RELATIVE ACCURACY
TEST REPORT
FOR
AMEREN
LABADIE STATION
UNIT 3
LABADIE, MO
September 21-22, 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 3 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/rs

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 3.

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 21-22, 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 3.

RELATIVE ACCURACY
PART 75

Date	Monitor	Units	RA	Allowable	Results
09-21-15	NO_x	lb/mmBtu	1.03%	10%	Pass
09-21-15	SO_2	ppm	2.54%	10%	Pass
09-21-15	CO_2	Percent	1.02%	10%	Pass
09-21-15	Flow (H)	SCFH	0.67%	10%	Pass
09-21/22-15	Flow (L)	SCFH	0.51%	10%	Pass

BIAS TEST RESULTS

Date	Monitor	Monitor Designation	Mean of Difference	Confidence Coefficient	Bias Results Factor Required	Bias Adj. Factor
09-21-15	NO_x	lb/mmBtu	0.000	0.001	No	N/A
09-21-15	SO_2	ppm	-3.489	1.457	No	N/A
09-21-15	Flow (H)	SCFH	85333.333	455320.496	No	N/A
09-21/22-15	Flow (L)	SCFH	32000.000	192509.187	N/A	N/A

STRATIFICATION

Date		Point 1	Point 2	Point 3	Average	Greatest Deviation
09-21-15	NO_x	54.61	51.46	53.73	53.27	3.40%
09-21-15	SO_2	194.79	194.77	195.26	194.94	0.16%
09-21-15	CO_2	13.01	13.13	12.79	12.97	1.46%

NOx CONVERTER EFFICIENCY

		NO_2 Gas Value	Recorded Value	Converter Efficiency %
09-21-15	NO_x	50.29	48.10	95.65%

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 3
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
NOx lb/mmBtu
9/21/2015

Use	Start Time	Stop Time	Run	NOx lb/mmBtu RM	CEMS	Difference
N	14:25	14:45	1	0.092	0.094	-0.002
Y	15:00	15:20	2	0.092	0.092	0.000
Y	15:35	15:55	3	0.093	0.094	-0.001
Y	16:10	16:30	4	0.094	0.093	0.001
Y	16:45	17:05	5	0.093	0.093	0.000
Y	17:20	17:40	6	0.094	0.094	0.000
Y	17:55	18:15	7	0.094	0.096	-0.002
Y	18:30	18:50	8	0.096	0.096	0.000
Y	19:05	19:25	9	0.095	0.096	-0.001
Y	19:40	20:00	10	0.096	0.095	0.001
Averages				0.094	0.094	0.000

Standard Deviation	0.001
Confidence Coefficient	0.001
Relative Accuracy	1.03
Bias Test Pass/Fail	PASS
Bias Adjustment Factor	1.000

* Central Standard Time

Grace Consulting, Inc.

Ameren : Labadie Unit 3
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
SO2 ppm
9/21/2015

Use	Start Time	Stop Time	Run	SO2 ppm RM	SO2 ppm CEMS	Difference
N	14:25	14:45	1	190.900	197.700	-6.800
Y	15:00	15:20	2	192.600	199.000	-6.400
Y	15:35	15:55	3	193.300	199.900	-6.600
Y	16:10	16:30	4	194.700	198.700	-4.000
Y	16:45	17:05	5	195.400	198.000	-2.600
Y	17:20	17:40	6	195.500	198.700	-3.200
Y	17:55	18:15	7	195.300	198.700	-3.400
Y	18:30	18:50	8	195.700	197.100	-1.400
Y	19:05	19:25	9	195.500	197.300	-1.800
Y	19:40	20:00	10	195.100	197.100	-2.000
Averages				194.789	198.278	-3.489

Standard Deviation	1.895
Confidence Coefficient	1.457
Relative Accuracy	2.54
Bias Test Pass/Fail	PASS
Bias Adjustment Factor	1.000

* Central Standard Time

Grace Consulting, Inc.

Ameren : Labadie Unit 3
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
CO2 Percent
9/21/2015

Use	Start Time	Stop Time	Run	CO2 Percent RM	CEMS	Difference
N	14:25	14:45	1	12.800	13.000	-0.200
Y	15:00	15:20	2	12.800	13.000	-0.200
Y	15:35	15:55	3	12.800	13.000	-0.200
Y	16:10	16:30	4	13.000	13.000	0.000
Y	16:45	17:05	5	13.000	13.000	0.000
Y	17:20	17:40	6	12.900	13.000	-0.100
Y	17:55	18:15	7	13.000	13.000	0.000
Y	18:30	18:50	8	12.900	13.000	-0.100
Y	19:05	19:25	9	13.000	12.900	0.100
Y	19:40	20:00	10	13.000	12.900	0.100
Averages				12.933	12.978	-0.044

Standard Deviation	0.113
Confidence Coefficient	0.087
Relative Accuracy	1.02

* Central Standard Time

Grace Consulting Inc.

Ameren: Labadie Unit Unit 3
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
High Flow
9/21/2015

Use	Run	Start Time	Stop Time	High Flow RM	High Flow CEMS	Difference
Y	1	18:00	18:19	80736000	79214000	1522000
Y	2	18:30	18:34	79687000	80212000	-525000
Y	3	18:35	18:39	79829000	79825000	4000
N	4	18:40	18:44	81057000	80147000	910000
Y	5	18:45	18:49	80459000	80768000	-309000
N	6	18:50	18:54	81293000	80389000	904000
Y	7	18:55	18:59	80702000	80534000	168000
Y	8	19:00	19:04	80173000	80373000	-200000
Y	9	19:05	19:09	80663000	80479000	184000
Y	10	19:10	19:14	80234000	80072000	162000
Y	11	19:15	19:19	80350000	80588000	-238000
N	12	19:20	19:24	80202000	79992000	210000
Averages				80314777.778	80229444.444	85333.333

Standard Deviation	592351.036
Confidence Coefficient	455320.496
Relative Accuracy	0.67
Bias Test Pass/Fail	PASS
Bias Adjustment Factor	1.000

*Central Standard Time

Grace Consulting Inc.

Ameren: Labadie Unit Unit 3
Relative Accuracy Test Audit
Relative Accuracy Calculations and Results
Low Flow
9/21-22/2015

Use	Run	Start Time	Stop Time	Low Flow RM	Low Flow CEMS	Difference
Y	1	23:25	23:45	43787000	43399000	388000
Y	2	23:46	23:50	43932000	43955000	-23000
Y	3	23:51	23:55	43622000	43572000	50000
N	4	23:56	0:00	43052000	43735000	-683000
Y	5	0:01	0:05	43486000	43424000	62000
Y	6	0:06	0:10	44120000	43790000	330000
Y	7	0:11	0:15	43926000	43961000	-35000
N	8	0:16	0:20	43468000	44160000	-692000
Y	9	0:21	0:25	43371000	43415000	-44000
N	10	0:26	0:30	44103000	43269000	834000
Y	11	0:31	0:35	43440000	43929000	-489000
Y	12	0:36	0:40	43864000	43815000	49000
Averages				43727555.556	43695555.556	32000.000

Standard Deviation	250445.603
Confidence Coefficient	192509.187
Relative Accuracy	0.51
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 3

Date: 9/21/2015
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	54.15	0.90	1.20	0.15	100.60	100.90	0.15	100.20	53.40
2	54.26	1.20	1.00	-0.10	100.90	100.40	-0.25	100.20	53.50
3	54.31	1.00	0.80	-0.10	100.40	100.10	-0.15	100.20	53.90
4	55.78	0.80	0.70	-0.05	100.10	100.30	0.10	100.20	55.40
5	55.43	0.70	0.80	0.05	100.30	99.90	-0.20	100.20	55.10
6	55.57	0.80	0.70	-0.05	99.90	99.80	-0.05	100.20	55.40
7	55.65	0.70	0.80	0.05	99.80	99.70	-0.05	100.20	55.60
8	56.12	0.80	0.70	-0.05	99.70	99.60	-0.05	100.20	56.10
9	56.24	0.70	0.80	0.05	99.60	99.90	0.15	100.20	56.20
10	57.06	0.80	0.90	0.05	99.90	100.20	0.15	100.20	56.80

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

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 3

Date: 9/21/2015
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	194.17	1.60	2.10	0.12	245.60	246.20	0.14	242.20	190.90
2	196.22	2.10	1.70	-0.10	246.20	246.40	0.05	242.20	192.60
3	196.22	1.70	1.40	-0.07	246.40	244.60	-0.43	242.20	193.30
4	196.73	1.40	1.20	-0.05	244.60	244.30	-0.07	242.20	194.70
5	197.23	1.20	1.10	-0.02	244.30	244.10	-0.05	242.20	195.40
6	197.15	1.10	1.00	-0.02	244.10	243.90	-0.05	242.20	195.50
7	197.02	1.00	1.10	0.02	243.90	244.20	0.07	242.20	195.30
8	197.38	1.10	0.90	-0.05	244.20	243.80	-0.10	242.20	195.70
9	197.06	0.90	1.10	0.05	243.80	243.90	0.02	242.20	195.50
10	196.87	1.10	1.20	0.02	243.90	244.30	0.10	242.20	195.10

Cgas = (Cavg - Co) * Cma / (Cm - Co) 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 3

Date: 9/21/2015
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	12.94	0.10	0.20	0.45	11.60	11.70	0.45	11.49	12.80
2	12.96	0.20	0.10	-0.45	11.70	11.60	-0.45	11.49	12.80
3	12.85	0.10	0.10	0.00	11.60	11.50	-0.45	11.49	12.80
4	12.97	0.10	0.10	0.00	11.50	11.50	0.00	11.49	13.00
5	13.02	0.10	0.10	0.00	11.50	11.50	0.00	11.49	13.00
6	12.90	0.10	0.10	0.00	11.50	11.50	0.00	11.49	12.90
7	13.03	0.10	0.10	0.00	11.50	11.50	0.00	11.49	13.00
8	12.88	0.10	0.10	0.00	11.50	11.50	0.00	11.49	12.90
9	12.95	0.10	0.10	0.00	11.50	11.50	0.00	11.49	13.00
10	12.97	0.10	0.10	0.00	11.50	11.50	0.00	11.49	13.00

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

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:	09/21/15
Unit Number:	Unit 3
Load:	High

Run:	1-2	3-12
Initial Weight of Impingers:	3498.00	3553.00
Final Weight of Impingers:	3553.00	3605.00
Weight gain of Impingers:	55.00	52.00
Initial Meter Reading:	324.582	346.865
Final Meter Reading:	346.632	369.110
Volume Metered:	22.050	22.245
Meter Temperature:	97.00	104.00
Delta H:	2.062	2.062
Barometric Pressure:	29.12	29.12
Meter Correction Factor:	0.975	0.975
Volume Measured (DSCF):	19.93	19.86
Water Volume (SCF):	2.59	2.45
% Moisture in Flue Gas:	11.50	11.00

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.54**
Baro Press	**29.12**	**CO2**	**14.7**		
Pitot Coef.	**0.809**	**O2**	**4.6**		<INPUTS
Static Press	**-2.00**	**Pitot No.**	**IN4A**		
Molecular Wt.	**29.10**	**%Moisture**	**11.5**		
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	9/21/15 18:19	317.3	1.186	6.9	78.19
2	2.00	9/21/15 18:17	326.7	1.155	6.2	76.71
3	3.00	9/21/15 18:16	338.4	1.267	6.3	84.76
4	4.00	9/21/15 18:15	340.5	1.286	6.2	86.16
5	5.00	9/21/15 18:14	354.1	1.394	6.3	94.17
6	6.00	9/21/15 18:13	354.8	1.422	6.2	96.12
7	7.00	9/21/15 18:11	354.3	1.439	5.2	97.41
A4	7.87	9/21/15 18:10	354.6	1.469	6.6	99.20
8	8.00	9/21/15 18:10	354.6	1.469	6.6	99.20
9	9.00	9/21/15 18:09	357.5	1.505	5.6	102.01
10	10.00	9/21/15 18:08	355.4	1.488	-2.4	101.12
11	11.00	9/21/15 18:07	355.5	1.494	6.5	100.97
12	12.00	9/21/15 18:05	355.6	1.521	6.8	102.74
D-Rem	14.22	9/21/15 18:04	353.7	1.525	2.0	103.55
A3	25.83	9/21/15 18:02	327.0	1.588	3.0	105.97
A2	47.72	9/21/15 18:01	355.7	1.649	3.1	112.01
A1	79.46	9/21/15 18:00	353.3	1.670	3.2	113.26
Average			**347.7**	**1.443**	**5.0**	**97.27**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.54**
Baro Press	**29.12**	**CO2**	**14.7**		
Pitot Coef.	**0.808**	**O2**	**4.6**		<INPUTS
Static Press	**-2.00**	**Pitot No.**	**IN4A**		
Molecular Wt.	**29.10**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**High**		
Stack Diameter	**20.5**				

Point No. Port B	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/21/15 18:19	316.4	1.178	-0.8	78.08
2	2.00	9/21/15 18:17	319.4	1.161	-1.1	77.09
3	3.00	9/21/15 18:16	327.7	1.240	4.3	82.56
4	4.00	9/21/15 18:15	335.3	1.245	4.3	83.29
5	5.00	9/21/15 18:14	331.8	1.322	4.8	88.19
6	6.00	9/21/15 18:13	341.9	1.391	4.1	93.47
7	7.00	9/21/15 18:11	354.2	1.454	1.0	98.68
A4	7.87	9/21/15 18:10	355.1	1.470	1.0	99.83
8	8.00	9/21/15 18:10	355.1	1.470	1.0	99.83
9	9.00	9/21/15 18:09	354.1	1.483	1.0	100.65
10	10.00	9/21/15 18:08	355.6	1.480	2.4	100.46
11	11.00	9/21/15 18:07	353.0	1.513	2.8	102.51
12	12.00	9/21/15 18:05	355.4	1.505	11.6	100.15
D-Rem	14.22	9/21/15 18:04	358.2	1.535	1.8	104.40
A3	25.83	9/21/15 18:02	331.2	1.629	4.5	108.67
A2	47.72	9/21/15 18:01	367.5	1.699	5.1	115.81
A1	79.46	9/21/15 18:00	365.7	1.716	5.4	116.78
Average			**354.9**	**1.441**	**3.1**	**97.09**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.54**
Baro Press	**29.12**	**CO2**	**14.7**		
Pitot Coef.	**0.808**	**O2**	**4.6**		<INPUTS
Static Press	**-2.00**	**Pitot No.**	**IN4C**		
Molecular Wt.	**29.10**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**High**		
Stack Diameter	**20.5**				

Point No. Port C	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/21/15 18:19	312.8	0.936	7.0	61.44
2	2.00	9/21/15 18:17	316.5	1.105	6.8	72.74
3	3.00	9/21/15 18:16	340.3	1.215	4.8	81.48
4	4.00	9/21/15 18:15	342.9	1.234	4.8	82.89
5	5.00	9/21/15 18:14	352.2	1.313	6.6	88.43
6	6.00	9/21/15 18:13	357.1	1.392	4.3	94.39
7	7.00	9/21/15 18:11	357.2	1.432	4.8	97.04
A4	7.87	9/21/15 18:10	353.3	1.451	6.3	97.85
8	8.00	9/21/15 18:10	353.3	1.451	6.3	97.85
9	9.00	9/21/15 18:09	357.9	1.480	6.8	99.98
10	10.00	9/21/15 18:08	353.0	1.502	6.3	101.27
11	11.00	9/21/15 18:07	358.7	1.502	3.6	102.04
12	12.00	9/21/15 18:05	355.9	1.528	3.4	103.65
D-Rem	14.22	9/21/15 18:04	358.8	1.556	6.7	105.20
A3	25.83	9/21/15 18:02	324.3	1.657	6.4	109.71
A2	47.72	9/21/15 18:01	350.7	1.698	5.9	114.41
A1	79.46	9/21/15 18:00	354.5	1.704	5.3	115.20
Average			**345.7**	**1.421**	**5.7**	**95.62**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.54**
Baro Press	**29.12**	**CO2**	**14.7**		
Pitot Coef.	**0.808**	**O2**	**4.6**		<INPUTS
Static Press	**-2.00**	**Pitot No.**	**IN4D**		
Molecular Wt.	**29.10**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**High**		
Stack Diameter	**20.5**				

Point No. Port D	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/21/15 18:19	312.6	1.459	3.3	96.32
2	2.00	9/21/15 18:17	315.9	1.141	3.4	75.48
3	3.00	9/21/15 18:16	323.5	1.252	4.8	83.08
4	4.00	9/21/15 18:15	326.6	1.247	4.3	82.97
5	5.00	9/21/15 18:14	338.3	1.360	4.6	91.12
6	6.00	9/21/15 18:13	350.0	1.438	3.4	97.19
7	7.00	9/21/15 18:11	352.6	1.477	4.1	99.91
A4	7.87	9/21/15 18:10	355.0	1.491	3.5	101.07
8	8.00	9/21/15 18:10	355.0	1.491	3.5	101.07
9	9.00	9/21/15 18:09	354.9	1.509	3.4	102.30
10	10.00	9/21/15 18:08	358.6	1.517	4.1	102.99
11	11.00	9/21/15 18:07	354.4	1.534	4.6	103.81
12	12.00	9/21/15 18:05	357.1	1.551	3.5	105.27
D-Rem	14.22	9/21/15 18:04	355.4	1.587	3.4	107.62
A3	25.83	9/21/15 18:02	352.6	1.655	4.5	111.89
A2	47.72	9/21/15 18:01	359.2	1.703	5.1	115.50
A1	79.46	9/21/15 18:00	355.3	1.699	2.0	115.34
Average			**355.5**	**1.477**	**3.9**	**99.58**

Method 2H Worksheet 2H-1

Client	Ameren	Date	9/21/2015
Project No.	15-409	Unit	3
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	78.19	39.10	11883.60	11691.17	192.43	7523.18
2	76.71	77.45	11691.17	11500.30	190.86	14782.29
3	84.76	80.74	11500.30	11311.01	189.29	15282.46
4	86.16	85.46	11311.01	11123.29	187.72	16042.62
5	94.17	90.17	11123.29	10937.14	186.15	16784.22
6	96.12	95.15	10937.14	10752.56	184.58	17561.79
7	97.41	96.77	10752.56	10569.55	183.01	17708.81
8	99.20	98.31	10569.55	10388.12	181.44	17836.23
9	102.01	100.61	10388.12	10208.25	179.87	18095.50
10	101.12	101.57	10208.25	10029.95	178.30	18108.64
11	100.97	101.05	10029.95	9853.23	176.73	17857.20
12	102.74	101.86	9853.23	9678.07	175.15	17840.36

