RELATIVE ACCURACY
TEST REPORT
FOR
AMEREN
LABADIE STATION
UNIT 4
LABADIE, MO
September 22-23, 2015

Job # 15-409

Test Report Date: 10-19-15

Grace Consulting, Inc.
Emissions Testing Services

October 19, 2015

I, Nathan Vineyard, hereby certify that the data obtained for Ameren, Labadie Station, on Unit 4 is in accordance with procedures set forth by the USEPA. This report accurately represents the data obtained from the testing procedures and analysis of this data.

Nathan Vineyard/so

Nathan Vineyard, QSTI
Crew Chief

I, Carl Vineyard, hereby certify that I have reviewed this report and to the best of my knowledge, the data presented herein is complete and accurate.

Carl Vineyard, P.E., QSTI
Test Engineer

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INTRODUCTION

INTRODUCTION

This report presents the results of the Relative Accuracy tests performed for Ameren, Labadie Station, on Unit 4.

The purpose of the tests was to determine the Relative Accuracy of the plant CEMS of the unit. The results can be found in the Summary of Test Results section of this report.

The testing was performed by Grace Consulting, Inc., located at 684 Tower Road, Plainfield, IN 46168. Present during the testing from Grace Consulting, Inc. were Nathan Vineyard, Rodney Nelson, Stephen Thornton, Billy Neville, and Gary Edwards. Yoga Swamy from Ameren was present to observe the testing.

The tests were performed on September 22-23, 2015. The testing was completed in accordance with USEPA test methods as published in the July 1, 2015 Federal Register, - "Standards of Performance for New Stationary Sources" and subsequent revisions.

The sampling and analytical procedures can be found in the Sampling and Analytical Procedures section of this report. The raw field data and the equations used to determine the final results are presented in the Appendix section.

SUMMARY OF TEST RESULTS

SUMMARY OF TEST RESULTS

The following presents the results of the Relative Accuracy tests performed for Ameren, Labadie Station, on Unit 4.

RELATIVE ACCURACY
PART 75

Date	Monitor	Units	RA	Allowable	Results
09-22-15	NO_x	lb/mmBtu	3.58%	10%	Pass
09-22-15	SO_2	ppm	2.26%	10%	Pass
09-22-15	CO_2	Percent	1.42%	10%	Pass
09-22-15	Flow (H)	SCFH	0.45%	10%	Pass
09-23-15	Flow (L)	SCFH	1.11%	10%	Pass

BIAS TEST RESULTS

Date	Monitor	Monitor Designation	Mean of Difference	Confidence Coefficient	Bias Results Factor Required	Bias Adj. Factor
09-22-15	NO_x	lb/mmBtu	-0.002	0.001	No	N/A
09-22-15	SO_2	ppm	-3.811	0.332	No	N/A
09-22-15	Flow (H)	SCFH	58000.000	287912.614	No	N/A
09-23-15	Flow (L)	SCFH	-338555.556	124648.556	N/A	N/A

STRATIFICATION

Date		Point 1	Point 2	Point 3	Average	Greatest Deviation
09-22-15	NO_x	48.55	49.17	50.09	49.27	1.66%
09-22-15	SO_2	184.00	183.58	183.18	183.59	0.23%
09-22-15	CO_2	12.61	12.68	12.62	12.64	0.33%

NOx CONVERTER EFFICIENCY

		NO_2 Gas Value	Recorded Value	Converter Efficiency %
09-22-15	NO_x	50.29	49.30	98.03%

PROTOCOL GAS

Gas Type	Low (zero)	Mid	PGVP #	Exp date	High	PGVP #	Exp date
NO_x	EB00054563	CC75313	B12014	09-12-22	LCC0-SA16978	B12011	10-29-19
SO_2	EB00054563	CC75313	B12014	09-12-22	LCC0-SA16978	B12011	10-29-19
CO_2	EB00054563	CC75313	B12014	09-12-22	SG9148338BAL	B12014	06-30-22

The complete results can be found on the computer printouts following.

INTERMEDIATE CALCULATIONS

Grace Consulting, Inc.

Ameren : Labadie Unit 4
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
NOx lb/mmBtu
9/22/2015

Use	Start Time	Stop Time	Run	NOx lb/mmBtu RM	CEMS	Difference
N	14:10	14:30	1	0.082	0.085	-0.003
Y	14:45	15:05	2	0.083	0.085	-0.002
Y	15:20	15:40	3	0.083	0.084	-0.001
Y	15:55	16:15	4	0.087	0.090	-0.003
Y	16:30	16:50	5	0.085	0.088	-0.003
Y	17:05	17:25	6	0.083	0.086	-0.003
Y	17:40	18:00	7	0.082	0.085	-0.003
Y	18:15	18:35	8	0.084	0.085	-0.001
Y	18:50	19:10	9	0.084	0.086	-0.002
Y	19:25	19:45	10	0.083	0.086	-0.003
Averages				0.084	0.086	-0.002

Standard Deviation	0.001
Confidence Coefficient	0.001
Relative Accuracy	3.58
Bias Test Pass/Fail	PASS
Bias Adjustment Factor	1.000

*Central Standard Time

Grace Consulting, Inc.

Ameren : Labadie Unit 4
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
SO2 ppm
9/22/2015

Use	Start Time	Stop Time	Run	SO2 ppm RM	SO2 ppm CEMS	Difference
Y	14:10	14:30	1	183.700	187.900	-4.200
Y	14:45	15:05	2	183.000	187.000	-4.000
N	15:20	15:40	3	182.500	190.300	-7.800
Y	15:55	16:15	4	182.500	186.500	-4.000
Y	16:30	16:50	5	183.100	186.100	-3.000
Y	17:05	17:25	6	182.400	185.700	-3.300
Y	17:40	18:00	7	186.600	190.700	-4.100
Y	18:15	18:35	8	182.600	186.700	-4.100
Y	18:50	19:10	9	182.700	186.200	-3.500
Y	19:25	19:45	10	182.400	186.500	-4.100
Averages				183.222	187.033	-3.811

Standard Deviation	0.431
Confidence Coefficient	0.332
Relative Accuracy	2.26
Bias Test Pass/Fail	PASS
Bias Adjustment Factor	1.000

*Central Standard Time

Grace Consulting, Inc.

Ameren : Labadie Unit 4
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
CO2 Percent
9/22/2015

Use	Start Time	Stop Time	Run	CO2 Percent RM	CEMS	Difference
Y	14:10	14:30	1	12.400	12.600	-0.200
Y	14:45	15:05	2	12.400	12.700	-0.300
N	15:20	15:40	3	12.300	12.700	-0.400
Y	15:55	16:15	4	12.500	12.700	-0.200
Y	16:30	16:50	5	12.600	12.600	0.000
Y	17:05	17:25	6	12.600	12.700	-0.100
Y	17:40	18:00	7	12.700	12.700	0.000
Y	18:15	18:35	8	12.700	12.700	0.000
Y	18:50	19:10	9	12.600	12.600	0.000
Y	19:25	19:45	10	12.600	12.600	0.000
Averages				12.567	12.656	-0.089

Standard Deviation	0.117
Confidence Coefficient	0.090
Relative Accuracy	1.42

*Central Standard Time

Grace Consulting Inc.

Ameren: Labadie Unit Unit 4
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
High Flow
9/22/2015

Use	Run	Start Time	Stop Time	High Flow RM	High Flow CEMS	Difference
Y	1	17:54	18:13	77028000	76481000	547000
N	2	18:22	18:26	77357000	76237000	1120000
Y	3	18:27	18:31	76823000	76480000	343000
Y	4	18:32	18:36	76359000	76577000	-218000
Y	5	18:37	18:41	77008000	76799000	209000
Y	6	18:42	18:46	76224000	76850000	-626000
Y	7	18:47	18:51	76486000	76352000	134000
N	8	18:52	18:56	76910000	76417000	493000
N	9	18:57	19:01	76912000	76413000	499000
Y	10	19:02	19:06	76499000	76845000	-346000
Y	11	19:07	19:11	77117000	76865000	252000
Y	12	19:12	19:16	76791000	76564000	227000
Averages				76703888.889	76645888.889	58000.000

Standard Deviation	374561.076
Confidence Coefficient	287912.614
Relative Accuracy	0.45
Bias Test Pass/Fail	PASS
Bias Adjustment Factor	1.000

*Central Standard Time

Grace Consulting Inc.

Ameren: Labadie Unit Unit 4
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
Low Flow
9/23/2015

Use	Run	Start Time	Stop Time	Low Flow RM	Low Flow CEMS	Difference
Y	1	0:42	1:03	40815000	41312000	-497000
Y	2	1:05	1:09	41692000	42015000	-323000
Y	3	1:10	1:14	41493000	41633000	-140000
Y	4	1:15	1:19	41677000	42044000	-367000
Y	5	1:20	1:24	41788000	41997000	-209000
N	6	1:25	1:29	41415000	42349000	-934000
Y	7	1:30	1:34	41516000	41851000	-335000
Y	8	1:35	1:39	41863000	42054000	-191000
Y	9	1:40	1:44	41816000	42480000	-664000
Y	10	1:45	1:49	42301000	42622000	-321000
N	11	1:50	1:54	41337000	42767000	-1430000
N	12	1:55	1:59	41353000	42270000	-917000
Averages				41662333.333	42000888.889	-338555.556

Standard Deviation	162162.042
Confidence Coefficient	124648.556
Relative Accuracy	1.11
Bias Test Pass/Fail	PASS
Bias Adjustment Factor	1.000

*Central Standard Time

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Sampling System Bias Check and Measured Value Correction

Ameren
Labadie - Unit 4

Date: 9/22/2015
Pollutant: NOx
Monitor Span: 201.3

Run Number	Average Measured Value	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Value, Wet Basis
1	47.43	1.10	0.90	-0.10	100.90	101.20	0.15	100.20	46.50
2	47.85	0.90	1.20	0.15	101.20	101.60	0.20	100.20	46.70
3	47.52	1.20	0.90	-0.15	101.60	100.90	-0.35	100.20	46.50
4	50.29	0.90	0.80	-0.05	100.90	100.80	-0.05	100.20	49.50
5	49.68	0.80	1.10	0.15	100.80	101.30	0.25	100.20	48.80
6	48.44	1.10	1.00	-0.05	101.30	101.10	-0.10	100.20	47.40
7	48.26	1.00	0.90	-0.05	101.10	100.80	-0.15	100.20	47.40
8	49.08	0.90	0.80	-0.05	100.80	100.90	0.05	100.20	48.30
9	48.93	0.80	0.90	0.05	100.90	100.70	-0.10	100.20	48.20
10	48.38	0.90	0.90	0.00	100.70	101.20	0.25	100.20	47.60

$$C_{gas} = (C_{avg} - C_o) * C_{ma} / (C_m - C_o) \qquad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, ppm
Cavg = Average gas concentration indicated by gas analyzer, dry basis, ppm
Co = Average of initial and final system calibration bias check responses for the zero gas, ppm
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm
Cma = Actual concentration of the upscale calibration gas, ppm

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Sampling System Bias Check and Measured Value Correction

Ameren
Labadie - Unit 4

Date: 9/22/2015
Pollutant: SO2
Monitor Span: 418.4

Run Number	Average Measured Value	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Value, Wet Basis
1	184.59	1.50	1.30	-0.05	243.10	242.80	-0.07	242.20	183.70
2	184.09	1.30	1.60	0.07	242.80	243.60	0.19	242.20	183.00
3	183.76	1.60	1.50	-0.02	243.60	243.20	-0.10	242.20	182.50
4	183.70	1.50	1.30	-0.05	243.20	243.40	0.05	242.20	182.50
5	184.45	1.30	1.50	0.05	243.40	243.60	0.05	242.20	183.10
6	183.65	1.50	1.40	-0.02	243.60	243.10	-0.12	242.20	182.40
7	187.49	1.40	1.30	-0.02	243.10	242.80	-0.07	242.20	186.60
8	183.28	1.30	1.20	-0.02	242.80	242.70	-0.02	242.20	182.60
9	183.32	1.20	1.10	-0.02	242.70	242.60	-0.02	242.20	182.70
10	183.21	1.10	1.20	0.02	242.60	243.10	0.12	242.20	182.40

$$Cgas = (Cavg - Co) * Cma / (Cm - Co) \qquad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, ppm
Cavg = Average gas concentration indicated by gas analyzer, dry basis, ppm
Co = Average of initial and final system calibration bias check responses for the zero gas, ppm
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm
Cma = Actual concentration of the upscale calibration gas, ppm

Grace Consulting, Inc.

Sampling System Bias Check and Measured Value Correction

Ameren
Labadie - Unit 4

Date: 9/22/2015
Pollutant: CO2
Monitor Span: 22.15

Run Number	Average Measured Percent	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Percent, Wet Basis
1	12.29	0.10	0.10	0.00	11.30	11.50	0.90	11.49	12.40
2	12.45	0.10	0.10	0.00	11.50	11.50	0.00	11.49	12.40
3	12.35	0.10	0.10	0.00	11.50	11.50	0.00	11.49	12.30
4	12.53	0.10	0.10	0.00	11.50	11.50	0.00	11.49	12.50
5	12.52	0.10	0.10	0.00	11.50	11.40	-0.45	11.49	12.60
6	12.50	0.10	0.10	0.00	11.40	11.50	0.45	11.49	12.60
7	12.67	0.10	0.10	0.00	11.50	11.40	-0.45	11.49	12.70
8	12.63	0.10	0.10	0.00	11.40	11.50	0.45	11.49	12.70
9	12.55	0.10	0.10	0.00	11.50	11.40	-0.45	11.49	12.60
10	12.51	0.10	0.10	0.00	11.40	11.50	0.45	11.49	12.60

$$C_{gas} = (C_{avg} - C_o) * C_{ma} / (C_m - C_o) \qquad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, percent
Cavg = Average gas concentration indicated by gas analyzer, dry basis, percent
Co = Average of initial and final system calibration bias check responses for the zero gas, percent
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, percent
Cma = Actual concentration of the upscale calibration gas, percent

Grace Consulting Inc.
Moisture Calculations (Runs 1 - 12)

Client:	Ameren
Site:	Labadie
Date:	09/22/15
Unit Number:	Unit 4
Load:	High

Run:	1-3	4-12
Initial Weight of Impingers:	3506.00	3560.00
Final Weight of Impingers:	3560.00	3612.00
Weight gain of Impingers:	54.00	52.00
Initial Meter Reading:	417.064	439.384
Final Meter Reading:	439.270	461.630
Volume Metered:	22.206	22.246
Meter Temperature:	99.00	105.00
Delta H:	2.062	2.062
Barometric Pressure:	29.23	29.23
Meter Correction Factor:	0.975	0.975
Volume Measured (DSCF):	20.07	19.90
Water Volume (SCF):	2.55	2.45
% Moisture in Flue Gas:	11.30	11.00

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Pitot Coef.	**0.809**	**O2**	**5.0**		<INPUTS
Static Press	**-1.50**	**Pitot No.**	**IN4A**		
Molecular Wt.	**29.08**	**%Moisture**	**11.3**		
Area of Flue	**330.1**	**Load**	**High**		
Stack Diameter	**20.50**				

Point No. Port A	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/22/15 18:13	319.6	0.826	-2.7	54.75
2	2.00	9/22/15 18:12	324.7	1.028	-2.9	68.35
3	3.00	9/22/15 18:11	326.8	1.116	-3.4	74.27
4	4.00	9/22/15 18:10	328.0	1.142	-2.9	76.09
5	5.00	9/22/15 18:08	330.4	1.258	-3.2	83.93
6	6.00	9/22/15 18:07	340.7	1.301	-3.2	87.36
7	7.00	9/22/15 18:06	338.9	1.346	-3.1	90.29
A4	7.87	9/22/15 18:05	341.8	1.368	-2.7	91.96
8	8.00	9/22/15 18:05	341.8	1.368	-2.7	91.96
9	9.00	9/22/15 18:04	337.8	1.407	-2.7	94.35
10	10.00	9/22/15 18:02	340.7	1.411	-2.8	94.78
11	11.00	9/22/15 18:01	340.8	1.441	-3.2	96.77
12	12.00	9/22/15 18:00	340.1	1.451	-3.1	97.40
D-Rem	14.22	9/22/15 17:59	341.4	1.451	-2.9	97.50
A3	25.83	9/22/15 17:56	340.9	1.573	-3.4	105.62
A2	47.72	9/22/15 17:55	338.0	1.609	-3.1	107.87
A1	79.46	9/22/15 17:54	339.5	1.616	-4.4	108.28
Average			**340.1**	**1.336**	**-3.1**	**89.50**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Pitot Coef.	**0.808**	**O2**	**5.0**		<INPUTS
Static Press	**-1.50**	**Pitot No.**	**IN4B**		
Molecular Wt.	**29.08**	**%Moisture**	**11.3**		
Area of Flue	**330.1**	**Load**	**High**		
Stack Diameter	**20.50**				

Point No. Port B	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/22/15 18:13	324.2	0.994	4.3	65.89
2	2.00	9/22/15 18:12	329.0	1.122	4.1	74.62
3	3.00	9/22/15 18:11	336.3	1.218	3.9	81.40
4	4.00	9/22/15 18:10	337.7	1.391	3.2	93.11
5	5.00	9/22/15 18:08	342.5	1.422	3.9	95.40
6	6.00	9/22/15 18:07	340.8	1.433	-0.4	96.26
7	7.00	9/22/15 18:06	339.0	1.432	-0.5	96.08
A4	7.87	9/22/15 18:05	339.8	1.450	-0.3	97.34
8	8.00	9/22/15 18:05	339.8	1.450	-0.3	97.34
9	9.00	9/22/15 18:04	340.4	1.447	2.4	97.09
10	10.00	9/22/15 18:02	343.5	1.487	2.8	99.94
11	11.00	9/22/15 18:01	343.2	1.474	3.5	98.98
12	12.00	9/22/15 18:00	342.6	1.510	4.1	101.29
D-Rem	14.22	9/22/15 17:59	344.2	1.515	3.8	101.76
A3	25.83	9/22/15 17:56	342.0	1.549	0.0	104.13
A2	47.72	9/22/15 17:55	344.0	1.575	1.7	105.96
A1	79.46	9/22/15 17:54	342.1	1.608	0.3	108.10
Average			**342.0**	**1.416**	**2.1**	**94.98**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Pitot Coef.	**0.808**	**O2**	**5.0**		<INPUTS
Static Press	**-1.50**	**Pitot No.**	**IN4C**		
Molecular Wt.	**29.08**	**%Moisture**	**11.3**		
Area of Flue	**330.1**	**Load**	**High**		
Stack Diameter	**20.50**				

Point No. Port C	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/22/15 18:13	321.5	0.854	-0.1	56.67
2	2.00	9/22/15 18:12	325.4	0.965	3.0	64.11
3	3.00	9/22/15 18:11	329.9	1.015	-4.4	67.52
4	4.00	9/22/15 18:10	332.0	1.103	5.5	73.34
5	5.00	9/22/15 18:08	335.1	1.090	0.1	72.96
6	6.00	9/22/15 18:07	339.5	1.227	-1.4	82.33
7	7.00	9/22/15 18:06	341.0	1.307	3.7	87.62
A4	7.87	9/22/15 18:05	342.9	1.392	7.5	92.83
8	8.00	9/22/15 18:05	342.9	1.392	7.5	92.83
9	9.00	9/22/15 18:04	340.2	1.415	8.0	94.09
10	10.00	9/22/15 18:02	341.8	1.458	8.4	96.95
11	11.00	9/22/15 18:01	340.1	1.445	4.0	96.79
12	12.00	9/22/15 18:00	339.5	1.452	-1.6	97.42
D-Rem	14.22	9/22/15 17:59	344.7	1.471	-1.6	99.01
A3	25.83	9/22/15 17:56	338.3	1.536	-1.6	102.98
A2	47.72	9/22/15 17:55	344.0	1.617	0.4	108.83
A1	79.46	9/22/15 17:54	341.3	1.612	0.9	108.30
Average			**341.6**	**1.315**	**2.3**	**87.92**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Pitot Coef.	**0.808**	**O2**	**5.0**		<INPUTS
Static Press	**-1.50**	**Pitot No.**	**IN4D**		
Molecular Wt.	**29.08**	**%Moisture**	**11.3**		
Area of Flue	**330.1**	**Load**	**High**		
Stack Diameter	**20.50**				

Point No. Port D	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/22/15 18:13	317.3	0.792	2.3	52.37
2	2.00	9/22/15 18:12	319.7	0.771	3.2	51.02
3	3.00	9/22/15 18:11	324.7	1.067	0.4	70.95
4	4.00	9/22/15 18:10	326.7	1.053	0.8	70.10
5	5.00	9/22/15 18:08	338.3	1.140	0.1	76.46
6	6.00	9/22/15 18:07	340.5	1.076	-1.1	72.25
7	7.00	9/22/15 18:06	340.7	1.224	2.1	82.16
A4	7.87	9/22/15 18:05	340.2	1.297	0.9	87.08
8	8.00	9/22/15 18:05	340.2	1.297	0.9	87.08
9	9.00	9/22/15 18:04	340.6	1.378	1.9	92.50
10	10.00	9/22/15 18:02	340.9	1.395	-0.5	93.71
11	11.00	9/22/15 18:01	342.2	1.438	0.9	96.67
12	12.00	9/22/15 18:00	341.3	1.455	-0.9	97.76
D-Rem	14.22	9/22/15 17:59	343.5	1.434	0.4	96.49
A3	25.83	9/22/15 17:56	341.6	1.550	0.8	104.16
A2	47.72	9/22/15 17:55	344.1	1.612	4.0	108.24
A1	79.46	9/22/15 17:54	342.6	1.601	3.7	107.44
Average			**342.1**	**1.269**	**1.2**	**85.08**

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/22/2015**
Project No.	**15-409**	**Unit**	**4**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4A**	**Operator**	**GCI**
Port	**A**	**Stack r in.**	**123.0**

Distance from Wall	Measured Velocity	Decay Velocity	Intermediate Calculations		Area of Segment	Volumetric Flow in Segment
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	54.75	27.38	11883.60	11691.17	192.43	5267.86
2	68.35	61.55	11691.17	11500.30	190.86	11747.58
3	74.27	71.31	11500.30	11311.01	189.29	13498.39
4	76.09	75.18	11311.01	11123.29	187.72	14112.85
5	83.93	80.01	11123.29	10937.14	186.15	14893.86
6	87.36	85.65	10937.14	10752.56	184.58	15808.29
7	90.29	88.83	10752.56	10569.55	183.01	16255.72
8	91.96	91.13	10569.55	10388.12	181.44	16533.50
9	94.35	93.16	10388.12	10208.25	179.87	16755.50
10	94.78	94.57	10208.25	10029.95	178.30	16860.57
11	96.77	95.78	10029.95	9853.23	176.73	16925.86
12	97.40	97.09	9853.23	9678.07	175.15	17004.87

