2014	14:39	19.47	-0.08
11/5/2014	14:40	19.48	-0.07
11/5/2014	14:41	19.47	-0.07
11/5/2014	14:42	19.48	-0.08
11/5/2014	14:43	19.49	-0.07
11/5/2014	14:44	19.5	-0.07
11/5/2014	14:45	19.49	-0.08
11/5/2014	14:46	19.47	-0.07
11/5/2014	14:47	19.45	-0.07
11/5/2014	14:48	19.43	-0.07
11/5/2014	14:49	19.41	-0.08
11/5/2014	14:50	19.39	-0.07
11/5/2014	14:51	19.41	-0.07
11/5/2014	14:52	19.39	-0.07
11/5/2014	14:53	19.37	-0.07
11/5/2014	14:54	19.33	-0.07
11/5/2014	14:55	19.32	-0.07
11/5/2014	14:56	19.33	-0.07
11/5/2014	14:57	19.34	-0.07
11/5/2014	14:58	19.33	-0.08
11/5/2014	14:59	19.31	-0.07
11/5/2014	15:00	19.29	-0.07
11/5/2014	15:01	19.27	-0.07
11/5/2014	15:02	19.25	-0.07
11/5/2014	15:03	19.24	-0.07
11/5/2014	15:04	19.22	-0.07
11/5/2014	15:05	19.19	-0.07
11/5/2014	15:06	19.16	-0.07
11/5/2014	15:07	19.14	-0.07
11/5/2014	15:08	19.12	-0.07
11/5/2014	15:09	19.11	-0.07
11/5/2014	15:10	19.11	-0.07
11/5/2014	15:11	19.13	-0.07
11/5/2014	15:12	19.41	-0.06
11/5/2014	15:13	19.39	-0.05
11/5/2014	15:14	19.35	-0.05
11/5/2014	15:15	19.34	-0.06
11/5/2014	15:16	19.35	-0.06
11/5/2014	15:17	19.36	-0.06
11/5/2014	15:18	19.35	-0.06
11/5/2014	15:19	19.33	-0.06
11/5/2014	15:20	19.31	-0.06
11/5/2014	15:21	19.29	-0.06
11/5/2014	15:22	19.27	-0.06
11/5/2014	15:23	19.26	-0.06
11/5/2014	15:24	19.24	-0.06
11/5/2014	15:25	19.21	-0.06

Date	Time	O2	CO2
11/5/2014	15:26	19.19	-0.07
11/5/2014	15:27	19.14	-0.07
11/5/2014	15:28	19.11	-0.06
11/5/2014	15:29	19.01	-0.07
11/5/2014	15:30	18.97	-0.07
11/5/2014	15:31	19.01	-0.07
11/5/2014	15:32	19.13	-0.07
11/5/2014	15:33	19.17	-0.07
11/5/2014	15:34	19.11	-0.06
11/5/2014	15:35	19.09	-0.07
11/5/2014	15:36	19.12	-0.07
11/5/2014	15:37	19.2	-0.06
11/5/2014	15:38	19.63	-0.06
11/5/2014	15:39	19.41	-0.06
11/5/2014	15:40	19.32	-0.06
11/5/2014	15:41	19.63	-0.06
11/5/2014	15:42	19.26	-0.05
11/5/2014	15:43	19.24	-0.04
11/5/2014	15:44	19.23	-0.05
11/5/2014	15:45	19.21	-0.04
11/5/2014	15:46	19.18	-0.05
11/5/2014	15:47	19.16	-0.05
11/5/2014	15:48	19.11	-0.05
11/5/2014	15:49	19.08	-0.05
11/5/2014	15:50	18.98	-0.04
11/5/2014	15:51	18.94	-0.05
11/5/2014	15:52	18.98	-0.05
11/5/2014	15:53	19.1	-0.05
11/5/2014	15:54	19.14	-0.05
11/5/2014	15:55	19.08	-0.05
11/5/2014	15:56	19.06	-0.06
11/5/2014	15:57	19.09	-0.06
11/5/2014	15:58	19.17	-0.05
11/5/2014	15:59	19.6	-0.05
11/5/2014	16:00	19.38	-0.05
11/5/2014	16:01	19.18	-0.05
11/5/2014	16:02	19.16	-0.04
11/5/2014	16:03	19.14	-0.04
11/5/2014	16:04	19.13	-0.05
11/5/2014	16:05	19.13	-0.05
11/5/2014	16:06	19.15	-0.04
11/5/2014	16:07	19.43	-0.04
11/5/2014	16:08	19.41	-0.04
11/5/2014	16:09	19.37	-0.04
11/5/2014	16:10	19.36	-0.04
11/5/2014	16:11	19.37	-0.04
11/5/2014	16:12	19.38	-0.05
11/5/2014	16:13	19.37	-0.05
11/5/2014	16:14	19.35	-0.04
11/5/2014	16:15	19.33	-0.05
11/5/2014	16:16	19.31	-0.05
11/5/2014	16:17	19.29	-0.05
11/5/2014	16:18	19.28	-0.05
11/5/2014	16:19	19.26	-0.05
11/5/2014	16:20	19.23	-0.05
11/5/2014	16:21	19.21	-0.05
11/5/2014	16:22	19.16	-0.05
11/5/2014	16:23	19.18	-0.05
11/5/2014	16:24	19.12	-0.05
11/5/2014	16:25	19.1	-0.05
11/5/2014	16:26	19.13	-0.05
11/5/2014	16:27	19.21	-0.05
11/5/2014	16:28	19.64	-0.05
11/5/2014	16:29	19.42	-0.05
11/5/2014	16:30	19.22	-0.05
11/5/2014	16:31	19.2	-0.05
11/5/2014	16:32	19.18	-0.04

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#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/5/2014	16:33	19.17	-0.05
11/5/2014	16:34	19.17	-0.05
11/5/2014	16:35	19.19	-0.05
11/5/2014	16:36	19.47	-0.05
11/5/2014	16:37	19.45	-0.05
11/5/2014	16:38	19.41	-0.05
11/5/2014	16:39	19.4	-0.05
11/5/2014	16:40	19.11	-0.05
11/5/2014	16:41	19.05	-0.05
11/5/2014	16:42	19.03	-0.05
11/5/2014	16:43	19.06	-0.05
11/5/2014	16:44	19.14	-0.05
11/5/2014	16:45	19.57	-0.05
11/5/2014	16:46	19.35	-0.05
11/5/2014	16:47	19.15	-0.05
11/5/2014	16:48	19.13	-0.05
11/5/2014	16:49	19.11	-0.05
11/5/2014	16:50	19.1	-0.04
11/5/2014	16:51	19.1	-0.05
11/5/2014	16:52	19.12	-0.05
11/5/2014	16:53	19.4	-0.05
11/5/2014	16:54	19.38	-0.05
11/5/2014	16:55	19.34	-0.05
11/5/2014	16:56	19.33	-0.05
11/5/2014	16:57	19.34	-0.04
11/5/2014	16:58	19.23	-0.03
11/5/2014	16:59	19.51	-0.04
11/5/2014	17:00	19.49	-0.04
11/5/2014	17:01	19.45	-0.03
11/5/2014	17:02	19.44	-0.03
11/5/2014	17:03	19.15	-0.05
11/5/2014	17:04	19.09	-0.04
11/5/2014	17:05	19.07	-0.03
11/5/2014	17:06	19.1	-0.05
11/5/2014	17:07	19.18	-0.05
11/5/2014	17:08	19.61	-0.05
11/5/2014	17:09	19.39	-0.05
11/5/2014	17:10	19.19	-0.05
11/5/2014	17:11	19.17	-0.05
11/5/2014	17:12	19.15	-0.05
11/5/2014	17:13	19.14	-0.05
11/5/2014	17:14	19.14	-0.05
11/5/2014	17:15	19.16	-0.04
11/5/2014	17:16	19.44	-0.04
11/5/2014	17:17	19.51	-0.05
11/5/2014	17:18	19.49	-0.05
11/5/2014	17:19	19.45	-0.05
11/5/2014	17:20	20.79	-0.05
11/5/2014	17:21	20.81	-0.05
11/5/2014	17:22	20.83	-0.05
11/5/2014	17:23	20.83	-0.05
11/5/2014	17:24	5.87	-0.06
11/5/2014	17:25	-0.09	-0.1
11/5/2014	17:26	-0.11	-0.1
11/5/2014	17:27	-0.12	-0.1
11/5/2014	17:28	2.5	0.22
11/5/2014	17:29	1.85	1.89
11/5/2014	17:30	1.85	2.06
11/5/2014	17:31	1.85	2.06
11/5/2014	17:32	10.64	7.01
11/5/2014	17:33	18.89	19.04
11/5/2014	17:34	20.9	1.72
11/5/2014	17:35	20.87	0.07
11/5/2014	17:36	20.48	0.39
11/5/2014	17:37	7.98	8.12
11/5/2014	17:38	20.07	0.42
11/5/2014	17:39	21.19	-0.06

#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/5/2014	17:40	20.59	-0.06
11/5/2014	17:41	20.58	-0.09
11/5/2014	17:42	20.58	-0.09
11/5/2014	17:43	20.58	-0.09
11/5/2014	17:44	20.58	-0.1
11/5/2014	17:45	20.58	-0.1
11/5/2014	17:46	20.91	-0.1
11/5/2014	17:47	21.02	-0.1
11/5/2014	17:48	21.02	-0.1
11/5/2014	17:49	21.01	-0.1
11/5/2014	17:50	16	0.13
11/5/2014	17:51	18.49	0.35
11/5/2014	17:52	20.79	-0.02
11/5/2014	17:53	20.83	-0.04
11/5/2014	17:54	20.83	-0.04
11/5/2014	17:55	20.82	-0.04
11/5/2014	17:56	20.83	-0.04
11/5/2014	17:57	20.82	-0.04
11/5/2014	17:58	20.83	-0.04
11/5/2014	17:59	20.83	-0.04
11/5/2014	18:00	20.83	-0.04
11/6/2014	6:00	20.93	-0.06
11/6/2014	6:01	20.93	-0.05
11/6/2014	6:02	20.93	-0.05
11/6/2014	6:03	20.93	-0.05
11/6/2014	6:04	20.93	-0.05
11/6/2014	6:05	20.92	-0.04
11/6/2014	6:06	20.92	-0.05
11/6/2014	6:07	20.92	-0.05
11/6/2014	6:08	20.92	-0.05
11/6/2014	6:09	20.92	-0.06
11/6/2014	6:10	20.92	-0.05
11/6/2014	6:11	20.93	-0.05
11/6/2014	6:12	20.92	-0.05
11/6/2014	6:13	20.93	-0.05
11/6/2014	6:14	20.93	-0.05
11/6/2014	6:15	20.93	-0.06
11/6/2014	6:16	20.93	-0.05
11/6/2014	6:17	20.93	-0.05
11/6/2014	6:18	20.93	-0.06
11/6/2014	6:19	20.93	-0.06
11/6/2014	6:20	20.93	-0.04
11/6/2014	6:21	20.93	-0.05
11/6/2014	6:22	20.93	-0.05
11/6/2014	6:23	20.93	-0.05
11/6/2014	6:24	20.93	-0.05
11/6/2014	6:25	20.93	-0.05
11/6/2014	6:26	20.93	-0.06
11/6/2014	6:27	20.93	-0.06
11/6/2014	6:28	20.93	-0.06
11/6/2014	6:29	20.93	-0.05
11/6/2014	6:30	20.93	-0.04
11/6/2014	6:31	20.93	-0.05
11/6/2014	6:32	20.93	-0.06
11/6/2014	6:33	20.93	-0.05
11/6/2014	6:34	20.93	-0.05
11/6/2014	6:35	20.93	-0.05
11/6/2014	6:36	20.92	-0.05
11/6/2014	6:37	20.92	-0.05
11/6/2014	6:38	20.92	-0.05
11/6/2014	6:39	20.92	-0.05
11/6/2014	6:40	20.92	-0.05
11/6/2014	6:41	20.92	-0.05
11/6/2014	6:42	20.92	-0.05
11/6/2014	6:43	20.92	-0.06
11/6/2014	6:44	20.92	-0.06
11/6/2014	6:45	20.92	-0.06

#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/6/2014	6:46	20.92	-0.05
11/6/2014	6:47	20.92	-0.05
11/6/2014	6:48	20.92	-0.05
11/6/2014	6:49	20.91	-0.05
11/6/2014	6:50	20.91	-0.05
11/6/2014	6:51	20.91	-0.05
11/6/2014	6:52	20.91	-0.05
11/6/2014	6:53	20.91	-0.05
11/6/2014	6:54	20.91	-0.05
11/6/2014	6:55	10.23	-0.06
11/6/2014	6:56	-0.06	-0.1
11/6/2014	6:57	-0.1	-0.1
11/6/2014	6:58	0.73	-0.1
11/6/2014	6:59	9.09	0.07
11/6/2014	7:00	1.69	1.82
11/6/2014	7:01	1.68	2.23
11/6/2014	7:02	1.69	2.25
11/6/2014	7:03	5.68	2.21
11/6/2014	7:04	14.33	5.13
11/6/2014	7:05	9.22	11.13
11/6/2014	7:06	9.26	11.16
11/6/2014	7:07	9.28	11.16
11/6/2014	7:08	12.99	9.21
11/6/2014	7:09	21	0.2
11/6/2014	7:10	20.9	0.03
11/6/2014	7:11	20.84	0.02
11/6/2014	7:12	20.82	0.02
11/6/2014	7:13	20.82	0.01
11/6/2014	7:14	20.82	0
11/6/2014	7:15	20.82	0
11/6/2014	7:16	20.83	-0.01
11/6/2014	7:17	20.83	-0.01
11/6/2014	7:18	20.84	-0.01
11/6/2014	7:19	20.84	-0.02
11/6/2014	7:20	20.85	-0.02
11/6/2014	7:21	20.85	-0.02
11/6/2014	7:22	20.85	-0.02
11/6/2014	7:23	20.85	-0.04
11/6/2014	7:24	20.86	-0.04
11/6/2014	7:25	20.86	-0.04
11/6/2014	7:26	20.86	-0.04
11/6/2014	7:27	20.86	-0.04
11/6/2014	7:28	20.86	-0.04
11/6/2014	7:29	20.86	-0.04
11/6/2014	7:30	20.86	-0.04
11/6/2014	7:31	20.86	-0.04
11/6/2014	7:32	20.87	-0.04
11/6/2014	7:33	20.87	-0.04
11/6/2014	7:34	20.87	-0.04
11/6/2014	7:35	20.87	-0.05
11/6/2014	7:36	20.87	-0.04
11/6/2014	7:37	20.87	-0.04
11/6/2014	7:38	20.88	-0.04
11/6/2014	7:39	20.88	-0.04
11/6/2014	7:40	20.83	-0.02
11/6/2014	7:41	20.8	0.03
11/6/2014	7:42	20.81	0.01
11/6/2014	7:43	20.8	-0.01
11/6/2014	7:44	20.77	-0.02
11/6/2014	7:45	20.75	-0.03
11/6/2014	7:46	20.74	-0.02
11/6/2014	7:47	20.73	-0.02
11/6/2014	7:48	20.75	-0.02
11/6/2014	7:49	20.78	-0.02
11/6/2014	7:50	20.79	-0.02
11/6/2014	7:51	20.8	-0.02
11/6/2014	7:52	20.8	-0.02