Total volumetric flow for all sections located between stack wall and d last.	195423.30
Velocity measured at d rem	103.55
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	79254.4819
Wall effects-adjusted flow in equal area sector. (Qt)	274677.78
Replacement point for Port A.	92.46

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/21/2015**
Project No.	**15-409**	**Unit**	**3**
Probe Type	**S type**	**Test Location**	**Stack**
Pitot No.	**IN4A**	**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	78.08	39.04	11883.60	11691.17	192.43	7512.59
2	77.09	77.59	11691.17	11500.30	190.86	14808.06
3	82.56	79.83	11500.30	11311.01	189.29	15110.20
4	83.29	82.93	11311.01	11123.29	187.72	15566.75
5	88.19	85.74	11123.29	10937.14	186.15	15960.50
6	93.47	90.83	10937.14	10752.56	184.58	16765.33
7	98.68	96.08	10752.56	10569.55	183.01	17582.54
8	99.83	99.26	10569.55	10388.12	181.44	18008.59
9	100.65	100.24	10388.12	10208.25	179.87	18029.85
10	100.46	100.56	10208.25	10029.95	178.30	17928.56
11	102.51	101.49	10029.95	9853.23	176.73	17934.96
12	100.15	101.33	9853.23	9678.07	175.15	17748.40

Total volumetric flow for all sections located between stack wall and d last.	192956.34
Velocity measured at d rem	104.40
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	79905.0498
Wall effects-adjusted flow in equal area sector. (Qt)	272861.39
Replacement point for Port B.	91.84

Method 2H Worksheet 2H-1

Client	Ameren	Date	9/21/2015
Project No.	15-409	Unit	3
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	61.44	30.72	11883.60	11691.17	192.43	5911.55
2	72.74	67.09	11691.17	11500.30	190.86	12804.96
3	81.48	77.11	11500.30	11311.01	189.29	14596.28
4	82.89	82.19	11311.01	11123.29	187.72	15427.84
5	88.43	85.66	11123.29	10937.14	186.15	15945.61
6	94.39	91.41	10937.14	10752.56	184.58	16872.39
7	97.04	95.72	10752.56	10569.55	183.01	17516.65
8	97.85	97.45	10569.55	10388.12	181.44	17680.19
9	99.98	98.92	10388.12	10208.25	179.87	17791.53
10	101.27	100.63	10208.25	10029.95	178.30	17941.04
11	102.04	101.66	10029.95	9853.23	176.73	17965.00
12	103.65	102.85	9853.23	9678.07	175.15	18013.76

Total volumetric flow for all sections located between stack wall and d last.	188466.79
Velocity measured at d rem	105.20
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	80517.3490
Wall effects-adjusted flow in equal area sector. (Qt)	268984.14
Replacement point for Port C.	90.54

Method 2H Worksheet 2H-1

Client	Ameren	Date	9/21/2015
Project No.	15-409	Unit	3
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	96.32	48.16	11883.60	11691.17	192.43	9267.58
2	75.48	85.90	11691.17	11500.30	190.86	16395.08
3	83.08	79.28	11500.30	11311.01	189.29	15007.04
4	82.97	83.03	11311.01	11123.29	187.72	15585.52
5	91.12	87.05	11123.29	10937.14	186.15	16203.43
6	97.19	94.16	10937.14	10752.56	184.58	17379.06
7	99.91	98.55	10752.56	10569.55	183.01	18035.48
8	101.07	100.49	10569.55	10388.12	181.44	18232.67
9	102.30	101.69	10388.12	10208.25	179.87	18289.76
10	102.99	102.65	10208.25	10029.95	178.30	18301.20
11	103.81	103.40	10029.95	9853.23	176.73	18273.39
12	105.27	104.54	9853.23	9678.07	175.15	18310.65

Total volumetric flow for all sections located between stack wall and d last.	199280.85
Velocity measured at d rem	107.62
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	82369.5542
Wall effects-adjusted flow in equal area sector. (Qt)	281650.41
Replacement point for Port D.	94.80

Method 2H Calculations

Drem = 14.2168

Point Dist. From Wall	Port A	Port B	Port C	Port D		
					Uncorrected Vavg	109.53
					Provisional Adj. V'avg	107.76
1.00	78.19	78.08	61.44	96.32		
2.00	76.71	77.09	72.74	75.48		
3.00	84.76	82.56	81.48	83.08	Wall Adj Factor	0.9838
4.00	86.16	83.29	82.89	82.97	Must be >97%	
5.00	94.17	88.19	88.43	91.12		
6.00	96.12	93.47	94.39	97.19		
7.00	97.41	98.68	97.04	99.91		
7.87	99.20	99.83	97.85	101.07		
8.00	99.20	99.83	97.85	101.07		
9.00	102.01	100.65	99.98	102.30	Average Temp	351
10.00	101.12	100.46	101.27	102.99	Average Angle	4.40
11.00	100.97	102.51	102.04	103.81		
12.00	102.74	100.15	103.65	105.27		
14.22	103.55	104.40	105.20	107.62	Unadj KSCFH	82065
25.83	105.97	108.67	109.71	111.89	Adj KSCFH	80735.7
47.72	112.01	115.81	114.41	115.50	SCFH	80736000
79.46	113.26	116.78	115.20	115.34		

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**2**	Md	**30.54**
Baro Press	**29.12**	**CO2**	**14.7**		
Static Press	**-2.00**	**O2**	**4.6**		<INPUTS
Molecular Wt.	**29.10**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 18:30	352.4	1.675	3.5	113.50	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 18:31	356.9	1.651	2.2	112.31	0.809	IN4A
A3	9/21/15 18:32	356.0	1.597	1.8	108.61		
A4	9/21/15 18:34	355.4	1.471	2.0	99.99		
B1	9/21/15 18:30	358.6	1.672	3.8	113.55	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 18:31	358.0	1.669	3.4	113.36	0.808	IN4B
B3	9/21/15 18:32	358.3	1.624	4.3	110.21		
B4	9/21/15 18:34	355.3	1.466	4.0	99.34		
C1	9/21/15 18:30	359.0	1.688	5.4	114.41	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 18:31	355.2	1.655	5.6	111.88	0.808	IN4C
C3	9/21/15 18:32	357.2	1.635	5.7	110.64		
C4	9/21/15 18:34	357.4	1.404	5.0	95.13		
D1	9/21/15 18:30	357.5	1.686	0.5	114.68	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 18:31	355.8	1.690	4.4	114.49	0.808	IN4D
D3	9/21/15 18:32	355.7	1.614	2.8	109.53		
D4	9/21/15 18:34	353.1	1.470	3.1	99.57		
Average		**356.4**	**1.604**	**3.6**	**108.83**		

KSCFH	**80999**
ADJKSCFH	**79686.8**
SCFH	**79687000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**3**	Md	**30.52**
Baro Press	**29.12**	**CO2**	**14.6**		
Static Press	**-2.00**	**O2**	**4.7**		<INPUTS
Molecular Wt.	**29.15**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 18:35	357.4	1.671	2.9	113.55	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 18:37	355.6	1.662	2.1	112.88	0.809	IN4A
A3	9/21/15 18:38	355.1	1.626	1.6	110.43		
A4	9/21/15 18:39	355.6	1.462	2.0	99.30		
B1	9/21/15 18:35	354.5	1.690	4.0	114.36	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 18:37	356.6	1.684	4.2	114.07	0.808	IN4B
B3	9/21/15 18:38	358.7	1.644	3.6	111.59		
B4	9/21/15 18:39	355.0	1.525	-5.4	103.02		
C1	9/21/15 18:35	358.2	1.673	5.7	113.18	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 18:37	358.3	1.653	3.7	112.16	0.808	IN4C
C3	9/21/15 18:38	354.5	1.632	6.1	110.08		
C4	9/21/15 18:39	359.2	1.422	6.2	96.17		
D1	9/21/15 18:35	356.4	1.655	1.2	112.37	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 18:37	357.8	1.666	3.5	113.03	0.808	IN4D
D3	9/21/15 18:38	357.0	1.624	2.7	110.21		
D4	9/21/15 18:39	357.2	1.452	1.3	98.63		
Average		**356.7**	**1.609**	**2.8**	**109.07**		

KSCFH	**81144**
ADJKSCFH	**79829.5**
SCFH	**79829000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**4**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 18:40	359.2	1.691	2.1	115.12	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 18:42	357.4	1.700	2.2	115.60	0.809	IN4A
A3	9/21/15 18:43	357.6	1.618	1.6	110.08		
A4	9/21/15 18:44	355.4	1.488	1.4	101.11		
B1	9/21/15 18:40	357.6	1.718	2.0	116.71	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 18:42	359.9	1.704	1.0	115.98	0.808	IN4B
B3	9/21/15 18:43	357.1	1.670	2.4	113.39		
B4	9/21/15 18:44	357.2	1.601	2.2	108.72		
C1	9/21/15 18:40	359.7	1.693	5.9	114.62	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 18:42	359.5	1.682	6.1	113.82	0.808	IN4C
C3	9/21/15 18:43	360.0	1.659	4.2	112.63		
C4	9/21/15 18:44	354.3	1.439	6.1	97.07		
D1	9/21/15 18:40	354.6	1.671	2.2	113.30	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 18:42	357.6	1.679	1.9	114.07	0.808	IN4D
D3	9/21/15 18:43	358.5	1.643	3.3	111.56		
D4	9/21/15 18:44	357.2	1.478	3.5	100.26		
Average		**357.7**	**1.633**	**3.0**	**110.88**		

KSCFH	**82392**
ADJKSCFH	**81057.2**
SCFH	**81057000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**5**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 18:45	346.3	1.687	2.4	113.92	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 18:47	355.8	1.638	1.9	111.30	0.809	IN4A
A3	9/21/15 18:48	354.3	1.625	1.6	110.33		
A4	9/21/15 18:49	354.7	1.488	1.7	101.05		
B1	9/21/15 18:45	351.3	1.724	1.7	116.69	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 18:47	360.9	1.714	11.4	114.44	0.808	IN4B
B3	9/21/15 18:48	360.1	1.662	8.4	111.93		
B4	9/21/15 18:49	362.3	1.597	7.5	107.94		
C1	9/21/15 18:45	331.0	1.702	5.9	113.19	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 18:47	353.0	1.682	5.8	113.43	0.808	IN4C
C3	9/21/15 18:48	359.0	1.630	6.3	110.23		
C4	9/21/15 18:49	355.0	1.422	5.0	96.14		
D1	9/21/15 18:45	357.2	1.662	1.6	112.90	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 18:47	356.4	1.682	3.6	114.03	0.808	IN4D
D3	9/21/15 18:48	363.0	1.606	2.6	109.42		
D4	9/21/15 18:49	355.9	1.441	1.6	97.81		
Average		**354.8**	**1.623**	**4.3**	**109.67**		

KSCFH	**81784**
ADJKSCFH	**80459.1**
SCFH	**80459000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**6**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 18:50	355.1	1.680	2.4	114.07	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 18:51	356.0	1.686	2.5	114.53	0.809	IN4A
A3	9/21/15 18:52	356.9	1.649	1.9	112.12		
A4	9/21/15 18:54	356.1	1.487	1.6	101.07		
B1	9/21/15 18:50	353.4	1.728	5.6	116.60	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 18:51	360.3	1.725	4.9	117.02	0.808	IN4B
B3	9/21/15 18:52	345.8	1.670	5.9	112.10		
B4	9/21/15 18:54	355.7	1.593	3.6	107.95		
C1	9/21/15 18:50	354.7	1.705	5.3	115.20	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 18:51	360.0	1.698	6.2	114.92	0.808	IN4C
C3	9/21/15 18:52	359.3	1.678	5.9	113.58		
C4	9/21/15 18:54	356.0	1.431	6.2	96.61		
D1	9/21/15 18:50	356.5	1.679	2.7	113.93	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 18:51	357.1	1.668	2.1	113.27	0.808	IN4D
D3	9/21/15 18:52	357.7	1.677	2.1	113.93		
D4	9/21/15 18:54	357.1	1.458	3.1	98.93		
Average		**356.1**	**1.638**	**3.9**	**110.99**		

KSCFH	**82632**
ADJKSCFH	**81293.4**
SCFH	**81293000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**7**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 18:55	365.4	1.684	2.1	115.08	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 18:55	356.3	1.665	1.6	113.19	0.809	IN4A
A3	9/21/15 18:56	355.8	1.606	0.9	109.17		
A4	9/21/15 18:59	357.3	1.460	1.4	99.32		
B1	9/21/15 18:55	357.9	1.722	3.1	116.90	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 18:55	355.8	1.700	3.0	115.27	0.808	IN4B
B3	9/21/15 18:56	359.6	1.637	2.8	111.28		
B4	9/21/15 18:59	355.2	1.579	2.5	107.07		
C1	9/21/15 18:55	352.9	1.711	5.7	115.40	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 18:55	357.5	1.705	6.0	115.26	0.808	IN4C
C3	9/21/15 18:56	355.6	1.658	6.0	111.95		
C4	9/21/15 18:59	353.9	1.425	7.3	95.86		
D1	9/21/15 18:55	354.1	1.670	3.0	113.12	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 18:55	356.3	1.662	2.2	112.80	0.808	IN4D
D3	9/21/15 18:56	348.9	1.629	2.4	110.05		
D4	9/21/15 18:59	353.8	1.491	2.0	101.05		
Average		**356.0**	**1.625**	**3.3**	**110.17**		

KSCFH	**82031**
ADJKSCFH	**80702.1**
SCFH	**80702000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**8**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 19:00	352.1	1.694	2.4	114.80	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 19:01	352.6	1.651	2.6	111.91	0.809	IN4A
A3	9/21/15 19:03	350.8	1.619	2.2	109.65		
A4	9/21/15 19:04	353.7	1.465	2.7	99.36		
B1	9/21/15 19:00	359.4	1.703	2.7	115.76	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 19:01	357.2	1.676	3.6	113.68	0.808	IN4B
B3	9/21/15 19:03	355.9	1.609	3.2	109.09		
B4	9/21/15 19:04	355.6	1.597	2.5	108.32		
C1	9/21/15 19:00	353.5	1.661	0.4	112.62	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 19:01	358.0	1.646	-1.7	111.87	0.808	IN4C
C3	9/21/15 19:03	353.9	1.598	1.3	108.35		
C4	9/21/15 19:04	356.5	1.421	3.3	96.37		
D1	9/21/15 19:00	354.0	1.676	2.9	113.53	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 19:01	357.4	1.674	3.5	113.57	0.808	IN4D
D3	9/21/15 19:03	355.2	1.628	2.6	110.39		
D4	9/21/15 19:04	352.9	1.473	3.9	99.61		
Average		**354.9**	**1.612**	**2.4**	**109.30**		

KSCFH	**81493**
ADJKSCFH	**80172.8**
SCFH	**80173000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**9**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 19:05	356.6	1.700	2.6	115.51	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 19:06	354.5	1.643	2.0	111.54	0.809	IN4A
A3	9/21/15 19:07	354.5	1.599	2.0	108.56		
A4	9/21/15 19:09	355.4	1.484	2.3	100.78		
B1	9/21/15 19:05	358.2	1.738	2.3	118.09	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 19:06	359.3	1.703	2.9	115.74	0.808	IN4B
B3	9/21/15 19:07	356.5	1.641	3.2	111.30		
B4	9/21/15 19:09	355.6	1.567	2.2	106.31		
C1	9/21/15 19:05	355.9	1.700	0.1	115.44	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 19:06	355.1	1.676	1.9	113.69	0.808	IN4C
C3	9/21/15 19:07	356.3	1.622	2.9	110.03		
C4	9/21/15 19:09	356.9	1.417	2.1	96.22		
D1	9/21/15 19:05	355.8	1.709	3.6	115.81	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 19:06	357.2	1.677	4.1	113.68	0.808	IN4D
D3	9/21/15 19:07	356.5	1.614	4.6	109.29		
D4	9/21/15 19:09	354.8	1.481	4.6	100.18		
Average		**356.2**	**1.623**	**2.7**	**110.14**		

KSCFH	**81991**
ADJKSCFH	**80662.7**
SCFH	**80663000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**10**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 19:10	354.3	1.667	2.9	113.08	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 19:11	354.3	1.652	2.4	112.11	0.809	IN4A
A3	9/21/15 19:13	357.3	1.631	1.7	110.94		
A4	9/21/15 19:14	352.7	1.469	1.9	99.63		
B1	9/21/15 19:10	355.6	1.695	2.9	114.93	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 19:11	357.0	1.679	2.6	113.97	0.808	IN4B
B3	9/21/15 19:13	357.8	1.648	2.4	111.94		
B4	9/21/15 19:14	352.5	1.590	2.7	107.62		
C1	9/21/15 19:10	357.4	1.666	1.7	113.18	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 19:11	356.7	1.679	1.8	114.01	0.808	IN4C
C3	9/21/15 19:13	355.3	1.610	2.5	109.18		
C4	9/21/15 19:14	353.5	1.427	1.9	96.71		
D1	9/21/15 19:10	353.7	1.660	2.7	112.45	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 19:11	354.7	1.675	4.2	113.35	0.808	IN4D
D3	9/21/15 19:13	355.9	1.611	3.2	109.22		
D4	9/21/15 19:14	352.0	1.456	6.3	98.04		
Average		**355.0**	**1.613**	**2.7**	**109.40**		