Total volumetric flow for all sections located between stack wall and d last.	175664.85
Velocity measured at d rem	97.50
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	74623.9689
Wall effects-adjusted flow in equal area sector. (Qt)	250288.82
Replacement point for Port A.	84.25

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/22/2015**
Project No.	**15-409**	**Unit**	**4**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4B**	**Testers**	**GCI**
Port	**B**	**Stack r in.**	**123.0**

Distance from Wall	Measured Velocity	Decay Velocity	Intermediate Calculations		Area of Segment	Volumetric Flow in Segment
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	65.89	32.95	11883.60	11691.17	192.43	6339.71
2	74.62	70.26	11691.17	11500.30	190.86	13409.04
3	81.40	78.01	11500.30	11311.01	189.29	14766.64
4	93.11	87.26	11311.01	11123.29	187.72	16379.58
5	95.40	94.26	11123.29	10937.14	186.15	17545.57
6	96.26	95.83	10937.14	10752.56	184.58	17688.23
7	96.08	96.17	10752.56	10569.55	183.01	17599.92
8	97.34	96.71	10569.55	10388.12	181.44	17546.83
9	97.09	97.22	10388.12	10208.25	179.87	17485.75
10	99.94	98.52	10208.25	10029.95	178.30	17564.83
11	98.98	99.46	10029.95	9853.23	176.73	17577.09
12	101.29	100.14	9853.23	9678.07	175.15	17539.09

Total volumetric flow for all sections located between stack wall and d last.	191442.30
Velocity measured at d rem	101.76
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	77884.4623
Wall effects-adjusted flow in equal area sector. (Qt)	269326.76
Replacement point for Port B.	90.65

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/22/2015**
Project No.	**15-409**	**Unit**	**4**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4C**	**Testers**	**GCI**
Port	**C**	**Stack r in.**	**123.0**

Distance from Wall	**Measured Velocity**	**Decay Velocity**	**Intermediate Calculations**		**Area of Segment**	**Volumetric Flow in Segment**
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	56.67	28.34	11883.60	11691.17	192.43	5452.59
2	64.11	60.39	11691.17	11500.30	190.86	11526.18
3	67.52	65.82	11500.30	11311.01	189.29	12458.23
4	73.34	70.43	11311.01	11123.29	187.72	13221.18
5	72.96	73.15	11123.29	10937.14	186.15	13616.87
6	82.33	77.65	10937.14	10752.56	184.58	14331.65
7	87.62	84.98	10752.56	10569.55	183.01	15551.14
8	92.83	90.23	10569.55	10388.12	181.44	16370.21
9	94.09	93.46	10388.12	10208.25	179.87	16810.35
10	96.95	95.52	10208.25	10029.95	178.30	17030.84
11	96.79	96.87	10029.95	9853.23	176.73	17119.37
12	97.42	97.11	9853.23	9678.07	175.15	17008.37

Total volumetric flow for all sections located between stack wall and d last.	170497.00
Velocity measured at d rem	99.01
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	75779.6837
Wall effects-adjusted flow in equal area sector. (Qt)	246276.69
Replacement point for Port C.	82.90

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/22/2015**
Project No.	**15-409**	**Unit**	**4**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4D**	**Testers**	**GCI**
Port	**D**	**Stack r in.**	**123.0**

Distance from Wall	**Measured Velocity**	**Decay Velocity**	**Intermediate Calculations**		**Area of Segment**	**Volumetric Flow in Segment**
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	52.37	26.19	11883.60	11691.17	192.43	5038.86
2	51.02	51.70	11691.17	11500.30	190.86	9866.63
3	70.95	60.99	11500.30	11311.01	189.29	11543.95
4	70.10	70.53	11311.01	11123.29	187.72	13239.01
5	76.46	73.28	11123.29	10937.14	186.15	13641.07
6	72.25	74.36	10937.14	10752.56	184.58	13724.39
7	82.16	77.21	10752.56	10569.55	183.01	14129.17
8	87.08	84.62	10569.55	10388.12	181.44	15353.25
9	92.50	89.79	10388.12	10208.25	179.87	16150.24
10	93.71	93.11	10208.25	10029.95	178.30	16600.25
11	96.67	95.19	10029.95	9853.23	176.73	16822.48
12	97.76	97.22	9853.23	9678.07	175.15	17027.64

Total volumetric flow for all sections located between stack wall and d last.	163136.95
Velocity measured at d rem	96.49
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	73850.9411
Wall effects-adjusted flow in equal area sector. (Qt)	236987.89
Replacement point for Port D.	79.77

Method 2H Calculations

Drem = 14.2168

Point Dist. From Wall	Port A	Port B	Port C	Port D		
					Uncorrected Vavg	103.07
					Provisional Adj. V'avg	101.09
1.00	54.75	65.89	56.67	52.37		
2.00	68.35	74.62	64.11	51.02		
3.00	74.27	81.40	67.52	70.95	Wall Adj Factor	0.9808
4.00	76.09	93.11	73.34	70.10	Must be >97%	
5.00	83.93	95.40	72.96	76.46		
6.00	87.36	96.26	82.33	72.25		
7.00	90.29	96.08	87.62	82.16		
7.87	91.96	97.34	92.83	87.08		
8.00	91.96	97.34	92.83	87.08		
9.00	94.35	97.09	94.09	92.50	Average Temp	341
10.00	94.78	99.94	96.95	93.71	Average Angle	0.62
11.00	96.77	98.98	96.79	96.67		
12.00	97.40	101.29	97.42	97.76		
14.22	97.50	101.76	99.01	96.49	Unadj KSCFH	78536
25.83	105.62	104.13	102.98	104.16	Adj KSCFH	77027.7
47.72	107.87	105.96	108.83	108.24	SCFH	77028000
79.46	108.28	108.10	108.30	107.44		

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**2**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.50**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**29.08**	**%Moisture**	**11.3**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:22	315.3	1.595	-3.0	105.41	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:23	331.0	1.583	-2.6	105.70	0.809	IN4A
A3	9/22/15 18:24	336.1	1.548	-2.4	103.72		
A4	9/22/15 18:26	340.1	1.385	-2.7	93.01		
B1	9/22/15 18:22	330.2	1.593	2.7	106.18	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:23	336.6	1.587	3.4	106.14	0.808	IN4B
B3	9/22/15 18:24	338.9	1.573	3.7	105.32		
B4	9/22/15 18:26	339.3	1.506	4.0	100.82		
C1	9/22/15 18:22	337.3	1.593	-1.5	106.74	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:23	340.1	1.623	4.8	108.59	0.808	IN4C
C3	9/22/15 18:24	341.7	1.559	5.5	104.30		
C4	9/22/15 18:26	339.3	1.350	-7.1	89.90		
D1	9/22/15 18:22	329.4	1.595	5.0	105.97	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:23	340.0	1.630	5.7	108.90	0.808	IN4D
D3	9/22/15 18:24	337.9	1.566	5.9	104.45		
D4	9/22/15 18:26	338.2	1.331	1.8	89.22		
Average		**335.7**	**1.539**	**1.5**	**102.77**		

KSCFH	**78871**
ADJKSCFH	**77356.7**
SCFH	**77357000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**3**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.50**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**29.08**	**%Moisture**	**11.3**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:27	338.8	1.624	-1.7	109.04	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:29	336.6	1.587	-2.0	106.39	0.809	IN4A
A3	9/22/15 18:30	341.9	1.537	-1.5	103.41		
A4	9/22/15 18:31	337.0	1.313	-3.1	87.97		
B1	9/22/15 18:27	337.6	1.627	2.9	108.93	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:29	341.7	1.583	3.1	106.24	0.808	IN4B
B3	9/22/15 18:30	340.7	1.504	4.0	100.78		
B4	9/22/15 18:31	338.7	1.458	3.2	97.66		
C1	9/22/15 18:27	341.2	1.613	1.6	108.34	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:29	340.0	1.641	7.3	109.28	0.808	IN4C
C3	9/22/15 18:30	339.7	1.550	-2.0	103.98		
C4	9/22/15 18:31	341.4	1.357	-1.7	91.15		
D1	9/22/15 18:27	340.7	1.601	5.7	107.01	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:29	338.2	1.622	3.2	108.61	0.808	IN4D
D3	9/22/15 18:30	338.0	1.572	3.4	105.23		
D4	9/22/15 18:31	335.2	1.291	4.0	86.21		
Average		**339.2**	**1.530**	**1.7**	**102.51**		

KSCFH	**78327**
ADJKSCFH	**76823.1**
SCFH	**76823000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**4**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.50**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**29.11**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:32	338.0	1.599	-2.1	107.23	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:33	338.2	1.607	-2.2	107.77	0.809	IN4A
A3	9/22/15 18:34	335.7	1.515	-3.1	101.37		
A4	9/22/15 18:36	333.2	1.395	-2.7	93.23		
B1	9/22/15 18:32	341.6	1.603	2.3	107.59	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:33	340.8	1.603	2.9	107.49	0.808	IN4B
B3	9/22/15 18:34	340.2	1.515	3.3	101.51		
B4	9/22/15 18:36	337.8	1.367	2.5	91.52		
C1	9/22/15 18:32	339.9	1.584	-3.5	106.09	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:33	338.9	1.599	-3.9	106.98	0.808	IN4C
C3	9/22/15 18:34	339.4	1.537	-3.7	102.89		
C4	9/22/15 18:36	336.2	1.340	-10.0	88.34		
D1	9/22/15 18:32	336.5	1.586	6.2	105.57	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:33	337.6	1.606	5.8	107.06	0.808	IN4D
D3	9/22/15 18:34	340.1	1.562	6.8	104.09		
D4	9/22/15 18:36	339.4	1.345	5.9	89.74		
Average		**338.3**	**1.523**	**0.3**	**101.78**		

KSCFH	**77854**
ADJKSCFH	**76359.2**
SCFH	**76359000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**5**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Static Press	**-1.50**	**O2**	**5.1**		<INPUTS
Molecular Wt.	**29.10**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:37	339.8	1.612	-2.0	108.25	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:38	340.1	1.569	-3.7	105.22	0.809	IN4A
A3	9/22/15 18:39	339.1	1.557	-3.4	104.39		
A4	9/22/15 18:41	337.4	1.467	-3.6	98.23		
B1	9/22/15 18:37	339.4	1.594	0.7	106.94	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:38	341.5	1.582	4.1	106.01	0.808	IN4B
B3	9/22/15 18:39	338.4	1.506	3.5	100.79		
B4	9/22/15 18:41	337.0	1.486	2.5	99.45		
C1	9/22/15 18:37	342.4	1.595	-2.5	107.11	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:38	340.7	1.590	-2.2	106.68	0.808	IN4C
C3	9/22/15 18:39	337.3	1.535	0.9	102.84		
C4	9/22/15 18:41	337.6	1.370	0.6	91.81		
D1	9/22/15 18:37	336.9	1.606	4.1	107.31	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:38	339.4	1.617	5.4	108.01	0.808	IN4D
D3	9/22/15 18:39	338.2	1.558	4.2	104.17		
D4	9/22/15 18:41	335.0	1.298	8.0	86.00		
Average		**338.8**	**1.534**	**1.0**	**102.70**		

KSCFH	**78516**
ADJKSCFH	**77008.5**
SCFH	**77008000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**6**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.50**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**29.11**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:42	337.5	1.605	-2.8	107.54	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:43	339.1	1.569	-2.7	105.24	0.809	IN4A
A3	9/22/15 18:04	338.7	1.506	-3.3	100.94		
A4	9/22/15 18:46	335.3	1.289	-2.9	86.24		
B1	9/22/15 18:42	339.5	1.597	0.5	107.13	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:43	338.5	1.573	0.8	105.45	0.808	IN4B
B3	9/22/15 18:04	339.9	1.526	3.3	102.23		
B4	9/22/15 18:46	341.4	1.478	3.8	99.05		
C1	9/22/15 18:42	336.2	1.606	-0.2	107.51	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:43	340.1	1.598	-4.7	106.88	0.808	IN4C
C3	9/22/15 18:04	337.3	1.518	-4.1	101.43		
C4	9/22/15 18:46	338.9	1.324	-5.4	88.39		
D1	9/22/15 18:42	337.2	1.593	3.7	106.49	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:43	340.4	1.630	5.3	108.94	0.808	IN4D
D3	9/22/15 18:04	339.9	1.584	8.9	105.01		
D4	9/22/15 18:46	338.7	1.312	3.2	87.83		
Average		**338.7**	**1.519**	**0.2**	**101.64**		

KSCFH	**77716**
ADJKSCFH	**76223.9**
SCFH	**76224000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**7**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.50**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**29.11**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:47	337.4	1.615	-2.8	108.20	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:49	337.9	1.597	-2.3	107.07	0.809	IN4A
A3	9/22/15 18:50	337.7	1.525	-1.5	102.28		
A4	9/22/15 18:51	336.5	1.354	-3.3	90.62		
B1	9/22/15 18:47	337.1	1.607	2.4	107.55	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:49	337.6	1.574	3.3	105.29	0.808	IN4B
B3	9/22/15 18:50	338.0	1.516	3.6	101.40		
B4	9/22/15 18:51	339.4	1.486	2.2	99.61		
C1	9/22/15 18:47	339.8	1.607	-0.6	107.82	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:49	337.5	1.610	-1.1	107.85	0.808	IN4C
C3	9/22/15 18:50	338.8	1.532	-0.6	102.72		
C4	9/22/15 18:51	336.8	1.351	-0.8	90.47		
D1	9/22/15 18:47	336.2	1.599	2.8	106.92	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:49	341.1	1.592	5.3	106.45	0.808	IN4D
D3	9/22/15 18:50	342.0	1.518	4.2	101.72		
D4	9/22/15 18:51	338.6	1.268	1.7	84.98		
Average		**338.3**	**1.522**	**0.8**	**101.94**		

KSCFH	**77983**
ADJKSCFH	**76485.7**
SCFH	**76486000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**8**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Static Press	**-1.50**	**O2**	**5.1**		<INPUTS
Molecular Wt.	**29.10**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:52	336.1	1.607	-3.3	107.55	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:53	341.1	1.599	-3.0	107.38	0.809	IN4A
A3	9/22/15 18:55	340.4	1.545	-3.1	103.70		
A4	9/22/15 18:56	338.0	1.378	-3.7	92.29		
B1	9/22/15 18:52	336.3	1.608	3.1	107.52	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:53	338.6	1.549	2.7	103.76	0.808	IN4B
B3	9/22/15 18:55	334.4	1.521	2.3	101.64		
B4	9/22/15 18:56	338.1	1.450	2.7	97.10		
C1	9/22/15 18:52	347.5	1.590	-0.9	107.20	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:53	341.3	1.608	0.4	108.01	0.808	IN4C
C3	9/22/15 18:55	336.8	1.552	0.6	103.95		
C4	9/22/15 18:56	336.1	1.334	0.6	89.31		
D1	9/22/15 18:52	338.4	1.592	2.9	106.61	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:53	339.4	1.638	1.5	109.86	0.808	IN4D
D3	9/22/15 18:55	339.3	1.581	3.9	105.82		
D4	9/22/15 18:56	336.1	1.335	5.0	89.04		
Average		**338.6**	**1.530**	**0.7**	**102.55**		

KSCFH	**78416**
ADJKSCFH	**76910.4**
SCFH	**76910000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**9**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Static Press	**-1.50**	**O2**	**5.1**		<INPUTS
Molecular Wt.	**29.10**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 18:57	334.8	1.616	-3.6	108.03	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 18:58	336.6	1.601	-3.4	107.17	0.809	IN4A
A3	9/22/15 19:00	340.5	1.518	-3.1	101.89		
A4	9/22/15 19:01	337.4	1.420	-2.9	95.15		
B1	9/22/15 18:57	337.4	1.631	2.5	109.19	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 18:58	341.8	1.557	0.7	104.61	0.808	IN4B
B3	9/22/15 19:00	337.0	1.513	3.0	101.22		
B4	9/22/15 19:01	337.8	1.455	2.2	97.45		
C1	9/22/15 18:57	339.6	1.608	0.4	107.89	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 18:58	338.4	1.603	0.5	107.48	0.808	IN4C
C3	9/22/15 19:00	339.4	1.551	1.0	104.04		
C4	9/22/15 19:01	339.8	1.304	-3.6	87.34		
D1	9/22/15 18:57	337.0	1.596	4.7	106.56	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 18:58	339.0	1.618	5.4	108.05	0.808	IN4D
D3	9/22/15 19:00	338.4	1.581	7.4	105.12		
D4	9/22/15 19:01	335.2	1.329	4.1	88.70		
Average		**338.1**	**1.531**	**1.0**	**102.49**		

KSCFH	**78418**
ADJKSCFH	**76912.4**
SCFH	**76912000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**10**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.50**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**29.11**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 19:02	339.8	1.600	-2.3	107.40	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 19:03	340.5	1.594	-3.5	106.93	0.809	IN4A
A3	9/22/15 19:05	340.1	1.522	-3.1	102.12		
A4	9/22/15 19:06	338.8	1.369	-3.4	91.75		
B1	9/22/15 19:02	341.0	1.596	2.5	107.07	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 19:03	339.5	1.549	-3.5	103.72	0.808	IN4B
B3	9/22/15 19:05	338.1	1.506	3.2	100.78		
B4	9/22/15 19:06	334.6	1.357	2.3	90.68		
C1	9/22/15 19:02	338.6	1.601	0.4	107.34	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 19:03	337.2	1.594	0.7	106.77	0.808	IN4C
C3	9/22/15 19:05	337.3	1.565	1.3	104.82		
C4	9/22/15 19:06	338.1	1.360	3.7	90.96		
D1	9/22/15 19:02	336.5	1.609	5.4	107.26	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 19:03	337.9	1.609	4.8	107.45	0.808	IN4D
D3	9/22/15 19:05	337.3	1.597	4.2	106.70		
D4	9/22/15 19:06	339.8	1.345	4.6	89.95		
Average		**338.4**	**1.523**	**1.1**	**101.98**		

KSCFH	**77997**
ADJKSCFH	**76499.5**
SCFH	**76499000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**11**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.50**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**29.11**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 19:07	337.5	1.613	-2.6	108.09	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 19:09	339.1	1.622	-2.9	108.78	0.809	IN4A
A3	9/22/15 19:10	340.2	1.522	-3.2	102.11		
A4	9/22/15 19:11	336.3	1.412	-9.1	93.46		
B1	9/22/15 19:07	339.1	1.620	0.6	108.64	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 19:09	339.7	1.577	2.9	105.67	0.808	IN4B
B3	9/22/15 19:10	340.3	1.538	0.9	103.21		
B4	9/22/15 19:11	339.5	1.436	0.3	96.33		
C1	9/22/15 19:07	343.8	1.615	1.0	108.62	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 19:09	340.3	1.590	-1.2	106.69	0.808	IN4C
C3	9/22/15 19:10	337.7	1.538	-0.1	103.06		
C4	9/22/15 19:11	337.2	1.353	4.0	90.41		
D1	9/22/15 19:07	335.7	1.599	5.8	106.46	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 19:09	338.5	1.633	8.3	108.33	0.808	IN4D
D3	9/22/15 19:10	339.0	1.556	5.3	103.90		
D4	9/22/15 19:11	337.0	1.375	4.7	91.79		
Average		**338.8**	**1.537**	**0.9**	**102.85**		

KSCFH	**78627**
ADJKSCFH	**77117.4**
SCFH	**77117000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**12**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-1.50**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.09**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 19:12	340.7	1.618	-2.1	108.72	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 19:14	338.9	1.554	-3.5	104.18	0.809	IN4A
A3	9/22/15 19:15	336.0	1.538	-3.4	102.93		
A4	9/22/15 19:16	339.6	1.364	-1.3	91.63		
B1	9/22/15 19:12	339.1	1.597	1.6	107.10	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 19:14	339.3	1.577	1.5	105.78	0.808	IN4B
B3	9/22/15 19:15	341.2	1.497	0.8	100.56		
B4	9/22/15 19:16	339.1	1.430	0.4	95.94		
C1	9/22/15 19:12	339.9	1.612	3.6	107.99	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 19:14	338.5	1.584	-4.4	105.92	0.808	IN4C
C3	9/22/15 19:15	339.5	1.562	1.2	104.80		
C4	9/22/15 19:16	338.9	1.359	3.1	91.03		
D1	9/22/15 19:12	341.4	1.614	6.2	107.81	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 19:14	338.8	1.624	5.8	108.38	0.808	IN4D
D3	9/22/15 19:15	339.0	1.574	5.9	105.03		
D4	9/22/15 19:16	334.1	1.366	2.6	91.26		
Average		**339.0**	**1.529**	**1.1**	**102.44**		

KSCFH	**78294**
ADJKSCFH	**76790.8**
SCFH	**76791000**

Grace Consulting Inc.
Moisture Calculations (Runs 1 - 12)

Client:	Ameren
Site:	Labadie
Date:	09/23/15
Unit Number:	Unit 4
Load:	Low

Run:	1-4	5-12
Initial Weight of Impingers:	3498.00	3550.00
Final Weight of Impingers:	3550.00	3603.00
Weight gain of Impingers:	52.00	53.00
Initial Meter Reading:	462.700	485.278
Final Meter Reading:	485.150	507.155
Volume Metered:	22.450	21.877
Meter Temperature:	90.00	96.00
Delta H:	2.062	2.062
Barometric Pressure:	29.23	29.23
Meter Correction Factor:	0.975	0.975
Volume Measured (DSCF):	20.63	19.88
Water Volume (SCF):	2.45	2.50
% Moisture in Flue Gas:	10.60	11.20

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Pitot Coef.	**0.809**	**O2**	**5.5**		<INPUTS
Static Press	**-0.70**	**Pitot No.**	**IN4A**		
Molecular Wt.	**29.12**	**%Moisture**	**10.6**		
Area of Flue	**330.1**	**Load**	**Low**		
Stack Diameter	**20.50**				