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#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/6/2014	7:53	20.81	-0.02
11/6/2014	7:54	20.81	-0.02
11/6/2014	7:55	20.81	-0.02
11/6/2014	7:56	20.81	-0.02
11/6/2014	7:57	20.81	-0.02
11/6/2014	7:58	20.81	-0.02
11/6/2014	7:59	20.81	-0.02
11/6/2014	8:00	20.81	-0.02
11/6/2014	8:01	20.81	-0.02
11/6/2014	8:02	20.81	-0.02
11/6/2014	8:03	20.81	-0.01
11/6/2014	8:04	20.81	-0.01
11/6/2014	8:05	20.81	-0.01
11/6/2014	8:06	20.81	-0.01
11/6/2014	8:07	20.83	-0.04
11/6/2014	8:08	20.19	-0.06
11/6/2014	8:09	20.81	-0.05
11/6/2014	8:10	20.84	-0.05
11/6/2014	8:11	20.84	-0.04
11/6/2014	8:12	20.83	-0.05
11/6/2014	8:13	20.82	-0.06
11/6/2014	8:14	20.8	-0.06
11/6/2014	8:15	20.8	-0.06
11/6/2014	8:16	20.82	-0.06
11/6/2014	8:17	20.84	-0.06
11/6/2014	8:18	20.84	-0.05
11/6/2014	8:19	20.85	-0.05
11/6/2014	8:20	20.85	-0.06
11/6/2014	8:21	20.83	-0.05
11/6/2014	8:22	20.75	-0.01
11/6/2014	8:23	20.68	0.02
11/6/2014	8:24	20.71	0.09
11/6/2014	8:25	20.77	-0.04
11/6/2014	8:26	20.77	-0.05
11/6/2014	8:27	20.78	-0.05
11/6/2014	8:28	20.78	-0.05
11/6/2014	8:29	20.78	-0.05
11/6/2014	8:30	20.77	-0.05
11/6/2014	8:31	20.77	-0.05
11/6/2014	8:32	20.78	-0.05
11/6/2014	8:33	20.77	-0.05
11/6/2014	8:34	20.78	-0.05
11/6/2014	8:35	20.78	-0.06
11/6/2014	8:36	20.78	-0.06
11/6/2014	8:37	20.77	-0.05
11/6/2014	8:38	20.78	-0.05
11/6/2014	8:39	20.77	-0.05
11/6/2014	8:40	20.77	-0.05
11/6/2014	8:41	20.77	-0.05
11/6/2014	8:42	20.77	-0.05
11/6/2014	8:43	20.77	-0.05
11/6/2014	8:44	20.77	-0.05
11/6/2014	8:45	20.77	-0.05
11/6/2014	8:46	20.77	-0.05
11/6/2014	8:47	20.78	-0.05
11/6/2014	8:48	20.77	-0.05
11/6/2014	8:49	20.77	-0.05
11/6/2014	8:50	20.77	-0.05
11/6/2014	8:51	20.78	-0.05
11/6/2014	8:52	20.77	-0.05
11/6/2014	8:53	18.53	-0.07
11/6/2014	8:54	17.62	-0.09
11/6/2014	8:55	17.58	-0.1
11/6/2014	8:56	17.51	-0.1
11/6/2014	8:57	17.51	-0.1
11/6/2014	8:58	17.52	-0.1
11/6/2014	8:59	17.49	-0.1

#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/6/2014	9:00	17.48	-0.1
11/6/2014	9:01	17.48	-0.1
11/6/2014	9:02	17.5	-0.1
11/6/2014	9:03	17.49	-0.1
11/6/2014	9:04	17.59	-0.1
11/6/2014	9:05	17.62	-0.1
11/6/2014	9:06	17.59	-0.1
11/6/2014	9:07	17.57	-0.1
11/6/2014	9:08	17.49	-0.1
11/6/2014	9:09	17.49	-0.1
11/6/2014	9:10	17.5	-0.1
11/6/2014	9:11	17.5	-0.1
11/6/2014	9:12	17.43	-0.1
11/6/2014	9:13	17.42	-0.1
11/6/2014	9:14	17.39	-0.1
11/6/2014	9:15	17.36	-0.1
11/6/2014	9:16	17.38	-0.1
11/6/2014	9:17	17.54	-0.1
11/6/2014	9:18	17.7	-0.1
11/6/2014	9:19	17.6	-0.1
11/6/2014	9:20	17.67	-0.1
11/6/2014	9:21	17.72	-0.1
11/6/2014	9:22	17.74	-0.1
11/6/2014	9:23	17.63	-0.1
11/6/2014	9:24	17.47	-0.1
11/6/2014	9:25	17.4	-0.1
11/6/2014	9:26	17.37	-0.1
11/6/2014	9:27	17.47	-0.1
11/6/2014	9:28	17.56	-0.1
11/6/2014	9:29	17.73	-0.1
11/6/2014	9:30	17.85	-0.1
11/6/2014	9:31	17.87	-0.1
11/6/2014	9:32	17.91	-0.1
11/6/2014	9:33	17.86	-0.1
11/6/2014	9:34	17.82	-0.1
11/6/2014	9:35	17.79	-0.1
11/6/2014	9:36	17.76	-0.1
11/6/2014	9:37	17.76	-0.1
11/6/2014	9:38	17.71	-0.1
11/6/2014	9:39	17.69	-0.1
11/6/2014	9:40	17.73	-0.1
11/6/2014	9:41	17.76	-0.1
11/6/2014	9:42	17.71	-0.1
11/6/2014	9:43	17.81	-0.1
11/6/2014	9:44	17.85	-0.1
11/6/2014	9:45	17.78	-0.1
11/6/2014	9:46	17.66	-0.1
11/6/2014	9:47	17.62	-0.1
11/6/2014	9:48	17.55	-0.1
11/6/2014	9:49	17.54	-0.1
11/6/2014	9:50	17.51	-0.1
11/6/2014	9:51	17.54	-0.1
11/6/2014	9:52	17.67	-0.1
11/6/2014	9:53	17.68	-0.1
11/6/2014	9:54	17.78	-0.1
11/6/2014	9:55	17.91	-0.1
11/6/2014	9:56	17.93	-0.1
11/6/2014	9:57	18.02	-0.1
11/6/2014	9:58	17.96	-0.1
11/6/2014	9:59	18	-0.1
11/6/2014	10:00	17.94	-0.1
11/6/2014	10:01	17.94	-0.1
11/6/2014	10:02	17.84	-0.1
11/6/2014	10:03	17.89	-0.1
11/6/2014	10:04	17.82	-0.1
11/6/2014	10:05	17.81	-0.1
11/6/2014	10:06	17.73	-0.1

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#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/6/2014	10:07	17.75	-0.1
11/6/2014	10:08	17.73	-0.1
11/6/2014	10:09	17.72	-0.1
11/6/2014	10:10	17.68	-0.1
11/6/2014	10:11	17.75	-0.1
11/6/2014	10:12	17.7	-0.1
11/6/2014	10:13	17.67	-0.1
11/6/2014	10:14	17.63	-0.1
11/6/2014	10:15	17.54	-0.1
11/6/2014	10:16	17.52	-0.09
11/6/2014	10:17	17.5	-0.1
11/6/2014	10:18	17.59	-0.09
11/6/2014	10:19	17.52	-0.09
11/6/2014	10:20	17.54	-0.09
11/6/2014	10:21	17.51	-0.09
11/6/2014	10:22	17.45	-0.09
11/6/2014	10:23	17.51	-0.09
11/6/2014	10:24	17.45	-0.09
11/6/2014	10:25	17.48	-0.1
11/6/2014	10:26	17.54	-0.09
11/6/2014	10:27	17.55	-0.09
11/6/2014	10:28	17.59	-0.1
11/6/2014	10:29	17.49	-0.09
11/6/2014	10:30	17.43	-0.09
11/6/2014	10:31	17.5	-0.09
11/6/2014	10:32	17.49	-0.09
11/6/2014	10:33	17.57	-0.09
11/6/2014	10:34	17.55	-0.09
11/6/2014	10:35	17.56	-0.09
11/6/2014	10:36	17.56	-0.1
11/6/2014	10:37	17.4	-0.09
11/6/2014	10:38	17.49	-0.1
11/6/2014	10:39	17.66	-0.09
11/6/2014	10:40	17.59	-0.09
11/6/2014	10:41	17.63	-0.1
11/6/2014	10:42	17.6	-0.09
11/6/2014	10:43	17.66	-0.09
11/6/2014	10:44	17.56	-0.09
11/6/2014	10:45	17.61	-0.1
11/6/2014	10:46	17.49	-0.1
11/6/2014	10:47	17.51	-0.1
11/6/2014	10:48	17.58	-0.1
11/6/2014	10:49	17.68	-0.09
11/6/2014	10:50	17.64	-0.1
11/6/2014	10:51	17.66	-0.1
11/6/2014	10:52	17.69	-0.1
11/6/2014	10:53	17.6	-0.1
11/6/2014	10:54	17.61	-0.1
11/6/2014	10:55	17.55	-0.1
11/6/2014	10:56	17.5	-0.1
11/6/2014	10:57	17.57	-0.1
11/6/2014	10:58	17.61	-0.09
11/6/2014	10:59	17.62	-0.09
11/6/2014	11:00	17.7	-0.1
11/6/2014	11:01	17.65	-0.1
11/6/2014	11:02	17.67	-0.09
11/6/2014	11:03	17.65	-0.1
11/6/2014	11:04	17.61	-0.1
11/6/2014	11:05	17.61	-0.09
11/6/2014	11:06	17.52	-0.1
11/6/2014	11:07	17.54	-0.09
11/6/2014	11:08	17.5	-0.09
11/6/2014	11:09	17.54	-0.09
11/6/2014	11:10	17.5	-0.09
11/6/2014	11:11	17.61	-0.1
11/6/2014	11:12	17.59	-0.09
11/6/2014	11:13	17.59	-0.1

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#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/6/2014	11:14	17.53	-0.1
11/6/2014	11:15	17.55	-0.09
11/6/2014	11:16	17.53	-0.09
11/6/2014	11:17	17.62	-0.09
11/6/2014	11:18	17.6	-0.1
11/6/2014	11:19	17.58	-0.09
11/6/2014	11:20	17.56	-0.09
11/6/2014	11:21	17.6	-0.09
11/6/2014	11:22	17.51	-0.09
11/6/2014	11:23	17.52	-0.09
11/6/2014	11:24	17.52	-0.1
11/6/2014	11:25	17.48	-0.1
11/6/2014	11:26	17.47	-0.09
11/6/2014	11:27	17.49	-0.09
11/6/2014	11:28	17.53	-0.09
11/6/2014	11:29	17.63	-0.1
11/6/2014	11:30	17.64	-0.09
11/6/2014	11:31	17.67	-0.09
11/6/2014	11:32	17.63	-0.09
11/6/2014	11:33	17.69	-0.1
11/6/2014	11:34	17.63	-0.09
11/6/2014	11:35	17.5	-0.09
11/6/2014	11:36	17.38	-0.1
11/6/2014	11:37	17.39	-0.09
11/6/2014	11:38	17.47	-0.09
11/6/2014	11:39	17.35	-0.09
11/6/2014	11:40	17.77	-0.09
11/6/2014	11:41	17.77	-0.09
11/6/2014	11:42	17.86	-0.09
11/6/2014	11:43	17.42	-0.09
11/6/2014	11:44	17.45	-0.09
11/6/2014	11:45	17.8	-0.09
11/6/2014	11:46	17.75	-0.08
11/6/2014	11:47	17.59	-0.09
11/6/2014	11:48	17.52	-0.09
11/6/2014	11:49	17.51	-0.09
11/6/2014	11:50	17.59	-0.09
11/6/2014	11:51	17.64	-0.09
11/6/2014	11:52	17.74	-0.1
11/6/2014	11:53	17.77	-0.09
11/6/2014	11:54	17.72	-0.09
11/6/2014	11:55	17.81	-0.09
11/6/2014	11:56	18.06	-0.09
11/6/2014	11:57	17.62	-0.09
11/6/2014	11:58	17.59	-0.09
11/6/2014	11:59	17.75	-0.09
11/6/2014	12:00	17.58	-0.09
11/6/2014	12:01	17.45	-0.09
11/6/2014	12:02	17.61	-0.09
11/6/2014	12:03	17.6	-0.09
11/6/2014	12:04	17.5	-0.09
11/6/2014	12:05	17.43	-0.09
11/6/2014	12:06	17.51	-0.09
11/6/2014	12:07	17.42	-0.09
11/6/2014	12:08	17.41	-0.09
11/6/2014	12:09	17.45	-0.09
11/6/2014	12:10	17.59	-0.09
11/6/2014	12:11	17.93	-0.09
11/6/2014	12:12	17.91	-0.09
11/6/2014	12:13	18.01	-0.09
11/6/2014	12:14	17.74	-0.09
11/6/2014	12:15	17.9	-0.09
11/6/2014	12:16	17.83	-0.09
11/6/2014	12:17	17.75	-0.09
11/6/2014	12:18	17.84	-0.09
11/6/2014	12:19	17.68	-0.09
11/6/2014	12:20	17.72	-0.09