KSCFH	**81555**
ADJKSCFH	**80233.8**
SCFH	**80234000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**11**	Md	**30.50**
Baro Press	**29.12**	**CO2**	**14.4**		
Static Press	**-2.00**	**O2**	**4.9**		<INPUTS
Molecular Wt.	**29.13**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 19:15	355.2	1.690	3.1	114.70	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 19:17	355.4	1.666	2.4	113.16	0.809	IN4A
A3	9/21/15 19:18	354.6	1.599	1.7	108.60		
A4	9/21/15 19:19	352.0	1.485	1.5	100.71		
B1	9/21/15 19:15	355.4	1.703	3.0	115.47	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 19:17	352.2	1.706	3.1	115.43	0.808	IN4B
B3	9/21/15 19:18	353.0	1.635	3.0	110.69		
B4	9/21/15 19:19	357.9	1.575	2.5	107.00		
C1	9/21/15 19:15	358.9	1.666	1.8	113.30	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 19:17	359.8	1.658	2.3	112.78	0.808	IN4C
C3	9/21/15 19:18	357.7	1.626	2.3	110.47		
C4	9/21/15 19:19	351.5	1.415	3.3	95.68		
D1	9/21/15 19:15	351.6	1.683	2.2	113.92	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 19:17	352.4	1.661	3.7	112.33	0.808	IN4D
D3	9/21/15 19:18	356.4	1.613	1.7	109.54		
D4	9/21/15 19:19	347.3	1.452	4.2	97.83		
Average		**354.5**	**1.615**	**2.6**	**109.48**		

KSCFH	**81673**
ADJKSCFH	**80349.9**
SCFH	**80350000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**12**	Md	**30.51**
Baro Press	**29.12**	**CO2**	**14.5**		
Static Press	**-2.00**	**O2**	**4.8**		<INPUTS
Molecular Wt.	**29.14**	**%Moisture**	**11.0**		
Area of Flue	**330.1**	**Load**	**High**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 19:20	354.7	1.676	2.8	113.73	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 19:21	353.1	1.664	1.9	112.88	0.809	IN4A
A3	9/21/15 19:23	352.2	1.623	1.6	110.05		
A4	9/21/15 19:24	355.3	1.464	1.7	99.46		
B1	9/21/15 19:20	355.1	1.717	2.5	116.43	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 19:21	358.4	1.685	2.6	114.48	0.808	IN4B
B3	9/21/15 19:23	352.4	1.636	2.2	110.77		
B4	9/21/15 19:24	351.0	1.502	2.4	101.60		
C1	9/21/15 19:20	351.7	1.702	3.0	115.12	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 19:21	354.0	1.660	3.2	112.42	0.808	IN4C
C3	9/21/15 19:23	353.4	1.622	3.0	109.82		
C4	9/21/15 19:24	354.1	1.406	3.9	95.15		
D1	9/21/15 19:20	369.3	1.668	1.1	114.17	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 19:21	352.7	1.692	3.2	114.49	0.808	IN4D
D3	9/21/15 19:23	353.0	1.622	2.6	109.83		
D4	9/21/15 19:24	353.5	1.454	2.9	98.46		
Average		**354.6**	**1.612**	**2.5**	**109.30**		

KSCFH	**81523**
ADJKSCFH	**80202.3**
SCFH	**80202000**

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

Client:	Ameren
Site:	Labadie
Date:	9/21-22/2015
Unit Number:	Unit 3
Load:	Low

Run:	1-5	6-12
Initial Weight of Impingers:	3623.00	3676.00
Final Weight of Impingers:	3687.00	3732.00
Weight gain of Impingers:	64.00	56.00
Initial Meter Reading:	372.012	394.769
Final Meter Reading:	394.210	416.950
Volume Metered:	22.198	22.181
Meter Temperature:	88.00	89.00
Delta H:	2.062	2.062
Barometric Pressure:	29.23	29.23
Meter Correction Factor:	0.975	0.975
Volume Measured (DSCF):	20.47	20.42
Water Volume (SCF):	3.02	2.64
% Moisture in Flue Gas:	12.80	11.50

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Pitot Coef.	**0.809**	**O2**	**5.1**		<INPUTS
Static Press	**-1.27**	**Pitot No.**	**IN4A**		
Molecular Wt.	**28.88**	**%Moisture**	**12.8**		
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	9/21/15 23:45	283.0	0.665	-0.7	43.21
2	2.00	9/21/15 23:44	281.1	0.676	-0.4	43.88
3	3.00	9/21/15 23:43	288.9	0.639	-0.6	41.69
4	4.00	9/21/15 23:42	287.8	0.631	-0.4	41.14
5	5.00	9/21/15 23:40	293.7	0.672	-0.7	43.98
6	6.00	9/21/15 23:39	300.7	0.713	-0.5	46.88
7	7.00	9/21/15 23:37	304.3	0.739	-0.1	48.71
A4	7.87	9/21/15 23:35	303.6	0.759	-0.4	50.00
8	8.00	9/21/15 23:35	303.6	0.759	-0.4	50.00
9	9.00	9/21/15 23:34	306.6	0.783	-0.1	51.69
10	10.00	9/21/15 23:33	305.6	0.758	-0.5	50.00
11	11.00	9/21/15 23:32	308.2	0.782	-0.4	51.67
12	12.00	9/21/15 23:31	308.8	0.799	-0.7	52.82
D-Rem	14.22	9/21/15 23:30	308.8	0.792	-0.1	52.36
A3	25.83	9/21/15 23:28	308.0	0.839	-0.4	55.43
A2	47.72	9/21/15 23:27	305.1	0.875	-0.5	57.70
A1	79.46	9/21/15 23:25	311.6	0.878	0.8	58.14
Average			**307.1**	**0.751**	**-0.4**	**49.37**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Pitot Coef.	**0.808**	**O2**	**5.1**		<INPUTS
Static Press	**-1.27**	**Pitot No.**	**IN4B**		
Molecular Wt.	**28.88**	**%Moisture**	**12.8**		
Area of Flue	**330.1**	**Load**	**Low**		
Stack Diameter	**20.5**				

Point No. Port B	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/21/15 23:45	250.5	0.716	-6.4	45.16
2	2.00	9/21/15 23:44	252.3	0.707	-6.0	44.69
3	3.00	9/21/15 23:43	253.2	0.685	-6.3	43.30
4	4.00	9/21/15 23:42	275.4	0.687	-5.9	44.13
5	5.00	9/21/15 23:40	302.1	0.751	-6.3	49.07
6	6.00	9/21/15 23:39	304.6	0.694	-5.3	45.50
7	7.00	9/21/15 23:37	307.5	0.813	-5.7	53.37
A4	7.87	9/21/15 23:35	308.4	0.832	-5.4	54.68
8	8.00	9/21/15 23:35	308.4	0.832	-5.4	54.68
9	9.00	9/21/15 23:34	304.4	0.840	-5.9	55.01
10	10.00	9/21/15 23:33	311.2	0.828	-5.7	54.48
11	11.00	9/21/15 23:32	309.4	0.821	-5.8	53.95
12	12.00	9/21/15 23:31	310.0	0.819	-5.3	53.89
D-Rem	14.22	9/21/15 23:30	309.5	0.853	-6.2	56.02
A3	25.83	9/21/15 23:28	309.1	0.873	-5.3	57.41
A2	47.72	9/21/15 23:27	308.5	0.897	-6.1	58.88
A1	79.46	9/21/15 23:25	309.1	0.885	-5.6	58.17
Average			**308.8**	**0.796**	**-5.8**	**51.91**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Pitot Coef.	**0.808**	**O2**	**5.1**		<INPUTS
Static Press	**-1.27**	**Pitot No.**	**IN4C**		
Molecular Wt.	**28.88**	**%Moisture**	**12.8**		
Area of Flue	**330.1**	**Load**	**Low**		
Stack Diameter	**20.5**				

Point No. Port C	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/21/15 23:45	228.2	0.589	-1.1	36.79
2	2.00	9/21/15 23:44	236.5	0.586	-0.8	36.82
3	3.00	9/21/15 23:43	243.5	0.593	-1.3	37.44
4	4.00	9/21/15 23:42	256.3	0.574	-1.0	36.58
5	5.00	9/21/15 23:40	293.3	0.619	-1.3	40.45
6	6.00	9/21/15 23:39	302.3	0.690	-1.2	45.36
7	7.00	9/21/15 23:37	306.7	0.719	-1.3	47.40
A4	7.87	9/21/15 23:35	305.4	0.738	-0.8	48.61
8	8.00	9/21/15 23:35	305.4	0.738	-0.8	48.61
9	9.00	9/21/15 23:34	307.3	0.742	-2.4	48.90
10	10.00	9/21/15 23:33	306.5	0.759	-2.1	50.01
11	11.00	9/21/15 23:32	307.6	0.755	-2.6	49.76
12	12.00	9/21/15 23:31	307.7	0.766	-2.8	50.48
D-Rem	14.22	9/21/15 23:30	307.5	0.807	-2.6	53.18
A3	25.83	9/21/15 23:28	308.1	0.851	-2.5	56.11
A2	47.72	9/21/15 23:27	309.7	0.875	-4.2	57.65
A1	79.46	9/21/15 23:25	312.4	0.892	-4.5	58.85
Average			**308.9**	**0.723**	**-2.0**	**47.24**

Method 2H Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**1**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Pitot Coef.	**0.808**	**O2**	**5.1**		<INPUTS
Static Press	**-1.27**	**Pitot No.**	**IN4D**		
Molecular Wt.	**28.88**	**%Moisture**	**12.8**		
Area of Flue	**330.1**	**Load**	**Low**		
Stack Diameter	**20.5**				

Point No. Port D	Dist from Wall (in.)	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel
1	1.00	9/21/15 23:45	211.2	0.607	-4.6	37.33
2	2.00	9/21/15 23:44	216.7	0.635	-4.6	39.21
3	3.00	9/21/15 23:43	219.6	0.618	-4.7	38.23
4	4.00	9/21/15 23:42	224.3	0.616	-4.6	38.25
5	5.00	9/21/15 23:40	275.4	0.651	-4.4	41.91
6	6.00	9/21/15 23:39	291.6	0.694	-4.4	45.17
7	7.00	9/21/15 23:37	293.9	0.717	-4.1	46.76
A4	7.87	9/21/15 23:35	304.6	0.756	-4.0	49.66
8	8.00	9/21/15 23:35	304.6	0.756	-4.0	49.66
9	9.00	9/21/15 23:34	303.2	0.780	-4.2	51.17
10	10.00	9/21/15 23:33	308.0	0.782	-4.1	51.47
11	11.00	9/21/15 23:32	307.4	0.780	-3.7	51.35
12	12.00	9/21/15 23:31	310.7	0.817	-4.9	53.81
D-Rem	14.22	9/21/15 23:30	309.1	0.812	-3.9	53.50
A3	25.83	9/21/15 23:28	308.7	0.864	-6.1	56.72
A2	47.72	9/21/15 23:27	312.0	0.919	-5.4	60.53
A1	79.46	9/21/15 23:25	311.0	0.899	-7.7	58.91
Average			**309.1**	**0.747**	**-4.7**	**48.45**

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/21/2015**
Project No.	**15-409**	**Unit**	**3**
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	43.21	21.61	11883.60	11691.17	192.43	4157.52
2	43.88	43.55	11691.17	11500.30	190.86	8311.10
3	41.69	42.79	11500.30	11311.01	189.29	8098.84
4	41.14	41.42	11311.01	11123.29	187.72	7774.46
5	43.98	42.56	11123.29	10937.14	186.15	7922.55
6	46.88	45.43	10937.14	10752.56	184.58	8385.43
7	48.71	47.80	10752.56	10569.55	183.01	8746.89
8	50.00	49.36	10569.55	10388.12	181.44	8954.85
9	51.69	50.85	10388.12	10208.25	179.87	9145.33
10	50.00	50.85	10208.25	10029.95	178.30	9065.46
11	51.67	50.84	10029.95	9853.23	176.73	8983.83
12	52.82	52.25	9853.23	9678.07	175.15	9150.94

Total volumetric flow for all sections located between stack wall and d last.	98697.21
Velocity measured at d rem	52.36
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	40074.9847
Wall effects-adjusted flow in equal area sector. (Qt)	138772.19
Replacement point for Port A.	46.71

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/21/2015**
Project No.	**15-409**	**Unit**	**3**
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	45.16	22.58	11883.60	11691.17	192.43	4345.14
2	44.69	44.93	11691.17	11500.30	190.86	8574.49
3	43.30	44.00	11500.30	11311.01	189.29	8327.88
4	44.13	43.72	11311.01	11123.29	187.72	8206.22
5	49.07	46.60	11123.29	10937.14	186.15	8674.59
6	45.50	47.29	10937.14	10752.56	184.58	8727.83
7	53.37	49.44	10752.56	10569.55	183.01	9047.02
8	54.68	54.03	10569.55	10388.12	181.44	9802.17
9	55.01	54.85	10388.12	10208.25	179.87	9864.80
10	54.48	54.75	10208.25	10029.95	178.30	9760.82
11	53.95	54.22	10029.95	9853.23	176.73	9581.16
12	53.89	53.92	9853.23	9678.07	175.15	9444.33

Total volumetric flow for all sections located between stack wall and d last.	104356.45
Velocity measured at d rem	56.02
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	42876.2537
Wall effects-adjusted flow in equal area sector. (Qt)	147232.70
Replacement point for Port B.	49.56

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/21/2015**
Project No.	**15-409**	**Unit**	**3**
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	36.79	18.40	11883.60	11691.17	192.43	3539.81
2	36.82	36.81	11691.17	11500.30	190.86	7024.69
3	37.44	37.13	11500.30	11311.01	189.29	7028.40
4	36.58	37.01	11311.01	11123.29	187.72	6947.55
5	40.45	38.52	11123.29	10937.14	186.15	7169.57
6	45.36	42.91	10937.14	10752.56	184.58	7919.37
7	47.40	46.38	10752.56	10569.55	183.01	8487.93
8	48.61	48.01	10569.55	10388.12	181.44	8709.91
9	48.90	48.76	10388.12	10208.25	179.87	8769.41
10	50.01	49.46	10208.25	10029.95	178.30	8817.63
11	49.76	49.89	10029.95	9853.23	176.73	8815.94
12	50.48	50.12	9853.23	9678.07	175.15	8778.74

Total volumetric flow for all sections located between stack wall and d last.	92008.95
Velocity measured at d rem	53.18
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	40702.5915
Wall effects-adjusted flow in equal area sector. (Qt)	132711.54
Replacement point for Port C.	44.67

Method 2H Worksheet 2H-1

Client	**Ameren**	**Date**	**9/21/2015**
Project No.	**15-409**	**Unit**	**3**
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	37.33	18.67	11883.60	11691.17	192.43	3591.77
2	39.21	38.27	11691.17	11500.30	190.86	7304.30
3	38.23	38.72	11500.30	11311.01	189.29	7329.37
4	38.25	38.24	11311.01	11123.29	187.72	7178.44
5	41.91	40.08	11123.29	10937.14	186.15	7460.89
6	45.17	43.54	10937.14	10752.56	184.58	8036.58
7	46.76	45.97	10752.56	10569.55	183.01	8411.98
8	49.66	48.21	10569.55	10388.12	181.44	8747.11
9	51.17	50.42	10388.12	10208.25	179.87	9067.99
10	51.47	51.32	10208.25	10029.95	178.30	9150.15
11	51.35	51.41	10029.95	9853.23	176.73	9085.44
12	53.81	52.58	9853.23	9678.07	175.15	9209.62

Total volumetric flow for all sections located between stack wall and d last.	94573.66
Velocity measured at d rem	53.50
Total area in remainder of Method 1 equal area segment.	765.37404
Total flow in remainder of Method 1 equal area segment. (Qrem)	40947.5111
Wall effects-adjusted flow in equal area sector. (Qt)	135521.17
Replacement point for Port D.	45.62

Method 2H Calculations

Drem = 14.2168

Point Dist. From Wall	Port A	Port B	Port C	Port D		
					Uncorrected Vavg	56.09
					Provisional Adj.	
1.00	43.21	45.16	36.79	37.33	V'avg	55.07
2.00	43.88	44.69	36.82	39.21		
3.00	41.69	43.30	37.44	38.23	Wall Adj Factor	0.9818
4.00	41.14	44.13	36.58	38.25	Must be >97%	
5.00	43.98	49.07	40.45	41.91		
6.00	46.88	45.50	45.36	45.17		
7.00	48.71	53.37	47.40	46.76		
7.87	50.00	54.68	48.61	49.66		
8.00	50.00	54.68	48.61	49.66		
9.00	51.69	55.01	48.90	51.17	Average Temp	308
10.00	50.00	54.48	50.01	51.47	Average Angle	-3.20
11.00	51.67	53.95	49.76	51.35		
12.00	52.82	53.89	50.48	53.81		
14.22	52.36	56.02	53.18	53.50	Unadj KSCFH	44599
25.83	55.43	57.41	56.11	56.72	Adj KSCFH	43787.4
47.72	57.70	58.88	57.65	60.53	SCFH	43787000
79.46	58.14	58.17	58.85	58.91		

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**2**	Md	**30.47**
Baro Press	**29.23**	**CO2**	**14.1**		
Static Press	**-1.27**	**O2**	**5.3**		<INPUTS
Molecular Wt.	**28.87**	**%Moisture**	**12.8**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 23:46	295.6	0.890	0.4	58.34	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 23:48	301.5	0.868	-0.2	57.12	0.809	IN4A
A3	9/21/15 23:49	299.4	0.840	-0.2	55.20		
A4	9/21/15 23:50	301.3	0.750	-0.5	49.35		
B1	9/21/15 23:46	278.7	0.916	-7.7	58.76	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 23:48	298.5	0.882	-7.3	57.38	0.808	IN4B
B3	9/21/15 23:49	301.6	0.853	-7.3	55.61		
B4	9/21/15 23:50	301.7	0.839	-7.8	54.64		
C1	9/21/15 23:46	255.8	0.903	-1.5	57.52	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 23:48	297.8	0.878	-1.6	57.54	0.808	IN4C
C3	9/21/15 23:49	299.8	0.843	-0.5	55.34		
C4	9/21/15 23:50	299.6	0.710	-10.0	45.90		
D1	9/21/15 23:46	286.7	0.903	-5.9	58.46	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 23:48	297.4	0.900	-6.3	58.64	0.808	IN4D
D3	9/21/15 23:49	300.3	0.859	-5.3	56.17		
D4	9/21/15 23:50	300.2	0.739	-5.7	48.29		
Average		**294.7**	**0.848**	**-4.2**	**55.27**		