Point No. Port A	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/23/15 1:03	284.2	0.498	-3.9	32.16
2	2.00	9/23/15 1:01	287.2	0.530	-4.0	34.29
3	3.00	9/23/15 1:00	289.8	0.567	-1.5	36.83
4	4.00	9/23/15 0:58	290.1	0.603	-3.7	39.10
5	5.00	9/23/15 0:57	291.3	0.663	-3.9	43.02
6	6.00	9/23/15 0:56	294.3	0.693	-2.8	45.10
7	7.00	9/23/15 0:55	295.2	0.701	-3.8	45.61
A4	7.87	9/23/15 0:53	293.1	0.701	-4.1	45.53
8	8.00	9/23/15 0:53	293.1	0.701	-4.1	45.53
9	9.00	9/23/15 0:51	292.2	0.739	-1.9	48.06
10	10.00	9/23/15 0:49	293.4	0.764	-1.5	49.74
11	11.00	9/23/15 0:48	294.6	0.771	-4.0	50.13
12	12.00	9/23/15 0:47	294.6	0.758	-3.6	49.31
D-Rem	14.22	9/23/15 0:46	296.0	0.765	-4.5	49.75
A3	25.83	9/23/15 0:45	296.9	0.826	-4.0	53.79
A2	47.72	9/23/15 0:43	295.2	0.843	-3.8	54.85
A1	79.46	9/23/15 0:42	298.9	0.849	-3.8	55.37
Average			**296.0**	**0.704**	**-3.5**	**45.77**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Pitot Coef.	**0.808**	**O2**	**5.5**		<INPUTS
Static Press	**-0.70**	**Pitot No.**	**IN4B**		
Molecular Wt.	**29.12**	**%Moisture**	**10.6**		
Area of Flue	**330.1**	**Load**	**Low**		
Stack Diameter	**20.50**				

Point No. Port B	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/23/15 1:03	293.6	0.463	-4.9	30.01
2	2.00	9/23/15 1:01	294.3	0.537	-4.7	34.83
3	3.00	9/23/15 1:00	298.0	0.573	-5.3	37.22
4	4.00	9/23/15 0:58	297.7	0.644	-5.1	41.84
5	5.00	9/23/15 0:57	299.8	0.707	-4.8	46.02
6	6.00	9/23/15 0:56	305.2	0.749	-4.9	48.92
7	7.00	9/23/15 0:55	307.1	0.747	-4.7	48.86
A4	7.87	9/23/15 0:53	308.3	0.750	-4.9	49.08
8	8.00	9/23/15 0:53	308.3	0.750	-4.9	49.08
9	9.00	9/23/15 0:51	305.8	0.771	-4.4	50.41
10	10.00	9/23/15 0:49	307.1	0.770	-4.6	50.37
11	11.00	9/23/15 0:48	306.7	0.779	-4.7	50.94
12	12.00	9/23/15 0:47	306.2	0.798	-4.8	52.16
D-Rem	14.22	9/23/15 0:46	305.7	0.767	-6.1	50.01
A3	25.83	9/23/15 0:45	308.8	0.801	-6.1	52.33
A2	47.72	9/23/15 0:43	307.2	0.838	-6.5	54.65
A1	79.46	9/23/15 0:42	309.4	0.840	-6.6	54.85
Average			**308.4**	**0.723**	**-5.2**	**47.15**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Pitot Coef.	**0.808**	**O2**	**5.5**		<INPUTS
Static Press	**-0.70**	**Pitot No.**	**IN4C**		
Molecular Wt.	**29.12**	**%Moisture**	**10.6**		
Area of Flue	**330.1**	**Load**	**Low**		
Stack Diameter	**20.50**				

Point No. Port C	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/23/15 1:03	295.2	0.449	3.2	29.19
2	2.00	9/23/15 1:01	297.0	0.492	2.7	32.04
3	3.00	9/23/15 1:00	297.0	0.527	3.4	34.30
4	4.00	9/23/15 0:58	298.1	0.547	1.7	35.67
5	5.00	9/23/15 0:57	301.8	0.555	-2.5	36.27
6	6.00	9/23/15 0:56	302.9	0.595	-2.9	38.89
7	7.00	9/23/15 0:55	301.5	0.619	-2.8	40.43
A4	7.87	9/23/15 0:53	303.4	0.643	-1.8	42.08
8	8.00	9/23/15 0:53	303.4	0.643	-1.8	42.08
9	9.00	9/23/15 0:51	302.9	0.688	-1.8	45.01
10	10.00	9/23/15 0:49	307.3	0.703	-1.8	46.12
11	11.00	9/23/15 0:48	309.1	0.727	-3.0	47.71
12	12.00	9/23/15 0:47	308.8	0.717	1.5	47.10
D-Rem	14.22	9/23/15 0:46	304.2	0.754	1.4	49.38
A3	25.83	9/23/15 0:45	308.6	0.780	1.3	51.23
A2	47.72	9/23/15 0:43	307.6	0.809	0.6	53.11
A1	79.46	9/23/15 0:42	308.3	0.859	0.4	56.42
Average			**307.0**	**0.653**	**-0.1**	**42.77**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Pitot Coef.	**0.808**	**O2**	**5.5**		<INPUTS
Static Press	**-0.70**	**Pitot No.**	**IN4D**		
Molecular Wt.	**29.12**	**%Moisture**	**10.6**		
Area of Flue	**330.1**	**Load**	**Low**		
Stack Diameter	**20.50**				

Point No. Port D	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/23/15 1:03	291.0	0.461	1.3	29.93
2	2.00	9/23/15 1:01	295.4	0.524	1.6	34.12
3	3.00	9/23/15 1:00	297.4	0.499	1.8	32.53
4	4.00	9/23/15 0:58	299.3	0.507	1.9	33.09
5	5.00	9/23/15 0:57	300.3	0.497	2.4	32.45
6	6.00	9/23/15 0:56	303.4	0.511	2.0	33.44
7	7.00	9/23/15 0:55	299.7	0.507	2.3	33.09
A4	7.87	9/23/15 0:53	300.4	0.510	3.4	33.27
8	8.00	9/23/15 0:53	300.4	0.510	3.4	33.27
9	9.00	9/23/15 0:51	301.9	0.562	3.2	36.70
10	10.00	9/23/15 0:49	302.3	0.591	3.2	38.61
11	11.00	9/23/15 0:48	303.1	0.678	3.2	44.31
12	12.00	9/23/15 0:47	304.0	0.699	2.6	45.74
D-Rem	14.22	9/23/15 0:46	308.4	0.725	4.1	47.50
A3	25.83	9/23/15 0:45	306.0	0.842	3.8	55.10
A2	47.72	9/23/15 0:43	307.2	0.813	3.3	53.27
A1	79.46	9/23/15 0:42	304.2	0.841	2.4	55.04
Average			**304.5**	**0.605**	**2.7**	**39.5**

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/23/2015**
Project No.	**15-409**	**Unit**	**4**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4A**	**Operator**	**GCI**
Port	**A**	**Stack r in.**	**123.0**

Distance from Wall	**Measured Velocity**	**Decay Velocity**	**Intermediate Calculations**		**Area of Segment**	**Volumetric Flow in Segment**
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	32.16	16.08	11883.60	11691.17	192.43	3094.33
2	34.29	33.23	11691.17	11500.30	190.86	6341.40
3	36.83	35.56	11500.30	11311.01	189.29	6731.21
4	39.10	37.97	11311.01	11123.29	187.72	7126.82
5	43.02	41.06	11123.29	10937.14	186.15	7643.32
6	45.10	44.06	10937.14	10752.56	184.58	8132.56
7	45.61	45.36	10752.56	10569.55	183.01	8300.35
8	45.53	45.57	10569.55	10388.12	181.44	8268.11
9	48.06	46.80	10388.12	10208.25	179.87	8416.87
10	49.74	48.90	10208.25	10029.95	178.30	8718.68
11	50.13	49.94	10029.95	9853.23	176.73	8824.78
12	49.31	49.72	9853.23	9678.07	175.15	8708.68

Total volumetric flow for all sections located between stack wall and d last.	90307.10
Velocity measured at d rem	49.75
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	38077.3585
Wall effects-adjusted flow in equal area sector. (Qt)	128384.46
Replacement point for Port A.	43.21

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/23/2015**
Project No.	**15-409**	**Unit**	**4**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4B**	**Testers**	**GCI**
Port	**B**	**Stack r in.**	**123.0**

Distance from Wall	Measured Velocity	Decay Velocity	Intermediate Calculations		Area of Segment	Volumetric Flow in Segment
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	30.01	15.01	11883.60	11691.17	192.43	2887.46
2	34.83	32.42	11691.17	11500.30	190.86	6187.76
3	37.22	36.03	11500.30	11311.01	189.29	6819.23
4	41.84	39.53	11311.01	11123.29	187.72	7420.60
5	46.02	43.93	11123.29	10937.14	186.15	8177.57
6	48.92	47.47	10937.14	10752.56	184.58	8761.98
7	48.86	48.89	10752.56	10569.55	183.01	8947.28
8	49.08	48.97	10569.55	10388.12	181.44	8885.00
9	50.41	49.75	10388.12	10208.25	179.87	8947.48
10	50.37	50.39	10208.25	10029.95	178.30	8984.34
11	50.94	50.66	10029.95	9853.23	176.73	8952.02
12	52.16	51.55	9853.23	9678.07	175.15	9029.21

Total volumetric flow for all sections located between stack wall and d last.	93999.93
Velocity measured at d rem	50.01
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	38276.3557
Wall effects-adjusted flow in equal area sector. (Qt)	132276.28
Replacement point for Port B.	44.52

Method 2H Worksheet 2H-1

Client	Ameren	Date	9/23/2015
Project No.	15-409	Unit	4
Probe Type	S type	Test Location	Stack
Pitot No.	IN4C	Testers	GCI
Port	C	Stack r in.	123.0

Distance from Wall	Measured Velocity	Decay Velocity	Intermediate Calculations		Area of Segment	Volumetric Flow in Segment
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	29.19	14.60	11883.60	11691.17	192.43	2808.56
2	32.04	30.62	11691.17	11500.30	190.86	5843.25
3	34.30	33.17	11500.30	11311.01	189.29	6278.80
4	35.67	34.99	11311.01	11123.29	187.72	6567.41
5	36.27	35.97	11123.29	10937.14	186.15	6695.82
6	38.89	37.58	10937.14	10752.56	184.58	6936.49
7	40.43	39.66	10752.56	10569.55	183.01	7258.11
8	42.08	41.26	10569.55	10388.12	181.44	7485.21
9	45.01	43.55	10388.12	10208.25	179.87	7832.30
10	46.12	45.57	10208.25	10029.95	178.30	8124.06
11	47.71	46.92	10029.95	9853.23	176.73	8291.06
12	47.10	47.41	9853.23	9678.07	175.15	8303.20

Total volumetric flow for all sections located between stack wall and d last.	82424.28
Velocity measured at d rem	49.38
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	37794.1701
Wall effects-adjusted flow in equal area sector. (Qt)	120218.45
Replacement point for Port C.	40.47

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/23/2015**
Project No.	**15-409**	**Unit**	**4**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4D**	**Testers**	**GCI**
Port	**D**	**Stack r in.**	**123.0**

Distance from Wall	**Measured Velocity**	**Decay Velocity**	**Intermediate Calculations**		**Area of Segment**	**Volumetric Flow in Segment**
(in.)	(ft/sec)	(ft/sec)	(in^2)	(in^2)	(in^2)	(ft-in^2/sec)
1	29.93	14.97	11883.60	11691.17	192.43	2879.76
2	34.12	32.03	11691.17	11500.30	190.86	6112.37
3	32.53	33.33	11500.30	11311.01	189.29	6308.14
4	33.09	32.81	11311.01	11123.29	187.72	6159.12
5	32.45	32.77	11123.29	10937.14	186.15	6100.14
6	33.44	32.95	10937.14	10752.56	184.58	6080.96
7	33.09	33.27	10752.56	10569.55	183.01	6087.78
8	33.27	33.18	10569.55	10388.12	181.44	6020.10
9	36.70	34.99	10388.12	10208.25	179.87	6292.64
10	38.61	37.66	10208.25	10029.95	178.30	6713.74
11	44.31	41.46	10029.95	9853.23	176.73	7327.03
12	45.74	45.03	9853.23	9678.07	175.15	7886.33

Total volumetric flow for all sections located between stack wall and d last.	73968.11
Velocity measured at d rem	47.50
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	36355.2669
Wall effects-adjusted flow in equal area sector. (Qt)	110323.37
Replacement point for Port D.	37.13

Method 2H Calculations

Drem = 14.2168

Point Dist. From Wall	Port A	Port B	Port C	Port D		
					Uncorrected Vavg	51.25
					Provisional Adj. V'avg	50.96
1.00	32.16	30.01	29.19	29.93		
2.00	34.29	34.83	32.04	34.12		
3.00	36.83	37.22	34.30	32.53	Wall Adj Factor	0.9943
4.00	39.10	41.84	35.67	33.09	Must be >97%	
5.00	43.02	46.02	36.27	32.45		
6.00	45.10	48.92	38.89	33.44		
7.00	45.61	48.86	40.43	33.09		
7.87	45.53	49.08	42.08	33.27		
8.00	45.53	49.08	42.08	33.27		
9.00	48.06	50.41	45.01	36.70	Average Temp	304
10.00	49.74	50.37	46.12	38.61	Average Angle	-1.52
11.00	50.13	50.94	47.71	44.31		
12.00	49.31	52.16	47.10	45.74		
14.22	49.75	50.01	49.38	47.50	Unadj KSCFH	41049
25.83	53.79	52.33	51.23	55.10	Adj KSCFH	40815.0
47.72	54.85	54.65	53.11	53.27	SCFH	40815000
79.46	55.37	54.85	56.42	55.04		

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**2**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Static Press	**-0.70**	**O2**	**5.5**		<INPUTS
Molecular Wt.	**29.12**	**%Moisture**	**10.6**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:05	289.3	0.850	-7.6	54.72	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:06	288.3	0.845	-5.7	54.57	0.809	IN4A
A3	9/23/15 1:07	289.8	0.829	-5.6	53.60		
A4	9/23/15 1:09	291.5	0.713	-6.1	46.11		
B1	9/23/15 1:05	285.0	0.845	-4.3	54.50	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:06	295.9	0.853	-4.5	55.40	0.808	IN4B
B3	9/23/15 1:07	298.1	0.809	-4.3	52.64		
B4	9/23/15 1:09	300.1	0.796	-4.8	51.82		
C1	9/23/15 1:05	290.0	0.845	1.9	54.81	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:06	297.2	0.817	0.8	53.27	0.808	IN4C
C3	9/23/15 1:07	299.0	0.786	2.1	51.28		
C4	9/23/15 1:09	291.3	0.651	-8.1	41.86		
D1	9/23/15 1:05	293.1	0.860	1.8	55.90	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:06	294.2	0.843	3.9	54.73	0.808	IN4D
D3	9/23/15 1:07	296.5	0.816	3.9	53.06		
D4	9/23/15 1:09	277.2	0.569	3.2	36.55		
Average		**292.3**	**0.795**	**-2.1**	**51.55**		

KSCFH	**41931**
ADJKSCFH	**41692.0**
SCFH	**41692000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**3**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-0.70**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**10.6**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:10	290.3	0.833	-7.8	53.62	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:11	289.2	0.831	-5.8	53.67	0.809	IN4A
A3	9/23/15 1:12	289.9	0.831	-5.9	53.69		
A4	9/23/15 1:14	290.9	0.742	-5.7	47.99		
B1	9/23/15 1:10	300.6	0.835	-4.2	54.41	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:11	297.8	0.831	-4.2	54.05	0.808	IN4B
B3	9/23/15 1:12	299.6	0.815	-3.8	53.09		
B4	9/23/15 1:14	294.9	0.764	-3.2	49.65		
C1	9/23/15 1:10	295.1	0.813	2.4	52.88	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:11	298.8	0.812	2.2	52.95	0.808	IN4C
C3	9/23/15 1:12	296.6	0.776	1.9	50.54		
C4	9/23/15 1:14	295.9	0.666	-6.5	43.10		
D1	9/23/15 1:10	285.2	0.832	2.3	53.76	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:11	295.4	0.848	4.4	55.05	0.808	IN4D
D3	9/23/15 1:12	296.2	0.852	4.3	55.35		
D4	9/23/15 1:14	280.1	0.598	3.2	38.48		
Average		**293.5**	**0.792**	**-1.7**	**51.39**		

KSCFH	**41731**
ADJKSCFH	**41493.1**
SCFH	**41493000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**4**	Md	**30.43**
Baro Press	**29.23**	**CO2**	**13.8**		
Static Press	**-0.70**	**O2**	**5.6**		<INPUTS
Molecular Wt.	**29.11**	**%Moisture**	**10.6**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:15	290.6	0.846	-6.2	54.68	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:16	290.1	0.841	-8.5	54.06	0.809	IN4A
A3	9/23/15 1:17	290.8	0.831	-6.0	53.74		
A4	9/23/15 1:19	289.0	0.706	-5.4	45.65		
B1	9/23/15 1:15	296.9	0.856	-3.7	55.70	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:16	297.0	0.844	-2.9	54.97	0.808	IN4B
B3	9/23/15 1:17	298.0	0.804	-3.7	52.36		
B4	9/23/15 1:19	295.8	0.789	-3.5	51.31		
C1	9/23/15 1:15	296.9	0.841	6.2	54.52	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:16	294.6	0.811	4.9	52.61	0.808	IN4C
C3	9/23/15 1:17	297.8	0.784	-1.4	51.14		
C4	9/23/15 1:19	294.9	0.653	11.1	41.73		
D1	9/23/15 1:15	286.6	0.831	2.1	53.78	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:16	293.9	0.857	3.5	55.67	0.808	IN4D
D3	9/23/15 1:17	294.1	0.833	4.1	54.08		
D4	9/23/15 1:19	280.7	0.611	2.8	39.37		
Average		**293.0**	**0.796**	**-0.4**	**51.58**		

KSCFH	**41916**
ADJKSCFH	**41677.1**
SCFH	**41677000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**5**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-0.70**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.06**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:20	291.3	0.842	-5.8	54.53	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:21	290.0	0.851	-11.8	54.18	0.809	IN4A
A3	9/23/15 1:22	292.1	0.816	-5.9	52.87		
A4	9/23/15 1:24	292.3	0.742	-5.7	48.10		
B1	9/23/15 1:20	295.3	0.827	-3.4	53.82	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:21	296.8	0.819	-4.2	53.30	0.808	IN4B
B3	9/23/15 1:22	296.9	0.817	-3.5	53.22		
B4	9/23/15 1:24	294.5	0.793	-3.4	51.58		
C1	9/23/15 1:20	293.3	0.832	-4.5	54.00	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:21	296.4	0.809	-4.5	52.62	0.808	IN4C
C3	9/23/15 1:22	292.8	0.790	-4.4	51.27		
C4	9/23/15 1:24	291.3	0.658	-4.3	42.66		
D1	9/23/15 1:20	285.4	0.853	2.3	55.20	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:21	294.4	0.873	4.4	56.71	0.808	IN4D
D3	9/23/15 1:22	294.0	0.823	4.7	53.43		
D4	9/23/15 1:24	265.7	0.600	2.6	38.30		
Average		**291.4**	**0.797**	**-3.0**	**51.61**		

KSCFH	**42028**
ADJKSCFH	**41788.4**
SCFH	**41788000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**6**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Static Press	**-0.70**	**O2**	**5.5**		<INPUTS
Molecular Wt.	**29.05**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:25	289.7	0.840	-5.7	54.37	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:26	290.6	0.843	-9.2	54.16	0.809	IN4A
A3	9/23/15 1:27	290.9	0.823	-5.2	53.35		
A4	9/23/15 1:29	292.6	0.698	-5.6	45.27		
B1	9/23/15 1:25	293.0	0.844	-4.0	54.82	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:26	294.7	0.837	-3.7	54.44	0.808	IN4B
B3	9/23/15 1:27	295.0	0.801	-3.8	52.10		
B4	9/23/15 1:29	290.5	0.785	-3.4	50.93		
C1	9/23/15 1:25	293.1	0.837	-4.7	54.31	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:26	291.8	0.805	-5.5	52.13	0.808	IN4C
C3	9/23/15 1:27	293.9	0.762	-7.3	49.24		
C4	9/23/15 1:29	290.5	0.645	-4.7	41.78		
D1	9/23/15 1:25	285.2	0.852	2.4	55.13	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:26	291.2	0.849	2.9	55.14	0.808	IN4D
D3	9/23/15 1:27	291.8	0.814	3.9	52.83		
D4	9/23/15 1:29	276.7	0.584	2.3	37.58		
Average		**290.7**	**0.789**	**-3.2**	**51.10**		

KSCFH	**41652**
ADJKSCFH	**41414.6**
SCFH	**41415000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**7**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-0.70**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.06**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:30	290.6	0.835	-9.5	53.59	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:31	290.1	0.829	-9.0	53.26	0.809	IN4A
A3	9/23/15 1:32	288.0	0.812	-5.1	52.54		
A4	9/23/15 1:34	289.3	0.744	-5.1	48.18		
B1	9/23/15 1:30	291.0	0.846	-3.5	54.89	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:31	292.6	0.827	-3.5	53.72	0.808	IN4B
B3	9/23/15 1:32	292.8	0.823	-2.9	53.50		
B4	9/23/15 1:34	290.9	0.781	-4.2	50.63		
C1	9/23/15 1:30	291.7	0.821	1.9	53.37	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:31	293.4	0.802	1.5	52.20	0.808	IN4C
C3	9/23/15 1:32	290.8	0.771	1.2	50.10		
C4	9/23/15 1:34	289.1	0.675	1.7	43.81		
D1	9/23/15 1:30	285.6	0.831	3.1	53.75	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:31	292.1	0.845	3.3	54.88	0.808	IN4D
D3	9/23/15 1:32	289.3	0.796	3.0	51.62		
D4	9/23/15 1:34	269.2	0.593	2.5	37.95		
Average		**289.2**	**0.789**	**-1.5**	**51.12**		

KSCFH	**41754**
ADJKSCFH	**41516.0**
SCFH	**41516000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**8**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Static Press	**-0.70**	**O2**	**5.5**		<INPUTS
Molecular Wt.	**29.05**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:35	291.4	0.813	-5.6	52.69	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:36	290.1	0.840	-4.2	54.50	0.809	IN4A
A3	9/23/15 1:38	290.4	0.817	-5.0	52.96		
A4	9/23/15 1:39	292.7	0.749	-5.5	48.59		
B1	9/23/15 1:35	291.7	0.846	-4.4	54.87	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:36	292.5	0.851	-3.1	55.31	0.808	IN4B
B3	9/23/15 1:38	291.7	0.819	-2.9	53.21		
B4	9/23/15 1:39	290.8	0.785	-3.3	50.95		
C1	9/23/15 1:35	289.6	0.831	0.9	53.97	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:36	287.6	0.829	9.2	53.09	0.808	IN4C
C3	9/23/15 1:38	288.5	0.800	8.7	51.33		
C4	9/23/15 1:39	286.3	0.671	2.7	43.44		
D1	9/23/15 1:35	281.8	0.836	2.6	53.97	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:36	292.2	0.850	3.9	55.18	0.808	IN4D
D3	9/23/15 1:38	288.0	0.826	3.0	53.53		
D4	9/23/15 1:39	268.0	0.566	-0.3	36.23		
Average		**288.3**	**0.796**	**-0.2**	**51.49**		