#1 #2 and #3 BSW 1 min avgs.xls

Date	Time	O2	CO2
11/6/2014	12:21	17.75	-0.09
11/6/2014	12:22	17.71	-0.09
11/6/2014	12:23	17.51	-0.09
11/6/2014	12:24	17.61	-0.09
11/6/2014	12:25	17.59	-0.09
11/6/2014	12:26	17.5	-0.09
11/6/2014	12:27	17.51	-0.1
11/6/2014	12:28	17.57	-0.09
11/6/2014	12:29	17.5	-0.09
11/6/2014	12:30	17.58	-0.09
11/6/2014	12:31	17.61	-0.09
11/6/2014	12:32	17.65	-0.09
11/6/2014	12:33	17.75	-0.09
11/6/2014	12:34	17.64	-0.1
11/6/2014	12:35	17.59	-0.1
11/6/2014	12:36	17.56	-0.1
11/6/2014	12:37	17.96	-0.1
11/6/2014	12:38	17.72	-0.1
11/6/2014	12:39	17.66	-0.1
11/6/2014	12:40	17.69	-0.1
11/6/2014	12:41	17.76	-0.1
11/6/2014	12:42	17.98	-0.09
11/6/2014	12:43	17.74	-0.09
11/6/2014	12:44	17.82	-0.09
11/6/2014	12:45	17.78	-0.09
11/6/2014	12:46	17.98	-0.1
11/6/2014	12:47	17.8	-0.1
11/6/2014	12:48	17.69	-0.09
11/6/2014	12:49	17.83	-0.1
11/6/2014	12:50	17.74	-0.09
11/6/2014	12:51	17.77	-0.09
11/6/2014	12:52	17.83	-0.1
11/6/2014	12:53	18.14	-0.08
11/6/2014	12:54	17.67	-0.09
11/6/2014	12:55	17.54	-0.1
11/6/2014	12:56	17.88	-0.09
11/6/2014	12:57	1.38	-0.06
11/6/2014	12:58	-0.1	-0.09
11/6/2014	12:59	-0.12	-0.09
11/6/2014	13:00	-0.12	-0.09
11/6/2014	13:01	1.95	-0.04
11/6/2014	13:02	1.67	1.61
11/6/2014	13:03	6.35	2.26
11/6/2014	13:04	21.02	2.27
11/6/2014	13:05	20.96	2.22
11/6/2014	13:06	20.92	0.68
11/6/2014	13:07	20.91	-0.01

GP BSW #1, #2 and #3 MeOH Testing
QA/QC Spikes

→ Bottle 20 – Blank
Lab result: < SRL

→ Bottle 21 – ~~Lcss~~ Low Spike
50 ~~ug~~ x 15,000 ug/mL = 750 ug
Lab result = 835 ug

→ Bottle 22 – High Spike
300 uL x 15,000 ug/mL = 4500 ug
Lab result = 4940 ug

Atmospheric Analysis & Consulting, Inc.

Client	:	Bighorn Environmental
Client Project Name	:	GP-Toledo 2014 BSW testing
Client Project Number	:	NA
AAC Project Number	:	141814
Reporting Date	:	11/21/2014

On November 19, 2014, Atmospheric Analysis & Consulting, Inc. received fifteen (15) liquid samples for Methanol Analysis by NCASI Method 94.02. Upon receipt the samples were assigned unique Laboratory ID numbers as follows:

Client Sample ID	AAC Sample ID	Client Sample ID	AAC Sample ID
BSW #2 Combined Vent Run 1	141814-75802	#1 Vacumn Pump Run 3	141814-75810
BSW #2 Combined Vent Run 2	141814-75803	#1 Foam Breaker Run 1	141814-75811
BSW #2 Combined Vent Run 3	141814-75804	#1 Foam Breaker Run 2	141814-75812
BSW #3 Combined Vent Run 1	141814-75805	#1 Foam Breaker Run 3	141814-75813
BSW #3 Combined Vent Run 2	141814-75806	Blank	141814-75814
BSW #3 Combined Vent Run 3	141814-75807	High Spike	141814-75815
#1 Vacumn Pump Run 1	141814-75808	Low Spike	141814-75816
#1 Vacumn Pump Run 2	141814-75809		

NCASI Method 94.02 – A portion of each of the liquid samples was transferred to a GC vial and spiked with internal standard, and was then analyzed on a GC/FID. Holding times for preparation and analysis were complied with.

No problems were encountered during receiving, preparation, and/ or analysis of these samples. The test results included in this report meet all requirements of the NELAC Standards and/or AAC SOP# N.94.02.02.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature. If you have any questions or require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 7 pages.

ACCREDITED IN ACCORDANCE WITH nelac Certificate#E87837

1534 Eastman Ave., Ste. A • Ventura, • CA 93003 www.aaclab.com • (805) 650-1642 • FAX (805) 650-1644

Laboratory Analysis Report

Client	: Bighorn Environmental	Sampling Date	: 11/05-06/2014
Client Project Name	: GP-Toledo 2014 BSW testing	Receiving Date	: 11/19/2014
AAC Project No.	: 141814	Analysis Date	: 11/20/2014
Analyst	: EG	Reporting Date	: 11/21/2014

Methanol Analysis by NCASI Method 94.02

Client Sample ID	AAC Sample ID	Sample Volume (mL)	Methanol (ug/mL)	Methanol (ug/sample)	SRL (ug/sample)	Internal Standard (Cyclohexanol) % Recovery
BSW #2 Combined Vent Run 1	141814-75802	26.0	144	3740	13.0	97.9
BSW #2 Combined Vent Run 2	141814-75803	30.2	97.3	2940	15.1	101
BSW #2 Combined Vent Run 3	141814-75804	19.0	90.4	1720	9.50	99.6
BSW #3 Combined Vent Run 1	141814-75805	20.2	397	8020	10.1	98.7
BSW #3 Combined Vent Run 2	141814-75806	29.8	316	9420	14.9	100
BSW #3 Combined Vent Run 3	141814-75807	31.0	276	8550	15.5	100
#1 Vacumn Pump Run 1	141814-75808	23.3	40.8	950	11.7	101
#1 Vacumn Pump Run 2	141814-75809	22.7	40.8	925	11.4	101
#1 Vacumn Pump Run 3	141814-75810	25.0	40.9	1020	12.5	98.6
#1 Foam Breaker Run 1	141814-75811	23.5	386	9070	11.8	106
#1 Foam Breaker Run 2	141814-75812	41.2	372	15300	20.6	104
#1 Foam Breaker Run 3	141814-75813	29.2	271	7910	14.6	105
Blank	141814-75814	40.5	<SRL	<SRL	20.3	108
High Spike	141814-75815	41.0	121	4940	20.5	98.9
Low Spike	141814-75816	40.5	20.6	835	20.3	99.4

MRL - Method Reporting Limit = 0.500 ug/mL

SRL - Sampling Reporting Limit (ug/sample) = MRL (0.500 ug/mL) x Sample Volume (mL) x Analysis Dilution Factor

<SRL - Analyte was analyzed for but not detected at or above the SRL

Marcus Hueppe
Laboratory Director

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

Methanol Analysis by NCASI Method 94.02

Client	: Bighorn Environmental	Sampling Date	: 11/05-06/2014
Client Project Name	: GP-Toledo 2014 BSW testing	Receiving Date	: 11/19/2014
AAC Project No.	: 141814	Analysis Date	: 11/20/2014
Analyst	: EG	Reporting Date	: 11/21/2014

Spiking Solution Evaluation

Client Sample ID	Sample Volume (mL)	Analyte	Measured Concentration (ug/sample)	Target Concentration (ug/sample)	Internal Standard % Recovery	% Recovery
High Spike	41.0	Methanol	4940	4740	108	104
Low Spike	40.5	Methanol	835	790	98.9	106
Client Sample ID	**Sample Volume (mL)**	**Analyte**	**Measured Concentration (ug/ml)**	**Target Concentration (ug/ml)**	**Internal Standard % Recovery**	**% Recovery**
Lab Spiking Solution (retained at Lab and analyzed with samples)	23.0	Methanol	15700	NA	10413	NA
Field Spiking Solution (went to field and back with samples)	23.0	Methanol	15800	15700	10739	101

<SRL - Analyte was analyzed for but not detected at or above the SRL

Internal Standard recovery should be between 80-120%

The target concentration for the Spikes is based on the measured Field Spiking Solution concentration x the spiked amount

Marcus Heuppe
Laboratory Director

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Quality Control/Quality Assurance Report

NCASI Method 94.02

FID Calibration Verification of the 9/18/2014 Calibration

Analysis Date : 11/20/2014 Instrument ID : GC 6890 #1
Analyst : EG

Sample ID	Analyte	Target Concentration (ug/mL)	Measured Concentration (ug/mL)	Percent Recovery (%)*
Opening CV	Methanol	500	475	95.0
	Cyclohexanol (IS)	20.0	19.4	96.9
Continuing CV	Methanol	500	502	100
	Cyclohexanol (IS)	20.0	19.9	99.4
Continuing CV	Methanol	500	527	105
	Cyclohexanol (IS)	20.0	20.2	101
Closing CV	Methanol	500	504	101
	Cyclohexanol (IS)	20.0	20.7	104
Second Source	Methanol	500	503	101
	Cyclohexanol (IS)	20.0	20.7	103

* Must be 85 - 115 %
IS - Internal Standard

Marcus Hueppe
Laboratory Director

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Quality Control/Quality Assurance Report
NCASI Method 94.02

Analysis Date : 11/20/2014 Analyst : EG Instrument ID : GC 6890 #1

Laboratory Control Spike Analysis

Analyte	Sample Concentration (ug/mL)	Spike Concentration (ug/mL)	Measured Spike Concentration (ug/mL)	Measured Spike Dup Concentration (ug/mL)	Spike Recovery (%)*	Spike Dup Recovery (%)*	%RPD**
Methanol	0.000	250	254	256	102	102	0.7
Cyclohexanol (IS)	0.000	20.0	19.5	19.8	97.3	99	1.9

* Must be 85-115%

** Must be ≤ 25%

Matrix Spike Analysis (141802-75804)

Analyte	Sample Concentration (ug/mL)	Spike Concentration (ug/mL)	Measured Spike Concentration (ug/mL)	Measured Spike Dup Concentration (ug/mL)	Spike Recovery (%)*	Spike Dup Recovery (%)*	%RPD**
Methanol	44.9	250	304	301	104	102	1.0
Cyclohexanol (IS)	0.000	20.0	19.9	19.3	99.4	96.3	3.2

* Must be 75-125%

** Must be ≤ 25%

Marcus Hueppe
Laboratory Director

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Quality Control/Quality Assurance Report
NCASI Method 94.02

Analysis Date : 11/20/2014 Instrument ID : GC 6890 #1
Analyst : EG

Duplicate Analysis

Sample ID	Analyte	Sample Concentration (ug/mL)	Duplicate Concentration (ug/mL)	%RPD*
141802-75804	Methanol	90.4	89.3	1.2
	Cyclohexanol (IS)	19.9	20.6	3.4
141802-75803	Methanol	97.3	98.3	1.0
	Cyclohexanol (IS)	20.1	19.4	3.6
141802-75812	Methanol	372	374	0.5
	Cyclohexanol (IS)	20.7	20.4	1.9

* Must be ≤15%

Method Blank Analysis

Sample ID	Analyte	Concentration (ug/mL)	RL / SRL (ug/mL)
Method Blank	Methanol	<RL	0.500
Internal Standard (IS)	**Target Concentration (ug/mL)**	**Measured Conc. (ug/mL)**	**% Recovery**
Cyclohexanol (IS)	20.0	19.9	99.5

RL - Reporting Limit
SRL - Sample Reporting Limit

Marcus Hueppe
Laboratory Director

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ATMOSPHERIC ANALYSIS & CONSULTING, INC.
1534 Eastman Avenue, Suite A
Ventura, California 93003
Phone (805) 650-1642 Fax (805) 650-1644
E-mail: info@aaclab.com

AAC Project No. 141814

CHAIN OF CUSTODY/ ANALYSIS REQUEST FORM

Client Name	Project Name	Analysis Requested	Send report:
GP-Toledo	2014 BSW testing		
Project Mgr (Print Name) Tim Homer	Project Number		Tim Homer
Sampler's Name (Print Name) Tim Homer	Sampler's Signature		Attn:
			Phone#:
			Fax#

AAC Sample No.	Date Sampled	Time Sampled	Sample Type	Client Sample ID/Description	Type/No. of Containers	NCASI CI-94.02 (MeOH)						
BSW #2 Combined Vent		Run 1	Liq	75802		X						
BSW #2 Combined Vent		Run 2	"	75803		X						
BSW #2 Combined Vent		Run 3	"	75804		X						
BSW #3 Combined Vent		Run 1	"	75805		X						
BSW #3 Combined Vent		Run 2	"	75806		X						
BSW #3 Combined Vent		Run 3	"	75807		X						
#1 Vacumm Pump		Run 1	"	75808		X						
#1 Vacumm Pump		Run 2	"	75809		X						
#1 Vacumm Pump		Run 3	"	75810		X						
#1 Foam Breaker		Run 1	"	75811		X						
#1 Foam Breaker		Run 2	"	75812		X						
#1 Foam Breaker		Run 3	"	75813		X						

Send invoice to:

Attn:

P.O. #

Turnaround Time

24-Hr ____ 48-Hr ____

5 Day ____ Normal X

Other (Specify) ____

Special Instructions/remarks:
75814, 75815, 75816
Blank, High and Low Spikes
also included