KSCFH	**44746**
ADJKSCFH	**43931.6**
SCFH	**43932000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21/2015**		
Project No.	**15-409**	**Run No.**	**3**	Md	**30.49**
Baro Press	**29.23**	**CO2**	**14.3**		
Static Press	**-1.27**	**O2**	**5.0**		<INPUTS
Molecular Wt.	**28.89**	**%Moisture**	**12.8**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 23:51	299.6	0.869	0.0	57.09	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 23:53	301.2	0.873	-0.3	57.42	0.809	IN4A
A3	9/21/15 23:54	302.5	0.869	-0.1	57.20		
A4	9/21/15 23:55	299.1	0.752	0.0	49.39		
B1	9/21/15 23:51	301.9	0.881	-7.1	57.45	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 23:53	301.9	0.899	-7.2	58.61	0.808	IN4B
B3	9/21/15 23:54	299.8	0.878	-7.3	57.15		
B4	9/21/15 23:55	302.3	0.825	-7.6	53.75		
C1	9/21/15 23:51	303.3	0.864	-9.6	56.04	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 23:53	298.2	0.861	-10.4	55.52	0.808	IN4C
C3	9/21/15 23:54	300.3	0.842	-10.1	54.42		
C4	9/21/15 23:55	298.7	0.704	-9.3	45.56		
D1	9/21/15 23:51	298.1	0.899	-6.6	58.54	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 23:53	302.4	0.903	-6.5	58.98	0.808	IN4D
D3	9/21/15 23:54	302.0	0.886	-5.9	57.92		
D4	9/21/15 23:55	301.0	0.766	-5.8	50.05		
Average		**300.8**	**0.848**	**-5.9**	**55.32**		

KSCFH	**44431**
ADJKSCFH	**43622.4**
SCFH	**43622000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/21-22/2015**		
Project No.	**15-409**	**Run No.**	**4**	Md	**30.48**
Baro Press	**29.23**	**CO2**	**14.2**		
Static Press	**-1.27**	**O2**	**5.1**		<INPUTS
Molecular Wt.	**28.88**	**%Moisture**	**12.8**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/21/15 23:56	299.5	0.856	0.6	56.24	**Pitot Coef. A**	**Pitot No.**
A2	9/21/15 23:58	298.4	0.860	-0.5	56.46	0.809	IN4A
A3	9/21/15 23:59	299.6	0.854	-0.1	56.12		
A4	9/22/15 0:00	299.3	0.751	-0.7	49.34		
B1	9/21/15 23:56	301.3	0.881	-8.0	57.32	**Pitot Coef. B**	**Pitot No.**
B2	9/21/15 23:58	299.7	0.866	-7.7	56.33	0.808	IN4B
B3	9/21/15 23:59	298.7	0.852	-9.3	55.15		
B4	9/22/15 0:00	299.9	0.831	-10.6	53.62		
C1	9/21/15 23:56	301.4	0.860	-9.9	55.67	**Pitot Coef. C**	**Pitot No.**
C2	9/21/15 23:58	301.2	0.836	-9.6	54.16	0.808	IN4C
C3	9/21/15 23:59	297.9	0.801	-8.9	51.88		
C4	9/22/15 0:00	299.5	0.718	-5.7	46.89		
D1	9/21/15 23:56	297.8	0.872	-5.9	56.86	**Pitot Coef. D**	**Pitot No.**
D2	9/21/15 23:58	296.7	0.893	-5.6	58.22	0.808	IN4D
D3	9/21/15 23:59	298.2	0.893	-5.7	58.26		
D4	9/22/15 0:00	301.7	0.756	-5.7	49.44		
Average		**299.4**	**0.836**	**-5.8**	**54.50**		

KSCFH	**43850**
ADJKSCFH	**43051.9**
SCFH	**43052000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**5**	Md	**30.50**
Baro Press	**29.23**	**CO2**	**14.4**		
Static Press	**-1.27**	**O2**	**4.9**		<INPUTS
Molecular Wt.	**28.90**	**%Moisture**	**12.8**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:01	298.8	0.872	-0.3	57.25	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:02	297.6	0.867	-0.2	56.88	0.809	IN4A
A3	9/22/15 0:03	298.2	0.848	-0.3	55.65		
A4	9/22/15 0:05	294.1	0.741	0.0	48.50		
B1	9/22/15 0:01	300.9	0.901	-10.4	58.19	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:02	299.6	0.886	-9.7	57.30	0.808	IN4B
B3	9/22/15 0:03	298.4	0.860	-9.6	55.59		
B4	9/22/15 0:05	296.9	0.814	-10.0	52.50		
C1	9/22/15 0:01	300.0	0.892	-6.3	58.18	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:02	297.8	0.856	-7.0	55.67	0.808	IN4C
C3	9/22/15 0:03	297.1	0.829	-6.3	53.97		
C4	9/22/15 0:05	294.6	0.705	-6.2	45.83		
D1	9/22/15 0:01	295.9	0.900	-6.6	58.51	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:02	297.4	0.900	-5.2	58.72	0.808	IN4D
D3	9/22/15 0:03	294.6	0.869	-4.4	56.66		
D4	9/22/15 0:05	296.1	0.751	-3.6	49.06		
Average		**297.4**	**0.843**	**-5.4**	**54.90**		

KSCFH	**44292**
ADJKSCFH	**43485.9**
SCFH	**43486000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**6**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-1.27**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.02**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:06	295.6	0.860	0.2	56.23	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:07	294.2	0.878	0.5	57.35	0.809	IN4A
A3	9/22/15 0:08	296.3	0.860	0.1	56.25		
A4	9/22/15 0:10	291.0	0.783	-0.5	51.03		
B1	9/22/15 0:06	295.9	0.896	-13.8	56.83	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:07	296.5	0.908	-13.5	57.69	0.808	IN4B
B3	9/22/15 0:08	296.6	0.904	-13.6	57.41		
B4	9/22/15 0:10	296.6	0.851	-12.6	54.27		
C1	9/22/15 0:06	296.4	0.877	-5.7	57.01	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:07	294.2	0.873	-5.9	56.65	0.808	IN4C
C3	9/22/15 0:08	296.6	0.860	-3.1	56.11		
C4	9/22/15 0:10	293.7	0.726	-4.2	47.22		
D1	9/22/15 0:06	298.0	0.900	-5.1	58.63	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:07	296.4	0.903	-4.7	58.80	0.808	IN4D
D3	9/22/15 0:08	297.3	0.882	-5.3	57.41		
D4	9/22/15 0:10	294.2	0.774	-5.5	50.26		
Average		**295.6**	**0.858**	**-5.8**	**55.57**		

KSCFH	**44938**
ADJKSCFH	**44120.1**
SCFH	**44120000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**7**	Md	**30.47**
Baro Press	**29.23**	**CO2**	**14.1**		
Static Press	**-1.27**	**O2**	**5.3**		<INPUTS
Molecular Wt.	**29.03**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:11	295.9	0.896	1.1	58.57	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:13	294.1	0.876	0.4	57.20	0.809	IN4A
A3	9/22/15 0:14	298.1	0.849	-0.4	55.59		
A4	9/22/15 0:15	291.6	0.753	0.6	49.09		
B1	9/22/15 0:11	296.7	0.921	-4.2	60.01	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:13	300.7	0.902	-4.2	58.93	0.808	IN4B
B3	9/22/15 0:14	295.5	0.862	-4.0	56.14		
B4	9/22/15 0:15	296.2	0.836	-6.7	54.23		
C1	9/22/15 0:11	296.3	0.895	-4.1	58.31	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:13	296.6	0.858	-4.1	55.91	0.808	IN4C
C3	9/22/15 0:14	293.2	0.821	-3.8	53.40		
C4	9/22/15 0:15	294.2	0.692	-3.7	45.04		
D1	9/22/15 0:11	295.5	0.921	-5.8	59.82	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:13	296.0	0.901	-3.9	58.70	0.808	IN4D
D3	9/22/15 0:14	294.1	0.860	-2.7	56.03		
D4	9/22/15 0:15	298.1	0.744	-4.1	48.53		
Average		**295.8**	**0.849**	**-3.1**	**55.34**		

KSCFH	**44740**
ADJKSCFH	**43925.7**
SCFH	**43926000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**8**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-1.27**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.02**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:16	296.4	0.874	0.8	57.17	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:17	297.4	0.866	-0.3	56.69	0.809	IN4A
A3	9/22/15 0:19	289.7	0.848	0.4	55.22		
A4	9/22/15 0:20	292.6	0.746	-0.4	48.67		
B1	9/22/15 0:16	297.1	0.891	-4.7	58.04	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:17	292.9	0.891	-3.4	57.97	0.808	IN4B
B3	9/22/15 0:19	295.7	0.856	-7.9	55.37		
B4	9/22/15 0:20	293.5	0.814	-6.9	52.69		
C1	9/22/15 0:16	293.5	0.875	-3.6	56.94	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:17	293.1	0.874	-3.7	56.86	0.808	IN4C
C3	9/22/15 0:19	295.5	0.828	-3.4	53.97		
C4	9/22/15 0:20	292.2	0.687	-3.5	44.68		
D1	9/22/15 0:16	292.8	0.880	-4.9	57.15	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:17	294.3	0.891	-5.8	57.83	0.808	IN4D
D3	9/22/15 0:19	294.1	0.858	-5.6	55.70		
D4	9/22/15 0:20	294.5	0.759	-4.7	49.36		
Average		**294.1**	**0.840**	**-3.6**	**54.64**		

KSCFH	**44274**
ADJKSCFH	**43468.2**
SCFH	**43468000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**9**	Md	**30.46**
Baro Press	**29.23**	**CO2**	**14.0**		
Static Press	**-1.27**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.02**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:21	295.2	0.854	1.8	55.79	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:23	295.3	0.858	-0.2	56.08	0.809	IN4A
A3	9/22/15 0:24	293.9	0.841	0.3	54.92		
A4	9/22/15 0:25	293.5	0.736	0.0	48.05		
B1	9/22/15 0:21	297.6	0.872	-6.8	56.61	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:23	294.9	0.885	-7.0	57.33	0.808	IN4B
B3	9/22/15 0:24	293.4	0.841	-6.9	54.44		
B4	9/22/15 0:25	293.9	0.834	-6.4	54.06		
C1	9/22/15 0:21	291.2	0.871	-3.6	56.60	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:23	291.5	0.875	-3.6	56.87	0.808	IN4C
C3	9/22/15 0:24	297.5	0.834	-3.9	54.40		
C4	9/22/15 0:25	291.3	0.730	-5.3	47.33		
D1	9/22/15 0:21	293.7	0.876	-6.4	56.77	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:23	295.7	0.868	-4.4	56.52	0.808	IN4D
D3	9/22/15 0:24	294.8	0.880	-3.4	57.33		
D4	9/22/15 0:25	292.6	0.758	-4.3	49.26		
Average		**294.1**	**0.838**	**-3.8**	**54.52**		

KSCFH	**44175**
ADJKSCFH	**43371.0**
SCFH	**43371000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**10**	Md	**30.50**
Baro Press	**29.23**	**CO2**	**14.4**		
Static Press	**-1.27**	**O2**	**4.9**		<INPUTS
Molecular Wt.	**29.06**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:26	291.4	0.862	1.1	56.15	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:27	292.0	0.875	0.1	57.03	0.809	IN4A
A3	9/22/15 0:28	291.5	0.866	-0.1	56.43		
A4	9/22/15 0:30	290.4	0.764	-0.2	49.74		
B1	9/22/15 0:26	292.0	0.886	-6.9	57.26	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:27	295.0	0.888	-7.0	57.49	0.808	IN4B
B3	9/22/15 0:28	295.0	0.865	-4.3	56.26		
B4	9/22/15 0:30	291.2	0.843	-4.4	54.69		
C1	9/22/15 0:26	293.1	0.893	-4.1	58.03	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:27	292.6	0.876	-3.7	56.93	0.808	IN4C
C3	9/22/15 0:28	295.1	0.859	-4.0	55.90		
C4	9/22/15 0:30	292.6	0.723	-3.2	47.01		
D1	9/22/15 0:26	287.5	0.878	-5.7	56.70	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:27	295.6	0.904	-5.3	58.74	0.808	IN4D
D3	9/22/15 0:28	293.1	0.877	-4.1	56.99		
D4	9/22/15 0:30	293.7	0.771	-5.7	50.00		
Average		**292.6**	**0.852**	**-3.6**	**55.33**		

KSCFH	**44921**
ADJKSCFH	**44103.4**
SCFH	**44103000**

Method 2G Worksheet

Client	**Ameren**	**Date**	**9/22/2015**		
Project No.	**15-409**	**Run No.**	**11**	Md	**30.47**
Baro Press	**29.23**	**CO2**	**14.1**		
Static Press	**-1.27**	**O2**	**5.3**		<INPUTS
Molecular Wt.	**29.03**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:31	292.6	0.885	0.9	57.73	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:32	292.3	0.863	0.2	56.29	0.809	IN4A
A3	9/22/15 0:33	293.2	0.829	0.3	54.10		
A4	9/22/15 0:35	291.7	0.736	0.1	47.99		
B1	9/22/15 0:31	294.5	0.909	-5.7	59.01	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:32	293.6	0.883	-5.7	57.29	0.808	IN4B
B3	9/22/15 0:33	293.1	0.858	-5.3	55.68		
B4	9/22/15 0:35	293.2	0.813	-5.3	52.77		
C1	9/22/15 0:31	292.4	0.893	-4.1	58.03	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:32	294.7	0.866	-4.2	56.35	0.808	IN4C
C3	9/22/15 0:33	291.9	0.853	-3.9	55.43		
C4	9/22/15 0:35	290.0	0.702	-2.4	45.62		
D1	9/22/15 0:31	292.2	0.886	-7.5	57.22	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:32	290.8	0.871	-5.0	56.47	0.808	IN4D
D3	9/22/15 0:33	293.7	0.835	-5.7	54.18		
D4	9/22/15 0:35	292.5	0.739	-5.6	47.92		
Average		**292.7**	**0.839**	**-3.7**	**54.50**		

KSCFH	**44245**
ADJKSCFH	**43439.7**
SCFH	**43440000**

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	**-1.27**	**O2**	**5.4**		<INPUTS
Molecular Wt.	**29.02**	**%Moisture**	**11.5**		
Area of Flue	**330.1**	**Load**	**Low**		

Point No.	Time	Stack T	Sqrt.ΔP	Yaw Angle	Point Vel		
A1	9/22/15 0:36	292.8	0.867	-0.2	56.58	**Pitot Coef. A**	**Pitot No.**
A2	9/22/15 0:37	292.5	0.876	-0.2	57.15	0.809	IN4A
A3	9/22/15 0:38	292.6	0.851	-0.8	55.52		
A4	9/22/15 0:40	291.0	0.737	-0.9	48.03		
B1	9/22/15 0:36	294.8	0.890	-4.8	57.88	**Pitot Coef. B**	**Pitot No.**
B2	9/22/15 0:37	291.8	0.893	-5.4	57.91	0.808	IN4B
B3	9/22/15 0:38	294.1	0.893	0.2	58.25		
B4	9/22/15 0:40	295.8	0.826	0.6	53.94		
C1	9/22/15 0:36	291.2	0.885	-3.3	57.53	**Pitot Coef. C**	**Pitot No.**
C2	9/22/15 0:37	292.2	0.883	-1.4	57.51	0.808	IN4C
C3	9/22/15 0:38	290.9	0.859	-0.3	55.92		
C4	9/22/15 0:40	291.1	0.708	-1.4	46.08		
D1	9/22/15 0:36	290.0	0.869	-5.4	56.28	**Pitot Coef. D**	**Pitot No.**
D2	9/22/15 0:37	292.1	0.895	-7.8	57.77	0.808	IN4D
D3	9/22/15 0:38	291.4	0.856	-6.4	55.39		
D4	9/22/15 0:40	295.5	0.747	-5.0	48.59		
Average		**292.5**	**0.846**	**-2.7**	**55.02**		

KSCFH	**44677**
ADJKSCFH	**43863.9**
SCFH	**43864000**

SAMPLING AND ANALYTICAL PROCEDURES

Test Methods used at Ameren, Labadie Station – Unit 3

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 0.9838 on the High (Normal), and 0.9818 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

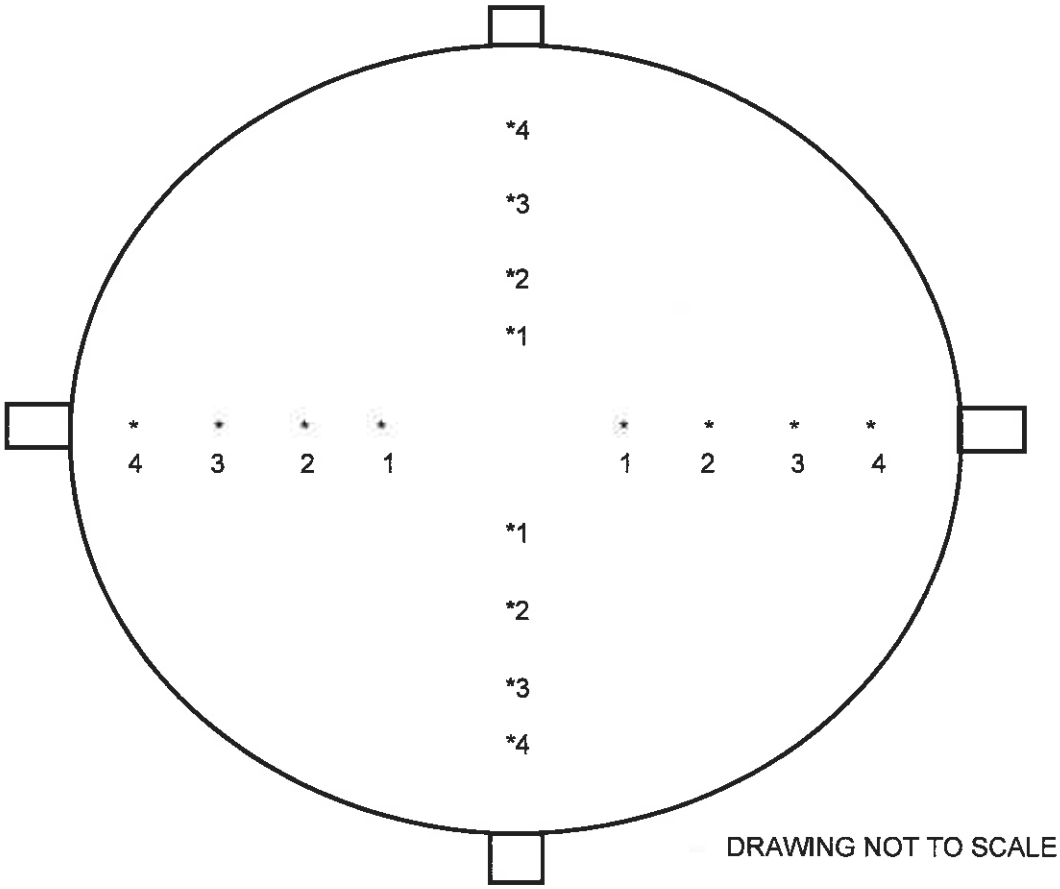
CO_2 concentrations were determined with 10 Method 3A test runs on the Normal load. The sampling was performed at 3-points. GCI used a monitor range of 0-22.15% for CO_2.