KSCFH	**42103**
ADJKSCFH	**41863.0**
SCFH	**41863000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**9**	Md	**30.44**
Baro Press	**29.23**	**CO2**	**13.9**		
Static Press	**-0.70**	**O2**	**5.5**		<INPUTS
Molecular Wt.	**29.05**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:40	291.0	0.865	-15.3	54.32	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:42	292.7	0.843	-4.7	54.76	0.809	IN4A
A3	9/23/15 1:43	289.7	0.840	-5.1	54.42		
A4	9/23/15 1:44	291.1	0.685	-4.7	44.45		
B1	9/23/15 1:40	289.5	0.836	-3.9	54.18	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:42	289.7	0.832	-2.8	53.98	0.808	IN4B
B3	9/23/15 1:43	289.7	0.826	-3.4	53.56		
B4	9/23/15 1:44	289.1	0.791	-3.7	51.26		
C1	9/23/15 1:40	288.4	0.829	2.8	53.74	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:42	289.5	0.824	-0.7	53.52	0.808	IN4C
C3	9/23/15 1:43	290.5	0.774	-1.2	50.30		
C4	9/23/15 1:44	288.9	0.657	2.4	42.62		
D1	9/23/15 1:40	282.2	0.841	1.7	54.34	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:42	287.2	0.860	4.6	55.60	0.808	IN4D
D3	9/23/15 1:43	290.7	0.835	3.6	54.17		
D4	9/23/15 1:44	270.4	0.592	8.6	37.53		
Average		**288.1**	**0.796**	**-1.4**	**51.42**		

KSCFH	**42056**
ADJKSCFH	**41816.3**
SCFH	**41816000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**10**	Md	**30.42**
Baro Press	**29.23**	**CO2**	**13.7**		
Static Press	**-0.70**	**O2**	**5.7**		<INPUTS
Molecular Wt.	**29.03**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:45	289.8	0.856	-4.5	55.53	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:47	290.5	0.838	-4.3	54.40	0.809	IN4A
A3	9/23/15 1:48	290.1	0.835	-5.0	54.14		
A4	9/23/15 1:49	289.6	0.749	-15.0	47.07		
B1	9/23/15 1:45	293.8	0.836	-3.6	54.37	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:47	287.6	0.855	-3.3	55.39	0.808	IN4B
B3	9/23/15 1:48	291.0	0.819	-3.4	53.18		
B4	9/23/15 1:49	289.6	0.813	-3.1	52.75		
C1	9/23/15 1:45	283.7	0.836	-1.2	54.10	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:47	288.2	0.813	-1.1	52.77	0.808	IN4C
C3	9/23/15 1:48	290.6	0.773	-1.1	50.25		
C4	9/23/15 1:49	288.7	0.657	-1.7	42.65		
D1	9/23/15 1:45	271.4	0.861	5.2	55.04	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:47	288.6	0.872	4.7	56.44	0.808	IN4D
D3	9/23/15 1:48	289.0	0.834	3.5	54.07		
D4	9/23/15 1:49	273.2	0.608	4.0	38.98		
Average		**287.2**	**0.803**	**-1.9**	**51.95**		

KSCFH	**42543**
ADJKSCFH	**42300.5**
SCFH	**42301000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**11**	Md	**30.42**
Baro Press	**29.23**	**CO2**	**13.7**		
Static Press	**-0.70**	**O2**	**5.7**		<INPUTS
Molecular Wt.	**29.03**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:50	280.3	0.842	-4.8	54.25	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:52	281.3	0.823	-4.8	53.06	0.809	IN4A
A3	9/23/15 1:53	282.3	0.815	-4.8	52.58		
A4	9/23/15 1:54	280.9	0.671	-7.7	43.01		
B1	9/23/15 1:50	288.6	0.840	-3.5	54.45	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:52	289.5	0.832	-3.2	53.98	0.808	IN4B
B3	9/23/15 1:53	290.2	0.808	-4.1	52.39		
B4	9/23/15 1:54	293.3	0.762	-3.2	49.56		
C1	9/23/15 1:50	289.5	0.832	-1.9	54.03	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:52	288.3	0.804	-2.5	52.15	0.808	IN4C
C3	9/23/15 1:53	292.0	0.748	-2.8	48.63		
C4	9/23/15 1:54	284.7	0.649	-1.7	42.02		
D1	9/23/15 1:50	282.3	0.862	6.7	55.36	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:52	287.0	0.843	4.2	54.54	0.808	IN4D
D3	9/23/15 1:53	287.0	0.829	2.4	53.73		
D4	9/23/15 1:54	265.8	0.570	2.6	36.41		
Average		**285.2**	**0.783**	**-1.8**	**50.63**		

KSCFH	**41574**
ADJKSCFH	**41337.0**
SCFH	**41337000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/23/2015**		
Project No.	**15-409**	**Run No.**	**12**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-0.70**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.06**	**%Moisture**	**11.2**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/23/15 1:55	282.2	0.830	-18.7	50.87	**Pitot Coef. A**	**Pitot No.**
A2	9/23/15 1:57	281.4	0.847	-4.7	54.59	0.809	IN4A
A3	9/23/15 1:58	280.6	0.820	-4.8	52.82		
A4	9/23/15 1:59	279.2	0.690	-5.3	44.37		
B1	9/23/15 1:55	288.7	0.822	-3.2	53.27	**Pitot Coef. B**	**Pitot No.**
B2	9/23/15 1:57	289.9	0.834	-3.4	54.08	0.808	IN4B
B3	9/23/15 1:58	287.9	0.829	-3.3	53.69		
B4	9/23/15 1:59	289.4	0.772	-4.2	50.00		
C1	9/23/15 1:55	283.6	0.813	-2.3	52.55	**Pitot Coef. C**	**Pitot No.**
C2	9/23/15 1:57	286.0	0.810	-0.8	52.48	0.808	IN4C
C3	9/23/15 1:58	284.9	0.773	1.6	50.03		
C4	9/23/15 1:59	285.6	0.639	-11.4	40.57		
D1	9/23/15 1:55	276.2	0.845	3.6	54.28	**Pitot Coef. D**	**Pitot No.**
D2	9/23/15 1:57	286.9	0.850	3.7	54.99	0.808	IN4D
D3	9/23/15 1:58	287.8	0.802	3.4	51.93		
D4	9/23/15 1:59	267.1	0.596	1.5	38.11		
Average		**283.6**	**0.786**	**-3.0**	**50.54**		

KSCFH	**41590**
ADJKSCFH	**41352.9**
SCFH	**41353000**

SAMPLING AND ANALYTICAL PROCEDURES

Test Methods used at Ameren, Labadie Station – Unit 4

Methods 1, 2G, 2H and 4

GCI performed 11 Method 2G test runs and 1 Method 2H test run on the High (Normal), and Low loads to determine the KSCFH of flue gas exiting the stack for a Relative Accuracy Test Audit of the in stack flow monitor. A 16 point traverse was tested for each Method 2G test run. The Method 2H Wall Adjustment Factors of 0.9808 on the High (Normal), and 0.9943 on the Low loads were used to correct each test for wall effects.

One Method 4 moisture test was performed for each hour of Method 2G, 2H testing.

GCI used a Precision Flow© train consisting of four probes mounted to the test ports, digital inclinometers, electronic pressure transducers and thermocouples. All data is collected on a PC and 100 readings are taken at each point and averaged for the recorded value. The data logged averages are shown in Section 6 of the test report.

Method 3A

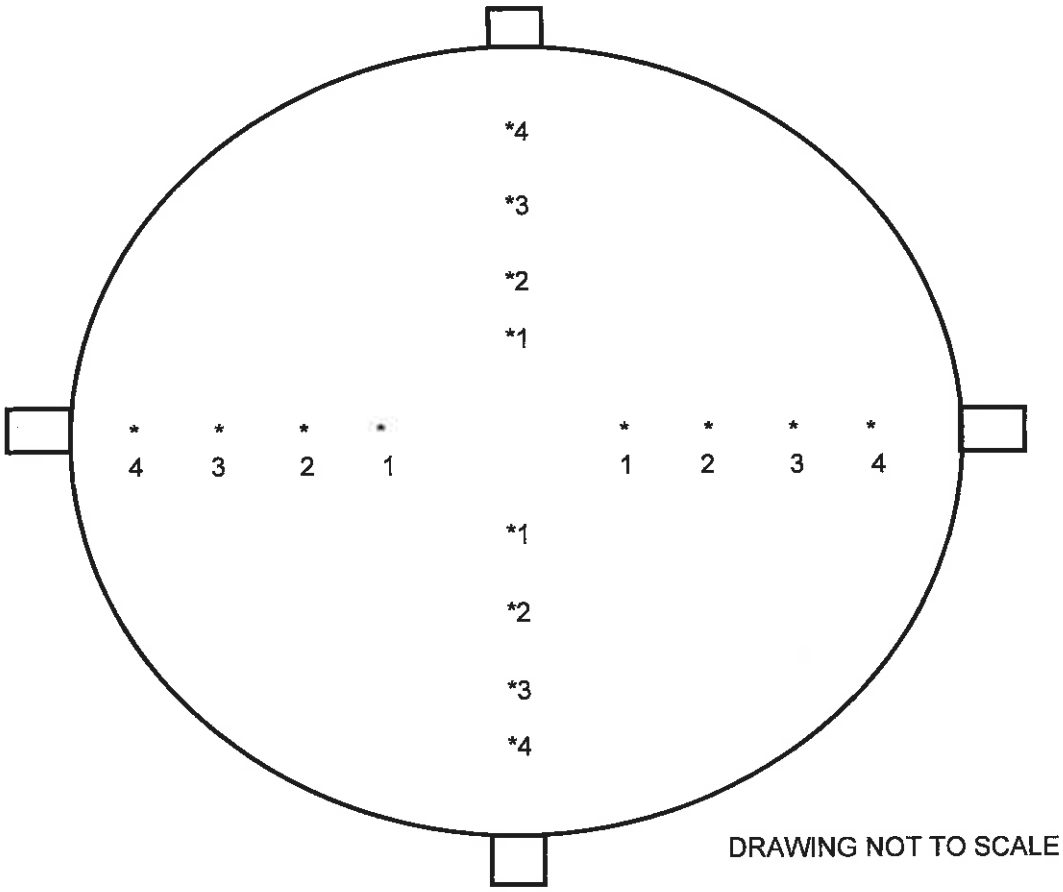
CO_2 concentrations were determined with 10 Method 3A test runs on the Normal load. The sampling was performed at 3-points. GCI used a monitor range of 0-22.15% for CO_2.

Method 6C

SO_2 emissions were determined with 10 Method 6C test runs on the Normal load. The sampling was performed at 3-points. GCI used a monitor span of 418.4 ppm for SO_2.

Method 7E

NO_x emissions were determined with 10 Method 7E test runs on the Normal load. The sampling was performed at 3-points. GCI used a monitor span of 201.3 ppm for NO_x.



POINTS	DISTANCE FROM INSIDE WALL
1)	79.462 "
2)	47.727 "
3)	25.831 "
4)	7.872 "

STACK AREA = 330.10 sq ft
STACK DIAMETER = 20.50 '

Ameren
Labadie Station
Unit 4

Grace Consulting, Inc.
Emissions Testing Services

APPENDIX

Sample Calculations

Ameren
Labadie
Unit 4
09-22-15
Run 1

NO_x CALCULATION
(CO_2 Based)

lb/dscf = $1.194 \times 10^{-7} \times PPM$

5.55E-06 = $1.194 \times 10^{-7} \times 46.50$

lb/mmBtu = lb/dscf x f-factor x $\frac{100}{\%CO2}$

0.082 = 5.55E-06 x 1840 x $\frac{100}{12.4}$

CO_2 and O_2 CALCULATION
(Calculated from CEMS CO_2)

$$CO_2 \text{ dry} = \text{Plant } CO_2 / ((100 - \% \text{ Moisture})/100)$$

$$O_2 \text{ dry} = (21) \times (1 - (CO_2/18.8))$$

Calculate the arithmetic mean of the differences, d, of a data set as follows:

$$\overline{d} = \frac{1}{n}\sum_{i=1}^{n} d_i$$

Where:

n = Number of data points

$\sum_{i=1}^{n} d_i$ = Algebraic sum of the individual differences d_i

d_i = The difference between a reference method value and the corresponding continuous emissions monitoring system value (RM_i-CEM_i) at a given point in time i.

When calculating the arithmetic mean of the difference of a flow monitor data set, be sure to correct the monitor measurements for moisture if applicable.

Calculate the standard deviation, S_d, of a data set as follows:

$$S_d = \sqrt{\frac{\sum_{i=l}^{n} d_i^{\,2} - \left[\frac{\left(\sum_{i=l}^{n} d_i\right)^2}{n}\right]}{n-1}}$$

Calculate the confidence coefficient (one-tailed), CC, of a data set as follows:

$$CC = t0.025 \frac{S_d}{\sqrt{n}}$$

Where:

$t_{0.025}$ = t value (see Table 7-1).

TABLE 7-1 T-VALUES

n-1	$t_{0.025}$	n-1	$t_{0.025}$	n-1	$t_{0.025}$
1	12.076	12	2.179	23	2.069
2	4.303	13	2.160	24	2.064
3	3.182	14	2.145	25	2.060
4	2.775	15	2.131	26	2.056
5	2.571	16	2.120	27	2.052
6	2.447	17	2.110	28	2.048
7	2.365	18	2.101	29	2.045
8	2.306	19	2.093	30	2.042
9	2.262	20	2.086	40	2.021
10	2.228	21	2.080	60	2.000
11	2.201	22	2.074	>60	1.960

The following equation is used to calculate the relative accuracy of a data set:

$$RA = \frac{|\bar{d}| + |cc|}{RM} \times 100$$

Where:

RM = Arithmetic mean of the reference method values.

$|\bar{d}|$ = The absolute value of the mean difference between the reference method values and the corresponding continuous emissions monitoring system values.

$|cc|$ = The absolute value of the confidence coefficient.

BIAS ADJUSTMENT CALCULATION

$$BAF = 1 + \frac{|\bar{d}|}{CEM}$$

SAMPLING SYSTEM BIAS CORRECTION

EMISSION CALCULATION
(CFR 40, Part 60, Appendix A)

Eq. 6C-1

$$C_{gas} = \left(\overline{C} - C_o\right)\frac{C_{ma}}{C_m - C_o}$$

Where:

C_{gas} = Effluent gas concentration, dry basis, ppm.
$\overline{C}$ = Average gas concentration indicated by gas analyzer, dry basis, ppm.
C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm.
C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm.
C_{ma} = Actual concentration of the upscale calibration gas, ppm.

VELOCITY NOMENCLATURE

A	=	cross-sectional area of stack, (ft^2)
acf	=	actual cubic feet
acfm	=	actual cubic feet per minute
B_{ws}	=	water vapor in the gas stream, proportion by volume
C_p	=	pitot tube coefficient, dimensionless
dscf	=	dry standard cubic feet
dscm	=	dry standard cubic meters
fps	=	feet per second
gm-mole	=	gram-mole
ΔH	=	orifice pressure drop in inches water, average
hr	=	hour
I	=	percent of isokinetic sampling
In. Hg	=	inches mercury
lbs	=	pounds
lb-mole	=	pound-mole
%M	=	percent moisture by volume
mmBtu	=	million Btu
M_s	=	molecular weight of stack gas, wet basis, (lb/lb-mole)
n	=	total number of traverse points
P_b	=	barometric pressure at the sampling site, (in Hg)
P_f	=	static pressure in flue in inches water, average
P_s	=	absolute stack gas pressure, (in. Hg)
P_{std}	=	standard absolute pressure, (29.92 in. Hg) (14.7 psia)
P_t	=	total pressure in inches of water
P_v	=	average velocity pressure in inches of water
Q_{sd}	=	dry volumetric stack gas flow rate corrected to standard conditions, (dscf/hr)
R	=	universal gas constant, (1545 ft lb/mole, °R)
$\sqrt{\Delta P}$	=	square root of velocity head in inches water, average
scf	=	standard cubic feet
scm	=	standard cubic meters
T_m	=	absolute average DGM temperature, (°R)
T_s	=	absolute average stack gas temperature, (°R)
T_{std}	=	standard absolute temperature, (528 °R)
V_l	=	volume of condensate through the impingers, ml
V_{lc}	=	total volume of liquid collected in impingers and silica gel, ml
V_m	=	volume of gas sample as measured by dry gas meter, (dcf)
$V_{m(std)}$	=	volume of gas sample measured by the dry gas meter, corrected to standard conditions, (dscf)
V_o	=	volume of flue gas at actual conditions in cubic feet per minute
$V_{w(std)}$	=	volume of water vapor in the gas sample, corrected to standard conditions, (scf)
V_{wc}	=	volume of water condensed in impingers corrected to standard conditions
V_{wsg}	=	volume of water collected in silica gel corrected to standard conditions
V_s	=	average stack gas velocity, (ft/sec)
W_{sg}	=	weight gain of impinger silica gel in grams
Y	=	dry gas meter calibration factor
*	=	total sampling time, min
V_p	=	mass of flue gas (lb/hr)

Test Data Sheets

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 1

	Time	CO2	NOx	SO2
1	14:10:00	12.05	48.92	187.36
2	14:11:00	11.99	48.26	186.26
3	14:12:00	12.15	49.98	188.63
4	14:13:00	12.12	48.59	188.01
5	14:14:00	12.08	47.76	184.52
6	14:15:00	12.10	46.29	185.52
7	14:16:00	12.18	48.19	182.31
8	14:17:00	12.21	47.27	183.80
9	14:18:00	12.25	47.16	184.51
10	14:19:00	12.25	46.01	184.07
11	14:20:00	12.28	47.22	184.19
12	14:21:00	12.31	45.98	183.82
13	14:22:00	12.37	48.43	184.74
14	14:23:00	12.40	47.82	184.46
15	14:24:00	12.41	46.93	184.91
16	14:25:00	12.51	47.83	183.08
17	14:26:00	12.55	46.03	183.31
18	14:27:00	12.57	47.42	183.67
19	14:28:00	12.52	46.02	182.33
20	14:29:00	12.41	46.97	184.01
21	14:30:00	12.42	47.03	182.91
	Average	**12.29**	**47.43**	**184.59**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 2

	Time	CO2	NOx	SO2
1	14:45:00	12.61	45.73	185.10
2	14:46:00	12.60	47.34	184.51
3	14:47:00	12.52	46.65	182.93
4	14:48:00	12.49	46.93	184.55
5	14:49:00	12.50	47.29	184.01
6	14:50:00	12.43	48.52	185.39
7	14:51:00	12.56	50.55	185.78
8	14:52:00	12.68	47.45	183.36
9	14:53:00	12.61	51.58	183.18
10	14:54:00	12.54	49.42	183.76
11	14:55:00	12.46	48.46	184.56
12	14:56:00	12.43	49.73	183.07
13	14:57:00	12.49	47.51	183.30
14	14:58:00	12.51	46.64	184.44
15	14:59:00	12.59	48.53	182.92
16	15:00:00	12.42	47.52	185.35
17	15:01:00	12.26	49.35	183.45
18	15:02:00	12.15	47.75	183.41
19	15:03:00	12.09	46.44	184.17
20	15:04:00	12.20	45.73	183.91
21	15:05:00	12.36	45.77	184.78
	Average	**12.45**	**47.85**	**184.09**

Client	Ameren	Project #	15-409
Location	Labadie	Date	9/22/2015
Unit	4	Operator	N.V.