Relinquished by (Signature):	Print Name: Tim Homer	Date/Time 11/15 13:00	Received by (signature):	Print Name
Relinquished by (Signature):	Print Name:	Date/Time 11/19/14 1420	Received by (signature):	Print Name Tony DiCeglie

Fed Ex 7.6°C

0007

APPENDIX B
CALCULATIONS

CALCULATIONS

FLOW RATES:

A = Vent pipe cross-sectional area (ft^2) = πr^2

P_{bar} = Barometric pressure at measurement site (in Hg)

P_g = Stack static pressure (in Hg) = in. $H_2O \div 13.6$ in H_2O/in. Hg

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

t_d = Temperature dry bulb (°F)

t_w = Temperature wet bulb (°F)

e" = Stack vapor pressure (in. Hg)
$= (0.00000608746 \times t_w^3)-(0.00100431 \times t_w^2)+(0.0756026 \times t_w)-1.69343$

$\%H_2O = [e" - (P_s - e")x(t_d - t_w)) \div (2800 - (1.3 \times t_w)] \div P_s \times 100$

MD = Molecular Density = $(100 - \%H_2O) \div 100$

M_d = Molecular weight of dry stack gas (lb/lb-mole)
$= (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + [(\%CO + \%N_2) \times 0.28]$

M_s = Molecular weight of wet stack gas (lb/lb-mole)
$= M_d \times (MD) + 18$lb/lb-mole $\times (1-MD)$

C_p = Pitot tube coefficient

$(\sqrt{\Delta p})_{avg}$ = Average square root velocity head of stack gas (in. H_2O)

T_s = Absolute stack temperature (°R) = $460 + t_d$

V_s = Average stack gas velocity (ft^3/min.)
$= 85.49$ ft/sec x 60 sec/min x $C_p \times (\sqrt{\Delta p})_{avg} \times \text{sqrt}(T_s \sqrt{} (P_s \times M_s))$

Q_{sd} = Stack gas dry molecular flow rate corrected to standard conditions

(dscfm) = MD x V_s x A x $(528°R \div T_s) \times (P_s \div 29.92"$ Hg)

Q_{ac} = Stack gas flow rate at actual conditions (acfm) = V_s x A

EMISSION RATES:

ODT = Oven Dry Tons of pulp production

$$\frac{\text{lb MeOH}}{\text{hour}} = (C_{gas} \div 1{,}000{,}000) \times (1\text{lb-mole} \div 385\text{ft}^3) \times 32.04 \text{ lb MeOH/lb-mole} \times Q_{sd} \times 60\text{min/hr}$$

$$\frac{\text{lb MeOH}}{\text{ODT}} = \frac{\text{lb MeOH}}{\text{hour}} \div \frac{\text{ODT}}{\text{hour}}$$

COMPLIANCE TEST - MANUAL CALCULATIONS SHEET

CLIENT: GP-Toledo
PROJECT: #1 BSW Foam Breaker
RUN TIME CHECKED: 910-1010
DATE: 11/6/14
CHECKED BY: [illegible]

FLOW RATES: 40CFR 60 APP. A, Method 2

r = Stack radius (ft) = (diameter (in.) ÷ 12) ÷ 2 = 15.75 - .6563

A = Stack cross-sectional area (ft^2) = πr^2 = 3.14159 x (.6563)^2 = 1.353

P_{bar} = Barometric pressure at measurement site (in Hg)= 29.81

P_g = Stack static pressure (in Hg) = in. H_2O ÷ 13.6 in H_2O/in. Hg = (-.06) / 13.6 = _____

P_s = Absolute stack gas pressure (in. Hg) = P_{bar} + P_g = 29.81 + -.0044 = 29.806

t_d = Temperature dry bulb (°F)= 115

t_w = Temperature wet bulb (°F)= 115

e" = Stack vapor pressure (in. Hg)
= (0.00000608746 x t_w^3)-(0.00100431 x t_w^2)+(0.0756026 x t_w)-1.69343
= (0.00000608746 x 115^3)-(0.00100431 x 115^2)+(0.0756026 x 115)-1.69343 = 2.977
9.259 13.252 8.6941

$\%H_2O$ = e" - [(P_s - e")x(t_d - t_w)) ÷ (2800 - (1.3 x t_w)] ÷ P_s x 100
= 2.977 - [((29.806 - 2.977) x (115 - 115))] ÷ (29.806) x 100 = 9.99
(2800 - (1.3 x 115))

MD = Molecular Density = (100 - $\%H_2O$) ÷ 100 = (100 - 9.99) / 100 = .9001

($\%CO + \%N_2$) = 100-$\%CO_2$ - $\%O_2$ = 100- (17.7) - (0) = 82.3

M_d = Molecular weight of dry stack gas (lb/lb-mole)=($\%CO_2$ x 0.44) + ($\%O_2$ x 0.32) + [($\%CO+\%N_2$) x 0.28]
= (0 x 0.44) + (17.7 x 0.32) + ((82.3) x 0.28) = 28.708

M_s = Molecular weight of wet stack gas (lb/lb-mole) = M_d x (MD) + (18lb/lb-mole x (1-MD))

= 28.708 x (.9001) + (18lb/lb-mole x (1- .9001)) = 27.636

C_p = Pitot tube coefficient = .84

$(\sqrt{\Delta p})_{avg}$ = Average square root velocity head of stack gas (in. H_2O)= .4462

T_s = Absolute stack temperature (°R) = 460 + t_d = 460 + 115 = 575

V_s = Average stack gas velocity (ft^2/min.)
= 85.49 ft/sec x 60 sec/min x C_p x $(\sqrt{\Delta p})_{avg}$ x sqrt(T_s ÷ (P_s x M_s))
= (85.49) x (60) x (.84) x (.4462) x sqrt (575 / (27.636 x 29.806)) = 1606.2

Q_{sd} = Dry stack gas flow rate at standard conditions = MD x V_s x A x (528°R ÷ T_s) x (P_s ÷ 29.92" Hg)
= .9001 x 1606.2 x 1.353 x (528°R) x (29.806) / (575) x (29.92) = 1789.4 / 1028

Q = Stack gas flow rate at actual conditions (acfm) = V_s x A = (1606.2) x (1.353) = 2173.2

Combined Stack Flow= _____ + _____ + _____ + _____ = _____

EMISSIONS:

Molecular Weight (MW)= lb / lb mole

MeOH= 32.04

lb Pollutant / hour = (C_{gas}÷1,000,000)x(1lb-mole÷385ft^3) x MW x Q_{sd} x 60min/hr
= (278.36 / 1,000,000) x (32.04 / 385) x (1) x (1789.4) x (60) = 2.486

lb Pollutant / ODTP = lb Pollutant / hour ÷ ODTP / hour
= (2.486 / (76.108)) = .1541b

Meter Vol (dscl) = Meter vol * ((273+20)/(273+Meter temp)* Meter Y* (Meter Pressure/29.92)=
23.992 x 1.006 x 293/288.2 . 29.81/29.92 = 24.444

MeOH ppm = mg/sample / MeOH MW . 24.04 / Meter Vol (dscf) = 9070 / 32.04 x 24.04 / 24.444 = 278.36

COMPLIANCE TEST - MANUAL CALCULATIONS SHEET

CLIENT: GP-Toledo
PROJECT: #1 BSW Vacuum Pump
RUN TIME CHECKED: 910-1010
DATE: 11/6/14
CHECKED BY: TP

FLOW RATES: 40CFR 60 APP. A, Method 2

r = Stack radius (ft) = (diameter (in.) ÷ 12) ÷ 2 = 10 ÷ 24 = .4167

A = Stack cross-sectional area (ft^2) = πr^2 = 3.14159 x (.4167)^2 = .54454

P_{bar} = Barometric pressure at measurement site (in Hg)= 29.81

P_g = Stack static pressure (in Hg) = in. H_2O ÷ 13.6 in H_2O/in. Hg = (0) ÷ 13.6 = 0

P_s = Absolute stack gas pressure (in. Hg) = P_{bar} + P_g = 29.81 + 0 = 29.81

t_d = Temperature dry bulb (°F)= 101.3

t_w = Temperature wet bulb (°F)= 97.7

e" = Stack vapor pressure (in. Hg)
= (0.00000608746 x t_w^3)-(0.00100431 x t_w^2)+(0.0756026 x t_w)-1.69343
= (0.00000608746 x 97.7^3)-(0.00100431 x 97.7^2)+(0.0756026 x 97.7)-1.69343 = 1.784
5.677 9.586 7.386

%H_2O = e" - [(P_s - e")x(t_d - t_w)) ÷ (2800 - (1.3 x t_w)] ÷ P_s x 100
= 1.784 - [((29.81 - 1.784) x (101.3 - 97.7))] ÷ (29.81) x 100 = 5.961
(2800 - (1.3 x 97.7))

MD = Molecular Density = (100 - %H_2O) ÷ 100 = (100 - 5.861) ÷ 100 = .94139

(%CO + %N_2) = 100-%CO_2 - %O_2 = 100- (17.7) - (0) = 82.3

M_d = Molecular weight of dry stack gas (lb/lb-mole)=(%CO_2 x 0.44) + (%O_2 x 0.32) + [(%CO+%N_2) x 0.28]
= (0 x 0.44) + (17.7 x 0.32) + ((82.3) x 0.28) = 29.704

M_s = Molecular weight of wet stack gas (lb/lb-mole) = M_d x (MD) + (18lb/lb-mole x (1-MD))

= .94139 x (28.708) + (18lb/lb-mole x (1- .94139)) = 28.082

C_p = Pitot tube coefficient = .84

$(\sqrt{\Delta p})_{avg}$ = Average square root velocity head of stack gas (in. H_2O)= .8833

T_s = Absolute stack temperature (°R) = 460 + t_d = 460 + 101.3 = 561.3

V_s = Average stack gas velocity (ft^2/min.)
= 85.49 ft/sec x 60 sec/min x C_p x $(\sqrt{\Delta p})_{avg}$ x sqrt($T_s \div (P_s \times M_s)$)
= (85.49) x (60) x (.84) x (.8833) x sqrt (561.3 / (28.082 x 29.81)) = 3116.4

Q_{sd} = Dry stack gas flow rate at standard conditions = MD x V_s x A x (528°R ÷ T_s) x (P_s ÷ 29.92" Hg)
= .94139 x .5454 x 3116.4 x (528°R) / (561.3) x (29.81 / 29.92) = 1499.6 dscfm

Q = Stack gas flow rate at actual conditions (acfm) = V_s x A = (3116.4) x (.5454) = 1699.7

Combined Stack Flow= _____ + _____ + _____ + _____ = _____

EMISSIONS:

Molecular Weight (MW)= lb / lb mole

MeOH= 32.04

lb Pollutant / hour = (C_{gas} ÷ 1,000,000) x (1lb-mole ÷ 385ft^3) x MW x Q_{sd} x 60min/hr
= (28.91 / 1,000,000) x (32.04 / 385) x (1) x (1499.6) x (60) = .2164

lb Pollutant / ODTP = lb Pollutant / hour ÷ ODTP / hour
= (.2164 / 1608) = .01345

Meter Vol (dscl) = Meter vol * ((273+20)/(273+Meter temp)* Meter Y* (Meter Pressure/29.92)= _____

24.029 x 1.006 x 293/286.2 x 29.81/29.92 = 24.657

950/32.04 x 24.04/24.657 = 28.91

COMPLIANCE TEST - MANUAL CALCULATIONS SHEET

CLIENT: GP-Toledo
PROJECT: #2 BSW
RUN TIME CHECKED: 1400-1500
DATE: 11/5/14
CHECKED BY: MP

FLOW RATES: 40CFR 60 APP. A, Method 2

r = Stack radius (ft) = (diameter (in.) ÷ 12) ÷ 2 = 16

A = Stack cross-sectional area (ft^2) = πr^2 = 3.14159 x (.67)^2 = 1.396

P_{bar} = Barometric pressure at measurement site (in Hg)= 29.76

P_g = Stack static pressure (in Hg) = in. H_2O ÷ 13.6 in H_2O/in. Hg = $\frac{(1.74)}{13.6}$ = .05414

P_s = Absolute stack gas pressure (in. Hg) = P_{bar} + P_g = 29.76 + .05414 = 29.7056

t_d = Temperature dry bulb (°F)= 130.1

t_w = Temperature wet bulb (°F)= 125.6

e" = Stack vapor pressure (in. Hg)
= (0.00000608746 x t_w^3)-(0.00100431 x t_w^2)+(0.0756026 x t_w)-1.69343
= (0.00000608746 x 125.6 ^{3})-(0.00100431 x 125.6 ^{2})+(0.0756026 x 125.6)-1.69343 = 4.022
12.062 15.843 9.496

$\%H_2O$ = e" - [(P_s - e")x(t_d - t_w)) ÷ (2800 - (1.3 x t_w)] ÷ P_s x 100
= 4.022 - [((29.7056 - 4.022) x (130.1 - 125.6))] ÷ (29.7056 x 100= 13.389
(2800 - (1.3 x 125.6))

MD = Molecular Density = (100 - $\%H_2O$) ÷ 100 = $\frac{(100 - 13.389)}{100}$ = .8661

(%CO + $\%N_2$) = 100-$\%CO_2$ - $\%O_2$ = 100- (19.49) - (0) = 80.51

M_d = Molecular weight of dry stack gas (lb/lb-mole)=($\%CO_2$ x 0.44) + ($\%O_2$ x 0.32) + [(%CO+$\%N_2$) x 0.28]
= (0 x 0.44) + (19.49 x 0.32) + ((80.51) x 0.28) = 28.777

M_s = Molecular weight of wet stack gas (lb/lb-mole) = M_d x (MD) + (18lb/lb-mole x (1-MD))

= 28,777 x (.86611) + (18lb/lb-mole x (1- .86611)) = 27,336

C_p = Pitot tube coefficient = 1.84

$(\sqrt{\Delta p})_{avg}$ = Average square root velocity head of stack gas (in. H_2O)= .6437