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 3

Grace Consulting, Inc.
Emissions Testing Services

APPENDIX

Sample Calculations

Ameren
Labadie
Unit 3
09-21-15
Run 1

NO_x CALCULATION
(CO_2 Based)

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

6.38E-06 = $1.194 \times 10^{-7} \times 53.40$

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

0.092 = 6.38E-06 x 1840 x $\frac{100}{12.8}$

CO_2 and O_2 CALCULATION
(Calculated from CEMS CO_2)

CO_2 dry = Plant CO_2/ ((100-% Moisture)/100)

O_2 dry = (21) x (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:

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

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

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

Where:

C_{gas} = Effluent gas concentration, dry basis, ppm.
$\bar{C}$ = 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_i	=	volume of condensate through the impingers, ml
V_{ic}	=	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	9/21/2015
	Unit	3	Operator	N.V.

Run 1

	Time	CO2	NOx	SO2
1	14:25:00	12.99	55.22	193.50
2	14:26:00	12.89	52.85	193.93
3	14:27:00	12.83	55.42	194.49
4	14:28:00	12.79	56.93	194.69
5	14:29:00	12.75	53.49	194.68
6	14:30:00	12.70	57.42	194.59
7	14:31:00	12.97	56.08	193.64
8	14:32:00	12.94	50.49	194.99
9	14:33:00	12.91	48.47	194.80
10	14:34:00	12.89	53.87	194.46
11	14:35:00	12.86	54.45	193.77
12	14:36:00	12.83	55.08	194.91
13	14:37:00	12.80	55.04	193.30
14	14:38:00	13.09	54.92	192.36
15	14:39:00	13.07	51.03	194.38
16	14:40:00	13.07	49.60	193.42
17	14:41:00	13.07	52.82	195.18
18	14:42:00	13.06	57.00	193.74
19	14:43:00	13.06	54.24	194.92
20	14:44:00	13.05	55.59	193.34
21	14:45:00	13.06	57.14	194.38
	Average	**12.94**	**54.15**	**194.17**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 2

	Time	CO2	NOx	SO2
1	15:00:00	13.04	58.73	195.22
2	15:01:00	13.04	55.90	195.31
3	15:02:00	13.04	56.43	196.15
4	15:03:00	13.03	52.74	195.71
5	15:04:00	13.03	51.32	197.36
6	15:05:00	13.01	52.95	196.48
7	15:06:00	13.01	56.96	197.13
8	15:07:00	13.00	54.43	197.20
9	15:08:00	13.00	53.94	196.75
10	15:09:00	12.97	59.13	196.55
11	15:10:00	12.94	51.95	196.65
12	15:11:00	12.93	52.96	195.07
13	15:12:00	12.92	53.75	196.25
14	15:13:00	12.90	55.34	195.54
15	15:14:00	12.89	54.44	196.15
16	15:15:00	12.89	51.40	196.17
17	15:16:00	12.89	49.79	196.20
18	15:17:00	12.88	54.22	195.05
19	15:18:00	12.89	53.26	197.45
20	15:19:00	12.88	53.62	196.56
21	15:20:00	12.88	56.25	195.66
	Average	**12.96**	**54.26**	**196.22**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 3

	Time	CO2	NOx	SO2
1	15:35:00	12.91	51.31	196.54
2	15:36:00	12.90	52.46	198.42
3	15:37:00	12.89	55.81	197.82
4	15:38:00	12.90	57.12	196.45
5	15:39:00	12.91	55.85	196.54
6	15:40:00	12.91	54.44	196.70
7	15:41:00	12.90	57.58	195.66
8	15:42:00	12.90	54.12	195.79
9	15:43:00	12.90	53.92	194.56
10	15:44:00	12.90	54.97	195.71
11	15:45:00	12.89	54.78	196.35
12	15:46:00	12.88	53.68	194.34
13	15:47:00	12.87	54.70	195.66
14	15:48:00	12.84	53.54	195.51
15	15:49:00	12.81	55.60	195.87
16	15:50:00	12.81	52.28	196.65
17	15:51:00	12.78	52.99	195.74
18	15:52:00	12.76	52.69	196.80
19	15:53:00	12.73	55.93	196.63
20	15:54:00	12.71	52.18	196.29
21	15:55:00	12.70	54.54	196.59
	Average	**12.85**	**54.31**	**196.22**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 4

	Time	CO2	NOx	SO2
1	16:10:00	13.19	54.46	196.43
2	16:11:00	13.14	56.33	195.70
3	16:12:00	13.10	53.39	196.40
4	16:13:00	13.05	56.93	196.38
5	16:14:00	12.99	56.97	197.06
6	16:15:00	12.94	56.24	196.33
7	16:16:00	12.90	56.66	196.27
8	16:17:00	13.04	56.72	196.39
9	16:18:00	12.98	54.19	197.89
10	16:19:00	12.92	54.39	195.74
11	16:20:00	12.88	52.29	197.80
12	16:21:00	12.83	55.19	195.73
13	16:22:00	12.89	58.56	196.84
14	16:23:00	12.83	57.12	197.96
15	16:24:00	12.88	55.32	196.47
16	16:25:00	12.93	56.16	197.48
17	16:26:00	12.99	55.51	197.45
18	16:27:00	12.95	56.19	197.39
19	16:28:00	13.01	58.66	196.65
20	16:29:00	12.97	55.26	196.22
21	16:30:00	12.93	54.91	196.69
	Average	**12.97**	**55.78**	**196.73**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 5

	Time	CO2	NOx	SO2
1	16:45:00	13.00	53.02	196.91
2	16:46:00	13.03	54.24	197.06
3	16:47:00	13.05	55.13	196.44
4	16:48:00	13.07	54.31	198.31
5	16:49:00	13.09	56.16	196.98
6	16:50:00	12.92	56.93	198.65
7	16:51:00	12.95	57.30	197.99
8	16:52:00	12.99	56.14	196.40
9	16:53:00	13.02	57.41	196.19
10	16:54:00	13.04	57.45	197.31
11	16:55:00	13.07	54.89	198.43
12	16:56:00	13.09	56.74	198.02
13	16:57:00	12.92	56.19	197.12
14	16:58:00	12.95	54.69	196.49
15	16:59:00	12.97	54.67	197.19
16	17:00:00	12.99	57.14	196.91
17	17:01:00	13.01	54.61	196.68
18	17:02:00	13.05	53.36	196.68
19	17:03:00	13.07	54.75	196.48
20	17:04:00	13.08	53.79	198.53
21	17:05:00	13.09	55.12	197.11
	Average	**13.02**	**55.43**	**197.23**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 6

	Time	CO2	NOx	SO2
1	17:20:00	12.72	53.04	196.92
2	17:21:00	12.73	52.40	198.03
3	17:22:00	12.73	57.56	196.59
4	17:23:00	12.75	56.64	197.19
5	17:24:00	12.77	55.24	198.12
6	17:25:00	12.79	57.05	196.90
7	17:26:00	12.81	54.68	196.65
8	17:27:00	12.83	54.27	197.99
9	17:28:00	12.85	53.96	197.58
10	17:29:00	12.87	54.78	199.37
11	17:30:00	12.89	57.22	197.25
12	17:31:00	12.91	56.11	196.25
13	17:32:00	12.93	54.92	196.14
14	17:33:00	12.95	57.89	196.04
15	17:34:00	12.98	56.26	197.79
16	17:35:00	13.02	57.04	197.30
17	17:36:00	13.04	55.69	197.93
18	17:37:00	13.06	56.77	197.26
19	17:38:00	13.08	55.67	197.15
20	17:39:00	13.11	54.93	195.80
21	17:40:00	13.13	54.87	196.00
	Average	**12.90**	**55.57**	**197.15**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 7

	Time	CO2	NOx	SO2
1	17:55:00	13.01	57.22	197.10
2	17:56:00	13.02	57.89	196.95
3	17:57:00	13.03	58.05	197.01
4	17:58:00	13.03	58.66	197.05
5	17:59:00	13.04	56.15	197.27
6	18:00:00	13.05	54.94	197.18
7	18:01:00	13.07	54.46	198.34
8	18:02:00	13.07	55.39	198.86
9	18:03:00	13.08	52.51	196.81
10	18:04:00	13.08	54.75	195.41
11	18:05:00	13.08	55.59	197.61
12	18:06:00	13.07	56.53	197.25
13	18:07:00	13.06	54.72	197.27
14	18:08:00	13.06	52.98	196.26
15	18:09:00	13.05	53.96	196.95
16	18:10:00	13.03	54.34	196.67
17	18:11:00	13.01	56.20	196.63
18	18:12:00	12.99	55.67	196.27
19	18:13:00	12.97	54.92	196.33
20	18:14:00	12.95	57.01	196.75
21	18:15:00	12.92	56.70	197.36
	Average	**13.03**	**55.65**	**197.02**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 8

	Time	CO2	NOx	SO2
1	18:30:00	12.98	54.94	198.06
2	18:31:00	12.93	58.25	198.40
3	18:32:00	12.88	57.79	198.10
4	18:33:00	12.84	58.49	198.00
5	18:34:00	12.81	57.32	198.44
6	18:35:00	12.77	56.14	196.72
7	18:36:00	12.73	55.37	197.72
8	18:37:00	12.68	52.07	199.13
9	18:38:00	12.84	54.01	197.25
10	18:39:00	12.90	55.09	194.87
11	18:40:00	12.93	53.38	196.74
12	18:41:00	12.82	55.59	196.49
13	18:42:00	12.78	57.16	196.53
14	18:43:00	12.84	56.71	196.78
15	18:44:00	12.90	55.96	197.18
16	18:45:00	12.84	57.46	198.18
17	18:46:00	12.96	55.18	197.27
18	18:47:00	13.06	57.69	196.10
19	18:48:00	12.99	57.71	198.53
20	18:49:00	13.03	56.44	197.50
21	18:50:00	12.99	55.69	196.89
	Average	**12.88**	**56.12**	**197.38**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 9

	Time	CO2	NOx	SO2
1	19:05:00	12.81	56.89	196.69
2	19:06:00	12.82	57.33	198.31
3	19:07:00	12.82	57.80	196.90
4	19:08:00	12.83	57.32	197.10
5	19:09:00	12.84	56.27	196.79
6	19:10:00	12.85	56.95	195.66
7	19:11:00	12.87	55.54	196.21
8	19:12:00	12.89	56.22	196.61
9	19:13:00	12.90	55.13	198.25
10	19:14:00	12.91	55.12	198.39
11	19:15:00	12.93	56.85	197.81
12	19:16:00	12.95	56.26	197.21
13	19:17:00	12.97	55.39	197.22
14	19:18:00	13.00	57.57	198.39
15	19:19:00	13.02	60.15	197.52
16	19:20:00	13.05	57.59	197.43
17	19:21:00	13.07	56.24	196.86
18	19:22:00	13.08	53.17	197.20
19	19:23:00	13.09	52.12	196.90
20	19:24:00	13.12	54.69	195.47
21	19:25:00	13.13	56.51	195.39
	Average	**12.95**	**56.24**	**197.06**

	Client	Ameren	Project #	15-409
	Location	Labadie	Date	9/21/2015
	Unit	3	Operator	N.V.

Run 10

	Time	CO2	NOx	SO2
1	19:40:00	12.79	52.22	197.88
2	19:41:00	12.81	54.19	196.82
3	19:42:00	12.84	56.91	196.12
4	19:43:00	12.87	55.39	196.32
5	19:44:00	12.90	56.91	198.34
6	19:45:00	12.92	59.00	197.68
7	19:46:00	12.94	59.81	196.73
8	19:47:00	12.98	58.64	196.57
9	19:48:00	13.00	56.94	197.75
10	19:49:00	13.03	58.21	197.76
11	19:50:00	13.06	57.87	196.46
12	19:51:00	13.09	58.41	196.00
13	19:52:00	13.11	57.69	197.93
14	19:53:00	13.04	56.38	196.24
15	19:54:00	13.06	55.97	195.53
16	19:55:00	13.01	56.25	197.23
17	19:56:00	13.00	58.98	197.59
18	19:57:00	12.99	57.20	196.83
19	19:58:00	12.97	57.69	196.86
20	19:59:00	13.01	56.69	195.43
21	20:00:00	13.05	56.85	196.24
	Average	**12.97**	**57.06**	**196.87**

	Client	Ameren	Project #	15-409		
	Location	Labadie	Date	9/21/2015		
	Unit	3	Operator	N.V.		
		Stratification Test				
Time	**CO2**	**% Dev.**	**NOx**	**% Dev.**	**SO2**	**% Dev.**
13:40	12.95		56.44		196.15	
13:41	12.97		53.10		193.20	
13:42	13.00		55.34		194.27	
13:43	13.01		55.73		195.75	
13:44	13.03		51.03		194.00	
13:45	13.04		54.29		195.88	
13:46	13.06		56.36		194.31	
Average	**13.01**	**0.26%**	**54.61**	**2.53%**	**194.79**	**-0.08%**
13:47	13.10		52.36		195.67	
13:48	13.12		51.67		196.40	
13:49	13.14		52.60		194.36	
13:50	13.15		53.04		195.76	
13:51	13.18		52.12		193.61	
13:52	13.20		51.29		195.05	
13:53	13.23		50.64		195.21	
13:54	13.26		49.66		194.77	
13:55	12.75		50.86		194.62	
Average	**13.13**	**1.20%**	**51.46**	**-3.40%**	**194.77**	**-0.09%**
13:56	12.73		53.26		193.57	
13:57	12.84		55.33		193.57	
13:58	12.83		56.07		192.72	
13:59	12.81		55.94		195.95	
13:59	12.80		53.03		195.05	
14:00	12.79		51.07		194.42	
14:01	12.77		54.47		196.43	
14:02	12.75		52.87		195.45	
14:03	12.75		52.67		196.82	
Average	**12.79**	**-1.46%**	**53.73**	**0.87%**	**195.26**	**0.16%**
Average	**12.97**		**53.27**		**194.94**	

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

RM 4 Moisture Field Data Sheet

Client:	Ameren			Date:	09/21/15				
Plant Name:	Labadie			Operator:	BN				
Project Number:	15-409			Load:	High				
Sampling Location:	Unit 3			Meter Number:	IN2				
Barometric Pressure:	29.12			Meter Correction:	0.975	Meter Orifice:	3.25018	Delta H@:	2.062
Run Number:	1-2	Sample Point	Delta H	Probe Temp	Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	324.582
Start Time:	18:00	5	2.062	250	65	97	4	328.272	
Stop Time:	18:30	10	2.062	250	65	97	4	331.972	
Initial Weight:	3498	15	2.062	250	62	97	4	335.604	
Final Weight:	3553	20	2.062	250	62	97	4	339.348	
Initial Leak Check:	000@15	25	2.062	250	62	98	4	343.125	Static Pressure
Final Leak Check:	000@5	30	2.062	250	62	98	4	346.632	-2.00
Average:						97			22.050
Run Number:	3-12	Sample Point	Delta H	Probe Temp	Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	346.865
Start Time:	18:35	5	2.062	250	55	104	4	350.547	
Stop Time:	19:05	10	2.062	250	55	104	4	354.350	
Initial Weight:	3553	15	2.062	250	54	104	4	357.890	
Final Weight:	3605	20	2.062	250	54	104	4	361.630	
Initial Leak Check:	000@15	25	2.062	250	55	104	4	365.340	Static Pressure
Final Leak Check:	001@5	30	2.062	250	55	104	4	369.110	-2.00
Average:						104			22.245

Ameren, Labadie, Unit 3, High Load **9/21/2015**

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
9/21/15 18:00	353.3	1.670	3.2	365.7	1.716	5.4	354.5	1.704	5.3	355.3	1.699	2.0
9/21/15 18:01	355.7	1.649	3.1	367.5	1.699	5.1	350.7	1.698	5.9	359.2	1.703	5.1
9/21/15 18:02	327.0	1.588	3.0	331.2	1.629	4.5	324.3	1.657	6.4	352.6	1.655	4.5
9/21/15 18:04	353.7	1.525	2.0	358.2	1.535	1.8	358.8	1.556	6.7	355.4	1.587	3.4
9/21/15 18:05	355.6	1.521	6.8	355.4	1.505	11.6	355.9	1.528	3.4	357.1	1.551	3.5
9/21/15 18:07	355.5	1.494	6.5	353.0	1.513	2.8	358.7	1.502	3.6	354.4	1.534	4.6
9/21/15 18:08	355.4	1.488	-2.4	355.6	1.480	2.4	353.0	1.502	6.3	358.6	1.517	4.1
9/21/15 18:09	357.5	1.505	5.6	354.1	1.483	1.0	357.9	1.480	6.8	354.9	1.509	3.4
9/21/15 18:10	354.6	1.469	6.6	355.1	1.470	1.0	353.3	1.451	6.3	355.0	1.491	3.5
9/21/15 18:11	354.3	1.439	5.2	354.2	1.454	1.0	357.2	1.432	4.8	352.6	1.477	4.1
9/21/15 18:13	354.8	1.422	6.2	341.9	1.391	4.1	357.1	1.392	4.3	350.0	1.438	3.4
9/21/15 18:14	354.1	1.394	6.3	331.8	1.322	4.8	352.2	1.313	6.6	338.3	1.360	4.6
9/21/15 18:15	340.5	1.286	6.2	335.3	1.245	4.3	342.9	1.234	4.8	326.6	1.247	4.3
9/21/15 18:16	338.4	1.267	6.3	327.7	1.240	4.3	340.3	1.215	4.8	323.5	1.252	4.8
9/21/15 18:17	326.7	1.155	6.2	319.4	1.161	-1.1	316.5	1.105	6.8	315.9	1.141	3.4
9/21/15 18:19	317.3	1.186	6.9	316.4	1.178	-0.8	312.8	0.936	7.0	312.6	1.459	3.3