Run 3

	Time	CO2	NOx	SO2
1	15:20:00	12.45	45.67	183.53
2	15:21:00	12.47	47.59	185.25
3	15:22:00	12.46	48.31	184.02
4	15:23:00	12.45	48.26	182.52
5	15:24:00	12.44	48.62	183.68
6	15:25:00	12.43	47.83	184.56
7	15:26:00	12.41	46.93	185.19
8	15:27:00	12.39	48.35	183.19
9	15:28:00	12.37	47.49	184.85
10	15:29:00	12.36	48.25	184.88
11	15:30:00	12.35	47.08	184.30
12	15:31:00	12.33	46.29	183.04
13	15:32:00	12.32	47.32	183.49
14	15:33:00	12.30	46.29	183.69
15	15:34:00	12.29	46.52	183.58
16	15:35:00	12.28	48.94	182.93
17	15:36:00	12.28	47.82	183.26
18	15:37:00	12.28	46.08	182.50
19	15:38:00	12.27	48.01	182.39
20	15:39:00	12.26	47.90	184.23
21	15:40:00	12.26	48.36	183.93
	Average	**12.35**	**47.52**	**183.76**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 4

	Time	CO2	NOx	SO2
1	15:55:00	12.34	50.64	183.76
2	15:56:00	12.39	51.30	184.65
3	15:57:00	12.44	50.42	183.95
4	15:58:00	12.48	49.39	184.28
5	15:59:00	12.51	47.82	183.15
6	16:00:00	12.57	48.67	184.15
7	16:01:00	12.61	50.40	183.67
8	16:02:00	12.16	50.33	183.14
9	16:03:00	12.22	51.24	183.05
10	16:04:00	12.32	51.09	183.27
11	16:05:00	12.40	50.04	184.39
12	16:06:00	12.46	48.85	183.32
13	16:07:00	12.51	51.43	182.66
14	16:08:00	12.56	49.41	182.98
15	16:09:00	12.61	50.33	183.71
16	16:10:00	12.66	52.69	184.54
17	16:11:00	12.70	51.27	183.61
18	16:12:00	12.75	51.38	183.16
19	16:13:00	12.80	50.53	183.21
20	16:14:00	12.83	49.81	185.66
21	16:15:00	12.86	49.06	183.39
	Average	**12.53**	**50.29**	**183.70**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 5

	Time	CO2	NOx	SO2
1	16:30:00	12.31	52.70	184.51
2	16:31:00	12.32	53.66	185.10
3	16:32:00	12.34	52.46	183.66
4	16:33:00	12.36	51.69	183.89
5	16:34:00	12.39	50.59	183.85
6	16:35:00	12.42	50.21	184.20
7	16:36:00	12.44	48.85	184.01
8	16:37:00	12.45	49.31	184.27
9	16:38:00	12.47	47.67	185.88
10	16:39:00	12.50	49.68	184.21
11	16:40:00	12.52	47.32	183.91
12	16:41:00	12.55	48.21	184.12
13	16:42:00	12.60	47.59	185.52
14	16:43:00	12.63	46.49	184.56
15	16:44:00	12.63	47.32	183.65
16	16:45:00	12.64	48.15	184.92
17	16:46:00	12.64	48.36	184.74
18	16:47:00	12.64	50.26	184.26
19	16:48:00	12.65	51.21	183.92
20	16:49:00	12.64	52.26	185.61
21	16:50:00	12.70	49.29	184.65
	Average	**12.52**	**49.68**	**184.45**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 6

	Time	CO2	NOx	SO2
1	17:05:00	12.47	49.01	183.93
2	17:06:00	12.51	46.99	183.03
3	17:07:00	12.52	47.28	183.73
4	17:08:00	12.51	48.76	182.23
5	17:09:00	12.51	50.18	182.55
6	17:10:00	12.50	49.64	184.47
7	17:11:00	12.51	47.80	182.41
8	17:12:00	12.51	49.68	184.43
9	17:13:00	12.52	49.31	183.83
10	17:14:00	12.51	49.34	184.07
11	17:15:00	12.50	50.39	184.81
12	17:16:00	12.50	48.74	182.99
13	17:17:00	12.47	47.85	183.83
14	17:18:00	12.48	46.58	184.58
15	17:19:00	12.48	48.07	183.34
16	17:20:00	12.48	47.61	183.48
17	17:21:00	12.49	49.35	184.46
18	17:22:00	12.50	47.86	183.28
19	17:23:00	12.49	46.69	183.43
20	17:24:00	12.49	47.71	183.81
21	17:25:00	12.48	48.42	183.90
	Average	**12.50**	**48.44**	**183.65**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 7

	Time	CO2	NOx	SO2
1	17:40:00	12.59	46.45	184.32
2	17:41:00	12.59	49.58	185.08
3	17:42:00	12.60	48.87	185.44
4	17:43:00	12.61	48.14	185.35
5	17:44:00	12.62	49.38	184.30
6	17:45:00	12.63	47.46	184.17
7	17:46:00	12.62	48.81	184.38
8	17:47:00	12.63	47.99	184.05
9	17:48:00	12.66	48.57	188.20
10	17:49:00	12.67	49.15	198.82
11	17:50:00	12.67	47.38	202.04
12	17:51:00	12.67	47.15	195.64
13	17:52:00	12.69	46.79	192.69
14	17:53:00	12.70	48.23	188.27
15	17:54:00	12.71	49.28	185.42
16	17:55:00	12.71	48.76	184.64
17	17:56:00	12.73	47.91	183.45
18	17:57:00	12.73	46.51	184.78
19	17:58:00	12.75	49.09	186.32
20	17:59:00	12.77	48.20	184.98
21	18:00:00	12.78	49.81	184.94
	Average	**12.67**	**48.26**	**187.49**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 8

	Time	CO2	NOx	SO2
1	18:15:00	12.59	48.29	183.26
2	18:16:00	12.59	50.79	182.47
3	18:17:00	12.59	49.22	183.31
4	18:18:00	12.60	50.57	182.97
5	18:19:00	12.60	51.87	183.78
6	18:20:00	12.61	49.10	183.49
7	18:21:00	12.61	48.19	183.22
8	18:22:00	12.61	48.85	183.58
9	18:23:00	12.61	49.31	182.85
10	18:24:00	12.62	48.70	183.64
11	18:25:00	12.63	49.25	184.87
12	18:26:00	12.63	47.47	183.64
13	18:27:00	12.63	48.02	182.94
14	18:28:00	12.64	47.34	183.78
15	18:29:00	12.64	48.57	183.85
16	18:30:00	12.66	49.04	182.17
17	18:31:00	12.68	48.19	182.09
18	18:32:00	12.68	49.69	181.60
19	18:33:00	12.69	50.47	183.00
20	18:34:00	12.70	49.51	184.00
21	18:35:00	12.72	48.16	184.44
	Average	**12.63**	**49.08**	**183.28**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 9

	Time	CO2	NOx	SO2
1	18:50:00	12.51	47.55	185.15
2	18:51:00	12.51	47.83	182.95
3	18:52:00	12.52	49.71	183.09
4	18:53:00	12.54	48.60	181.82
5	18:54:00	12.54	49.16	183.88
6	18:55:00	12.54	48.24	183.90
7	18:56:00	12.54	50.46	182.83
8	18:57:00	12.56	49.26	183.55
9	18:58:00	12.55	48.80	183.70
10	18:59:00	12.56	50.81	183.79
11	19:00:00	12.56	49.29	183.03
12	19:01:00	12.56	48.98	184.07
13	19:02:00	12.56	48.12	182.38
14	19:03:00	12.57	49.56	181.70
15	19:04:00	12.57	47.61	182.83
16	19:05:00	12.56	48.68	184.05
17	19:06:00	12.56	48.94	183.26
18	19:07:00	12.56	50.49	182.73
19	19:08:00	12.57	49.78	183.42
20	19:09:00	12.56	48.06	183.70
21	19:10:00	12.56	47.69	183.88
	Average	**12.55**	**48.93**	**183.32**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/22/2015
	Unit	4	Operator	N.V.

Run 10

	Time	CO2	NOx	SO2
1	19:25:00	12.77	48.85	182.19
2	19:26:00	12.75	50.05	182.68
3	19:27:00	12.72	51.12	183.04
4	19:28:00	12.67	49.47	182.71
5	19:29:00	12.65	48.30	183.16
6	19:30:00	12.62	49.86	182.89
7	19:31:00	12.58	48.31	184.22
8	19:32:00	12.56	49.93	184.31
9	19:33:00	12.53	47.86	183.67
10	19:34:00	12.50	46.95	183.65
11	19:35:00	12.48	45.79	183.32
12	19:36:00	12.47	46.59	183.13
13	19:37:00	12.43	47.93	184.67
14	19:38:00	12.42	49.60	184.01
15	19:39:00	12.40	47.87	181.58
16	19:40:00	12.39	49.36	183.87
17	19:41:00	12.38	48.55	183.79
18	19:42:00	12.38	47.39	182.21
19	19:43:00	12.36	46.95	183.27
20	19:44:00	12.35	47.38	181.55
21	19:45:00	12.36	47.81	183.58
	Average	**12.51**	**48.38**	**183.21**

Client	Ameren	Project #	15-409	
Location	Labadie	Date	9/22/2015	
Unit	4	Operator	N.V.	

Time	CO2	% Dev	NOx	% Dev	SO2	% Dev
13:15	12.59		49.18		183.45	
13:16	12.60		50.48		182.27	
13:17	12.60		50.19		185.38	
13:18	12.60		48.12		183.20	
13:19	12.61		46.24		184.89	
13:20	12.63		47.14		184.93	
13:21	12.63		48.50		183.91	
Average	**12.61**	**-0.21%**	**48.55**	**-1.46%**	**184.00**	**0.23%**
13:22	12.63		47.63		183.86	
13:23	12.64		49.63		182.61	
13:24	12.65		48.46		183.15	
13:25	12.66		48.72		183.46	
13:26	12.66		49.25		184.20	
13:27	12.67		51.42		183.83	
13:28	12.67		49.45		184.05	
13:29	12.72		49.31		183.59	
13:30	12.71		47.59		182.76	
Average	**12.68**	**0.33%**	**49.17**	**-0.20%**	**183.58**	**-0.01%**
13:31	12.69		49.15		184.15	
13:32	12.70		49.55		183.89	
13:33	12.69		50.98		183.06	
13:34	12.66		49.77		183.02	
13:35	12.64		51.27		183.02	
13:36	12.62		52.34		182.85	
13:37	12.60		50.09		183.92	
13:38	12.57		48.55		183.39	
13:39	12.57		47.61		183.02	
Average	**12.62**	**-0.11%**	**50.09**	**1.66%**	**183.18**	**-0.22%**
Average	**12.64**		**49.27**		**183.59**	

***Shaded values not included in averages.**

RM 4 Moisture Field Data Sheet

Client:	Ameren			Date:	09/22/15				
Plant Name:	Labadie			Operator:	BN				
Project Number:	15-409			Load:	High				
Sampling Location:	Unit 4			Meter Number:	IN2				
Barometric Pressure:	29.23			Meter Correction:	0.975	Meter Orifice:	3.250	Delta H@:	2.062
Run Number:	1-3	Sample Point	Delta H		Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	417.064
Start Time:	17:54	5	2.062	250	62	96	4	420.773	
Stop Time:	18:19	10	2.062	250	63	97	4	424.473	
Initial Weight:	3506	15	2.062	250	59	98	4	428.920	
Final Weight:	3560	20	2.062	250	58	99	4	432.370	
Initial Leak Check:	0.001@15	25	2.062	250	59	100	4	435.550	Static Pressure
Final Leak Check:	.001@05	30	2.062	250	60	101	4	439.270	-1.50
Average:						99			22.206
Run Number:	4-12	Sample Point	Delta H		Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	439.384
Start Time:	18:34	5	2.062	250	63	102	4	443.090	
Stop Time:	19:16	10	2.062	250	60	103	4	446.650	
Initial Weight:	3560	15	2.062	250	58	104	4	450.483	
Final Weight:	3612	20	2.062	250	58	105	4	454.200	
Initial Leak Check:	0.001@15	25	2.062	250	59	106	4	458.050	Static Pressure
Final Leak Check:	.001@05	30	2.062	250	60	107	4	461.630	-1.50
Average:						105			22.246

Ameren, Labadie, Unit 4, High Load **9/22/2015**

2H	A temp	A sq rt dp	A angle	B temp	B sq rt dp	B angle	C temp	C sq rt dp	C angle	D temp	D sq rt dp	D angle
9/22/15 17:54	339.5	1.616	-4.4	342.1	1.608	0.3	341.3	1.612	0.9	342.6	1.601	3.7
9/22/15 17:55	338.0	1.609	-3.1	344.0	1.575	1.7	344.0	1.617	0.4	344.1	1.612	4.0
9/22/15 17:56	340.9	1.573	-3.4	342.0	1.549	0.0	338.3	1.536	-1.6	341.6	1.550	0.8
9/22/15 17:59	341.4	1.451	-2.9	344.2	1.515	3.8	344.7	1.471	-1.6	343.5	1.434	0.4
9/22/15 18:00	340.1	1.451	-3.1	342.6	1.510	4.1	339.5	1.452	-1.6	341.3	1.455	-0.9
9/22/15 18:01	340.8	1.441	-3.2	343.2	1.474	3.5	340.1	1.445	4.0	342.2	1.438	0.9
9/22/15 18:02	340.7	1.411	-2.8	343.5	1.487	2.8	341.8	1.458	8.4	340.9	1.395	-0.5
9/22/15 18:04	337.8	1.407	-2.7	340.4	1.447	2.4	340.2	1.415	8.0	340.6	1.378	1.9
9/22/15 18:05	341.8	1.368	-2.7	339.8	1.450	-0.3	342.9	1.392	7.5	340.2	1.297	0.9
9/22/15 18:06	338.9	1.346	-3.1	339.0	1.432	-0.5	341.0	1.307	3.7	340.7	1.224	2.1
9/22/15 18:07	340.7	1.301	-3.2	340.8	1.433	-0.4	339.5	1.227	-1.4	340.5	1.076	-1.1
9/22/15 18:08	330.4	1.258	-3.2	342.5	1.422	3.9	335.1	1.090	0.1	338.3	1.140	0.1
9/22/15 18:10	328.0	1.142	-2.9	337.7	1.391	3.2	332.0	1.103	5.5	326.7	1.053	0.8
9/22/15 18:11	326.8	1.116	-3.4	336.3	1.218	3.9	329.9	1.015	-4.4	324.7	1.067	0.4
9/22/15 18:12	324.7	1.028	-2.9	329.0	1.122	4.1	325.4	0.965	3.0	319.7	0.771	3.2
9/22/15 18:13	319.6	0.826	-2.7	324.2	0.994	4.3	321.5	0.854	-0.1	317.3	0.792	2.3

Ameren, Labadie, Unit 4, High Load **9/22/2015**

		A temp	A sq rt dp	A angle	B temp	B sq rt dp	B angle	C temp	C sq rt dp	C angle	D temp	D sq rt dp	D angle
2	9/22/15 18:22	315.3	1.595	-3.0	330.2	1.593	2.7	337.3	1.593	-1.5	329.4	1.595	5.0
	9/22/15 18:23	331.0	1.583	-2.6	336.6	1.587	3.4	340.1	1.623	4.8	340.0	1.630	5.7
	9/22/15 18:24	336.1	1.548	-2.4	338.9	1.573	3.7	341.7	1.559	5.5	337.9	1.566	5.9
	9/22/15 18:26	340.1	1.385	-2.7	339.3	1.506	4.0	339.3	1.350	-7.1	338.2	1.331	1.8
3	9/22/15 18:27	338.8	1.624	-1.7	337.6	1.627	2.9	341.2	1.613	1.6	340.7	1.601	5.7
	9/22/15 18:29	336.6	1.587	-2.0	341.7	1.583	3.1	340.0	1.641	7.3	338.2	1.622	3.2
	9/22/15 18:30	341.9	1.537	-1.5	340.7	1.504	4.0	339.7	1.550	-2.0	338.0	1.572	3.4
	9/22/15 18:31	337.0	1.313	-3.1	338.7	1.458	3.2	341.4	1.357	-1.7	335.2	1.291	4.0
4	9/22/15 18:32	338.0	1.599	-2.1	341.6	1.603	2.3	339.9	1.584	-3.5	336.5	1.586	6.2
	9/22/15 18:33	338.2	1.607	-2.2	340.8	1.603	2.9	338.9	1.599	-3.9	337.6	1.606	5.8
	9/22/15 18:34	335.7	1.515	-3.1	340.2	1.515	3.3	339.4	1.537	-3.7	340.1	1.562	6.8
	9/22/15 18:36	333.2	1.395	-2.7	337.8	1.367	2.5	336.2	1.340	-10.0	339.4	1.345	5.9
5	9/22/15 18:37	339.8	1.612	-2.0	339.4	1.594	0.7	342.4	1.595	-2.5	336.9	1.606	4.1
	9/22/15 18:38	340.1	1.569	-3.7	341.5	1.582	4.1	340.7	1.590	-2.2	339.4	1.617	5.4
	9/22/15 18:39	339.1	1.557	-3.4	338.4	1.506	3.5	337.3	1.535	0.9	338.2	1.558	4.2
	9/22/15 18:41	337.4	1.467	-3.6	337.0	1.486	2.5	337.6	1.370	0.6	335.0	1.298	8.0
6	9/22/15 18:42	337.5	1.605	-2.8	339.5	1.597	0.5	336.2	1.606	-0.2	337.2	1.593	3.7
	9/22/15 18:43	339.1	1.569	-2.7	338.5	1.573	0.8	340.1	1.598	-4.7	340.4	1.630	5.3
	9/22/15 18:04	338.7	1.506	-3.3	339.9	1.526	3.3	337.3	1.518	-4.1	339.9	1.584	8.9
	9/22/15 18:46	335.3	1.289	-2.9	341.4	1.478	3.8	338.9	1.324	-5.4	338.7	1.312	3.2
7	9/22/15 18:47	337.4	1.615	-2.8	337.1	1.607	2.4	339.8	1.607	-0.6	336.2	1.599	2.8
	9/22/15 18:49	337.9	1.597	-2.3	337.6	1.574	3.3	337.5	1.610	-1.1	341.1	1.592	5.3
	9/22/15 18:50	337.7	1.525	-1.5	338.0	1.516	3.6	338.8	1.532	-0.6	342.0	1.518	4.2
	9/22/15 18:51	336.5	1.354	-3.3	339.4	1.486	2.2	336.8	1.351	-0.8	338.6	1.268	1.7
8	9/22/15 18:52	336.1	1.607	-3.3	336.3	1.608	3.1	347.5	1.590	-0.9	338.4	1.592	2.9
	9/22/15 18:53	341.1	1.599	-3.0	338.6	1.549	2.7	341.3	1.608	0.4	339.4	1.638	1.5
	9/22/15 18:55	340.4	1.545	-3.1	334.4	1.521	2.3	336.8	1.552	0.6	339.3	1.581	3.9
	9/22/15 18:56	338.0	1.378	-3.7	338.1	1.450	2.7	336.1	1.334	0.6	336.1	1.335	5.0
9	9/22/15 18:57	334.8	1.616	-3.6	337.4	1.631	2.5	339.6	1.608	0.4	337.0	1.596	4.7
	9/22/15 18:58	336.6	1.601	-3.4	341.8	1.557	0.7	338.4	1.603	0.5	339.0	1.618	5.4
	9/22/15 19:00	340.5	1.518	-3.1	337.0	1.513	3.0	339.4	1.551	1.0	338.4	1.581	7.4
	9/22/15 19:01	337.4	1.420	-2.9	337.8	1.455	2.2	339.8	1.304	-3.6	335.2	1.329	4.1

Ameren, Labadie, Unit 4, High Load **9/22/2015**

		A temp	A sq rt dp	A angle	B temp	B sq rt dp	B angle	C temp	C sq rt dp	C angle	D temp	D sq rt dp	D angle
10	9/22/15 19:02	339.8	1.600	-2.3	341.0	1.596	2.5	338.6	1.601	0.4	336.5	1.609	5.4
	9/22/15 19:03	340.5	1.594	-3.5	339.5	1.549	-3.5	337.2	1.594	0.7	337.9	1.609	4.8
	9/22/15 19:05	340.1	1.522	-3.1	338.1	1.506	3.2	337.3	1.565	1.3	337.3	1.597	4.2
	9/22/15 19:06	338.8	1.369	-3.4	334.6	1.357	2.3	338.1	1.360	3.7	339.8	1.345	4.6
11	9/22/15 19:07	337.5	1.613	-2.6	339.1	1.620	0.6	343.8	1.615	1.0	335.7	1.599	5.8
	9/22/15 19:09	339.1	1.622	-2.9	339.7	1.577	2.9	340.3	1.590	-1.2	338.5	1.633	8.3
	9/22/15 19:10	340.2	1.522	-3.2	340.3	1.538	0.9	337.7	1.538	-0.1	339.0	1.556	5.3
	9/22/15 19:11	336.3	1.412	-9.1	339.5	1.436	0.3	337.2	1.353	4.0	337.0	1.375	4.7
12	9/22/15 19:12	340.7	1.618	-2.1	339.1	1.597	1.6	339.9	1.612	3.6	341.4	1.614	6.2
	9/22/15 19:14	338.9	1.554	-3.5	339.3	1.577	1.5	338.5	1.584	-4.4	338.8	1.624	5.8
	9/22/15 19:15	336.0	1.538	-3.4	341.2	1.497	0.8	339.5	1.562	1.2	339.0	1.574	5.9
	9/22/15 19:16	339.6	1.364	-1.3	339.1	1.430	0.4	338.9	1.359	3.1	334.1	1.366	2.6

RM 4 Moisture Field Data Sheet

Client:	Ameren			Date:	09/23/15				
Plant Name:	Labadie			Operator:	BN				
Project Number:	15-409			Load:	High				
Sampling Location:	Unit 4			Meter Number:	IN2				
Barometric Pressure:	29.23			Meter Correction:	0.975	Meter Orifice:	3.25018	Delta H@:	2.062
Run Number:	1-4	Sample Point	Delta H	Probe Temp	Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	462.700
Start Time:	0:40	5	2.062	250	62	88	4	466.800	
Stop Time:	1:10	10	2.062	250	61	88	4	470.600	
Initial Weight:	3498	15	2.062	250	58	89	4	474.150	
Final Weight:	3550	20	2.062	250	59	90	4	477.580	
Initial Leak Check:	0.000@15	25	2.062	250	60	91	4	481.310	Static Pressure
Final Leak Check:	0.000@10	30	2.062	250	60	92	4	485.150	-0.70
Average:						90			22.450
Run Number:	5-12	Sample Point	Delta H	Probe Temp	Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	485.278
Start Time:	1:20	5	2.062	250	60	93	4	488.710	
Stop Time:	1:50	10	2.062	250	58	94	4	492.580	
Initial Weight:	3550	15	2.062	250	57	95	4	496.630	
Final Weight:	3603	20	2.062	250	59	96	4	500.620	
Initial Leak Check:	0.000@15	25	2.062	250	60	98	4	504.100	Static Pressure
Final Leak Check:	0.000@9	30	2.062	250	60	98	4	507.155	-0.70
Average:						96			21.877

Ameren, Labadie, Unit 4, Low Load **9/23/2015**

2H	A temp	A sq rt dp	A angle	B temp	B sq rt dp	B angle	C temp	C sq rt dp	C angle	D temp	D sq rt dp	D angle
9/23/15 0:42	298.9	0.849	-3.8	309.4	0.840	-6.6	308.3	0.859	0.4	304.2	0.841	2.4
9/23/15 0:43	295.2	0.843	-3.8	307.2	0.838	-6.5	307.6	0.809	0.6	307.2	0.813	3.3
9/23/15 0:45	296.9	0.826	-4.0	308.8	0.801	-6.1	308.6	0.780	1.3	306.0	0.842	3.8
9/23/15 0:46	296.0	0.765	-4.5	305.7	0.767	-6.1	304.2	0.754	1.4	308.4	0.725	4.1
9/23/15 0:47	294.6	0.758	-3.6	306.2	0.798	-4.8	308.8	0.717	1.5	304.0	0.699	2.6
9/23/15 0:48	294.6	0.771	-4.0	306.7	0.779	-4.7	309.1	0.727	-3.0	303.1	0.678	3.2
9/23/15 0:49	293.4	0.764	-1.5	307.1	0.770	-4.6	307.3	0.703	-1.8	302.3	0.591	3.2
9/23/15 0:51	292.2	0.739	-1.9	305.8	0.771	-4.4	302.9	0.688	-1.8	301.9	0.562	3.2
9/23/15 0:53	293.1	0.701	-4.1	308.3	0.750	-4.9	303.4	0.643	-1.8	300.4	0.510	3.4
9/23/15 0:55	295.2	0.701	-3.8	307.1	0.747	-4.7	301.5	0.619	-2.8	299.7	0.507	2.3
9/23/15 0:56	294.3	0.693	-2.8	305.2	0.749	-4.9	302.9	0.595	-2.9	303.4	0.511	2.0
9/23/15 0:57	291.3	0.663	-3.9	299.8	0.707	-4.8	301.8	0.555	-2.5	300.3	0.497	2.4
9/23/15 0:58	290.1	0.603	-3.7	297.7	0.644	-5.1	298.1	0.547	1.7	299.3	0.507	1.9
9/23/15 1:00	289.8	0.567	-1.5	298.0	0.573	-5.3	297.0	0.527	3.4	297.4	0.499	1.8
9/23/15 1:01	287.2	0.530	-4.0	294.3	0.537	-4.7	297.0	0.492	2.7	295.4	0.524	1.6
9/23/15 1:03	284.2	0.498	-3.9	293.6	0.463	-4.9	295.2	0.449	3.2	291.0	0.461	1.3