T_s = Absolute stack temperature (°R) = 460 + t_d = 460 + 130.1 = 590.1

V_s = Average stack gas velocity (ft^2/min.)
= 85.49 ft/sec x 60 sec/min x C_p x $(\sqrt{\Delta p})_{avg}$ x sqrt(T_s ÷ (P_s x M_s))
= (85.49) x (60) x (1.84) x (.6437) x sqrt (590.1 / (27.336 x 29.7056)) = 23643

Q_{sd} = Dry stack gas flow rate at standard conditions = MD x V_s x A x (528°R ÷ T_s) x (P_s ÷ 29.92" Hg)
= .86611 x 1.396 x 23643 x (528°R) / (590.1) x (29.92) x (29.7056) = 25395 .002

Q = Stack gas flow rate at actual conditions (acfm) = V_s x A = (23643) x (1.396) = 3300.6

Combined Stack Flow= _____ + _____ + _____ + _____ = _____

EMISSIONS:

Molecular Weight (MW)= lb / lb mole

MeOH= 32.04

lb Pollutant / hour = (C_{gas} ÷ 1,000,000) x (1lb-mole ÷ 385ft^3) x MW x Q_{sd} x 60min/hr
= (118.50) x (32.04) x (1) x (2539.5) x (60) = 1.502
1,000,000 385

lb Pollutant / ODTP = lb Pollutant / hour ÷ ODTP / hour
= (1.502) = .0124
(14.67)

Meter Vol (dscl) = Meter vol * ((273+20)/(273+Meter temp)* Meter Y* (Meter Pressure/29.92)= _____

= 24.007 * 1.01 * 293/298.4 * 29.76/29.92 = 23.68

MeOH ppm 3740/32.04 , 24.04/23.68 = 118.50

COMPLIANCE TEST - MANUAL CALCULATIONS SHEET

CLIENT: GP-Toledo
PROJECT: #28 BSW MeOH
RUN TIME CHECKED: 955-1055
DATE: 11/5/14
CHECKED BY: MP

FLOW RATES: 40CFR 60 APP. A, Method 2

r = Stack radius (ft) = (diameter (in.) ÷ 12) ÷ 2 = 16 - .67

A = Stack cross-sectional area (ft^2) = πr^2 = 3.14159 x (1.67)^2 = 1.396

P_{bar} = Barometric pressure at measurement site (in Hg)= 29.76

P_g = Stack static pressure (in Hg) = in. H_2O ÷ 13.6 in H_2O/in. Hg = (-1.01)/13.6 = -.074338

P_s = Absolute stack gas pressure (in. Hg) = P_{bar} + P_g = 29.76 + -.074338 = 29.759

t_d = Temperature dry bulb (°F)= 141.6

t_w = Temperature wet bulb (°F)= 134.6

e" = Stack vapor pressure (in. Hg)
= (0.00000608746 x t_w^3)-(0.00100431 x t_w^2)+(0.0756026 x t_w)-1.69343
= (0.00000608746 x 134.6^3)-(0.00100431 x 134.6^2)+(0.0756026 x 134.6)-1.69343 = 5.133

$\%H_2O$ = e" - [(P_s - e")x(t_d - t_w)) ÷ (2800 - (1.3 x t_w)] ÷ P_s x 100
= 5.133 - [((29.759 - 5.133) x (141.6 - 134.6))] ÷ (29.759) x 100 = 17.028
(2800 - (1.3 x 134.6))

MD = Molecular Density = (100 - $\%H_2O$) ÷ 100 = (100 - 17.028)/100 = .82972

(%CO + $\%N_2$) = 100-$\%CO_2$ - $\%O_2$ = 100- (9.98) - (0) = 90.02

M_d = Molecular weight of dry stack gas (lb/lb-mole)=($\%CO_2$ x 0.44) + ($\%O_2$ x 0.32) + [(%CO+$\%N_2$) x 0.28]
= (0 x 0.44) + (9.98 x 0.32) + ((90.02) x 0.28) = 28.663

M_s = Molecular weight of wet stack gas (lb/lb-mole) = M_d x (MD) + (18lb/lb-mole x (1-MD))

= 28.663 x (.82972) + (18lb/lb-mole x (1-.82972)) = 26.844

C_p = Pitot tube coefficient = .84

$(\sqrt{\Delta p})_{avg}$ = Average square root velocity head of stack gas (in. H_2O)= .1657

T_s = Absolute stack temperature (°R) = 460 + t_d = 460 + 141.6 = 601.6

V_s = Average stack gas velocity (ft^2/min.)
= 85.49 ft/sec x 60 sec/min x C_p x $(\sqrt{\Delta p})_{avg}$ x sqrt(T_s ÷ (P_s x M_s))
= (85.49) x (60) x (.84) x (.1657) x sqrt (601.6 / (26.844 x 29.759)) = 619.57

Q_{sd} = Dry stack gas flow rate at standard conditions = MD x V_s x A x (528°R ÷ T_s) x (P_s ÷ 29.92" Hg)
= .82972 x 1.396 x 619.57 x (528°R / (601.6)) x (29.759 / (29.92)) = 626.5 .01%

Q = Stack gas flow rate at actual conditions (acfm) = V_s x A = (619.57) x (1.396) = 864.9

Combined Stack Flow= _____ + _____ + _____ + _____ = _____

EMISSIONS:

Molecular Weight (MW)= lb / lb mole

MeOH= 32.04

lb Pollutant / hour = (C_{gas}÷1,000,000)x(1lb-mole÷385ft^3) x MW x Q_{sd} x 60min/hr
= (251.085 / 1,000,000) x (32.04 / 385) x (1) x (626.5) x (60) = .785

lb Pollutant / ODTP = lb Pollutant / hour ÷ ODTP / hour
= (.785 / 16.163) = .047

Meter Vol (dscl) = Meter vol * ((273+20)/(273+Meter temp)* Meter Y* (Meter Pressure/29.92)= _____

23,995 * 1.01 x 293/294 x 29.76/29.92 = 23.966

MeOH ppm: 8.52 / 32.04 x 24.04 / 23.966 = 251.085

APPENDIX C
QUALITY RECORDS

2014 Probe / S-Type Pitot Cals

Date:	8/18/2014		Calibrated by:	CK									
	Dimensions			Alignment						Pitot to probe components				
BH Probe	(Dτ)	(PA)	(PB)	$A_1 < 10°$	$A_2 < 10°$	$B_1 < 5°$	$B_2 < 5°$	Z	W	P-0.500"	Pitot to Sheath	Pitot to T/C(W)	Pitot to T/C(Z)	Meets criteria for Cp = 0.84
BH#1-3'ss	0.377	0.414	0.416	0	1	2	1°	0	0	1.280	3.816	5.722	.815.5	Yes
BH#2-3'ss	0.375	0.422	0.422	1°	1	2	1	0	0	1.602	3.724	4.427	0.873	Yes
BH#1-4'	0.374	0.425	0.429	0	1	1	0	0	0	1.023	3.395	6.501	1.275	YES
BH#1-4'HT	0.375	0.429	0.428	1	2	3	1°	0	0	1.315	3.234	2.372	1.023	Yes
BH#1-5'ss	0.375	0.430	0.432	1	2	2	1	0	0	1.826	3.577	5.833	1.356	Yes
BH#1-6'ss	0.376	0.416	0.415	0	2	1	0	0	0	1.751	4.093	5.735	0.758	Yes
BH#2-6'ss	0.375	0.465	0.466	1	2	2	1	0	0	1.152	3.137	5.522	0.790	Yes
BH#4-6'ss	0.377	0.451	0.457	2	2	1	1	0	0	1.380	3.406	5.764	0.913	Yes
BH#1-7'ss	0.373	0.456	0.457	0	1	1	1	0	0	1.426	3.387	5.891	1.052	Yes
BH#2-7'ss	0.375	0.443	0.440	2	1	1	2	0	0	1.202	3.421	5.418	1.199	Yes
BH#1-8'ss	0.376	0.431	0.425	0	1	1	1	0	0	1.250	1.242	3.366	0.949	Yes
BH#1-9'	0.374	0.434	0.435	0	2	2	1	0	0	1.241	3.340	5.891	1.228	YES
BH#1-10'ss	0.372	0.441	0.444	1	1	1	2	0	0	1.157	3.477	5.808	1.992	Yes
BH#2-10'ss	0.377	0.426	0.424	1	0	2	2	0	0	1.820	3.040	5.207	1.083	Yes
BH#1-16'ss	0.377	0.251	0.250	2°	0	1°	2	0	0	1.085	0.421	0.417	0.216	Yes
BH#2-16'ss	0.379	0.250	0.252	1°	1°	2°	1	0	0	1.041	0.421	0.419	0.216	Yes
										>3/4	>3	>3	>3/4	

	Dimensions			Alignment										
BH S-Type	(Dτ)	(PA)	(PB)	$A_1 < 10°$	$A_2 < 10°$	$B_1 < 5°$	$B_2 < 5°$	Z	W	CP - 0.84				
BH#1-4'ss	0.373	0.451	0.451	1	1	2	1	0	0	Yes				
BH#1-7'ss	0.376	0.450	0.450	0	0	2	2	0	0	Yes				
BH#1-10'ss	0.375	0.445	0.444	2	2	1	1	0	0	Yes				

8/18/2014									
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 3' #1 Probe	32	**0**		208	**-2**		448	**-2**	
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 3' #2 Probe	34	**2**		208	**-2**		449	**-1**	
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 4' Hi-Temp Probe	34	**2**		208	**-2**		452	**2**	
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 4' #1	34	**2**		206	**-4**		446	**-4**	
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 5' Probe	34	**2**		208	**-2**		448	**-2**	
NIST Thermometer I.D.:		E93-486							
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 6' #1 Probe	36	**4**		206	**-4**		446	**-4**	
NIST Thermometer I.D.:		E93-486							
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 6' #2 Probe	34	**2**		206	**-4**		447	**-3**	
NIST Thermometer I.D.:		E93-486							
Calibration date:		2/26/2013							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST		N/A	6.9		N/A	6.9		N/A	6.9
		0			**0**			**0**	
NIST Thermometer I.D.:		E93-486							
Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 6' #4 Probe	33	**1**		206	**-4**		453	**3**	
NIST Thermometer I.D.:		E93-486							

Calibration date:		2/19/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST		N/A	6.9		N/A	6.9		N/A	6.9
		0			0			0	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
MFB 7' #1 Probe	31	-1		207	-3		453	3	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 7' #2 Probe	31	-1		207	-3		450	0	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 8' #1	32	0		207	-3		451	1	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 9' #1 Probe	33	1		208	-2		447	-3	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 10' #1 Probe	31	-1		207	-3		448	-2	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05	450	N/A	13.65
BH 10' #2 Probe	34	2		207	-3		445	-5	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	212	N/A	10.08	450	N/A	13.65
BH 16' #1 Probe	30	-2		209	-3		449	-1	

Calibration date:		8/18/2014							
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	212	N/A	10.08	450	N/A	13.65
BH 16' #2 Probe	29	-3		210	-2		453	3	

Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
BH Impinger Exit #1	31	**-1**		208	**-2**	

Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
BH Impinger Exit #2	32	**0**		205	**-5**	

Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
BH Impinger Exit #3	33	**1**		208	**-2**	

Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
BH Impinger Exit #4	33	**1**		206	**-4**	

Calibration date:		8/18.14				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
BH Filter Oven #1	29	**-3**		208	**-2**	

Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
BH Filter Oven #2	33	**1**		207	**-3**	

Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
BH Filter Oven #3	29	**-3**		207	**-3**	

Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05

BH Filter Oven #4	31	-1		205	-5	
Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
	32	0		207	-3	
Meter Box #906017						
Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
Meter Box #0610022	32	0		207	-3	
Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
	34	2		206	-4	
Meter Box #0307031						
Calibration date:		8/18/2014				
Temp.	Test	Difference	Acceptance	Test	Difference	Acceptance
Device	Value	(°K)	Criteria (+/-)	Value	(°K)	Criteria (+/-)
NIST	32	N/A	7.38	210	N/A	10.05
	30			208		
Meter Box #1208030		-2			-2	

PRE

19-Sep-14

DRY GAS METER

Model:	623			
Serial #:	805005 Box 2		High Flow	
Location:	GEG			
Date	9/19/2014	9/19/2014	9/19/2014	9/19/2014
Console leak check (cfm)	0	0	0	0
Orifice setting (^h)	1.575	2.362	3.15	3.937
Barometric pressure (in. Hg)	27.77	27.77	27.77	27.77
Volume				
beginning reading	0	0	0	0
ending reading	0.3474257	0.4048121	0.48314	0.5309914
Total Volume (Vd) ft3	0.3474257	0.4048121	0.48314	0.5309914
Temperature (deg F)				
beginning inlet	66.2	75.2	77	78.8
ending inlet	75.2	77	78.8	80.6
beginning outlet	66.2	80.6	77	78.8
ending outlet	75.2	77	78.8	80.6
average outlet temp (Tmo)	70.7	78.8	77.9	79.7
average temp (Tm)	70.7	77.45	77.9	79.7

CALIBRATION METER

Yc	**1.006**	**1.006**	**1.006**	**1.006**	
Volume					
beginning reading	467.160	467.510	467.920	468.4	
ending reading	467.510	467.920	468.400	468.92	
Total Volume (Vc) ft3	0.35	0.41	0.48	0.52	
Temperature					
beginning	69.8	71.6	71.6	71.6	
ending	71.6	71.6	71.6	71.6	
average temp (Tc)	70.7	71.6	71.6	71.6	
Time (min)	11	11	11	10	
					AVERAGE
Y:	1.009	1.023	1.002	0.989	**1.006**
Difference from Average:	0.003	0.017	-0.003	-0.017	