Ameren, Labadie, Unit 3, High Load **9/21/2015**

		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	9/21/15 18:30	352.4	1.675	3.5	358.6	1.672	3.8	359.0	1.688	5.4	357.5	1.686	0.5
	9/21/15 18:31	356.9	1.651	2.2	358.0	1.669	3.4	355.2	1.655	5.6	355.8	1.690	4.4
	9/21/15 18:32	356.0	1.597	1.8	358.3	1.624	4.3	357.2	1.635	5.7	355.7	1.614	2.8
	9/21/15 18:34	355.4	1.471	2.0	355.3	1.466	4.0	357.4	1.404	5.0	353.1	1.470	3.1
3	9/21/15 18:35	357.4	1.671	2.9	354.5	1.690	4.0	358.2	1.673	5.7	356.4	1.655	1.2
	9/21/15 18:37	355.6	1.662	2.1	356.6	1.684	4.2	358.3	1.653	3.7	357.8	1.666	3.5
	9/21/15 18:38	355.1	1.626	1.6	358.7	1.644	3.6	354.5	1.632	6.1	357.0	1.624	2.7
	9/21/15 18:39	355.6	1.462	2.0	355.0	1.525	-5.4	359.2	1.422	6.2	357.2	1.452	1.3
4	9/21/15 18:40	359.2	1.691	2.1	357.6	1.718	2.0	359.7	1.693	5.9	354.6	1.671	2.2
	9/21/15 18:42	357.4	1.700	2.2	359.9	1.704	1.0	359.5	1.682	6.1	357.6	1.679	1.9
	9/21/15 18:43	357.6	1.618	1.6	357.1	1.670	2.4	360.0	1.659	4.2	358.5	1.643	3.3
	9/21/15 18:44	355.4	1.488	1.4	357.2	1.601	2.2	354.3	1.439	6.1	357.2	1.478	3.5
5	9/21/15 18:45	346.3	1.687	2.4	351.3	1.724	1.7	331.0	1.702	5.9	357.2	1.662	1.6
	9/21/15 18:47	355.8	1.638	1.9	360.9	1.714	11.4	353.0	1.682	5.8	356.4	1.682	3.6
	9/21/15 18:48	354.3	1.625	1.6	360.1	1.662	8.4	359.0	1.630	6.3	363.0	1.606	2.6
	9/21/15 18:49	354.7	1.488	1.7	362.3	1.597	7.5	355.0	1.422	5.0	355.9	1.441	1.6
6	9/21/15 18:50	355.1	1.680	2.4	353.4	1.728	5.6	354.7	1.705	5.3	356.5	1.679	2.7
	9/21/15 18:51	356.0	1.686	2.5	360.3	1.725	4.9	360.0	1.698	6.2	357.1	1.668	2.1
	9/21/15 18:52	356.9	1.649	1.9	345.8	1.670	5.9	359.3	1.678	5.9	357.7	1.677	2.1
	9/21/15 18:54	356.1	1.487	1.6	355.7	1.593	3.6	356.0	1.431	6.2	357.1	1.458	3.1
7	9/21/15 18:55	365.4	1.684	2.1	357.9	1.722	3.1	352.9	1.711	5.7	354.1	1.670	3.0
	9/21/15 18:55	356.3	1.665	1.6	355.8	1.700	3.0	357.5	1.705	6.0	356.3	1.662	2.2
	9/21/15 18:56	355.8	1.606	0.9	359.6	1.637	2.8	355.6	1.658	6.0	348.9	1.629	2.4
	9/21/15 18:59	357.3	1.460	1.4	355.2	1.579	2.5	353.9	1.425	7.3	353.8	1.491	2.0
8	9/21/15 19:00	352.1	1.694	2.4	359.4	1.703	2.7	353.5	1.661	0.4	354.0	1.676	2.9
	9/21/15 19:01	352.6	1.651	2.6	357.2	1.676	3.6	358.0	1.646	-1.7	357.4	1.674	3.5
	9/21/15 19:03	350.8	1.619	2.2	355.9	1.609	3.2	353.9	1.598	1.3	355.2	1.628	2.6
	9/21/15 19:04	353.7	1.465	2.7	355.6	1.597	2.5	356.5	1.421	3.3	352.9	1.473	3.9
9	9/21/15 19:05	356.6	1.700	2.6	358.2	1.738	2.3	355.9	1.700	0.1	355.8	1.709	3.6
	9/21/15 19:06	354.5	1.643	2.0	359.3	1.703	2.9	355.1	1.676	1.9	357.2	1.677	4.1
	9/21/15 19:07	354.5	1.599	2.0	356.5	1.641	3.2	356.3	1.622	2.9	356.5	1.614	4.6
	9/21/15 19:09	355.4	1.484	2.3	355.6	1.567	2.2	356.9	1.417	2.1	354.8	1.481	4.6

Ameren, Labadie, Unit 3, High Load **9/21/2015**

		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	9/21/15 19:10	354.3	1.667	2.9	355.6	1.695	2.9	357.4	1.666	1.7	353.7	1.660	2.7
	9/21/15 19:11	354.3	1.652	2.4	357.0	1.679	2.6	356.7	1.679	1.8	354.7	1.675	4.2
	9/21/15 19:13	357.3	1.631	1.7	357.8	1.648	2.4	355.3	1.610	2.5	355.9	1.611	3.2
	9/21/15 19:14	352.7	1.469	1.9	352.5	1.590	2.7	353.5	1.427	1.9	352.0	1.456	6.3
11	9/21/15 19:15	355.2	1.690	3.1	355.4	1.703	3.0	358.9	1.666	1.8	351.6	1.683	2.2
	9/21/15 19:17	355.4	1.666	2.4	352.2	1.706	3.1	359.8	1.658	2.3	352.4	1.661	3.7
	9/21/15 19:18	354.6	1.599	1.7	353.0	1.635	3.0	357.7	1.626	2.3	356.4	1.613	1.7
	9/21/15 19:19	352.0	1.485	1.5	357.9	1.575	2.5	351.5	1.415	3.3	347.3	1.452	4.2
12	9/21/15 19:20	354.7	1.676	2.8	355.1	1.717	2.5	351.7	1.702	3.0	369.3	1.668	1.1
	9/21/15 19:21	353.1	1.664	1.9	358.4	1.685	2.6	354.0	1.660	3.2	352.7	1.692	3.2
	9/21/15 19:23	352.2	1.623	1.6	352.4	1.636	2.2	353.4	1.622	3.0	353.0	1.622	2.6
	9/21/15 19:24	355.3	1.464	1.7	351.0	1.502	2.4	354.1	1.406	3.9	353.5	1.454	2.9

RM 4 Moisture Field Data Sheet

Client:	Ameren			Date:	9/21-22/2015				
Plant Name:	Labadie			Operator:	BN				
Project Number:	15-409			Load:	Low				
Sampling Location:	Unit 3			Meter Number:	IN2				
Barometric Pressure:	29.23			Meter Correction:	0.975	Meter Orifice:	3.25018	Delta H@:	2.062
Run Number:	1-5	Sample Point	Delta H	Probe Temp	Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	372.012
Start Time:	23:25	5	2.062	250	62	88	4	375.710	
Stop Time:	23:55	10	2.062	250	60	88	4	379.380	
Initial Weight:	3623	15	2.062	250	60	88	4	383.020	
Final Weight:	3687	20	2.062	250	60	88	4	386.790	Static Pressure:
Initial Leak Check:	000@15	25	2.062	250	61	88	4	390.510	-1.27
Final Leak Check:	000@6	30	2.062	250	61	89	4	394.210	
Average:						88			22.198
Run Number:	6-12	Sample Point	Delta H	Probe Temp	Imp. Temp	Meter Out	Vac Press.	Initial Dry Gas Volume:	394.769
Start Time:	0:10	5	2.062	250	62	89	4	398.450	
Stop Time:	0:40	10	2.062	250	62	89	4	402.080	
Initial Weight:	3676	15	2.062	250	62	89	4	405.860	
Final Weight:	3732	20	2.062	250	64	89	4	409.550	Static Pressure:
Initial Leak Check:	000@15	25	2.062	250	64	90	4	413.260	-1.27
Final Leak Check:	000@5	30	2.062	250	63	90	4	416.950	
Average:						89			22.181

Ameren, Labadie, Unit 3, Low Load **9/21/2015**

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
9/21/15 23:25	311.6	0.878	0.8	309.1	0.885	-5.6	312.4	0.892	-4.5	311.0	0.899	-7.7
9/21/15 23:27	305.1	0.875	-0.5	308.5	0.897	-6.1	309.7	0.875	-4.2	312.0	0.919	-5.4
9/21/15 23:28	308.0	0.839	-0.4	309.1	0.873	-5.3	308.1	0.851	-2.5	308.7	0.864	-6.1
9/21/15 23:30	308.8	0.792	-0.1	309.5	0.853	-6.2	307.5	0.807	-2.6	309.1	0.812	-3.9
9/21/15 23:31	308.8	0.799	-0.7	310.0	0.819	-5.3	307.7	0.766	-2.8	310.7	0.817	-4.9
9/21/15 23:32	308.2	0.782	-0.4	309.4	0.821	-5.8	307.6	0.755	-2.6	307.4	0.780	-3.7
9/21/15 23:33	305.6	0.758	-0.5	311.2	0.828	-5.7	306.5	0.759	-2.1	308.0	0.782	-4.1
9/21/15 23:34	306.6	0.783	-0.1	304.4	0.840	-5.9	307.3	0.742	-2.4	303.2	0.780	-4.2
9/21/15 23:35	303.6	0.759	-0.4	308.4	0.832	-5.4	305.4	0.738	-0.8	304.6	0.756	-4.0
9/21/15 23:37	304.3	0.739	-0.1	307.5	0.813	-5.7	306.7	0.719	-1.3	293.9	0.717	-4.1
9/21/15 23:39	300.7	0.713	-0.5	304.6	0.694	-5.3	302.3	0.690	-1.2	291.6	0.694	-4.4
9/21/15 23:40	293.7	0.672	-0.7	302.1	0.751	-6.3	293.3	0.619	-1.3	275.4	0.651	-4.4
9/21/15 23:42	287.8	0.631	-0.4	275.4	0.687	-5.9	256.3	0.574	-1.0	224.3	0.616	-4.6
9/21/15 23:43	288.9	0.639	-0.6	253.2	0.685	-6.3	243.5	0.593	-1.3	219.6	0.618	-4.7
9/21/15 23:44	281.1	0.676	-0.4	252.3	0.707	-6.0	236.5	0.586	-0.8	216.7	0.635	-4.6
9/21/15 23:45	283.0	0.665	-0.7	250.5	0.716	-6.4	228.2	0.589	-1.1	211.2	0.607	-4.6

Ameren, Labadie, Unit 3, Low Load **9/21-22/2015**

		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	9/21/15 23:46	295.6	0.890	0.4	278.7	0.916	-7.7	255.8	0.903	-1.5	286.7	0.903	-5.9
	9/21/15 23:48	301.5	0.868	-0.2	298.5	0.882	-7.3	297.8	0.878	-1.6	297.4	0.900	-6.3
	9/21/15 23:49	299.4	0.840	-0.2	301.6	0.853	-7.3	299.8	0.843	-0.5	300.3	0.859	-5.3
	9/21/15 23:50	301.3	0.750	-0.5	301.7	0.839	-7.8	299.6	0.710	-10.0	300.2	0.739	-5.7
3	9/21/15 23:51	299.6	0.869	0.0	301.9	0.881	-7.1	303.3	0.864	-9.6	298.1	0.899	-6.6
	9/21/15 23:53	301.2	0.873	-0.3	301.9	0.899	-7.2	298.2	0.861	-10.4	302.4	0.903	-6.5
	9/21/15 23:54	302.5	0.869	-0.1	299.8	0.878	-7.3	300.3	0.842	-10.1	302.0	0.886	-5.9
	9/21/15 23:55	299.1	0.752	0.0	302.3	0.825	-7.6	298.7	0.704	-9.3	301.0	0.766	-5.8
4	9/21/15 23:56	299.5	0.856	0.6	301.3	0.881	-8.0	301.4	0.860	-9.9	297.8	0.872	-5.9
	9/21/15 23:58	298.4	0.860	-0.5	299.7	0.866	-7.7	301.2	0.836	-9.6	296.7	0.893	-5.6
	9/21/15 23:59	299.6	0.854	-0.1	298.7	0.852	-9.3	297.9	0.801	-8.9	298.2	0.893	-5.7
	9/22/15 0:00	299.3	0.751	-0.7	299.9	0.831	-10.6	299.5	0.718	-5.7	301.7	0.756	-5.7
5	9/22/15 0:01	298.8	0.872	-0.3	300.9	0.901	-10.4	300.0	0.892	-6.3	295.9	0.900	-6.6
	9/22/15 0:02	297.6	0.867	-0.2	299.6	0.886	-9.7	297.8	0.856	-7.0	297.4	0.900	-5.2
	9/22/15 0:03	298.2	0.848	-0.3	298.4	0.860	-9.6	297.1	0.829	-6.3	294.6	0.869	-4.4
	9/22/15 0:05	294.1	0.741	0.0	296.9	0.814	-10.0	294.6	0.705	-6.2	296.1	0.751	-3.6
6	9/22/15 0:06	295.6	0.860	0.2	295.9	0.896	-13.8	296.4	0.877	-5.7	298.0	0.900	-5.1
	9/22/15 0:07	294.2	0.878	0.5	296.5	0.908	-13.5	294.2	0.873	-5.9	296.4	0.903	-4.7
	9/22/15 0:08	296.3	0.860	0.1	296.6	0.904	-13.6	296.6	0.860	-3.1	297.3	0.882	-5.3
	9/22/15 0:10	291.0	0.783	-0.5	296.6	0.851	-12.6	293.7	0.726	-4.2	294.2	0.774	-5.5
7	9/22/15 0:11	295.9	0.896	1.1	296.7	0.921	-4.2	296.3	0.895	-4.1	295.5	0.921	-5.8
	9/22/15 0:13	294.1	0.876	0.4	300.7	0.902	-4.2	296.6	0.858	-4.1	296.0	0.901	-3.9
	9/22/15 0:14	298.1	0.849	-0.4	295.5	0.862	-4.0	293.2	0.821	-3.8	294.1	0.860	-2.7
	9/22/15 0:15	291.6	0.753	0.6	296.2	0.836	-6.7	294.2	0.692	-3.7	298.1	0.744	-4.1
8	9/22/15 0:16	296.4	0.874	0.8	297.1	0.891	-4.7	293.5	0.875	-3.6	292.8	0.880	-4.9
	9/22/15 0:17	297.4	0.866	-0.3	292.9	0.891	-3.4	293.1	0.874	-3.7	294.3	0.891	-5.8
	9/22/15 0:19	289.7	0.848	0.4	295.7	0.856	-7.9	295.5	0.828	-3.4	294.1	0.858	-5.6
	9/22/15 0:20	292.6	0.746	-0.4	293.5	0.814	-6.9	292.2	0.687	-3.5	294.5	0.759	-4.7
9	9/22/15 0:21	295.2	0.854	1.8	297.6	0.872	-6.8	291.2	0.871	-3.6	293.7	0.876	-6.4
	9/22/15 0:23	295.3	0.858	-0.2	294.9	0.885	-7.0	291.5	0.875	-3.6	295.7	0.868	-4.4
	9/22/15 0:24	293.9	0.841	0.3	293.4	0.841	-6.9	297.5	0.834	-3.9	294.8	0.880	-3.4
	9/22/15 0:25	293.5	0.736	0.0	293.9	0.834	-6.4	291.3	0.730	-5.3	292.6	0.758	-4.3

Ameren, Labadie, Unit 3, Low 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 0:26	291.4	0.862	1.1	292.0	0.886	-6.9	293.1	0.893	-4.1	287.5	0.878	-5.7
	9/22/15 0:27	292.0	0.875	0.1	295.0	0.888	-7.0	292.6	0.876	-3.7	295.6	0.904	-5.3
	9/22/15 0:28	291.5	0.866	-0.1	295.0	0.865	-4.3	295.1	0.859	-4.0	293.1	0.877	-4.1
	9/22/15 0:30	290.4	0.764	-0.2	291.2	0.843	-4.4	292.6	0.723	-3.2	293.7	0.771	-5.7
11	9/22/15 0:31	292.6	0.885	0.9	294.5	0.909	-5.7	292.4	0.893	-4.1	292.2	0.886	-7.5
	9/22/15 0:32	292.3	0.863	0.2	293.6	0.883	-5.7	294.7	0.866	-4.2	290.8	0.871	-5.0
	9/22/15 0:33	293.2	0.829	0.3	293.1	0.858	-5.3	291.9	0.853	-3.9	293.7	0.835	-5.7
	9/22/15 0:35	291.7	0.736	0.1	293.2	0.813	-5.3	290.0	0.702	-2.4	292.5	0.739	-5.6
12	9/22/15 0:36	292.8	0.867	-0.2	294.8	0.890	-4.8	291.2	0.885	-3.3	290.0	0.869	-5.4
	9/22/15 0:37	292.5	0.876	-0.2	291.8	0.893	-5.4	292.2	0.883	-1.4	292.1	0.895	-7.8
	9/22/15 0:38	292.6	0.851	-0.8	294.1	0.893	0.2	290.9	0.859	-0.3	291.4	0.856	-6.4
	9/22/15 0:40	291.0	0.737	-0.9	295.8	0.826	0.6	291.1	0.708	-1.4	295.5	0.747	-5.0

GCI Calibration Data

NOx Cal Sheet 1

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	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	EB00054563	**0.00**	0.90	0.90	0.45	
NO2 to NO Converter Check	CC500307	**50.29**	48.10	2.19	95.65%	**PASS**
Mid-Range Gas	CC75313	**100.20**	100.60	0.40	0.20	
High-Range Gas	LCCO-SA16978	**201.30**	201.90	0.60	0.30	

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	0.90	0.90	0.00	1.20	0.15	0.15
Upscale Gas	100.60	100.60	0.00	100.90	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	0.90	1.20	0.15	1.00	0.05	-0.10
Upscale Gas	100.60	100.90	0.15	100.40	-0.10	-0.25

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	0.90	1.00	0.05	0.80	-0.05	-0.10
Upscale Gas	100.60	100.40	-0.10	100.10	-0.25	-0.15

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	0.90	0.80	-0.05	0.70	-0.10	-0.05
Upscale Gas	100.60	100.10	-0.25	100.30	-0.15	0.10

NOx Cal Sheet 2

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	Operator	Nathan V.