Ameren, Labadie, Unit 4, Low Load **9/23/2015**

		A temp	A sq rt dp	A angle	B temp	B sq rt dp	B angle	C temp	C sq rt dp	C angle	D temp	D sq rt dp	D angle
2	9/23/15 1:05	289.3	0.850	-7.6	285.0	0.845	-4.3	290.0	0.845	1.9	293.1	0.860	1.8
	9/23/15 1:06	288.3	0.845	-5.7	295.9	0.853	-4.5	297.2	0.817	0.8	294.2	0.843	3.9
	9/23/15 1:07	289.8	0.829	-5.6	298.1	0.809	-4.3	299.0	0.786	2.1	296.5	0.816	3.9
	9/23/15 1:09	291.5	0.713	-6.1	300.1	0.796	-4.8	291.3	0.651	-8.1	277.2	0.569	3.2
3	9/23/15 1:10	290.3	0.833	-7.8	300.6	0.835	-4.2	295.1	0.813	2.4	285.2	0.832	2.3
	9/23/15 1:11	289.2	0.831	-5.8	297.8	0.831	-4.2	298.8	0.812	2.2	295.4	0.848	4.4
	9/23/15 1:12	289.9	0.831	-5.9	299.6	0.815	-3.8	296.6	0.776	1.9	296.2	0.852	4.3
	9/23/15 1:14	290.9	0.742	-5.7	294.9	0.764	-3.2	295.9	0.666	-6.5	280.1	0.598	3.2
4	9/23/15 1:15	290.6	0.846	-6.2	296.9	0.856	-3.7	296.9	0.841	6.2	286.6	0.831	2.1
	9/23/15 1:16	290.1	0.841	-8.5	297.0	0.844	-2.9	294.6	0.811	4.9	293.9	0.857	3.5
	9/23/15 1:17	290.8	0.831	-6.0	298.0	0.804	-3.7	297.8	0.784	-1.4	294.1	0.833	4.1
	9/23/15 1:19	289.0	0.706	-5.4	295.8	0.789	-3.5	294.9	0.653	11.1	280.7	0.611	2.8
5	9/23/15 1:20	291.3	0.842	-5.8	295.3	0.827	-3.4	293.3	0.832	-4.5	285.4	0.853	2.3
	9/23/15 1:21	290.0	0.851	-11.8	296.8	0.819	-4.2	296.4	0.809	-4.5	294.4	0.873	4.4
	9/23/15 1:22	292.1	0.816	-5.9	296.9	0.817	-3.5	292.8	0.790	-4.4	294.0	0.823	4.7
	9/23/15 1:24	292.3	0.742	-5.7	294.5	0.793	-3.4	291.3	0.658	-4.3	265.7	0.600	2.6
6	9/23/15 1:25	289.7	0.840	-5.7	293.0	0.844	-4.0	293.1	0.837	-4.7	285.2	0.852	2.4
	9/23/15 1:26	290.6	0.843	-9.2	294.7	0.837	-3.7	291.8	0.805	-5.5	291.2	0.849	2.9
	9/23/15 1:27	290.9	0.823	-5.2	295.0	0.801	-3.8	293.9	0.762	-7.3	291.8	0.814	3.9
	9/23/15 1:29	292.6	0.698	-5.6	290.5	0.785	-3.4	290.5	0.645	-4.7	276.7	0.584	2.3
7	9/23/15 1:30	290.6	0.835	-9.5	291.0	0.846	-3.5	291.7	0.821	1.9	285.6	0.831	3.1
	9/23/15 1:31	290.1	0.829	-9.0	292.6	0.827	-3.5	293.4	0.802	1.5	292.1	0.845	3.3
	9/23/15 1:32	288.0	0.812	-5.1	292.8	0.823	-2.9	290.8	0.771	1.2	289.3	0.796	3.0
	9/23/15 1:34	289.3	0.744	-5.1	290.9	0.781	-4.2	289.1	0.675	1.7	269.2	0.593	2.5
8	9/23/15 1:35	291.4	0.813	-5.6	291.7	0.846	-4.4	289.6	0.831	0.9	281.8	0.836	2.6
	9/23/15 1:36	290.1	0.840	-4.2	292.5	0.851	-3.1	287.6	0.829	9.2	292.2	0.850	3.9
	9/23/15 1:38	290.4	0.817	-5.0	291.7	0.819	-2.9	288.5	0.800	8.7	288.0	0.826	3.0
	9/23/15 1:39	292.7	0.749	-5.5	290.8	0.785	-3.3	286.3	0.671	2.7	268.0	0.566	-0.3
9	9/23/15 1:40	291.0	0.865	-15.3	289.5	0.836	-3.9	288.4	0.829	2.8	282.2	0.841	1.7
	9/23/15 1:42	292.7	0.843	-4.7	289.7	0.832	-2.8	289.5	0.824	-0.7	287.2	0.860	4.6
	9/23/15 1:43	289.7	0.840	-5.1	289.7	0.826	-3.4	290.5	0.774	-1.2	290.7	0.835	3.6
	9/23/15 1:44	291.1	0.685	-4.7	289.1	0.791	-3.7	288.9	0.657	2.4	270.4	0.592	8.6

Ameren, Labadie, Unit 4, Low Load **9/23/2015**

		A temp	A sq rt dp	A angle	B temp	B sq rt dp	B angle	C temp	C sq rt dp	C angle	D temp	D sq rt dp	D angle
10	9/23/15 1:45	289.8	0.856	-4.5	293.8	0.836	-3.6	283.7	0.836	-1.2	271.4	0.861	5.2
	9/23/15 1:47	290.5	0.838	-4.3	287.6	0.855	-3.3	288.2	0.813	-1.1	288.6	0.872	4.7
	9/23/15 1:48	290.1	0.835	-5.0	291.0	0.819	-3.4	290.6	0.773	-1.1	289.0	0.834	3.5
	9/23/15 1:49	289.6	0.749	-15.0	289.6	0.813	-3.1	288.7	0.657	-1.7	273.2	0.608	4.0
11	9/23/15 1:50	280.3	0.842	-4.8	288.6	0.840	-3.5	289.5	0.832	-1.9	282.3	0.862	6.7
	9/23/15 1:52	281.3	0.823	-4.8	289.5	0.832	-3.2	288.3	0.804	-2.5	287.0	0.843	4.2
	9/23/15 1:53	282.3	0.815	-4.8	290.2	0.808	-4.1	292.0	0.748	-2.8	287.0	0.829	2.4
	9/23/15 1:54	280.9	0.671	-7.7	293.3	0.762	-3.2	284.7	0.649	-1.7	265.8	0.570	2.6
12	9/23/15 1:55	282.2	0.830	-18.7	288.7	0.822	-3.2	283.6	0.813	-2.3	276.2	0.845	3.6
	9/23/15 1:57	281.4	0.847	-4.7	289.9	0.834	-3.4	286.0	0.810	-0.8	286.9	0.850	3.7
	9/23/15 1:58	280.6	0.820	-4.8	287.9	0.829	-3.3	284.9	0.773	1.6	287.8	0.802	3.4
	9/23/15 1:59	279.2	0.690	-5.3	289.4	0.772	-4.2	285.6	0.639	-11.4	267.1	0.596	1.5

GCI Calibration Data

NOx Cal Sheet 1

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Calibration Data For Sampling Runs: 1-10 Gas Type: NOx Span: 201.30	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas	EB0054563	**0.00**	1.10	1.10	0.55	
NO2 to NO Converter Check	CC500307	**50.29**	49.30	0.99	98.03%	**PASS**
Mid-Range Gas	CC75313	**100.20**	100.90	0.70	0.35	
High-Range Gas	LCCO-SA16978	**201.30**	201.80	0.50	0.25	

Run #: 1 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	1.10	0.00	0.90	-0.10	-0.10
Upscale Gas	100.90	100.90	0.00	101.20	0.15	0.15

Run #: 2 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	0.90	-0.10	1.20	0.05	0.15
Upscale Gas	100.90	101.20	0.15	101.60	0.35	0.20

Run #: 3 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	1.20	0.05	0.90	-0.10	-0.15
Upscale Gas	100.90	101.60	0.35	100.90	0.00	-0.35

Run #: 4 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	0.90	-0.10	0.80	-0.15	-0.05
Upscale Gas	100.90	100.90	0.00	100.80	-0.05	-0.05

NOx Cal Sheet 2

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Run #: 5 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	0.80	-0.15	1.10	0.00	0.15
Upscale Gas	100.90	100.80	-0.05	101.30	0.20	0.25

Run #: 6 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	1.10	0.00	1.00	-0.05	-0.05
Upscale Gas	100.90	101.30	0.20	101.10	0.10	-0.10

Run #: 7 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	1.00	-0.05	0.90	-0.10	-0.05
Upscale Gas	100.90	101.10	0.10	100.80	-0.05	-0.15

Run #: 8 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	0.90	-0.10	0.80	-0.15	-0.05
Upscale Gas	100.90	100.80	-0.05	100.90	0.00	0.05

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100$$

NOx Cal Sheet 3

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Run #: 9 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	0.80	-0.15	0.90	-0.10	0.05
Upscale Gas	100.90	100.90	0.00	100.70	-0.10	-0.10

Run #: 10 Gas Type: NOx Span: 201.30	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.10	0.90	-0.10	0.90	-0.10	0.00
Upscale Gas	100.90	100.70	-0.10	101.20	0.15	0.25

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100$$

SO2 Cal Sheet 1

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Calibration Data For Sampling Runs: 1-10 Gas Type: SO2 Span: 418.40	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas	EB0054563	**0.00**	1.50	1.50	0.36	
Low-Range Gas						
Mid-Range Gas	CC75313	**242.20**	243.10	0.90	0.22	
High-Range Gas	LCCO-SA16978	**418.40**	420.20	1.80	0.43	

Run #: 1 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.50	0.00	1.30	-0.05	-0.05
Upscale Gas	243.10	243.10	0.00	242.80	-0.07	-0.07

Run #: 2 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.30	-0.05	1.60	0.02	0.07
Upscale Gas	243.10	242.80	-0.07	243.60	0.12	0.19

Run #: 3 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.60	0.02	1.50	0.00	-0.02
Upscale Gas	243.10	243.60	0.12	243.20	0.02	-0.10

Run #: 4 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.50	0.00	1.30	-0.05	-0.05
Upscale Gas	243.10	243.20	0.02	243.40	0.07	0.05

SO2 Cal Sheet 2

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Run #: 5 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.30	-0.05	1.50	0.00	0.05
Upscale Gas	243.10	243.40	0.07	243.60	0.12	0.05

Run #: 6 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.50	0.00	1.40	-0.02	-0.02
Upscale Gas	243.10	243.60	0.12	243.10	0.00	-0.12

Run #: 7 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.40	-0.02	1.30	-0.05	-0.02
Upscale Gas	243.10	243.10	0.00	242.80	-0.07	-0.07

Run #: 8 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.30	-0.05	1.20	-0.07	-0.02
Upscale Gas	243.10	242.80	-0.07	242.70	-0.10	-0.02

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100$$

SO2 Cal Sheet 3

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Run #: 9 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.20	-0.07	1.10	-0.10	-0.02
Upscale Gas	243.10	242.70	-0.10	242.60	-0.12	-0.02

Run #: 10 Gas Type: SO2 Span: 418.40	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	1.50	1.10	-0.10	1.20	-0.07	0.02
Upscale Gas	243.10	242.60	-0.12	243.10	0.00	0.12

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100$$

Co2 Cal Sheet 1

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Calibration Data For Sampling Runs: 1-10 Gas Type: CO2 Span: 22.15	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas	EB0005825	**0.00**	0.10	0.10	0.45	
Low-Range Gas						
Mid-Range Gas	CC75313	**11.49**	11.30	0.19	0.86	
High-Range Gas	SG9148338BAL	**22.15**	22.10	0.05	0.23	

Run #: 1 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.30	0.00	11.50	0.90	0.90

Run #: 2 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.50	0.90	11.50	0.90	0.00

Run #: 3 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.50	0.90	11.50	0.90	0.00

Run #: 4 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.50	0.90	11.50	0.90	0.00

CO2 Cal Sheet 2

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Run #: 5 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.50	0.90	11.40	0.45	-0.45

Run #: 6 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.40	0.45	11.50	0.90	0.45

Run #: 7 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.50	0.90	11.40	0.45	-0.45

Run #: 8 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.40	0.45	11.50	0.90	0.45

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100$$

CO2 Cal Sheet 3

Client	Ameren	Test Date	9/22/2015
	Labadie	Project #	15-409
Source Identification	4	Operator	Nathan V.

Run #: 9 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.50	0.90	11.40	0.45	-0.45

Run #: 10 Gas Type: CO2 Span: 22.15	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.30	11.40	0.45	11.50	0.90	0.45

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100$$

$$\text{Drift} = \frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100$$

Calibration/Gas Certification Sheets

Grace Consulting, Inc.
EPA Method 5
522 Series Meter Box Calibration
Calibration Orifice Method
English Meter Box Units, English K' Factor

Date:	8/14/2015
Model:	Apex
Serial:	IN2

Barometric Pressure:	29.45	(in Hg)
Theoretical Critical Vacuum:	13.89	(in Hg)

DRY GAS METER READINGS							Critical Orifice Readings			AMBIENT TEMPERATURE		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Temp Initial (deg F)	Temp Final (deg F)	Orifice Serial #	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.69	142.3	662.418	727.385	64.967	88	88	48	0.3387	24.5	84	88	86
1.15	39.7	727.385	751.277	23.892	88	91	55	0.4427	22.5	88	87	87.5
2.05	32.5	751.277	777.849	26.572	91	93	63	0.5929	20	87	85	86
3.65	10	777.849	788.926	11.077	93	95	73	0.8094	16	85	84	85

CORRECTED VOLUME	
DRY GAS METER Vm(std) (cu ft)	ORIFICE Vcr(std) (cu ft)
61.694	60.745
22.652	22.120
25.135	24.286
10.482	10.215

DRY GAS METER CALIBRATION FACTOR Y	
Value	Variation
0.985	0.009
0.977	0.001
0.966	-0.0093
0.975	-0.0009

Average 0.975

ORIFICE CALIBRATION FACTOR dH@	
Value (in H20)	Variation (in H20)
2.130	0.068
2.084	0.022
2.065	0.004
1.968	-0.094

Average 2.062

Orifice for Calc.
3.25018

SIGNED: Eric [illegible]

Date: 8-14-15

$$V_{m(std)} = 17.64\,(V_m)\frac{P_b + \frac{\Delta H}{13.6}}{t_m + 460}$$

$$V_{cr(std)} = K'\frac{P_b\theta}{\sqrt{t_{amb} + 460}}$$

$$Y = \frac{V_{cr(std)}}{V_{m(std)}}$$

$$\Delta H_@ = \Delta H\left(\frac{.75\theta}{V_{cr(std)}}\right)^2$$

Grace Consulting, Inc.
EPA Method 5
Post Test Calibration
Calibration Orifice Method
English Meter Box Units, English K' Factor

Date:	9/28/2015
Model:	Apex
Serial:	IN2

Barometric Pressure:	29.32	(in Hg)
Theoretical Critical Vacuum:	14.00	(in Hg)

IMPORTAN For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTAN The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

DRY GAS METER READINGS							Critical Orifice Readings			AMBIENT TEMPERAT	
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Temp Initial (deg F)	Temp Final (deg F)	Orifice Serial #	K' Orifice Coefficient (see above	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)
2	12.8	670.1	680.267	10.167	82	84	63	0.5929	20.5	85	88
2	13	680.267	690.579	10.312	84	85	63	0.5929	20.5	88	92
2	14.1	690.579	701.75	11.171	85	86	63	0.5929	20.5	92	93

CORRECTED VOLUME	
DRY GAS METER Vm(std) (cu ft)	ORIFICE Vcr(std) (cu ft)
9.733	9.518
9.844	9.636
10.645	10.428

DRY GAS METER CALIBRATION FACTOR Y	
Value	Variation
0.978	-0.001
0.979	4.2E-05
0.980	0.00081

ORIFICE CALIBRATION FACTOR dH@	
Value (in H20)	Variation (in H20)
2.034	-0.012
2.048	0.001
2.057	0.011

Average 0.979

Average 2.046

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

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

SIGNED: _____ Date: 9-28-15

$$V_{m(std)} = 17.64\,(V_m)\frac{P_b + \frac{\Delta H}{13.6}}{t_m + 460}$$

$$V_{cr(std)} = K'\frac{P_b\theta}{\sqrt{t_{amb} + 460}}$$

$$Y = \frac{V_{cr(std)}}{V_{m(std)}}$$

$$\Delta H_@ = \Delta H\left(\frac{.75\theta}{V_{cr(std)}}\right)^2$$

Pitot Calibration Form

Operator:	Teague	Probe #:	Avg Pc A side	.809
Date:	11/26/2014	Pitot #:	IN4A	
BaroPress:	29.1			

Low — **Side A** — Calculations

Run #	sqrt P std (in H_2O)	sqrt D P (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	.90	1.09	.814	.002
2	.91	1.10	.815	.003
3	.90	1.10	.808	.004
	Average	Cp (Side A)	**.812**	**.0029**

Cp (s) = P std / P (s)

Deviation = Cp (s) = Cp (A or B)

Mid Low — **Side A**

Run #	P std cm H_2O (in H_2O)	P (s) cm H_2O (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	1.20	1.47	.810	.004
2	1.21	1.49	.806	.000
3	1.20	1.48	.801	.005
	Average	Cp (Side A)	**.806**	**.0030**

Average Deviation = side (A or B)

Cp (side A) * Cp (side B) = **.0001**

Pitot Calibration Form

Operator:	Teague	Probe #:	Avg Pc A side	.808
Date:	11/26/2014	Pitot #:	IN4B	
BaroPress:	29.1			

Low — **Side A**

Run #	sqrt P std (in H_2O)	sqrt D P (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	.90	1.09	.813	.002
2	.89	1.10	.801	.010
3	.90	1.09	.818	.007
	Average	Cp (Side A)	**.811**	**.0065**

Mid Low — **Side A**

Run #	P std cm H_2O (in H_2O)	P (s) cm H_2O (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	1.21	1.48	.810	.005
2	1.20	1.49	.797	.008
3	1.21	1.48	.807	.002
	Average	Cp (Side A)	**.805**	**.0053**

Calculations

Cp (s) = P std / P (s)

Deviation = Cp (s) = Cp (A or B)

Average Deviation = side (A or B)

Cp (side A) * Cp (side B) = **.0012**

Pitot Calibration Form

Operator:	Teague	Probe #:	Avg Pc A side	.808
Date:	11/26/2014	Pitot #:	IN4C	
BaroPress:	29.1			

Low — **Side A** — Calculations

Run #	sqrt P std (in H_2O)	sqrt D P (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	.90	1.11	.803	.001
2	.90	1.11	.805	.001
3	.90	1.11	.804	.000
	Average	Cp (Side A)	**.804**	**.0009**

Cp (s) = P std / P (s)

Deviation = Cp (s) = Cp (A or B)

Average Deviation = side (A or B)

Mid Low — **Side A**

Run #	P std cm H_2O (in H_2O)	P (s) cm H_2O (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	1.21	1.48	.812	.001
2	1.22	1.48	.815	.002
3	1.21	1.47	.812	.001
	Average	Cp (Side A)	**.813**	**.0014**

Cp (side A) * Cp (side B) = **.0004**

Pitot Calibration Form

Operator:	Teague	Probe #:	Avg Pc A side	.808
Date:	11/26/2014	Pitot #:	IN4D	
BaroPress:	29.1			

Low

Side A

Run #	sqrt P std (in H_2O)	sqrt D P (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	.90	1.11	.803	.005
2	.91	1.11	.809	.001
3	.91	1.11	.811	.003
	Average	Cp (Side A)	**.808**	**.0030**

Mid Low

Side A

Run #	P std cm H_2O (in H_2O)	P (s) cm H_2O (in H_2O)	Cp (s)	Deviation Cp(s) - Cp(A)
1	1.21	1.48	.808	.001
2	1.21	1.48	.807	.002
3	1.21	1.47	.812	.003
	Average	Cp (Side A)	**.809**	**.0021**

Calculations

Cp (s) = P std / P (s)

Deviation = Cp (s) = Cp (A or B)

Average Deviation = side (A or B)

Cp (side A) * Cp (side B)

= **.0009**

IN601

Airgas

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	NI CZ15A	Reference Number:	40-400480699-1
Cylinder Analyzed:	EB0054563	Cylinder Volume:	142.0 CF
Laboratory:	MID - Saint Louis SGL (SAP) - MO	Cylinder Pressure:	2000 PSIG
Analysis Date:	Jan 29, 2015	Valve Outlet:	580
Lot Number:	40-400480699-1		

Expiration Date: Jan 29, 2023

ANALYTICAL RESULTS

Component		Requested Purity		Certified Concentration
CARBON DIOXIDE	<	1.0 PPM	<LDL	0.12 PPM
NOx	<	0.1 PPM	<	0.1 PPM
SO2	<	0.1 PPM	<	0.1 PPM
THC	<	0.1 PPM		0.04 PPM
CARBON MONOXIDE	<	0.5 PPM	<LDL	0.12 PPM
NITROGEN		99.9995 %		99.9995 %

Permanent Notes: Airgas certifies that the contents of this cylinder meet the requirements of 40 CFR 72.2

Cylinders In Batch:

CC151992, CC156309, CC184658, CC273411, EB0005828@, EB0021353, EB0054563, SG9149519, SG9170515BAL@

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file

Approved for Release

Airgas IN5917

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI99E15A1376	Reference Number:	54-124360256-3
Cylinder Number:	CC500307	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12013	Valve Outlet:	660
Gas Code:	NO2	Certification Date:	Mar 01, 2013

Expiration Date: Mar 01, 2016

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	50.00 PPM	50.29 PPM	G1	+/- 2%	02/22/2013, 03/01/2013
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	124288126109	CC316574	58.29 PPM NITROGEN DIOXIDE/NITROGEN	+/-2%	Oct 25, 2015
PRM	12314	726635	50.0 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Mar 15, 2013

The SRM or PRM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
(CH-3) ECO PHYSICS CLD822S	Chemiluminescence	Feb 27, 2013