Y Acceptance criteria: +/- 0.02 From Average

PRE

19-Aug-14

DRY GAS METER

Model:	623			
Serial #:	805005 BOX 1		High Flow	
Location:	GEG			
Date	8/19/2014	8/19/2014	8/19/2014	8/19/2014
Console leak check (cfm)	0	0	0	0
Orifice setting (^h)	1.575	2.362	3.15	3.937
Barometric pressure (in. Hg)	27.77	27.77	27.77	27.77
Volume				
beginning reading	0	0	0	0
ending reading	1.1689509	1.5748224	2.1676498	2.3550647
Total Volume (Vd) ft3	1.1689509	1.5748224	2.1676498	2.3550647
Temperature (deg F)				
beginning inlet	66	69	73	76
ending inlet	69	73	76	77
beginning outlet	66	69	73	76
ending outlet	69	73	76	77
average outlet temp (Tmo)	67.5	71	74.5	76.5
average temp (Tm)	67.5	71	74.5	76.5

0.0353147

CALIBRATION METER

Yc	**1.006**	**1.006**	**1.006**	**1.006**
Volume				
beginning reading	459.560	460.730	462.310	464.48
ending reading	460.730	462.310	464.480	466.84
Total Volume (Vc) ft3	1.17	1.58	2.17	2.36
Temperature				
beginning	66	67	67	67
ending	67	67	67	67
average temp (Tc)	66.5	67	67	67
Time (min)	10	10	12	12

					AVERAGE
Y:	1.004	1.010	1.012	1.015	**1.010**
Difference from Average:	-0.006	0.000	0.002	0.005	

Y Acceptance criteria: +/- 0.02 From Average

POST

20-Nov-14

DRY GAS METER

Model:	**623**				
Serial #:	**805005**	**BOX 1**	**High Flow**		0.0353147
Location:	**GEG**				
Date	11/20/2014	11/20/2014	11/20/2014	11/20/2014	
Console leak check (cfm)	0	0	0	0	
Orifice setting (^h)	1.575	2.362	3.15	3.937	
Barometric pressure (in. Hg)	27.75	27.75	27.75	27.75	
Volume					
beginning reading	0	0	0	0	
ending reading	1.1969907	1.5976004	1.8181758	1.9046967	
Total Volume (Vd) ft3	1.1969907	1.5976004	1.8181758	1.9046967	
Temperature (deg F)					
beginning inlet	63	58	61	63	
ending inlet	58	61	63	64	
beginning outlet	63	58	61	63	
ending outlet	58	61	63	64	
average outlet temp (Tmo)	60.5	59.5	62	63.5	
average temp (Tm)	60.5	59.5	62	63.5	

CALIBRATION METER

Yc	**1.006**	**1.006**	**1.006**	**1.006**	
Volume					
beginning reading	76.525	77.730	79.345	81.17	
ending reading	77.730	79.345	81.170	83.085	
Total Volume (Vc) ft3	1.205	1.615	1.825	1.915	
Temperature					
beginning	51	56	55	55	
ending	56	55	55	56	
average temp (Tc)	53.5	55.5	55	55.5	
Time (min)	10	10	10	10	
					AVERAGE
Y:	1.022	1.018	1.015	1.016	**1.018**
Difference from Average:	0.004	0.000	-0.003	-0.002	

Y Acceptance criteria: +/- 0.02 From Average

POST

20-Nov-14

DRY GAS METER

Model:	**623**				
Serial #:	**805005**	**Box 2**	**High Flow**		0.0353147
Location:	**GEG**				
Date	11/20/2014	11/20/2014	11/20/2014	11/20/2014	
Console leak check (cfm)	0	0	0	0	
Orifice setting (^h)	1.575	2.362	3.15	3.937	
Barometric pressure (in. Hg)	27.75	27.75	27.75	27.75	
Volume					
beginning reading	0	0	0	0	
ending reading	0.6269413	0.7423497	0.9241849	0.9597115	
Total Volume (Vd) ft3	0.6269413	0.7423497	0.9241849	0.9597115	
Temperature (deg F)					
beginning inlet	50	62.6	64.4	68	
ending inlet	62.6	64.4	66.2	71.6	
beginning outlet	50	62.6	64.4	68	
ending outlet	62.6	64.4	66.2	71.6	
average outlet temp (Tmo)	56.3	63.5	65.3	69.8	
average temp (Tm)	56.3	63.5	65.3	69.8	

60000

CALIBRATION METER

Yc	**1.006**	**1.006**	**1.006**	**1.006**	
Volume					
beginning reading	83.435	84.060	85.620	86.54	
ending reading	84.060	84.790	86.540	87.48	
Total Volume (Vc) ft3	0.625	0.73	0.92	0.94	
Temperature					
beginning	57.2	57.2	59	59	
ending	57.2	59	59	59	
average temp (Tc)	57.2	58.1	59	59	
Time (min)	10	10	11	10	
					AVERAGE
Y:	0.996	0.993	1.005	0.995	**0.997**
Difference from Average:	-0.001	-0.004	0.007	-0.002	

Y Acceptance criteria: +/- 0.02 From Average

GAS DILUTION SYSTEM VERIFICATION METHOD									
Project:	GP-Toledo			Date:	11/3/2014				
Dilution Gas	20.93	% O2		1ST DILUTION=	90	%			
Undiluted Gas	18.01	% O2		2ND DILUTION=	50	%			
		Run 1		Run 2		Run 3		Average	
	Actual Concen. (ppm)	Instrument Response (ppm)	% Diff. from Average (ppm)	Instrument Response (ppm)	% Diff. from Average (ppm)	Instrument Response (ppm)	% Diff. from Average (ppm)	Instrument Response (ppm)	% Diff. from Actual (ppm)
1ST DILUTION	18.837	19.1	0.1%	19.12	0.2%	19.03	0.3%	19.08	1.3%
2ND DILUTION	10.465	10.31	-0.1%	10.35	0.3%	10.3	0.2%	10.32	-1.4%
Mid-Level Gas	18.01	18.41	0.3%	18.32	-0.1%	18.31	0.2%	18.35	1.9%
Note: All percent differences must be within +/- 2.0%.									

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22013

DocNumber: 000052499

[redacted]

Customer & Order Information:

PRAXAIR WHSE VANCOUVER W
603 SE VICTORY AVE
VANCOUVER WA 986610

Praxair Order Number: 23050520
Customer P. O. Number: 04307063
Customer Reference Number:

Fill Date: 3/8/2013
Part Number: NI CD22O5E-AS
Lot Number: 109306801
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	4/13/2021		NIST Traceable Analytical Uncertainty:
Cylinder Number:	CC49794		
21.65 %		CARBON DIOXIDE	± 2 %
20.93 %		OXYGEN	±-1 %
Balance		NITROGEN	

Certifcation Information: ***Certification Date:*** 4/13/2013 ***Term:*** 96 Months ***Expiration Date:*** 4/13/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G2. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

G2 ANALYSIS FOR CO2 WAS DONE USING STEC INC SGD-710C @ 70% {C.F.=0.6943}

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1 . Component: CARBON DIOXIDE

Requested Concentration: 22 %
Certified Concentration: 21.65 %
Instrument Used: Horiba VIA-510 S/N 2607014
Analytical Method: NDIR
Last Multipoint Calibration: 3/20/2013

First Analysis Data:						Date:	4/10/2013
Z:	0	R:	17.97	C:	15.02	Conc:	15.02
R:	17.97	Z:	0	C:	15.04	Conc:	15.04
Z:	0	C:	15.04	R:	17.97	Conc:	15.04
UOM:	%			Mean Test Assay:			15.03 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC265304
Ref. Std. Conc: 17.97%
Ref. Std. Traceable to SRM # : 2745
SRM Sample # : 9-B-09
SRM Cylinder # : CAL-010765

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%			Mean Test Assay:			0 %

2 . Component: OXYGEN

Requested Concentration: 21 %
Certified Concentration: 20.93 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 3/20/2013

First Analysis Data:						Date:	4/10/2013
Z:	0	R:	20	C:	20.94	Conc:	20.93
R:	20	Z:	0	C:	20.94	Conc:	20.93
Z:	0	C:	20.94	R:	20	Conc:	20.93
UOM:	%			Mean Test Assay:			20.93 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC92589
Ref. Std. Conc: 18.99%
Ref. Std. Traceable to SRM # : 2659a
SRM Sample # : 71-37-B
SRM Cylinder # : CLM-005734

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%			Mean Test Assay:			0 %

Analyzed by: Shameela Jiffrey

Certified by: Ying Yu

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVP ID: F22013

DocNumber: 000051337

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE VANCOUVER W
603 SE VICTORY AVE
VANCOUVER WA 986610

Praxair Order Number: 23050701
Customer P. O. Number: 04307067
Customer Reference Number:

Fill Date: 3/9/2013
Part Number: NI CD11O5E-AS
Lot Number: 109306804
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	3/27/2021	NIST Traceable
Cylinder Number:	CC120997	Analytical Uncertainty:
11.02 %	CARBON DIOXIDE	± 1 %
10.49 %	OXYGEN	± 1 %
Balance	NITROGEN	

Certifcation Information: *Certification Date:* 3/27/2013 *Term:* 96 Months *Expiration Date:* 3/27/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON DIOXIDE

Requested Concentration: 11 %
Certified Concentration: 11.02 %
Instrument Used: Horiba VIA-510 S/N 2807014
Analytical Method: NDIR
Last Multipoint Calibration: 3/4/2013

First Analysis Data:						Date: 3/15/2013
Z: 0	R: 10.07	C: 11.01	Conc: 11.01			
R: 10.07	Z: 0	C: 11.02	Conc: 11.02			
Z: 0	C: 11.03	R: 10.07	Conc: 11.03			
UOM: %		Mean Test Assay: 11.02 %				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC7663
Ref. Std. Conc: 10.07%
Ref. Std. Traceable to SRM # : 1675b
SRM Sample # : 6-F-51
SRM Cylinder # : CAL014538

Second Analysis Data:						Date:
Z: 0	R: 0	C: 0	Conc: 0			
R: 0	Z: 0	C: 0	Conc: 0			
Z: 0	C: 0	R: 0	Conc: 0			
UOM: %		Mean Test Assay: 0 %				

2. Component: OXYGEN

Requested Concentration: 10.5 %
Certified Concentration: 10.49 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 3/4/2013

First Analysis Data:						Date: 3/15/2013
Z: 0	R: 10	C: 10.48	Conc: 10.49			
R: 10	Z: 0	C: 10.48	Conc: 10.49			
Z: 0	C: 10.48	R: 10	Conc: 10.49			
UOM: %		Mean Test Assay: 10.49 %				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA15925
Ref. Std. Conc: 10.01%
Ref. Std. Traceable to SRM # : 2658a
SRM Sample # : 72-28-B
SRM Cylinder # : CLM-006896

Second Analysis Data:						Date:
Z: 0	R: 0	C: 0	Conc: 0			
R: 0	Z: 0	C: 0	Conc: 0			
Z: 0	C: 0	R: 0	Conc: 0			
UOM: %		Mean Test Assay: 0 %				

Analyzed by:

Certified by:
Shameela Jiffrey

AIRDATA MULTIMETER CERTIFICATE OF CALIBRATION

Customer ID: 020243
Customer: Bighorn Environmental City: Liberty Lake State: WA S/N: M1217
Model #: 860c PO #: Calibration Due Date: Order #: 120539
Test By: TJW Date 03-19-12 Rh 25 % Ambient Temperature 72 °F Barometric Pressure 28.36 i

ABSOLUTE PRESSURE TEST (in Hg)
TEST METER TOLERANCE = ± 2.0 % ± .1 in Hg

Pressure Standard: Heise #02-R S/N: 41741/42451 ✓
Pressure Standard: Heise #04-R S/N: 41743/42453
Pressure Standard: Heise #06-R S/N: 41742/42452
Pressure Standard: Heise #08-R S/N: 42186/43328
Pressure Standard: Heise #10-R S/N: 42203/43352

Pressure Standard: Heise #12-R S/N: 43166/44731
Pressure Standard: Heise #14-R S/N: 43412/45043
Pressure Standard: Heise #18-R S/N: 44581/46845
Pressure Standard: Heise #20-R S/N: 44582/46847

Approx Set Point	Standard	Test Meter	% Diff
14.0	13.84	13.8	-.29
28.4	28.36	28.3	-.21
40.0	40.39	40.3	-.22

DIFFERENTIAL PRESSURE TEST (in wc)
TEST METER TOLERANCE = ± 2.0 % ± 0.001 in wc

Pressure Standard: Heise #01-L S/N: 41739/42449 ✓
Pressure Standard: Heise #01-R S/N: 41739/42446 ✓
Pressure Standard: Heise #02-L S/N: 41741/42454 ✓
Pressure Standard: Heise #03-L S/N: 41738/42448
Pressure Standard: Heise #03-R S/N: 41738/42445
Pressure Standard: Heise #04-L S/N: 41743/42456
Pressure Standard: Heise #05-L S/N: 41740/42450
Pressure Standard: Heise #05-R S/N: 41740/42447
Pressure Standard: Heise #06-L S/N: 41742/42455
Pressure Standard: Heise #07-L S/N: 42185/42186
Pressure Standard: Heise #07-R S/N: 42185/43326
Pressure Standard: Heise #08-L S/N: 42186/43329
Pressure Standard: Heise #09-L S/N: 42202/43351
Pressure Standard: Heise #09-R S/N: 42202/43350
Pressure Standard: Heise #10-L S/N: 42203/43353

Pressure Standard: Heise #11-L S/N: 43165/44551
Pressure Standard: Heise #11-R S/N: 43165/44730
Pressure Standard: Heise #12-L S/N: 43166/44732
Pressure Standard: Heise #13-L S/N: 43415/45041
Pressure Standard: Heise #13-R S/N: 43415/45039
Pressure Standard: Heise #14-L S/N: 43412/45045
Pressure Standard: Heise #17-L S/N: 44579/46842
Pressure Standard: Heise #17-R S/N: 44579/46841
Pressure Standard: Heise #18-L S/N: 44581/46846
Pressure Standard: Heise #19-L S/N: 44580/46844
Pressure Standard: Heise #19-R S/N: 44580/46843
Pressure Standard: Heise #20-L S/N: 44582/46848

Approx Set Point	Standard	Test Meter	% Diff
.0500	.0515	.0513	-.39
.1250	.1277	.1274	-.23
.2250	.2254	.2250	-.18
.2700	.2705	.2701	-.15
2.000	2.059	2.053	-.29
3.600	3.661	3.648	-.36
4.400	4.415	4.414	-.02
27.00	27.31	27.37	.22
50.00	50.56	50.58	.04
Over Pressure	NA	✓	NA