Run #: 5		Initial Values		Final Values		
Gas Type: NOx Span: 201.30	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.90	0.70	-0.10	0.80	-0.05	0.05
Upscale Gas	100.60	100.30	-0.15	99.90	-0.35	-0.20

Run #: 6		Initial Values		Final Values		
Gas Type: NOx Span: 201.30	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.90	0.80	-0.05	0.70	-0.10	-0.05
Upscale Gas	100.60	99.90	-0.35	99.80	-0.40	-0.05

Run #: 7		Initial Values		Final Values		
Gas Type: NOx Span: 201.30	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.90	0.70	-0.10	0.80	-0.05	0.05
Upscale Gas	100.60	99.80	-0.40	99.70	-0.45	-0.05

Run #: 8		Initial Values		Final Values		
Gas Type: NOx Span: 201.30	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.90	0.80	-0.05	0.70	-0.10	-0.05
Upscale Gas	100.60	99.70	-0.45	99.60	-0.50	-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	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	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	0.90	0.70	-0.10	0.80	-0.05	0.05
Upscale Gas	100.60	99.60	-0.50	99.90	-0.35	0.15

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	0.90	0.80	-0.05	0.90	0.00	0.05
Upscale Gas	100.60	99.90	-0.35	100.20	-0.20	0.15

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

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

SO2 Cal Sheet 1

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	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	EB00054563	**0.00**	1.60	1.60	0.38	
Low-Range Gas						
Mid-Range Gas	CC75313	**242.20**	245.60	3.40	0.81	
High-Range Gas	LCCO-SA16978	**418.40**	421.90	3.50	0.84	

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	1.60	1.60	0.00	2.10	0.12	0.12
Upscale Gas	245.60	245.60	0.00	246.20	0.14	0.14

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	1.60	2.10	0.12	1.70	0.02	-0.10
Upscale Gas	245.60	246.20	0.14	246.40	0.19	0.05

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	1.60	1.70	0.02	1.40	-0.05	-0.07
Upscale Gas	245.60	246.40	0.19	244.60	-0.24	-0.43

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	1.60	1.40	-0.05	1.20	-0.10	-0.05
Upscale Gas	245.60	244.60	-0.24	244.30	-0.31	-0.07

SO2 Cal Sheet 2

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	Operator	Nathan V.

Run #: 5		Analyzer Response	Initial Values		Final Values		Drift % of Span
Gas Type:	SO2		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Span:	418.40						
Zero Gas		1.60	1.20	-0.10	1.10	-0.12	-0.02
Upscale Gas		245.60	244.30	-0.31	244.10	-0.36	-0.05

Run #: 6		Analyzer Response	Initial Values		Final Values		Drift % of Span
Gas Type:	SO2		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Span:	418.40						
Zero Gas		1.60	1.10	-0.12	1.00	-0.14	-0.02
Upscale Gas		245.60	244.10	-0.36	243.90	-0.41	-0.05

Run #: 7		Analyzer Response	Initial Values		Final Values		Drift % of Span
Gas Type:	SO2		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Span:	418.40						
Zero Gas		1.60	1.00	-0.14	1.10	-0.12	0.02
Upscale Gas		245.60	243.90	-0.41	244.20	-0.33	0.07

Run #: 8		Analyzer Response	Initial Values		Final Values		Drift % of Span
Gas Type:	SO2		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Span:	418.40						
Zero Gas		1.60	1.10	-0.12	0.90	-0.17	-0.05
Upscale Gas		245.60	244.20	-0.33	243.80	-0.43	-0.10

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

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

SO2 Cal Sheet 3

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	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	1.60	0.90	-0.17	1.10	-0.12	0.05
Upscale Gas	245.60	243.80	-0.43	243.90	-0.41	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	1.60	1.10	-0.12	1.20	-0.10	0.02
Upscale Gas	245.60	243.90	-0.41	244.30	-0.31	0.10

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

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

CO2 Cal Sheet 1

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	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	EB00054563	**0.00**	0.10	0.10	0.45	
Low-Range Gas						
Mid-Range Gas	CC75313	**11.49**	11.60	0.11	0.50	
High-Range Gas	SG9148338BAL	**22.15**	22.30	0.15	0.68	

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	0.20	0.45	0.45
Upscale Gas	11.60	11.60	0.00	11.70	0.45	0.45

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	0.20	0.45	0.10	0.00	-0.45
Upscale Gas	11.60	11.70	0.45	11.60	0.00	-0.45

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	11.60	11.60	0.00	11.50	-0.45	-0.45

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	11.60	11.50	-0.45	11.50	-0.45	0.00

CO2 Cal Sheet 2

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	Operator	Nathan V.

Run #: 5		Initial Values		Final Values		
Gas Type: CO2	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Span: 22.15						
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.60	11.50	-0.45	11.50	-0.45	0.00

Run #: 6		Initial Values		Final Values		
Gas Type: CO2	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Span: 22.15						
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.60	11.50	-0.45	11.50	-0.45	0.00

Run #: 7		Initial Values		Final Values		
Gas Type: CO2	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Span: 22.15						
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.60	11.50	-0.45	11.50	-0.45	0.00

Run #: 8		Initial Values		Final Values		
Gas Type: CO2	Analyzer Response	System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Span: 22.15						
Zero Gas	0.10	0.10	0.00	0.10	0.00	0.00
Upscale Gas	11.60	11.50	-0.45	11.50	-0.45	0.00

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

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

CO2 Cal Sheet 3

Client	Ameren	Test Date	9/21/2015
	Labadie	Project #	15-409
Source Identification	3	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	11.60	11.50	-0.45	11.50	-0.45	0.00

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	11.60	11.50	-0.45	11.50	-0.45	0.00

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

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

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: _____ 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)

IMPORTAI For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTAI 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** — 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	.813	.002
2	.89	1.10	.801	.010
3	.90	1.09	.818	.007
	Average	Cp (Side A)	**.811**	**.0065**

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	1.21	1.48	.810	.005
2	1.20	1.49	.797	.008
3	1.21	1.48	.807	.002
	Average	Cp (Side A)	**.805**	**.0053**

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)

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**

Average Deviation = side (A or B)

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** — 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	.005
2	.91	1.11	.809	.001
3	.91	1.11	.811	.003
	Average	Cp (Side A)	**.808**	**.0030**

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	1.21	1.48	.808	.001
2	1.21	1.48	.807	.002
3	1.21	1.47	.812	.003
	Average	Cp (Side A)	**.809**	**.0021**

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 IN 5 S 7

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

I N 00165

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
NITROGEN	Balance				
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 IN50U

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:	156.5 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 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	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

Run 1
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 14:25 Through 09/21/2015 14:45
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	14:25	13.1	624	0.094	55.9	198.5
09/21/15	14:26	13.0	624	0.095	56.2	197.7
09/21/15	14:27	13.1	624	0.094	56.2	198.6
09/21/15	14:28	13.0	625	0.095	56.1	197.2
09/21/15	14:29	13.1	624	0.095	56.4	198.0
09/21/15	14:30	13.0	622	0.095	56.0	197.5
09/21/15	14:31	13.0	623	0.096	56.6	196.9
09/21/15	14:32	13.1	624	0.094	56.3	198.0
09/21/15	14:33	13.0	624	0.095	56.0	198.6
09/21/15	14:34	13.0	625	0.095	56.0	198.0
09/21/15	14:35	13.0	625	0.095	56.2	196.7
09/21/15	14:36	13.0	624	0.094	55.8	197.2
09/21/15	14:37	13.0	625	0.095	56.1	196.7
09/21/15	14:38	13.0	624	0.095	56.1	199.3
09/21/15	14:39	13.1	623	0.094	56.1	200.2
09/21/15	14:40	13.0	623	0.094	55.4	198.4
09/21/15	14:41	13.0	623	0.094	55.8	196.0
09/21/15	14:42	12.9	625	0.094	55.4	196.1
09/21/15	14:43	13.0	623	0.094	55.6	197.0
09/21/15	14:44	13.0	622	0.093	55.2	197.6
09/21/15	14:45	13.0	623	0.094	55.5	197.4
Average		13.0	624	0.094	55.9	197.7
Minimum		12.9	622	0.093	55.2	196.0
Maximum		13.1	625	0.096	56.6	200.2
Summation		273.4	13,099	1.984	1,174.9	4,151.6
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
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 15:00 Through 09/21/2015 15:20
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	15:00	13.0	625	0.093	55.0	201.8
09/21/15	15:01	13.0	626	0.093	55.3	200.0
09/21/15	15:02	13.0	630	0.092	54.6	200.7
09/21/15	15:03	13.1	630	0.092	55.1	201.0
09/21/15	15:04	13.1	627	0.091	54.5	200.2
09/21/15	15:05	13.0	627	0.092	54.2	199.4
09/21/15	15:06	13.0	629	0.093	54.9	199.4
09/21/15	15:07	13.1	627	0.092	55.1	199.3
09/21/15	15:08	13.1	625	0.092	55.1	198.8
09/21/15	15:09	13.0	624	0.093	55.2	197.2
09/21/15	15:10	13.0	622	0.092	54.4	197.4
09/21/15	15:11	13.0	620	0.092	54.7	197.9
09/21/15	15:12	12.9	620	0.092	54.2	197.4
09/21/15	15:13	12.8	621	0.094	55.0	195.3
09/21/15	15:14	13.0	622	0.093	55.3	197.4
09/21/15	15:15	13.0	623	0.092	54.7	198.7
09/21/15	15:16	13.0	623	0.092	54.7	200.1
09/21/15	15:17	13.1	624	0.092	54.9	199.9
09/21/15	15:18	13.0	624	0.092	54.7	199.6
09/21/15	15:19	13.0	623	0.092	54.6	199.2
09/21/15	15:20	13.0	623	0.093	55.0	197.8
	Average	13.0	625	0.092	54.8	199.0
	Minimum	12.8	620	0.091	54.2	195.3
	Maximum	13.1	630	0.094	55.3	201.8
	Summation	273.2	13,115	1.939	1,151.2	4,178.5
	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

Run 3
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 15:35 Through 09/21/2015 15:55
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	15:35	13.0	625	0.094	55.5	198.1
09/21/15	15:36	13.0	626	0.094	55.7	197.2
09/21/15	15:37	13.0	625	0.094	55.9	197.6
09/21/15	15:38	13.0	626	0.094	55.8	196.7
09/21/15	15:39	13.0	626	0.094	55.5	198.6
09/21/15	15:40	13.0	626	0.094	55.4	197.1
09/21/15	15:41	13.0	625	0.093	55.3	197.9
09/21/15	15:42	13.0	624	0.094	55.5	198.7
09/21/15	15:43	13.0	622	0.094	55.7	197.3
09/21/15	15:44	13.0	621	0.093	55.2	200.8
09/21/15	15:45	13.0	619	0.093	55.0	207.2
09/21/15	15:46	12.8	618	0.095	55.2	207.3
09/21/15	15:47	12.7	620	0.096	55.5	200.0
09/21/15	15:48	12.8	621	0.097	56.4	196.6
09/21/15	15:49	13.0	623	0.094	55.4	200.0
09/21/15	15:50	12.9	624	0.093	54.8	201.9
09/21/15	15:51	13.0	625	0.093	54.9	202.0
09/21/15	15:52	13.0	624	0.092	54.3	202.1
09/21/15	15:53	13.0	621	0.091	53.8	200.6
09/21/15	15:54	13.0	622	0.092	54.3	199.9
09/21/15	15:55	13.0	620	0.092	54.3	200.0
	Average	13.0	623	0.094	55.2	199.9
	Minimum	12.7	618	0.091	53.8	196.6
	Maximum	13.0	626	0.097	56.4	207.3
	Summation	272.2	13,083	1.966	1,159.4	4,197.6
	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 4
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 16:10 Through 09/21/2015 16:30
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	16:10	13.0	626	0.092	54.4	198.3
09/21/15	16:11	13.0	625	0.094	55.4	199.0
09/21/15	16:12	13.1	624	0.092	54.6	200.8
09/21/15	16:13	13.0	624	0.093	55.2	198.8
09/21/15	16:14	13.0	623	0.093	55.1	199.1
09/21/15	16:15	13.0	622	0.093	54.9	196.8
09/21/15	16:16	13.0	622	0.093	54.9	198.0
09/21/15	16:17	13.0	623	0.092	54.7	197.8
09/21/15	16:18	12.9	623	0.095	55.8	197.1
09/21/15	16:19	12.9	624	0.093	54.9	197.2
09/21/15	16:20	13.0	624	0.093	55.1	199.0
09/21/15	16:21	12.9	623	0.094	55.0	200.1
09/21/15	16:22	13.0	621	0.093	54.8	200.6
09/21/15	16:23	12.8	621	0.094	54.5	200.0
09/21/15	16:24	12.9	622	0.093	54.7	197.8
09/21/15	16:25	13.0	624	0.093	54.8	199.1
09/21/15	16:26	13.0	625	0.092	54.7	198.1
09/21/15	16:27	13.0	625	0.092	54.5	199.3
09/21/15	16:28	13.0	623	0.093	55.0	198.9
09/21/15	16:29	13.0	623	0.093	55.1	198.2
09/21/15	16:30	13.0	622	0.093	54.9	198.9
	Average	13.0	623	0.093	54.9	198.7
	Minimum	12.8	621	0.092	54.4	196.8
	Maximum	13.1	626	0.095	55.8	200.8
	Summation	272.5	13,069	1.953	1,153.0	4,172.9
	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 5
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 16:45 Through 09/21/2015 17:05
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	16:45	12.9	625	0.093	54.4	198.4
09/21/15	16:46	13.0	625	0.093	55.3	198.2
09/21/15	16:47	13.0	625	0.093	55.3	197.7
09/21/15	16:48	13.0	623	0.093	55.0	198.1
09/21/15	16:49	13.1	624	0.093	55.3	200.1
09/21/15	16:50	13.0	623	0.093	55.3	199.6
09/21/15	16:51	13.0	622	0.094	55.9	197.5
09/21/15	16:52	13.0	623	0.095	56.3	196.9
09/21/15	16:53	12.9	623	0.095	55.6	197.2
09/21/15	16:54	13.0	622	0.094	55.5	197.7
09/21/15	16:55	12.9	622	0.093	54.4	199.4
09/21/15	16:56	12.8	623	0.094	54.9	195.7
09/21/15	16:57	12.9	623	0.094	55.3	195.4
09/21/15	16:58	13.0	624	0.093	55.1	197.4
09/21/15	16:59	13.0	622	0.093	55.1	198.9
09/21/15	17:00	13.0	622	0.093	55.1	198.1
09/21/15	17:01	13.0	621	0.094	55.6	197.1
09/21/15	17:02	13.0	620	0.094	55.4	198.6
09/21/15	17:03	13.0	621	0.093	55.3	197.8
09/21/15	17:04	13.0	622	0.093	55.3	198.1
09/21/15	17:05	13.0	624	0.093	54.9	200.1
	Average	13.0	623	0.093	55.3	198.0
	Minimum	12.8	620	0.093	54.4	195.4
	Maximum	13.1	625	0.095	56.3	200.1
	Summation	272.5	13,079	1.963	1,160.3	4,158.0
	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

Average Data

Run 4

Plant: LABADIE
Interval: 1 Minute
Type: Block
Report Period: 09/21/2015 17:20 Through 09/21/2015 17:40
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter Unit		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	17:20	13.0	621	0.094	55.6	197.6
09/21/15	17:21	12.9	621	0.093	54.7	196.4
09/21/15	17:22	12.9	624	0.096	56.1	194.1
09/21/15	17:23	13.0	625	0.095	56.0	196.2
09/21/15	17:24	13.0	624	0.094	55.8	197.6
09/21/15	17:25	13.0	624	0.094	55.4	196.3
09/21/15	17:26	12.9	624	0.094	55.2	196.3
09/21/15	17:27	13.0	623	0.094	55.5	197.1
09/21/15	17:28	13.0	621	0.094	55.6	198.2
09/21/15	17:29	13.0	622	0.094	55.5	203.2
09/21/15	17:30	13.0	623	0.095	56.0	203.3
09/21/15	17:31	12.9	625	0.096	56.1	200.8
09/21/15	17:32	12.9	625	0.096	56.1	198.5
09/21/15	17:33	13.0	626	0.094	55.8	199.9
09/21/15	17:34	13.0	627	0.094	55.9	200.4
09/21/15	17:35	13.0	626	0.094	55.7	199.8
09/21/15	17:36	13.0	627	0.094	55.9	199.3
09/21/15	17:37	13.0	625	0.094	55.5	199.7
09/21/15	17:38	13.0	626	0.094	55.6	198.9
09/21/15	17:39	12.9	625	0.095	55.5	199.2
09/21/15	17:40	13.0	625	0.094	55.9	199.2
Average		13.0	624	0.094	55.7	198.7
Minimum		12.9	621	0.093	54.7	194.1
Maximum		13.0	627	0.096	56.1	203.3
Summation		272.4	13,109	1.982	1,169.4	4,172.0
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** **I = Invalid**
M = Maintenance **T = Out Of Control** **^ = Suspect** **U = Startup** **D = Shutdown**