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas IN521

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E04NI88E15A1FX1	Reference Number:	54-124451476-1
Cylinder Number:	CC75313	Cylinder Volume:	150.8 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12014	Valve Outlet:	660
Gas Code:	CO2,NO,SO2,BALN	Certification Date:	Sep 12, 2014

Expiration Date: Sep 12, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 1.0% NIST Traceable	09/05/2014, 09/12/2014
NITRIC OXIDE	100.0 PPM	100.2 PPM	G1	+/- 0.9% NIST Traceable	09/05/2014, 09/12/2014
SULFUR DIOXIDE	237.5 PPM	242.2 PPM	G1	+/- 1.0% NIST Traceable	09/05/2014, 09/12/2014
CARBON DIOXIDE	11.45 %	11.49 %	G1	+/- 0.5% NIST Traceable	09/05/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13061008	CC423130	99.86 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Nov 19, 2019
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 14, 2012
GMIS	124206889102	CC320508	4.979 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	May 04, 2015
NTRM	11060833	CC341862	241 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%	May 13, 2017
NTRM	97051017	SG9198991BAL	10.818 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	Jun 28, 2018

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nexus 470 AEP0000428	FTIR	Aug 11, 2014
Nexus 470 AEP0000428	FTIR	Sep 11, 2014
Nexus 470 AEP0000428	FTIR	Sep 11, 2014
Nexus 470 AEP0000428	FTIR	Sep 11, 2014

Triad Data Available Upon Request

Approved for Release

IN00165

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E04NI81E15A0011	Reference Number:	54-124286336-5
Cylinder Number:	LCCO-SA16978	Cylinder Volume:	155.4 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12011	Valve Outlet:	660
Gas Code:	CO2,NO,SO2,BALN	Certification Date:	Oct 29, 2011

Expiration Date: Oct 29, 2019

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITRIC OXIDE	200.0 PPM	201.3 PPM	G1	+/- 1% NIST Traceable	10/20/2011, 10/29/2011
NITRIC OXIDE	200.0 PPM	201.3 PPM	G1	+/- 1% NIST Traceable	10/20/2011, 10/29/2011
SULFUR DIOXIDE	400.0 PPM	418.4 PPM	G1	+/- 1% NIST Traceable	10/20/2011, 10/29/2011
CARBON DIOXIDE	18.00 %	18.09 %	G1	+/- 1% NIST Traceable	10/20/2011, 10/29/2011
NITROGEN	Balance				10/20/2011
Total oxides of nitrogen		201.3 PPM		For Reference Only	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11060128	CC330714.	248.4 PPM NITRIC OXIDE/	+/- 0.5%	Jan 17, 2017
NTRM/SO2	09061029	CC301419.	479.5 PPM SULFUR DIOXIDE/	+/- 1.0%	Feb 15, 2015
NTRM/CO2	06120403	CC184925	19.66 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 01, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Sep 26, 2011
Nexus 470 AEP0000428	FTIR	Oct 18, 2011
Nexus 470 AEP0000428	FTIR	Oct 18, 2011

Triad Data Available Upon Request

Notes:

Signature on file

Approved for Release

Airgas IN 50U

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E04NI77E15A0029	Reference Number:	54-124439113-1A
Cylinder Number:	SG9148338BAL	Cylinder Volume:	158.5 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12014	Valve Outlet:	660
Gas Code:	CO2,NO,NOX,SO2,BALN	Certification Date:	Jun 30, 2014

Expiration Date: Jun 30, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which effect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	105.0 PPM	G1	+/- 1% NIST Traceable	06/19/2014, 06/30/2014
NITRIC OXIDE	100.0 PPM	104.9 PPM	G1	+/- 1% NIST Traceable	06/19/2014, 06/30/2014
SULFUR DIOXIDE	237.5 PPM	239.8 PPM	G1	+/- 1% NIST Traceable	06/19/2014, 06/30/2014
CARBON DIOXIDE	22.00 %	22.15 %	G2	+/- 1% NIST Traceable	06/20/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13061056	CC423751	99.86 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Nov 19, 2019
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 14, 2012
GMIS	124206889102	CC320508	4.979 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	May 04, 2015
NTRM	11060833	CC341862	241 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%	May 13, 2017
NTRM	97050816	SG9167530BAL	7.029 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 01, 2016

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	May 23, 2014
Nexus 470 AEP0000428	FTIR	Jun 28, 2014
Nexus 470 AEP0000428	FTIR	Jun 28, 2014
Nexus 470 AEP0000428	FTIR	Jun 28, 2014

Triad Data Available Upon Request

Notes:

Approved for Release

Plant Data Sheets

R1
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 14:10 Through 09/22/2015 14:30
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	14:10	12.6	590	0.086	49.1	183.8
09/22/15	14:11	12.6	590	0.086	49.3	183.5
09/22/15	14:12	12.6	590	0.086	49.2	183.4
09/22/15	14:13	12.6	590	0.085	49.0	184.8
09/22/15	14:14	12.7	591	0.085	49.1	185.2
09/22/15	14:15	12.7	591	0.084	48.8	185.6
09/22/15	14:16	12.7	590	0.084	48.4	187.9
09/22/15	14:17	12.6	589	0.085	48.5	189.1
09/22/15	14:18	12.6	589	0.087	49.7	188.3
09/22/15	14:19	12.6	590	0.084	48.2	187.5
09/22/15	14:20	12.7	591	0.084	48.5	186.7
09/22/15	14:21	12.7	592	0.084	48.8	186.9
09/22/15	14:22	12.7	592	0.084	48.6	185.5
09/22/15	14:23	12.7	590	0.084	48.5	185.2
09/22/15	14:24	12.7	590	0.084	48.8	186.2
09/22/15	14:25	12.7	590	0.084	48.5	196.5
09/22/15	14:26	12.6	591	0.085	48.8	195.8
09/22/15	14:27	12.6	591	0.085	48.6	193.7
09/22/15	14:28	12.7	591	0.084	48.7	191.8
09/22/15	14:29	12.6	591	0.085	48.8	188.3
09/22/15	14:30	12.6	591	0.085	48.8	189.5
	Average	12.6	590	0.085	48.8	187.9
	Minimum	12.6	589	0.084	48.2	183.4
	Maximum	12.7	592	0.087	49.7	196.5
	Summation	265.6	12,400	1.780	1,024.7	3,945.2
	Included Data Points	21	21	21	21	21
	Total number of Data Points	21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

Run 2
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 14:45 Through 09/22/2015 15:05
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	14:45	12.7	590	0.084	48.5	186.8
09/22/15	14:46	12.7	589	0.084	48.6	185.9
09/22/15	14:47	12.6	589	0.085	48.5	186.4
09/22/15	14:48	12.6	589	0.085	48.6	187.6
09/22/15	14:49	12.7	588	0.084	48.6	188.1
09/22/15	14:50	12.6	588	0.085	48.7	186.8
09/22/15	14:51	12.5	590	0.085	48.5	187.6
09/22/15	14:52	12.6	590	0.085	48.6	185.6
09/22/15	14:53	12.7	591	0.085	49.4	186.9
09/22/15	14:54	12.8	591	0.084	49.1	186.6
09/22/15	14:55	12.8	591	0.084	48.9	187.1
09/22/15	14:56	12.8	591	0.084	48.9	187.0
09/22/15	14:57	12.8	591	0.084	48.9	186.6
09/22/15	14:58	12.7	590	0.085	49.0	188.5
09/22/15	14:59	12.7	590	0.085	49.2	189.3
09/22/15	15:00	12.7	590	0.084	48.5	186.9
09/22/15	15:01	12.7	590	0.085	49.1	186.3
09/22/15	15:02	12.7	590	0.085	48.9	188.7
09/22/15	15:03	12.6	590	0.086	49.2	186.6
09/22/15	15:04	12.7	591	0.084	48.8	187.9
09/22/15	15:05	12.7	591	0.085	49.1	186.6
Average		12.7	590	0.085	48.8	187.0
Minimum		12.5	588	0.084	48.5	185.6
Maximum		12.8	591	0.086	49.4	189.3
Summation		266.4	12,390	1.777	1,025.6	3,927.8
Included Data Points		21	21	21	21	21
Total number of Data Points		21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

R3
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 15:20 Through 09/22/2015 15:40
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	15:20	12.7	590	0.085	48.9	188.2
09/22/15	15:21	12.7	589	0.084	48.5	186.7
09/22/15	15:22	12.7	587	0.084	48.8	188.6
09/22/15	15:23	12.6	588	0.085	48.8	194.4
09/22/15	15:24	12.5	588	0.086	48.7	194.7
09/22/15	15:25	12.7	589	0.085	48.9	194.6
09/22/15	15:26	12.7	589	0.085	49.0	197.6
09/22/15	15:27	12.7	590	0.085	48.9	193.2
09/22/15	15:28	12.6	590	0.084	48.2	189.2
09/22/15	15:29	12.6	592	0.084	48.3	190.4
09/22/15	15:30	12.7	592	0.084	48.4	194.4
09/22/15	15:31	12.7	592	0.084	48.4	189.2
09/22/15	15:32	12.7	591	0.083	48.2	188.8
09/22/15	15:33	12.7	591	0.084	48.4	187.3
09/22/15	15:34	12.8	591	0.084	49.1	187.9
09/22/15	15:35	12.7	590	0.084	48.3	187.6
09/22/15	15:36	12.7	590	0.084	48.5	188.6
09/22/15	15:37	12.7	590	0.083	48.1	188.3
09/22/15	15:38	12.7	588	0.084	48.6	189.0
09/22/15	15:39	12.9	589	0.084	49.5	189.2
09/22/15	15:40	12.6	590	0.086	49.1	187.6
Average		12.7	590	0.084	48.6	190.3
Minimum		12.5	587	0.083	48.1	186.7
Maximum		12.9	592	0.086	49.5	197.6
Summation		266.4	12,386	1.771	1,021.6	3,995.5
Included Data Points		21	21	21	21	21
Total number of Data Points		21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

R4
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 15:55 Through 09/22/2015 16:15
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	15:55	12.6	589	0.086	49.3	188.0
09/22/15	15:56	12.5	589	0.089	50.4	186.4
09/22/15	15:57	12.6	589	0.087	49.8	186.9
09/22/15	15:58	12.6	589	0.088	50.3	187.2
09/22/15	15:59	12.6	590	0.088	50.5	187.0
09/22/15	16:00	12.7	590	0.088	50.7	185.6
09/22/15	16:01	12.8	591	0.087	50.7	186.2
09/22/15	16:02	12.8	591	0.087	50.8	187.6
09/22/15	16:03	12.7	591	0.089	51.4	187.1
09/22/15	16:04	12.7	591	0.089	51.7	186.8
09/22/15	16:05	12.7	590	0.092	52.9	185.6
09/22/15	16:06	12.7	590	0.091	52.5	186.7
09/22/15	16:07	12.7	590	0.090	52.3	185.5
09/22/15	16:08	12.6	589	0.093	53.2	184.6
09/22/15	16:09	12.7	589	0.091	52.4	185.9
09/22/15	16:10	12.7	588	0.091	52.6	184.5
09/22/15	16:11	12.6	587	0.092	52.5	184.9
09/22/15	16:12	12.7	587	0.090	52.0	185.1
09/22/15	16:13	12.5	587	0.092	52.6	186.6
09/22/15	16:14	12.7	589	0.090	51.8	189.1
09/22/15	16:15	12.6	589	0.091	52.0	188.7
	Average	12.7	589	0.090	51.5	186.5
	Minimum	12.5	587	0.086	49.3	184.5
	Maximum	12.8	591	0.093	53.2	189.1
	Summation	265.8	12,375	1.881	1,082.4	3,916.0
	Included Data Points	21	21	21	21	21
	Total number of Data Points	21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

R5
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 16:30 Through 09/22/2015 16:50
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	16:30	12.5	589	0.093	52.7	184.7
09/22/15	16:31	12.7	590	0.090	51.9	187.0
09/22/15	16:32	12.6	591	0.091	52.1	186.8
09/22/15	16:33	12.6	591	0.092	53.0	185.4
09/22/15	16:34	12.6	590	0.093	53.1	185.6
09/22/15	16:35	12.6	590	0.092	52.9	185.6
09/22/15	16:36	12.6	589	0.092	53.0	185.5
09/22/15	16:37	12.7	590	0.092	52.9	185.7
09/22/15	16:38	12.6	589	0.091	52.4	184.0
09/22/15	16:39	12.6	589	0.089	51.2	186.2
09/22/15	16:40	12.7	590	0.086	50.0	187.8
09/22/15	16:41	12.7	591	0.086	49.9	188.2
09/22/15	16:42	12.6	591	0.087	49.8	187.1
09/22/15	16:43	12.7	590	0.085	49.4	185.3
09/22/15	16:44	12.6	589	0.086	49.4	184.7
09/22/15	16:45	12.7	589	0.086	49.9	186.3
09/22/15	16:46	12.7	590	0.085	48.9	185.7
09/22/15	16:47	12.7	590	0.086	49.7	186.7
09/22/15	16:48	12.6	591	0.086	49.3	186.0
09/22/15	16:49	12.7	590	0.085	49.4	187.5
09/22/15	16:50	12.7	590	0.085	49.3	185.9
	Average	12.6	590	0.088	51.0	186.1
	Minimum	12.5	589	0.085	48.9	184.0
	Maximum	12.7	591	0.093	53.1	188.2
	Summation	265.5	12,389	1.858	1,070.2	3,907.7
	Included Data Points	21	21	21	21	21
	Total number of Data Points	21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

R6
09

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 17:05 Through 09/22/2015 17:25
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	17:05	12.7	591	0.086	49.5	185.3
09/22/15	17:06	12.7	591	0.085	49.2	185.8
09/22/15	17:07	12.7	590	0.085	48.9	184.0
09/22/15	17:08	12.7	589	0.085	49.0	186.0
09/22/15	17:09	12.7	589	0.085	49.2	184.8
09/22/15	17:10	12.7	589	0.085	49.4	185.5
09/22/15	17:11	12.6	589	0.086	49.5	185.3
09/22/15	17:12	12.7	589	0.085	49.4	185.4
09/22/15	17:13	12.7	589	0.086	49.5	185.5
09/22/15	17:14	12.7	589	0.086	49.6	186.0
09/22/15	17:15	12.7	590	0.087	50.2	184.7
09/22/15	17:16	12.7	590	0.086	49.8	185.7
09/22/15	17:17	12.7	589	0.086	49.7	185.9
09/22/15	17:18	12.6	589	0.087	49.9	185.1
09/22/15	17:19	12.6	589	0.086	49.2	184.2
09/22/15	17:20	12.7	590	0.085	49.1	185.5
09/22/15	17:21	12.7	590	0.086	49.5	186.3
09/22/15	17:22	12.7	590	0.085	49.2	186.9
09/22/15	17:23	12.7	590	0.085	49.1	185.5
09/22/15	17:24	12.7	590	0.085	49.1	187.7
09/22/15	17:25	12.6	589	0.085	49.0	189.4
	Average	12.7	590	0.086	49.4	185.7
	Minimum	12.6	589	0.085	48.9	184.0
	Maximum	12.7	591	0.087	50.2	189.4
	Summation	266.3	12,381	1.797	1,037.0	3,900.5
	Included Data Points	21	21	21	21	21
	Total number of Data Points	21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

27
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 17:40 Through 09/22/2015 18:00
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	17:40	12.6	591	0.085	49.0	187.3
09/22/15	17:41	12.6	590	0.085	49.0	184.7
09/22/15	17:42	12.7	589	0.085	48.9	185.3
09/22/15	17:43	12.7	589	0.085	49.0	185.2
09/22/15	17:44	12.8	590	0.083	48.6	187.5
09/22/15	17:45	12.7	591	0.084	48.7	187.1
09/22/15	17:46	12.6	590	0.085	48.8	186.7
09/22/15	17:47	12.7	590	0.085	49.3	188.7
09/22/15	17:48	12.8	590	0.083	48.6	195.6
09/22/15	17:49	12.7	589	0.084	48.7	201.5
09/22/15	17:50	12.7	590	0.086	49.7	204.2
09/22/15	17:51	12.5	591	0.085	48.5	203.9
09/22/15	17:52	12.7	591	0.084	48.7	195.4
09/22/15	17:53	12.7	590	0.084	48.6	194.3
09/22/15	17:54	12.8	590	0.083	48.2	192.5
09/22/15	17:55	12.7	590	0.084	48.6	192.8
09/22/15	17:56	12.7	589	0.084	48.5	188.1
09/22/15	17:57	12.6	589	0.085	48.8	186.7
09/22/15	17:58	12.6	589	0.086	49.2	186.0
09/22/15	17:59	12.6	589	0.085	48.9	185.8
09/22/15	18:00	12.7	589	0.085	49.3	186.7
	Average	12.7	590	0.085	48.8	190.7
	Minimum	12.5	589	0.083	48.2	184.7
	Maximum	12.8	591	0.086	49.7	204.2
	Summation	266.2	12,386	1.775	1,025.6	4,004.0
	Included Data Points	21	21	21	21	21
	Total number of Data Points	21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

RS
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:15 Through 09/22/2015 18:35
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	18:15	12.7	590	0.086	49.6	186.9
09/22/15	18:16	12.6	589	0.086	49.2	185.8
09/22/15	18:17	12.7	589	0.086	49.8	186.9
09/22/15	18:18	12.7	589	0.086	49.8	187.0
09/22/15	18:19	12.7	589	0.085	49.3	186.7
09/22/15	18:20	12.7	588	0.085	49.4	186.8
09/22/15	18:21	12.6	587	0.085	48.9	188.8
09/22/15	18:22	12.6	587	0.086	49.1	188.6
09/22/15	18:23	12.7	588	0.087	50.1	187.5
09/22/15	18:24	12.7	588	0.086	49.6	188.6
09/22/15	18:25	12.7	588	0.085	49.4	187.8
09/22/15	18:26	12.6	589	0.085	49.0	187.7
09/22/15	18:27	12.6	590	0.085	49.0	185.7
09/22/15	18:28	12.6	590	0.085	49.0	186.0
09/22/15	18:29	12.7	590	0.084	48.8	186.5
09/22/15	18:30	12.7	589	0.086	49.5	188.2
09/22/15	18:31	12.7	589	0.085	49.1	185.2
09/22/15	18:32	12.8	589	0.085	49.3	184.6
09/22/15	18:33	12.6	589	0.086	49.1	184.7
09/22/15	18:34	12.7	588	0.085	49.4	186.2
09/22/15	18:35	12.6	588	0.086	49.5	184.9
Average		12.7	589	0.085	49.3	186.7
Minimum		12.6	587	0.084	48.8	184.6
Maximum		12.8	590	0.087	50.1	188.8
Summation		266.0	12,363	1.795	1,035.9	3,921.1
Included Data Points		21	21	21	21	21
Total number of Data Points		21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

R9
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:50 Through 09/22/2015 19:10
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	18:50	12.7	589	0.086	50.0	186.6
09/22/15	18:51	12.6	589	0.086	49.5	185.7
09/22/15	18:52	12.7	588	0.084	48.8	185.9
09/22/15	18:53	12.6	587	0.085	48.9	185.8
09/22/15	18:54	12.7	586	0.085	49.4	188.3
09/22/15	18:55	12.6	586	0.089	51.1	187.7
09/22/15	18:56	12.5	587	0.087	49.3	184.7
09/22/15	18:57	12.6	587	0.086	49.4	186.4
09/22/15	18:58	12.6	586	0.086	49.5	186.1
09/22/15	18:59	12.6	587	0.086	49.6	185.5
09/22/15	19:00	12.6	588	0.086	49.6	186.9
09/22/15	19:01	12.7	589	0.085	49.1	185.9
09/22/15	19:02	12.7	588	0.086	49.6	186.3
09/22/15	19:03	12.7	589	0.086	50.0	186.5
09/22/15	19:04	12.7	588	0.086	49.5	186.0
09/22/15	19:05	12.6	588	0.086	49.5	185.2
09/22/15	19:06	12.7	587	0.086	49.5	184.5
09/22/15	19:07	12.6	588	0.086	49.5	184.7
09/22/15	19:08	12.7	588	0.087	50.1	185.9
09/22/15	19:09	12.7	588	0.087	50.1	186.3
09/22/15	19:10	12.7	586	0.086	49.9	189.3
	Average	12.6	588	0.086	49.6	186.2
	Minimum	12.5	586	0.084	48.8	184.5
	Maximum	12.7	589	0.089	51.1	189.3
	Summation	265.6	12,339	1.807	1,041.9	3,910.2
	Included Data Points	21	21	21	21	21
	Total number of Data Points	21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

R10
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 19:25 Through 09/22/2015 19:45
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD4 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/22/15	19:25	12.6	588	0.086	49.5	186.1
09/22/15	19:26	12.7	588	0.086	49.5	189.3
09/22/15	19:27	12.6	586	0.086	49.5	189.5
09/22/15	19:28	12.6	586	0.086	49.5	188.1
09/22/15	19:29	12.5	587	0.086	49.1	186.2
09/22/15	19:30	12.6	587	0.086	49.3	186.5
09/22/15	19:31	12.6	587	0.086	49.3	186.7
09/22/15	19:32	12.6	588	0.087	49.9	189.6
09/22/15	19:33	12.6	589	0.086	49.5	188.9
09/22/15	19:34	12.7	588	0.085	49.2	187.2
09/22/15	19:35	12.7	587	0.085	49.3	186.3
09/22/15	19:36	12.6	587	0.086	49.5	185.2
09/22/15	19:37	12.7	588	0.086	49.9	186.8
09/22/15	19:38	12.8	589	0.087	50.4	187.5
09/22/15	19:39	12.7	589	0.086	49.5	186.5
09/22/15	19:40	12.6	589	0.086	49.3	185.0
09/22/15	19:41	12.6	589	0.087	49.7	184.3
09/22/15	19:42	12.7	588	0.086	49.6	184.3
09/22/15	19:43	12.7	588	0.086	50.0	185.0
09/22/15	19:44	12.7	587	0.086	49.7	184.1
09/22/15	19:45	12.6	587	0.087	49.9	184.3
	Average	12.6	588	0.086	49.6	186.5
	Minimum	12.5	586	0.085	49.1	184.1
	Maximum	12.8	589	0.087	50.4	189.6
	Summation	265.5	12,342	1.808	1,041.1	3,917.4
	Included Data Points	21	21	21	21	21
	Total number of Data Points	21	21	21	21	21