Shortridge Instruments, Inc.
7855 East Redfield Road Scottsdale, Arizona 85260
(480) 991-6744 • Fax (480) 443-1267 • www.shortridge.com

Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Order Number: 120539 Serial Number: M12172 Test Type: (Initial) As-Received Final

ABSOLUTE PRESSURE STANDARDS

ADM #02-R	S/N: 41741/42451	Heise Model: PPM-2	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 04/06/11	Due Date: 04/2012
ADM #04-R	S/N: 41743/42453	Heise Model: PPM-2	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 10/10/11	Due Date: 10/2012
ADM #06-R	S/N: 41742/42452	Heise Model: PPM-2	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 09/19/11	Due Date: 09/2012
ADM #08-R	S/N: 42188/43328	Heise Model: PPM-2	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 03/16/11	Due Date: 03/2012
ADM #10-R	S/N: 42203/43352	Heise Model: PPM-2	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 01/16/12	Due Date: 01/2013
ADM #12-R	S/N: 43186/44731	Heise Model: PPM-2	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 12/13/11	Due Date: 12/2012
ADM #14-R	S/N: 43412/45043	Heise Model: PPM-2	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 07/21/11	Due Date: 07/2012
ADM #18-R	S/N: 44581/46845	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 04/29/11	Due Date: 04/2012
ADM #20-R	S/N: 44582/46847	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 05/26/11	Due Date: 05/2012
02-R, 04-R, 06-R, 08-R, 10-R, 12-R, 14-R		Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-60 in Hg	Resolution: 0.01	Uncertainty: < 0.0358
#18-R, 20-R		Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-60 in Hg	Resolution: 0.001	Uncertainty: < 0.0358

DIFFERENTIAL PRESSURE STANDARDS

ADM #01-L	S/N: 41739/42449	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 04/28/11	Due Date: 04/2012
ADM #01-R	S/N: 41739/42446	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 05/04/11	Due Date: 04/2012
ADM #02-L	S/N: 41741/42454	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 04/06/11	Due Date: 04/2012
ADM #03-L	S/N: 41739/42448	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 11/09/11	Due Date: 10/2012
ADM #03-R	S/N: 41739/42445	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 10/19/11	Due Date: 10/2012
ADM #04-L	S/N: 41743/42456	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 10/18/11	Due Date: 10/2012
ADM #05-L	S/N: 41740/42450	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 10/14/11	Due Date: 09/2012
ADM #05-R	S/N: 41740/42447	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 09/30/11	Due Date: 09/2012
ADM #06-L	S/N: 41742/42455	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 09/27/11	Due Date: 09/2012
ADM #07-L	S/N: 42185/42139	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 03/15/11	Due Date: 03/2012
ADM #07-R	S/N: 42185/43328	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 03/10/11	Due Date: 03/2012
ADM #08-L	S/N: 42186/43329	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 03/10/11	Due Date: 03/2012
ADM #09-L	S/N: 42202/43351	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 01/25/12	Due Date: 01/2013
ADM #09-R	S/N: 42202/43350	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 01/23/12	Due Date: 01/2013
ADM #10-L	S/N: 42203/43353	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 01/23/12	Due Date: 01/2013
ADM #11-L	S/N: 43185/44551	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 12/22/11	Due Date: 12/2012
ADM #11-R	S/N: 43185/44730	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 12/02/11	Due Date: 12/2012
ADM #12-L	S/N: 43186/44732	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 12/14/11	Due Date: 12/2012
ADM #13-L	S/N: 43415/45041	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 07/21/11	Due Date: 07/2012
ADM #13-R	S/N: 43415/45039	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 07/14/11	Due Date: 07/2012
ADM #14-L	S/N: 43412/45045	Heise Model: PPM-1	Mfgd & Calibrated by Dresser Industries (Ashcroft)	Calibration Date: 07/14/11	Due Date: 07/2012
ADM #17-L	S/N: 44578/46842	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 04/15/11	Due Date: 04/2012
ADM #17-R	S/N: 44579/46841	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 04/08/11	Due Date: 04/2012
ADM #18-L	S/N: 44581/46846	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 04/29/11	Due Date: 04/2012
ADM #19-L	S/N: 44580/46844	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 09/27/11	Due Date: 09/2012
ADM #19-R	S/N: 44580/43843	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 09/21/11	Due Date: 09/2012
ADM #20-L	S/N: 44582/46848	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 09/14/11	Due Date: 09/2012
#01-L, 03-L, 05-L, 07-L, 09-L, 11-L, 13-L, 17-L, 19-L		Rated Accuracy: > 0.07% fs (0.000175 in wc)	Range: 0.0-0.25 in wc	Res.: 0.00001	Uncertainty: < 0.00035
#01-R, 03-R, 05-R, 07-R, 09-R, 11-R, 13-R, 17-R, 19-R		Rated Accuracy: > 0.06% fs (0.003 in wc)	Range: 0.0-5.0 in wc	Res.: 0.0001	Uncertainty: < 0.00348
#02-L, 04-L, 06-L, 08-L, 10-L, 12-L, 14-L, 16-L, 20-L		Rated Accuracy: > 0.06% fs (0.03 in wc)	Range: 0.0-50.0 in wc	Res.: 0.001	Uncertainty: < 0.0348

LOW VELOCITY EQUIVALENT CONFIRMATION STANDARDS

Vel Eqv Transfer Standard S/N: M02009	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/13/11	Due Date: 12/2012
Vel Eqv Transfer Standard S/N: M02803	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 01/24/12	Due Date: 01/2013
Vel Eqv Transfer Standard S/N: M02903	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/13/11	Due Date: 12/2012
Vel Eqv Transfer Standard S/N: M10839	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/13/11	Due Date: 12/2012
Vel Eqv Transfer Standard S/N: M10840	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/13/11	Due Date: 12/2012
Vel Eqv Transfer Standard S/N: M10897	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 01/24/12	Due Date: 01/2013
Vel Eqv Transfer Standard S/N: M10901	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/13/11	Due Date: 12/2012
Rated Accuracy: Velocity ± 1.5 % ± 3.5 fpm		Range: 100-6000 fpm Resolution: 0.1	Uncertainty: <3.00 fpm at 100 fpm; <7.50 fpm at 500 fpm	

TEMPERATURE STANDARDS

RTD Simulator S/N: 249	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by Hart Scientific (Fluke)	Calibration Date: 01/24/08	Due Date: 01/2012
RTD Simulator S/N: 250	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by Hart Scientific (Fluke)	Calibration Date: 01/24/08	Due Date: 01/2012
RTD Simulator S/N: 253	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by Hart Scientific (Fluke)	Calibration Date: 01/24/08	Due Date: 01/2012
RTD Simulator S/N: 254	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by Hart Scientific (Fluke)	Calibration Date: 03/07/08	Due Date: 03/2012
RTD Simulator S/N: 256	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by Hart Scientific (Fluke)	Calibration Date: 03/07/08	Due Date: 03/2012
RTD Simulator S/N: 257	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by Hart Scientific (Fluke)	Calibration Date: 03/07/08	Due Date: 03/2012
RTD Simulator S/N: 292	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/18/11	Due Date: 12/2015
RTD Simulator S/N: 293	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/18/11	Due Date: 12/2015
RTD Simulator S/N: 294	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 12/18/11	Due Date: 12/2015
Rated Accuracy: 0.025% of setting		Range: 100 Ω to 11111.10 Ω	Resolution: 0.01 Ω	Uncertainty: ± 0.00032° F	

Thermometer #1 S/N: SA089/Thermistor S/N A410880	Model 1504/5610	Mfgd & Calibrated by Hart Scientific (Fluke)	Calibration Date: 01/14/11	Due Date: 01/2013
Thermometer #2 S/N: SB104/Thermistor S/N 871507	Model 1504/5610	Mfgd & Calibrated by Hart Scientific (Fluke)	Calibration Date: 11/09/10	Due Date: 11/2012
Thermometer #5 S/N: B11780/Thermistor S/N B10505	Model 1504/5610	Mfgd & Calibrated by Hart Scientific (Fluke)	Calibration Date: 01/24/11	Due Date: 01/2013
Thermometer #6 S/N: B11782/Thermistor S/N B10503	Model 1504/5610	Mfg'd & Calibrated by Hart Scientific (Fluke)	Calibration Date: 01/24/11	Due Date: 01/2013
Rated Accuracy(combined): 0.023° F/0.018° F	Range: 32° F-176°	Resolution: 0.001° F	Combined Uncertainty with Baths: ± 0.040° F	

Temp Transfer Standard S/N M00136	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/25/11	Due Date: 10/2012
Temp Transfer Standard S/N M96100	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 03/09/11	Due Date: 03/2012
Rated Accuracy: 0.03° F	Range: 33° F-158° F	Resolution: 0.01° F	Uncertainty: < 0.023° F	

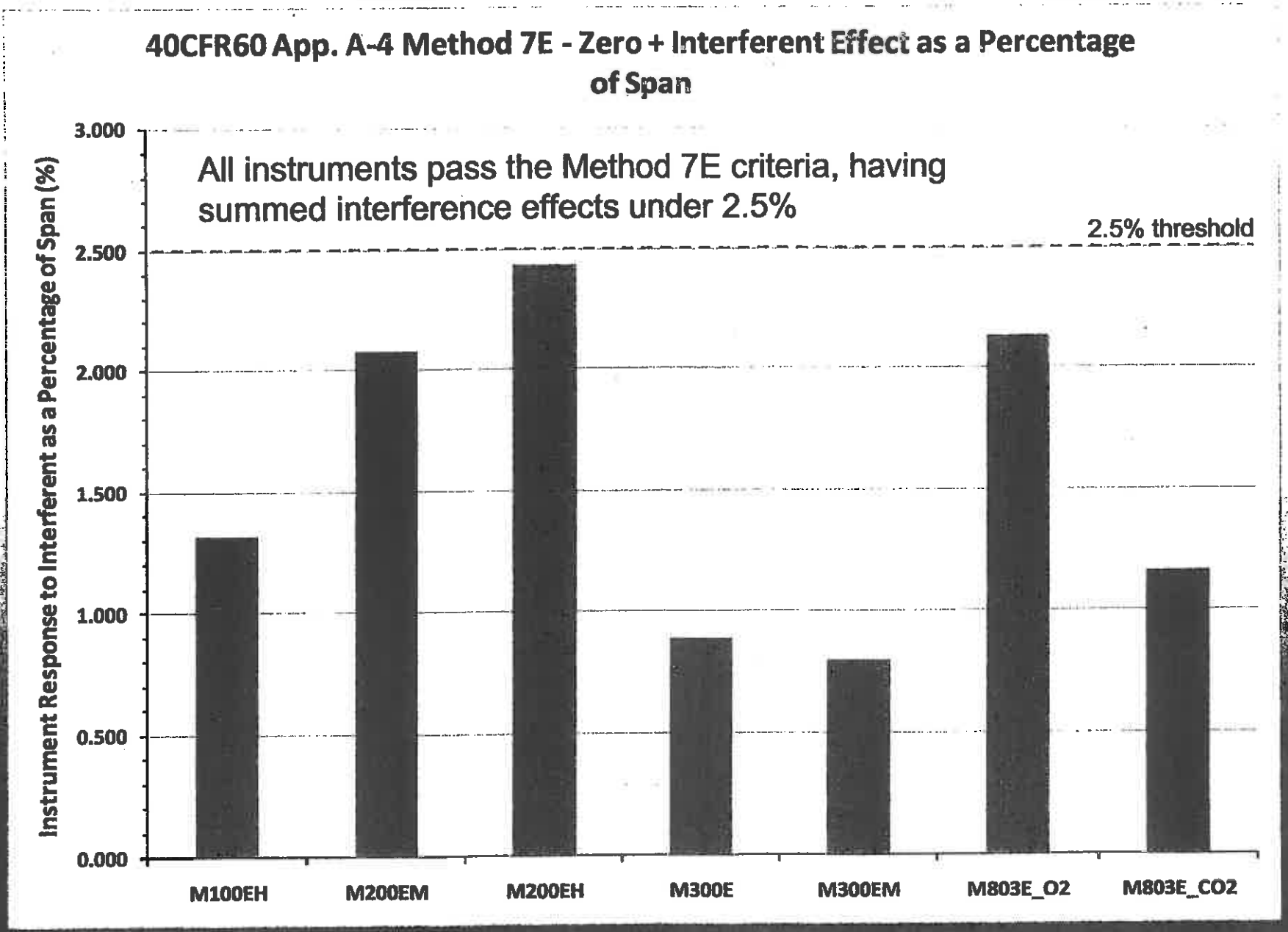
Total combined Uncertainty for MultiTemp and TemProbe testing : ± 0.046° F

This form must remain with the Certificate of Calibration corresponding to the Order Number listed above.