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H1
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 17:54 Through 09/22/2015 18:13
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	17:54	12.8	76,670,025.8	590	354.0	101.8
09/22/15	17:55	12.7	76,640,747.9	590	353.7	101.8
09/22/15	17:56	12.7	76,719,107.3	589	353.5	101.8
09/22/15	17:57	12.6	76,687,883.8	589	353.5	101.8
09/22/15	17:58	12.6	76,536,762.0	589	353.6	101.6
09/22/15	17:59	12.6	76,394,887.8	589	353.5	101.5
09/22/15	18:00	12.7	76,314,755.6	589	353.2	101.4
09/22/15	18:01	12.7	76,477,634.1	590	352.9	101.5
09/22/15	18:02	12.7	76,747,299.1	591	352.6	101.7
09/22/15	18:03	12.8	76,829,250.0	591	352.5	101.9
09/22/15	18:04	12.6	76,777,489.7	590	352.5	101.8
09/22/15	18:05	12.6	76,736,130.4	590	352.7	101.8
09/22/15	18:06	12.7	76,698,248.6	591	353.2	101.8
09/22/15	18:07	12.6	76,483,170.4	591	353.7	101.6
09/22/15	18:08	12.7	76,061,680.6	591	353.6	101.2
09/22/15	18:09	12.7	75,880,228.7	591	353.1	101.0
09/22/15	18:10	12.7	76,016,432.2	591	352.7	101.1
09/22/15	18:11	12.6	76,248,372.8	590	352.6	101.3
09/22/15	18:12	12.6	76,384,710.4	590	352.5	101.4
09/22/15	18:13	12.7	76,326,648.3	590	352.0	101.3
	Average	12.7	76,480,573.3	590	353.1	101.6
	Minimum	12.6	75,880,228.7	589	352.0	101.0
	Maximum	12.8	76,829,250.0	591	354.0	101.9
	Summation	253.4	1,529,611,465.5	11,802	7,061.6	2,031.1
	Included Data Points	20	20	20	20	20
	Total number of Data Points	20	20	20	20	20

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H2
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:22 Through 09/22/2015 18:26
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:22	12.6	75,893,376.1	587	351.6	100.8
09/22/15	18:23	12.7	75,778,978.9	588	351.8	100.7
09/22/15	18:24	12.7	76,054,325.1	588	351.5	101.0
09/22/15	18:25	12.7	76,564,812.5	588	351.2	101.5
09/22/15	18:26	12.6	76,891,045.2	589	350.9	101.7
Average		12.7	76,236,507.6	588	351.4	101.1
Minimum		12.6	75,778,978.9	587	350.9	100.7
Maximum		12.7	76,891,045.2	589	351.8	101.7
Summation		63.3	381,182,537.8	2,940	1,757.0	505.7
Included Data Points		5	5	5	5	5
Total number of Data Points		5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
! = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H3
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:27 Through 09/22/2015 18:31
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:27	12.6	76,908,508.3	590	350.8	101.7
09/22/15	18:28	12.6	76,647,270.9	590	350.8	101.5
09/22/15	18:29	12.7	76,359,394.0	590	350.6	101.2
09/22/15	18:30	12.7	76,206,734.3	589	350.4	101.0
09/22/15	18:31	12.7	76,279,426.7	589	350.4	101.1
Average		12.7	76,480,266.8	590	350.6	101.3
Minimum		12.6	76,206,734.3	589	350.4	101.0
Maximum		12.7	76,908,508.3	590	350.8	101.7
Summation		63.3	382,401,334.2	2,948	1,753.0	506.5
Included Data Points		5	5	5	5	5
Total number of Data Points		5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H4
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:32 Through 09/22/2015 18:36
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:32	12.8	76,502,850.1	589	350.5	101.3
09/22/15	18:33	12.6	76,563,150.3	589	350.4	101.4
09/22/15	18:34	12.7	76,575,963.9	588	350.2	101.4
09/22/15	18:35	12.6	76,636,917.4	588	350.2	101.5
09/22/15	18:36	12.7	76,607,725.2	588	350.1	101.4
	Average	12.7	76,577,321.4	588	350.3	101.4
	Minimum	12.6	76,502,850.1	588	350.1	101.3
	Maximum	12.8	76,636,917.4	589	350.5	101.5
	Summation	63.4	382,886,606.9	2,942	1,751.4	507.0
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
! = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H5
J4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:37 Through 09/22/2015 18:41
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:37	12.6	76,582,339.8	587	349.9	101.4
09/22/15	18:38	12.6	76,812,657.8	587	350.2	101.6
09/22/15	18:39	12.6	76,908,528.7	588	350.8	101.7
09/22/15	18:40	12.7	76,841,105.2	589	351.2	101.7
09/22/15	18:41	12.6	76,851,717.5	589	350.8	101.7
	Average	12.6	76,799,269.8	588	350.6	101.6
	Minimum	12.6	76,582,339.8	587	349.9	101.4
	Maximum	12.7	76,908,528.7	589	351.2	101.7
	Summation	63.1	383,996,349.0	2,940	1,752.9	508.1
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

HG
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:42 Through 09/22/2015 18:46
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:42	12.7	76,854,505.4	589	350.5	101.7
09/22/15	18:43	12.7	76,936,144.5	589	350.4	101.8
09/22/15	18:44	12.6	76,954,803.5	589	350.5	101.8
09/22/15	18:45	12.7	76,833,533.0	589	350.3	101.7
09/22/15	18:46	12.6	76,672,392.0	589	349.9	101.4
Average		12.7	76,850,275.7	589	350.3	101.7
Minimum		12.6	76,672,392.0	589	349.9	101.4
Maximum		12.7	76,954,803.5	589	350.5	101.8
Summation		63.3	384,251,378.4	2,945	1,751.6	508.4
Included Data Points		5	5	5	5	5
Total number of Data Points		5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H7
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:47 Through 09/22/2015 18:51
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:47	12.7	76,461,585.0	589	349.4	101.1
09/22/15	18:48	12.7	76,316,739.5	589	349.1	101.0
09/22/15	18:49	12.7	76,301,082.6	589	349.0	100.9
09/22/15	18:50	12.7	76,279,945.7	589	349.0	100.9
09/22/15	18:51	12.6	76,400,990.4	589	349.0	101.1
	Average	12.7	76,352,068.6	589	349.1	101.0
	Minimum	12.6	76,279,945.7	589	349.0	100.9
	Maximum	12.7	76,461,585.0	589	349.4	101.1
	Summation	63.4	381,760,343.2	2,945	1,745.5	505.0
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H8
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:52 Through 09/22/2015 18:56
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:52	12.7	76,734,985.1	588	349.0	101.4
09/22/15	18:53	12.6	76,805,839.1	587	349.2	101.5
09/22/15	18:54	12.7	76,785,072.5	586	349.7	101.5
09/22/15	18:55	12.6	76,314,738.1	586	350.5	101.1
09/22/15	18:56	12.5	75,443,222.1	587	350.9	100.2
	Average	12.6	76,416,771.4	587	349.9	101.1
	Minimum	12.5	75,443,222.1	586	349.0	100.2
	Maximum	12.7	76,805,839.1	588	350.9	101.5
	Summation	63.1	382,083,856.9	2,934	1,749.3	505.7
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

#9
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 18:57 Through 09/22/2015 19:01
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	18:57	12.6	75,594,754.6	587	350.2	100.3
09/22/15	18:58	12.6	76,622,002.9	586	349.8	101.4
09/22/15	18:59	12.6	76,904,453.8	587	349.7	101.7
09/22/15	19:00	12.6	76,641,251.2	588	349.7	101.4
09/22/15	19:01	12.7	76,303,238.8	589	349.6	101.0
	Average	12.6	76,413,140.3	587	349.8	101.2
	Minimum	12.6	75,594,754.6	586	349.6	100.3
	Maximum	12.7	76,904,453.8	589	350.2	101.7
	Summation	63.1	382,065,701.3	2,937	1,749.0	505.8
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

210
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 19:02 Through 09/22/2015 19:06
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	19:02	12.7	76,200,588.7	588	349.5	100.9
09/22/15	19:03	12.7	76,500,697.1	589	349.3	101.2
09/22/15	19:04	12.7	77,008,194.2	588	349.2	101.7
09/22/15	19:05	12.6	77,340,421.7	588	349.3	102.1
09/22/15	19:06	12.7	77,177,445.9	587	349.2	101.9
	Average	12.7	76,845,469.5	588	349.3	101.6
	Minimum	12.6	76,200,588.7	587	349.2	100.9
	Maximum	12.7	77,340,421.7	589	349.5	102.1
	Summation	63.4	384,227,347.6	2,940	1,746.5	507.8
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

R11
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 19:07 Through 09/22/2015 19:11
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	19:07	12.6	76,667,836.0	588	349.0	101.4
09/22/15	19:08	12.7	76,481,894.7	588	348.8	101.1
09/22/15	19:09	12.7	76,821,323.9	588	348.7	101.4
09/22/15	19:10	12.7	77,172,625.2	586	348.9	101.8
09/22/15	19:11	12.6	77,182,601.9	586	349.7	101.9
Average		12.7	76,865,256.3	587	349.0	101.5
Minimum		12.6	76,481,894.7	586	348.7	101.1
Maximum		12.7	77,182,601.9	588	349.7	101.9
Summation		63.3	384,326,281.7	2,936	1,745.1	507.6
Included Data Points		5	5	5	5	5
Total number of Data Points		5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

H12
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 19:12 Through 09/22/2015 19:16
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	19:12	12.4	76,971,897.0	587	350.9	101.8
09/22/15	19:13	12.5	76,695,988.6	588	351.1	101.6
09/22/15	19:14	12.6	76,452,804.5	588	350.2	101.3
09/22/15	19:15	12.5	76,294,397.6	589	349.5	101.0
09/22/15	19:16	12.6	76,405,392.9	589	349.3	101.1
Average		12.5	76,564,096.1	588	350.2	101.4
Minimum		12.4	76,294,397.6	587	349.3	101.0
Maximum		12.6	76,971,897.0	589	351.1	101.8
Summation		62.6	382,820,480.6	2,941	1,751.0	506.8
Included Data Points		5	5	5	5	5
Total number of Data Points		5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L1
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 00:42 Through 09/23/2015 01:03
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	00:42	12.3	41,723,537.9	321	321.9	58.1
09/23/15	00:43	12.4	41,591,466.5	322	321.7	57.9
09/23/15	00:44	12.4	41,506,029.3	321	321.6	57.8
09/23/15	00:45	12.6	41,446,828.4	321	321.4	57.7
09/23/15	00:46	12.4	41,351,436.0	321	321.4	57.6
09/23/15	00:47	12.4	41,213,386.9	322	321.7	57.4
09/23/15	00:48	12.4	41,125,973.9	322	321.9	57.3
09/23/15	00:49	12.4	41,180,594.4	323	321.8	57.4
09/23/15	00:50	12.4	41,273,912.6	322	321.5	57.5
09/23/15	00:51	12.3	41,294,063.3	323	321.2	57.5
09/23/15	00:52	12.2	41,182,963.4	322	320.8	57.3
09/23/15	00:53	12.2	40,886,142.0	322	320.5	56.9
09/23/15	00:54	12.3	40,585,928.0	321	320.0	56.4
09/23/15	00:55	12.5	40,547,150.2	320	319.5	56.3
09/23/15	00:56	12.5	40,756,597.2	320	319.4	56.6
09/23/15	00:57	12.4	41,067,186.2	319	319.3	57.0
09/23/15	00:58	12.3	41,418,124.0	318	319.2	57.5
09/23/15	00:59	12.3	41,659,628.8	320	318.7	57.8
09/23/15	01:00	12.2	41,713,252.2	319	318.3	57.9
09/23/15	01:01	12.2	41,727,149.3	320	317.9	57.8
09/23/15	01:02	12.3	41,779,878.3	320	317.3	57.9
09/23/15	01:03	12.4	41,822,506.2	321	316.4	57.9
	Average	12.4	41,311,533.4	321	320.2	57.4
	Minimum	12.2	40,547,150.2	318	316.4	56.3
	Maximum	12.6	41,822,506.2	323	321.9	58.1
	Summation	271.8	908,853,735.0	7,060	7,043.4	1,263.5
	Included Data Points	22	22	22	22	22
	Total number of Data Points	22	22	22	22	22

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L2
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:05 Through 09/23/2015 01:09
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:05	12.5	41,998,681.0	321	314.4	58.0
09/23/15	01:06	12.4	42,142,808.3	321	313.7	58.1
09/23/15	01:07	12.4	42,146,956.9	322	313.2	58.1
09/23/15	01:08	12.4	41,992,887.7	321	312.8	57.8
09/23/15	01:09	12.4	41,794,441.8	321	312.4	57.5
	Average	12.4	42,015,155.1	321	313.3	57.9
	Minimum	12.4	41,794,441.8	321	312.4	57.5
	Maximum	12.5	42,146,956.9	322	314.4	58.1
	Summation	62.1	210,075,775.7	1,606	1,566.5	289.5
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L3
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:10 Through 09/23/2015 01:14
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:10	12.5	41,632,432.5	322	311.9	57.3
09/23/15	01:11	12.5	41,582,736.0	321	311.5	57.2
09/23/15	01:12	12.5	41,608,064.9	321	311.3	57.2
09/23/15	01:13	12.4	41,638,043.5	320	311.3	57.2
09/23/15	01:14	12.4	41,704,788.9	321	311.1	57.3
	Average	12.5	41,633,213.2	321	311.4	57.2
	Minimum	12.4	41,582,736.0	320	311.1	57.2
	Maximum	12.5	41,704,788.9	322	311.9	57.3
	Summation	62.3	208,166,065.8	1,605	1,557.1	286.2
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L4
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:15 Through 09/23/2015 01:19
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:15	12.4	41,786,949.5	321	310.7	57.4
09/23/15	01:16	12.3	41,955,732.9	321	310.2	57.6
09/23/15	01:17	12.4	42,204,876.4	322	309.9	57.9
09/23/15	01:18	12.3	42,243,777.2	320	309.6	57.9
09/23/15	01:19	12.3	42,027,551.7	322	309.2	57.6
	Average	12.3	42,043,777.5	321	309.9	57.7
	Minimum	12.3	41,786,949.5	320	309.2	57.4
	Maximum	12.4	42,243,777.2	322	310.7	57.9
	Summation	61.7	210,218,887.7	1,606	1,549.6	288.4
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L5
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:20 Through 09/23/2015 01:24
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:20	12.3	41,845,277.9	321	309.0	57.3
09/23/15	01:21	12.3	41,903,190.3	321	309.0	57.4
09/23/15	01:22	12.4	42,014,117.8	320	309.0	57.6
09/23/15	01:23	12.4	42,061,787.4	321	308.8	57.6
09/23/15	01:24	12.5	42,158,378.3	320	308.4	57.7
Average		12.4	41,996,550.3	321	308.8	57.5
Minimum		12.3	41,845,277.9	320	308.4	57.3
Maximum		12.5	42,158,378.3	321	309.0	57.7
Summation		61.9	209,982,751.7	1,603	1,544.2	287.6
Included Data Points		5	5	5	5	5
Total number of Data Points		5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L6
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:25 Through 09/23/2015 01:29
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:25	12.3	42,323,762.4	321	308.0	57.9
09/23/15	01:26	12.3	42,501,362.0	322	307.5	58.1
09/23/15	01:27	12.3	42,538,173.1	322	306.8	58.2
09/23/15	01:28	12.2	42,348,038.7	321	305.9	57.9
09/23/15	01:29	12.3	42,033,050.5	321	305.4	57.4
	Average	12.3	42,348,877.3	321	306.7	57.9
	Minimum	12.2	42,033,050.5	321	305.4	57.4
	Maximum	12.3	42,538,173.1	322	308.0	58.2
	Summation	61.4	211,744,386.7	1,607	1,533.6	289.5
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L7
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:30 Through 09/23/2015 01:34
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:30	12.3	41,837,892.8	322	305.1	57.1
09/23/15	01:31	12.4	41,844,365.5	322	304.9	57.0
09/23/15	01:32	12.4	41,893,207.1	322	304.5	57.1
09/23/15	01:33	12.4	41,867,523.9	322	304.2	57.0
09/23/15	01:34	12.4	41,811,463.3	322	303.9	56.9
	Average	12.4	41,850,890.5	322	304.5	57.0
	Minimum	12.3	41,811,463.3	322	303.9	56.9
	Maximum	12.4	41,893,207.1	322	305.1	57.1
	Summation	61.9	209,254,452.6	1,610	1,522.6	285.1
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L8
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:35 Through 09/23/2015 01:39
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:35	12.3	41,769,127.4	321	303.7	56.8
09/23/15	01:36	12.3	41,827,165.1	320	303.4	56.9
09/23/15	01:37	12.4	42,044,700.2	321	303.3	57.2
09/23/15	01:38	12.3	42,262,444.0	321	303.5	57.5
09/23/15	01:39	12.3	42,368,231.5	321	303.8	57.7
Average		12.3	42,054,333.6	321	303.5	57.2
Minimum		12.3	41,769,127.4	320	303.3	56.8
Maximum		12.4	42,368,231.5	321	303.8	57.7
Summation		61.6	210,271,668.2	1,604	1,517.7	286.1
Included Data Points		5	5	5	5	5
Total number of Data Points		5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L9
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:40 Through 09/23/2015 01:44
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:40	12.2	42,397,066.7	321	303.7	57.7
09/23/15	01:41	12.3	42,412,167.5	321	303.4	57.7
09/23/15	01:42	12.3	42,468,230.9	320	303.2	57.8
09/23/15	01:43	12.3	42,551,336.6	321	303.1	57.9
09/23/15	01:44	12.2	42,572,333.2	321	302.9	57.9
	Average	12.3	42,480,227.0	321	303.3	57.8
	Minimum	12.2	42,397,066.7	320	302.9	57.7
	Maximum	12.3	42,572,333.2	321	303.7	57.9
	Summation	61.3	212,401,134.9	1,604	1,516.3	289.0
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
! = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L10
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:45 Through 09/23/2015 01:49
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:45	12.2	42,541,919.4	320	302.5	57.8
09/23/15	01:46	12.2	42,515,199.5	321	302.3	57.8
09/23/15	01:47	12.2	42,543,478.7	321	302.2	57.8
09/23/15	01:48	12.3	42,665,786.3	320	302.3	58.0
09/23/15	01:49	12.2	42,842,932.8	322	302.3	58.2
	Average	12.2	42,621,863.3	321	302.3	57.9
	Minimum	12.2	42,515,199.5	320	302.2	57.8
	Maximum	12.3	42,842,932.8	322	302.5	58.2
	Summation	61.1	213,109,316.7	1,604	1,511.6	289.6
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L11
04

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:50 Through 09/23/2015 01:54
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:50	12.2	42,938,865.7	320	302.2	58.3
09/23/15	01:51	12.1	42,868,915.0	322	302.2	58.2
09/23/15	01:52	12.2	42,785,316.4	322	302.1	58.1
09/23/15	01:53	12.3	42,717,380.7	321	301.9	58.0
09/23/15	01:54	12.2	42,522,466.9	321	301.5	57.7
	Average	12.2	42,766,588.9	321	302.0	58.1
	Minimum	12.1	42,522,466.9	320	301.5	57.7
	Maximum	12.3	42,938,865.7	322	302.2	58.3
	Summation	61.0	213,832,944.7	1,606	1,509.9	290.3
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L12
U4

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/23/2015 01:55 Through 09/23/2015 01:59
Time Online Criteria: 1 minute(s)

Source		LABU04				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD4 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/23/15	01:55	12.3	42,296,730.1	322	300.7	57.4
09/23/15	01:56	12.4	42,159,944.2	322	299.9	57.1
09/23/15	01:57	12.4	42,171,893.5	321	299.5	57.1
09/23/15	01:58	12.3	42,314,825.9	322	299.4	57.3
09/23/15	01:59	12.4	42,408,985.5	320	299.2	57.4
	Average	12.4	42,270,475.8	321	299.7	57.3
	Minimum	12.3	42,159,944.2	320	299.2	57.1
	Maximum	12.4	42,408,985.5	322	300.7	57.4
	Summation	61.8	211,352,379.2	1,607	1,498.7	286.3
	Included Data Points	5	5	5	5	5
	Total number of Data Points	5	5	5	5	5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

Accreditation

STACK TESTING ACCREDITATION COUNCIL 500 W. Wood St., Palatine, IL 60067, director@betterdata.org

February 27, 2012

Mr. Tyson Stiles
Grace Consulting, Inc.
510 Dickson Street
Wellington, Ohio 44090

VIA E-mail

Dear Mr. Stiles,

On behalf of the STAC Board of Directors, I am pleased to inform you that Grace Consulting has been granted interim accreditation by the Stack Testing Accreditation Council (STAC). After careful review of your Quality System documentation and procedures, STAC has determined that they are in conformance with ASTM D7036-04 "Standard Practice for the Competency of Air Emission Testing Bodies". Final accreditation is contingent upon successful completion of your field audit. Please see Module 3 of STAC policy documentation for scheduling requirements.

During this period of interim accreditation, Grace Consulting may not claim to be a STAC accredited organization although you may refer to your interim status. To achieve final accreditation requires evidence that your Quality System is effectively implemented in your organization as determined by the field assessment. You may claim that your Quality System meets ASTM D7036 requirements.

Please note that the Attestation of Compliance you signed as part of your application for accreditation requires Grace Consulting to be in continuous compliance with the provisions of ASTM D7036. You are also required to comply with all relevant STAC policies and procedures. I encourage you to review this information.

If you have any questions, please feel free to contact me at 847-654-4569. Thank you for your participation in the STAC process and congratulations.

Yours truly,

Scott Evans
Stack Testing Accreditation Council

Dedicated to Continuous Improvement of Air Quality Measurement

Grace Consulting, Inc.

Qualified Individual

LET IT BE KNOWN THAT

Nathan Vineyard

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES SET FORTH IN ASTM D 7036 FOR QUALIFIED INDIVIDUALS FOR

GROUP I – GAS FLOW, ISOKINETIC SAMPLING, AND PARTICULATE MATTER TESTING

EXAM COMPLETED ON NOVEMBER 16, 2012 AND EFFECTIVE UNTIL NOVEMBER 16, 2017

TYSON STILES, QUALITY MANAGER

SCOTT TEAGUE, QSTI I-IV, PRESIDENT

Grace Consulting, Inc.

Qualified Individual

LET IT BE KNOWN THAT

Nathan Vineyard

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES SET FORTH IN ASTM D 7036 FOR QUALIFIED INDIVIDUALS FOR

GROUP III – MEASURING GASEOUS POLLUTANT CONCENTRATIONS WITH INSTRUMENTAL TEST METHODS AND CONDUCTING CEMS RATAS

EXAM COMPLETED ON JUNE 21, 2013 AND EFFECTIVE UNTIL JUNE 21, 2018

TYSON STILES, QUALITY MANAGER

SCOTT TEAGUE, QSTI I-IV, PRESIDENT