Shortridge Instruments, Inc.
7855 East Redfield Road Scottsdale, Arizona 85260 • (480) 991-6744 • Fax (480) 443-1267 • www.shortridge.com

TELEDYNE
ADVANCED POLLUTION INSTRUMENTATION

Span + Interferent: 40CFR60 App. 4-A Method 7E



APEX INSTRUMENTS REFERENCE METER VERIFICATION

USING WET-TEST METER #11AE6

2-POINT ENGLISH UNITS

Calibration Meter Information	
WTM Model #	A120
WTM Serial #	11AE6
WTM Gamma	0.9999
Original WTM Gamma	0.9959

Calibration Conditions			
Date	Time	16-Jan-14	8:00
Barometric Pressure		29.60	in Hg
Calibration Tech		EW	
DGM Serial Number		S-110-367185	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

Calibration Data												Results		
	Metering Console						Calibration Meter						Dry Gas Meter	
Run Time	DGM Input Pressure	Volume Initial	Volume Final	Volume Remote	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Volume Sample	Outlet Temp Initial	Outlet Temp Final	Calibration Factor Previous	Calibration Factor Current	Flowrate Std & Corr
Elapsed	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	(V_{wi})	(V_{wf})	(V_w)	(t_{wi})	(t_{wf})			$(Q_{std,corr})$
(θ)					°F	°F				°F	°F	(Y)	(Y)	cfm
min	in H_2O	cubic feet	cubic feet	cubic feet			cubic feet	cubic feet	cubic feet					
6.00	-3.9	977.711	983.670	5.959	66.2	66.2	971.880	977.780	5.900	67	67	0.9915	0.9883	0.975
											Variation	0.88%	must be less than 1.5%	
10.00	-2.4	983.670	989.284	5.614	66.2	66.2	977.780	983.400	5.620	67	67	0.9966	1.0055	0.557
											Variation	0.90%	must be less than 1.5%	

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, App A, Method 5, Paragraph 7.1.2.2, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature _____ Date 1/16/14

APPENDIX D
GP PRODUCTION DATA

Source Tested	Date	Date	time (days)	BSW#1 cooks/day	BSW#1 ADT/day	BSW#1 ODT/day	33FIC004A stock flow GPM
BSW#1	11/6/14 9:10 AM	11/6/14 10:10 AM	0.042	29	429	386	992
	Date	Date	time (days)	BSW#1 cooks/day	BSW#1 ADT/day	BSW#1 ODT/day	33FIC004A stock flow GPM
	##########	11/6/14 11:35 AM	0.042	29	429	386	1202
	Date	Date	time (days)	BSW#1 cooks/day	BSW#1 ADT/day	BSW#1 ODT/day	33FIC004A stock flow GPM
	##########	11/6/14 12:55 PM	0.042	29	429	386	1199

Target Range	Average Stock Flow GPM Durring Tests
1084-1301	1131
	Average Stock Flow Day
	1125.3

Source Tested	Date	Date	time (days)	BSW#2 cooks/day	BSW#2 ADT/day	BSW#2 ODT/day	31FIC365 stock flow GPM
BSW#2	11/5/2014 14:00:00	11/5/2014 15:00:00	0.042	22	391	352	1824

	Date	Date	time (days)	BSW#2 cooks/day	BSW#2 ADT/day	BSW#2 ODT/day	33FIC004A stock flow GPM
	11/5/2014 15:10:00	11/5/2014 16:10:00	0.042	22	391	352	1748

	Date	Date	time (days)	BSW#2 cooks/day	BSW#2 ADT/day	BSW#2 ODT/day	33FIC004A stock flow GPM
	11/5/14 4:19 PM	11/5/2014 17:19	0.042	22	391	352	2011

33FIC004A Target Rang 1783-2179

Average Stock Flow GPM Durring Tests
1861

Average Stock Flow Day
1539.9

October Average Washer Flow GPM	1649.53972	from PI
Tons Production	1175	From plp2014

Source Tested			time	BSW#3	BSW#3	BSW#3	33FIC028 stock flow
	Date	Date	(days)	cooks/day	ADT/day	ODT/day	GPM
BSW#3	11/5/14 9:55 AM	11/5/14 10:55 AM	0.042	26	443	399	1220
	Date	Date	time (days)	BSW#3 cooks/day	BSW#3 ADT/day	BSW#3 ODT/day	33FIC028 stock flow GPM
	11/5/14 11:00 AM	11/5/14 12:00 PM	0.042	26	443	399	1228
	Date	Date	time (days)	BSW#3 cooks/day	BSW#3 ADT/day	BSW#3 ODT/day	33FIC028 stock flow GPM
	11/5/14 12:05 PM	11/5/14 1:05 PM	0.042	26	443	399	1225

33FIC028 Target Rang: 1170-1430

Average Stock Flow GPM Durring Tests
1224

Average Stock Flow Day
1055.8

October Average
Washer Flow GPM 1046.46243 from PI
Tons Production 1175 From plp2014

APPENDIX E
EPA/ODEQ CORRESPONDENCE

September 25, 2014

Mr. Mike Eisele
Oregon Department of Environmental Quality
750 Front Street, Suite 120
Salem, OR 97301

RE: Georgia-Pacific West Toledo, Oregon Mill's Brown Stock Washer Methanol Testing

Dear Mr. Eisele:

Please allow this letter to serve as notification that Bighorn Environmental is scheduled to perform methanol testing on Georgia Pacific's Brown Stock Washer Lines to comply with the CCA rules at their Toledo, Oregon Pulp and Paper Mill.

Purpose of Tests: To determine compliance with the CCA rules as outlined in GP's permit.

Sources, Parameters, and Test Dates: The following table outlines sources, parameters, and proposed test dates.

SOURCES	PARAMETERS	TEST DATES
#1 Wash Row Combined Vent	Methanol, Velocity & Moisture	November 3-7
#1 Wash Row Foam Breaker	Methanol, Velocity & Moisture	
#1 Wash Row Vacuum Pump	Methanol, Velocity & Moisture	
#2 Wash Row Combined Vent	Methanol, Velocity & Moisture	
#3 Wash Row Combined Vent	Methanol, Velocity & Moisture	

If testing dates change, Bighorn or Georgia Pacific personnel will call you soon after scheduling the new dates so you can make preparations to observe.

Test Methods: Testing will be conducted in accordance with EPA Methods *in Title 40 CFR 60, Appendix A , July 2013*, and ODEQ methods in its *Source Sampling Manual, Volume 1, January 1992*.

Flow Rates:	EPA Methods 1 & 2 (Shortridge digital manometer for low velocity sources, expected to be used on #1 WR combined vent)
O_2 & CO_2:	EPA Method 3A
Moisture:	Oregon DEQ Method 4
Methanol:	NCASI CI/SG/PULP 94.03

Discussion of Methods: EPA Methods 1 & 2 will be used to determine flow rates. O_2 and CO_2 will be measured at each stack either directly or with a bag sample. The absence of cyclonic flow will be verified for each source. Georgia Pacific's Sam Adams received approval to use NCASI Method 94.03 (see attached letter). This method includes a spike solution and method blank as part of its QA/QC.

Data Collection: Bighorn uses standard forms, which contain all required regulatory data and any additional information necessary for flow rate determinations.

Process data: GP personnel will record the pulp production from each wash row during each test period.

Sampling Replicates and Duration: Bighorn will conduct tests consisting of a minimum of three-one hour runs for methanol including a pitot traverse and moisture determination during each run to determine flow rates. These

will be conducted concurrently with each test run. Testing on the three #1 Wash Row Vents will be conducted simultaneously.

QC/QA: Cross checks such as manual calculations of Bighorn's computer generated spreadsheet summaries allow test results verification. Bighorn files manufacturers' accuracy certificates and interference tables for CEMS, flow controllers, gases, etc. Additionally dry gas meters, pitot tubes, thermocouples, gas dividers, etc. are certified as per ODEQ and EPA requirements and frequencies. Where EPA or ODEQ frequencies are not specified, Bighorn has established those based on neighboring state's regulatory criteria.

Thorough sample methodology adherence, chain-of-custody procedures, and documentation provide proof of our QA/QC efforts. Relevant QA/QC documentation is included in the final report's Appendices for results support and regulatory review.

ODEQ Source Sampling Manual Volume One Language

a. It is assumed today, but will be confirmed on or before the test day, that the duct air flow measuring meets criteria in EPA Methods 1 and 2.
b. In no case, will sampling replicates be accepted if separated by a time duration of 24 or more hours, unless prior authorization is granted by ODEQ.
c. The source to be tested must operate at a normal production rate during testing. Rates not in agreement with those stipulated in the Title V Operating Permit can result in test rejection for application to determine compliance. Imposed process limitations could also result from atypical rates.
d. The department must be notified of any changes in source test plans prior to testing. Significant changes not acknowledged by ODEQ which could affect the accuracy and reliability of results could result in test report rejection.
e. Method specific quality assurance/quality control procedures must be performed to ensure the data is valid for determining source compliance. Documentation of the procedures and results shall be presented in the source test report for review. Omission of this critical information may result in rejection of the data, requiring a re-test.
f. Source test reports must be submitted to the department within 60 days of the test dates, unless another deadline has been stipulated, either by permit condition, or by ODEQ letter approval.
g. Two copies of the completed source test report must be sent to the ODEQ Regional Operations staff person responsible for the source and the second copy to the Source Testing Coordinator, ODEQ headquarters in Portland, Oregon.

Please call me if you have any questions.

Sincerely,

Tim Homer
Air Emissions Lab Manager

cc: Dan Kunde - Georgia Pacific

Oregon
John A. Kitzhaber, MD, Governor

Department of Environmental Quality
Western Region - Salem Office
750 Front St NE Ste 120
Salem, OR 97301-1011
Ph: (503) 378-8240
Fax: (503) 373-7944
OTRS 1-800-735-2900
www.oregon.gov/DEQ

September 29, 2014

Mr. Daniel Kunde
Georgia Pacific Corporation
1400 SE Butler Bridge Rd.
Toledo, OR 97391

Mr. Tim Homer
Bighorn Environmental Air Quality
1324 N Liberty Lake Rd.
Liberty Lake, WA 99019

Re: Georgia Pacific Corporation
Title V Permit 21-0005-TV-01
Brown Stock Washer Methanol Source Test Plan

Dear Mr. Kunde and Mr. Homer:

The source test plan received on September 26, 2014 for testing at the Georgia Pacific facility located in Toledo, OR has been review. The plan proposes to check the methanol emission rates from the brown stock washers. The methanol testing is approved with the following conditions:

GENERAL PROCESS CONDITIONS

1.) Only regular operating staff may adjust the production process and emission control parameters during the source performance tests and within two (2) hours prior to the tests. Any operating adjustments made during the source performance tests, which are a result of consultation during the tests with source testing personnel, equipment vendors or consultants, may render the source performance test invalid

2.) Unless otherwise specified in the Permit, source testing shall be performed as follows:

- At least 90% of the design capacity for new or modified equipment.
- At least 90% of the maximum operating rate for existing equipment; or
- At 90 to 110% of the normal maximum operating rate for existing equipment. The normal maximum operating rate is defined as the 90th percentile of the average hourly operating rates during a 12 month period.

Documentation supporting the design capacity or operating rate determinations used must be included within the source test report.

3.) During compliance source testing, the following process parameters shall be determined, recorded and documented in the source test report. The process parameters below are to be reported for each individual test run and averaged for all test runs if appropriate.

- Washer production rate (oven dried ton/hr)

EPA/ODEQ METHODS 1-4 CONDITIONS

4.) The flow rate for the exhaust stacks must meet the EPA Methods 1 & 2 criteria. For ducts with diameters less than 12" use EPA Method 1A instead of EPA Method 1. Clear diagrams and documentation of this must be included in the source test report.

5.) The exhaust ducts must be checked for cyclonic flow. Documentation of this must be provided in the test report.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

AUG 23 2006

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. W. Samuel Adams, Jr.
Environmental Superintendent
Georgia-Pacific West, Inc.
Toledo Pulp and Paper Operations
1400 SE Butler Bridge Road
Toledo, Oregon 97391

Dear Mr. Adams:

This is in response to your letter dated August 3, 2006, which requests the approval of an alternative test method for measuring the methanol concentration of gas emission streams from your Kraft pulp mill in Toledo, Oregon. The method that you are proposing would be an alternative to Method 308 required by 40 CFR Part 63, Subpart S, National Emission Standards for Hazardous Air Pollutants from the Pulp and Paper Industry, Section 63.457. You are proposing to use NCASI Method CI/SG/PULP-94.03, entitled, "Chilled Impinger Test Method for Use on Pulp Mill Sources to Quantify Methanol Emissions," developed by the National Council for Air and Stream Improvement (NCASI) to measure methanol emissions. I notified the NCASI by letter dated October 6, 2004, that this test method met Method 301 criteria for measuring methanol from pulp and paper mill sources provided that the tester uses the appropriate correction factor. A copy of this letter is enclosed. Based on the data submitted by the NCASI and the similarity of the gas streams for which you propose to use the method to the gas streams from which the NCASI collected their supporting data, we are approving your request for use of this alternative test method at your facility in Toledo, Oregon.

Because we are currently able to approve alternative methods only on a site-specific basis, this approval to use NCASI Method CI/SG/PULP-94.03 is limited to its use at your facility in Toledo, Oregon. If you need further assistance, please contact Gary McAlister at (919) 541-1062.

Sincerely,

Connie Oldham

Connieene B. Oldham, Ph.D., Group Leader
Measurement Technology Group

Enclosure

cc: Mr. Gary Andes, DEQ Western Regional Office
Mr. Doug Hardesty, Region 10
Mr. Rai Peterson, DEQ Western Regional Office
Mr. Stephen Shedd, EPA/OAQPS/SPPD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OCT 6 2004

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Dr. Vipin Varma
NCASI
Southern Regional Center
P.O. Box 141020
Gainesville, Florida 32614-1020

Dear Dr. Varma:

I am writing in response to your request dated June 5, 2003, asking that we review the data that you submitted supporting your request to modify NCASI Method CI/SG/PULP-94.02 by eliminating the backup silica gel tubes from the sampling train when it is used to measure only methanol. The modified method would be renamed as NCASI Method CI/SG/PULP-94.03. We agree with your conclusion that the modified method met Method 301 criteria for measuring methanol in air emissions samples from various sources at pulp and paper mills regulated under 40 CFR Part 63, Subpart S, Paragraph 446. I have summarized in the enclosed Table the correction factors for the different sources. During any future testing, the tester must document and use the appropriate correction factor to correct the data from the test method.

As we discussed, each specific source must make its own alternative test method request. However, we can and will consider the validation data that you submitted in evaluating an alternative method request from any source similar to the ones at which you collected your validation data.

If you have any questions about our comments or you would like to meet to discuss them, please contact Gary McAlister of my staff at (919) 541-1062.

Sincerely,

Conniesue B. Oldham

Conniesue B. Oldham, Ph.D., Group Leader
Source Measurement Technology Group

Enclosure

cc: K. C. Hustvedt (C439-03)
Stephen A. Shedd (C439-03)
Jeffrey A. Telander (C504-05)