Run 7
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 17:55 Through 09/21/2015 18:15
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	17:55	13.0	626	0.095	56.1	197.9
09/21/15	17:56	13.0	625	0.094	55.8	198.6
09/21/15	17:57	13.0	625	0.094	55.9	198.0
09/21/15	17:58	13.0	625	0.095	56.2	198.1
09/21/15	17:59	13.0	624	0.096	56.8	199.2
09/21/15	18:00	13.0	624	0.095	56.5	197.1
09/21/15	18:01	13.0	624	0.097	57.2	196.8
09/21/15	18:02	13.0	624	0.096	57.0	196.1
09/21/15	18:03	12.9	625	0.096	56.5	196.6
09/21/15	18:04	13.0	625	0.096	57.0	197.2
09/21/15	18:05	13.0	624	0.096	56.6	197.8
09/21/15	18:06	13.0	625	0.095	56.5	199.1
09/21/15	18:07	13.0	625	0.096	56.7	198.3
09/21/15	18:08	13.0	626	0.096	56.6	197.3
09/21/15	18:09	13.0	625	0.096	56.8	197.5
09/21/15	18:10	13.0	623	0.095	56.5	198.4
09/21/15	18:11	13.0	623	0.095	56.3	204.3
09/21/15	18:12	12.9	623	0.096	56.6	204.1
09/21/15	18:13	12.9	624	0.096	56.3	201.7
09/21/15	18:14	12.9	623	0.097	56.9	200.6
09/21/15	18:15	12.9	624	0.097	56.8	198.8
	Average	13.0	624	0.096	56.6	198.7
	Minimum	12.9	623	0.094	55.8	196.1
	Maximum	13.0	626	0.097	57.2	204.3
	Summation	272.5	13,112	2.009	1,187.6	4,173.5
	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

R8
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 18:30 Through 09/21/2015 18:50
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	18:30	13.0	625	0.095	56.4	196.3
09/21/15	18:31	13.0	625	0.095	56.5	196.3
09/21/15	18:32	13.0	625	0.096	56.8	197.9
09/21/15	18:33	13.0	625	0.096	57.1	197.6
09/21/15	18:34	13.0	625	0.095	56.3	197.5
09/21/15	18:35	13.0	625	0.096	56.6	197.1
09/21/15	18:36	13.0	625	0.095	56.1	197.8
09/21/15	18:37	13.0	626	0.094	55.9	198.0
09/21/15	18:38	13.0	625	0.095	56.1	196.9
09/21/15	18:39	12.9	626	0.096	56.4	196.7
09/21/15	18:40	13.0	625	0.095	56.5	197.7
09/21/15	18:41	12.9	624	0.097	57.1	196.0
09/21/15	18:42	12.9	625	0.098	57.3	196.3
09/21/15	18:43	12.9	625	0.097	56.8	196.5
09/21/15	18:44	13.0	625	0.097	57.2	196.0
09/21/15	18:45	13.0	626	0.097	57.5	196.2
09/21/15	18:46	13.0	623	0.096	57.1	196.4
09/21/15	18:47	12.9	624	0.094	55.4	196.7
09/21/15	18:48	12.8	625	0.093	54.2	197.8
09/21/15	18:49	12.8	627	0.095	55.6	198.1
09/21/15	18:50	12.9	627	0.094	55.3	199.5
	Average	13.0	625	0.096	56.4	197.1
	Minimum	12.8	623	0.093	54.2	196.0
	Maximum	13.0	627	0.098	57.5	199.5
	Summation	272.0	13,128	2.006	1,184.2	4,139.3
	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
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 19:05 Through 09/21/2015 19:25
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	19:05	12.9	628	0.095	56.0	197.3
09/21/15	19:06	12.9	627	0.096	56.5	196.8
09/21/15	19:07	12.9	626	0.096	56.4	196.5
09/21/15	19:08	12.9	625	0.096	56.1	195.6
09/21/15	19:09	13.0	625	0.096	56.6	197.5
09/21/15	19:10	12.9	626	0.096	56.5	195.5
09/21/15	19:11	13.0	625	0.096	56.6	198.0
09/21/15	19:12	12.9	624	0.096	56.2	197.3
09/21/15	19:13	12.9	623	0.095	55.5	197.6
09/21/15	19:14	12.8	621	0.095	55.4	195.7
09/21/15	19:15	12.7	623	0.097	55.9	193.1
09/21/15	19:16	12.8	625	0.097	56.7	193.4
09/21/15	19:17	12.9	625	0.096	56.3	195.3
09/21/15	19:18	12.9	626	0.095	55.8	196.6
09/21/15	19:19	12.9	625	0.096	56.2	195.7
09/21/15	19:20	12.9	625	0.094	55.3	200.6
09/21/15	19:21	13.0	625	0.093	55.2	203.6
09/21/15	19:22	12.9	626	0.095	55.7	201.4
09/21/15	19:23	12.9	626	0.095	55.8	199.8
09/21/15	19:24	12.9	627	0.096	56.1	198.1
09/21/15	19:25	12.9	626	0.096	56.1	196.9
Average		12.9	625	0.096	56.0	197.3
Minimum		12.7	621	0.093	55.2	193.1
Maximum		13.0	628	0.097	56.7	203.6
Summation		270.8	13,129	2.007	1,176.9	4,142.3
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
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 19:40 Through 09/21/2015 20:00
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	MWLOAD3 (MW)	NOX#/MM (LB/MMBTU)	NOXPPM (PPM)	SO2PPM (PPM)
09/21/15	19:40	12.9	625	0.094	55.0	194.7
09/21/15	19:41	12.9	626	0.095	55.5	194.6
09/21/15	19:42	12.9	626	0.093	54.9	195.8
09/21/15	19:43	12.9	625	0.094	55.0	196.3
09/21/15	19:44	12.9	625	0.094	55.4	195.0
09/21/15	19:45	12.9	625	0.095	55.5	196.0
09/21/15	19:46	12.9	626	0.095	55.7	194.3
09/21/15	19:47	12.9	628	0.096	56.1	194.4
09/21/15	19:48	12.9	627	0.096	56.5	195.0
09/21/15	19:49	12.9	627	0.095	56.0	195.4
09/21/15	19:50	12.9	628	0.096	56.1	195.8
09/21/15	19:51	12.9	626	0.095	55.8	194.6
09/21/15	19:52	13.0	624	0.094	55.9	195.3
09/21/15	19:53	12.9	622	0.096	56.1	196.4
09/21/15	19:54	12.9	623	0.095	55.6	201.0
09/21/15	19:55	12.9	624	0.095	55.5	201.4
09/21/15	19:56	12.9	627	0.093	54.9	200.1
09/21/15	19:57	12.9	627	0.094	55.1	201.9
09/21/15	19:58	12.8	627	0.095	55.4	201.9
09/21/15	19:59	12.8	626	0.095	55.3	201.4
09/21/15	20:00	12.8	625	0.096	55.9	198.4
	Average	12.9	626	0.095	55.6	197.1
	Minimum	12.8	622	0.093	54.9	194.3
	Maximum	13.0	628	0.096	56.5	201.9
	Summation	270.7	13,139	1.991	1,167.2	4,139.7
	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

H R1
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 18:00 Through 09/21/2015 18:19
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	18:00	13.0	79,437,076.0	624	353.3	119.0
09/21/15	18:01	13.0	79,524,910.8	624	353.3	119.1
09/21/15	18:02	13.0	79,187,758.6	624	353.5	118.7
09/21/15	18:03	12.9	78,737,279.7	625	353.6	118.1
09/21/15	18:04	13.0	78,579,804.1	625	353.6	117.8
09/21/15	18:05	13.0	78,745,627.0	624	353.5	118.1
09/21/15	18:06	13.0	78,958,668.3	625	353.5	118.3
09/21/15	18:07	13.0	79,043,624.5	625	353.7	118.5
09/21/15	18:08	13.0	79,189,469.1	626	353.8	118.8
09/21/15	18:09	13.0	79,279,620.8	625	354.0	118.9
09/21/15	18:10	13.0	79,113,650.6	623	354.1	118.7
09/21/15	18:11	13.0	78,889,545.7	623	354.6	118.4
09/21/15	18:12	12.9	78,989,452.5	623	355.1	118.6
09/21/15	18:13	12.9	79,406,531.4	624	355.4	119.3
09/21/15	18:14	12.9	79,886,696.9	623	355.6	120.1
09/21/15	18:15	12.9	80,039,984.2	624	355.8	120.3
09/21/15	18:16	12.9	79,712,403.4	627	355.7	119.8
09/21/15	18:17	12.9	79,256,405.3	627	355.1	119.0
09/21/15	18:18	13.0	79,063,223.7	627	354.3	118.6
09/21/15	18:19	13.0	79,242,569.0	624	354.8	118.9
	Average	13.0	79,214,215.1	625	354.3	118.8
	Minimum	12.9	78,579,804.1	623	353.3	117.8
	Maximum	13.0	80,039,984.2	627	355.8	120.3
	Summation	259.3	1,584,284,301.6	12,492	7,086.3	2,377.0
	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

HR2
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 18:30 Through 09/21/2015 18:34
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	18:30	13.0	80,319,143.6	625	353.9	120.4
09/21/15	18:31	13.0	80,339,056.0	625	353.8	120.4
09/21/15	18:32	13.0	80,226,613.4	625	353.9	120.3
09/21/15	18:33	13.0	80,168,131.6	625	353.9	120.3
09/21/15	18:34	13.0	80,008,781.7	625	353.9	120.0
	Average	13.0	80,212,345.3	625	353.9	120.3
	Minimum	13.0	80,008,781.7	625	353.8	120.0
	Maximum	13.0	80,339,056.0	625	353.9	120.4
	Summation	65.0	401,061,726.3	3,125	1,769.4	601.4
	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

HR3
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 18:35 Through 09/21/2015 18:39
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	18:35	13.0	79,733,577.0	625	353.8	119.5
09/21/15	18:36	13.0	79,624,073.8	625	353.7	119.3
09/21/15	18:37	13.0	79,860,779.7	626	354.0	119.6
09/21/15	18:38	13.0	80,043,048.0	625	354.6	120.0
09/21/15	18:39	12.9	79,864,178.3	626	355.1	119.9
Average		13.0	79,825,131.4	625	354.2	119.7
Minimum		12.9	79,624,073.8	625	353.7	119.3
Maximum		13.0	80,043,048.0	626	355.1	120.0
Summation		64.9	399,125,656.8	3,127	1,771.2	598.3
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

H R4
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 18:40 Through 09/21/2015 18:44
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	18:40	13.0	79,744,971.0	625	355.2	119.7
09/21/15	18:41	12.9	79,894,783.5	624	355.3	120.0
09/21/15	18:42	12.9	80,157,245.2	625	355.5	120.4
09/21/15	18:43	12.9	80,356,636.7	625	355.6	120.8
09/21/15	18:44	13.0	80,583,601.0	625	355.6	121.1
	Average	12.9	80,147,447.5	625	355.4	120.4
	Minimum	12.9	79,744,971.0	624	355.2	119.7
	Maximum	13.0	80,583,601.0	625	355.6	121.1
	Summation	64.7	400,737,237.4	3,124	1,777.2	602.0
	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

AR6
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 18:50 Through 09/21/2015 18:54
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	18:50	12.9	80,711,831.6	627	357.1	121.6
09/21/15	18:51	13.0	80,449,544.4	629	356.5	121.1
09/21/15	18:52	12.9	80,339,295.1	626	356.5	120.9
09/21/15	18:53	12.9	80,214,646.8	624	356.7	120.7
09/21/15	18:54	12.9	80,230,513.8	625	356.9	120.7
	Average	12.9	80,389,166.3	626	356.7	121.0
	Minimum	12.9	80,214,646.8	624	356.5	120.7
	Maximum	13.0	80,711,831.6	629	357.1	121.6
	Summation	64.6	401,945,831.7	3,131	1,783.7	605.0
	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

AR7
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 18:55 Through 09/21/2015 18:59
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	18:55	13.0	80,322,911.1	623	356.9	120.9
09/21/15	18:56	12.9	80,478,622.5	624	356.7	121.1
09/21/15	18:57	12.9	80,675,944.4	624	356.0	121.3
09/21/15	18:58	12.9	80,703,834.3	624	355.1	121.2
09/21/15	18:59	12.9	80,487,778.2	626	354.8	120.8
Average		12.9	80,533,818.1	624	355.9	121.1
Minimum		12.9	80,322,911.1	623	354.8	120.8
Maximum		13.0	80,703,834.3	626	356.9	121.3
Summation		64.6	402,669,090.5	3,121	1,779.5	605.3
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

HR 8
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 19:00 Through 09/21/2015 19:04
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	19:00	13.0	80,224,886.8	626	354.8	120.4
09/21/15	19:01	12.9	80,004,469.7	628	354.8	120.1
09/21/15	19:02	12.9	80,168,589.2	629	354.6	120.3
09/21/15	19:03	12.9	80,629,625.7	630	354.6	121.0
09/21/15	19:04	12.9	80,839,753.1	629	354.8	121.3
	Average	12.9	80,373,464.9	628	354.7	120.6
	Minimum	12.9	80,004,469.7	626	354.6	120.1
	Maximum	13.0	80,839,753.1	630	354.8	121.3
	Summation	64.6	401,867,324.5	3,142	1,773.6	603.1
	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

HR9
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 19:05 Through 09/21/2015 19:09
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	19:05	12.9	80,772,304.4	628	354.8	121.2
09/21/15	19:06	12.9	80,642,522.4	627	354.7	121.0
09/21/15	19:07	12.9	80,429,600.5	626	354.3	120.6
09/21/15	19:08	12.9	80,298,050.8	625	353.7	120.4
09/21/15	19:09	13.0	80,254,283.3	625	353.3	120.3
Average		12.9	80,479,352.3	626	354.2	120.7
Minimum		12.9	80,254,283.3	625	353.3	120.3
Maximum		13.0	80,772,304.4	628	354.8	121.2
Summation		64.6	402,396,761.4	3,131	1,770.8	603.5
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

HR10
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 19:10 Through 09/21/2015 19:14
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	19:10	12.9	80,042,552.0	626	353.1	119.9
09/21/15	19:11	13.0	79,683,641.2	625	352.9	119.3
09/21/15	19:12	12.9	79,634,865.8	624	353.6	119.2
09/21/15	19:13	12.9	80,116,487.1	623	355.1	120.1
09/21/15	19:14	12.8	80,880,686.0	621	357.1	121.6
	Average	12.9	80,071,646.4	624	354.4	120.0
	Minimum	12.8	79,634,865.8	621	352.9	119.2
	Maximum	13.0	80,880,686.0	626	357.1	121.6
	Summation	64.5	400,358,232.1	3,119	1,771.8	600.1
	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

H R11
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 19:15 Through 09/21/2015 19:19
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	19:15	12.7	81,336,734.8	623	358.2	122.5
09/21/15	19:16	12.8	81,110,206.2	625	357.4	122.2
09/21/15	19:17	12.9	80,526,976.7	625	355.0	121.0
09/21/15	19:18	12.9	80,023,313.1	626	353.4	119.9
09/21/15	19:19	12.9	79,945,008.4	625	353.2	119.7
	Average	12.8	80,588,447.8	625	355.4	121.1
	Minimum	12.7	79,945,008.4	623	353.2	119.7
	Maximum	12.9	81,336,734.8	626	358.2	122.5
	Summation	64.2	402,942,239.2	3,124	1,777.2	605.3
	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

H 12
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 19:20 Through 09/21/2015 19:24
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	19:20	12.9	80,174,677.2	625	353.6	120.1
09/21/15	19:21	13.0	80,086,580.2	625	354.0	120.0
09/21/15	19:22	12.9	79,828,082.7	626	354.1	119.7
09/21/15	19:23	12.9	79,827,639.4	626	354.3	119.7
09/21/15	19:24	12.9	80,043,605.2	627	354.3	120.0
	Average	12.9	79,992,116.9	626	354.1	119.9
	Minimum	12.9	79,827,639.4	625	353.6	119.7
	Maximum	13.0	80,174,677.2	627	354.3	120.1
	Summation	64.6	399,960,584.7	3,129	1,770.3	599.5
	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

L1
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 23:25 Through 09/21/2015 23:45
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	23:25	12.5	43,005,519.6	319	316.2	62.7
09/21/15	23:26	12.5	43,256,825.2	318	315.9	63.1
09/21/15	23:27	12.5	43,507,667.3	318	315.5	63.4
09/21/15	23:28	12.4	43,734,130.6	320	314.6	63.7
09/21/15	23:29	12.3	43,795,569.8	318	313.8	63.7
09/21/15	23:30	12.3	43,526,472.0	320	313.1	63.2
09/21/15	23:31	12.3	43,077,229.5	317	312.6	62.5
09/21/15	23:32	12.5	42,847,585.7	320	312.5	62.2
09/21/15	23:33	12.5	42,995,295.0	319	312.2	62.4
09/21/15	23:34	12.5	43,213,285.8	319	311.7	62.7
09/21/15	23:35	12.6	43,305,858.7	318	311.4	62.8
09/21/15	23:36	12.5	43,418,427.7	320	311.0	62.9
09/21/15	23:37	12.4	43,601,699.7	318	310.8	63.2
09/21/15	23:38	12.3	43,739,620.5	319	310.4	63.3
09/21/15	23:39	12.3	43,740,187.9	316	309.7	63.3
09/21/15	23:40	12.4	43,625,668.6	317	308.9	63.1
09/21/15	23:41	12.3	43,456,516.8	318	308.5	62.8
09/21/15	23:42	12.4	43,330,268.9	318	308.1	62.6
09/21/15	23:43	12.5	43,293,027.4	319	307.6	62.5
09/21/15	23:44	12.6	43,340,086.8	318	307.1	62.5
09/21/15	23:45	12.6	43,557,579.0	318	306.7	62.8
	Average	12.4	43,398,501.1	318	311.3	62.9
	Minimum	12.3	42,847,585.7	316	306.7	62.2
	Maximum	12.6	43,795,569.8	320	316.2	63.7
	Summation	261.2	911,368,522.5	6,687	6,538.3	1,321.4
	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

L2
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 23:46 Through 09/21/2015 23:50
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	23:46	12.5	43,855,256.0	322	306.2	63.2
09/21/15	23:47	12.4	44,128,113.8	323	305.8	63.5
09/21/15	23:48	12.3	44,229,951.7	322	305.3	63.6
09/21/15	23:49	12.2	43,981,459.6	321	304.8	63.2
09/21/15	23:50	12.3	43,580,479.4	317	304.4	62.6
Average		12.3	43,955,052.1	321	305.3	63.2
Minimum		12.2	43,580,479.4	317	304.4	62.6
Maximum		12.5	44,229,951.7	323	306.2	63.6
Summation		61.7	219,775,260.5	1,605	1,526.5	316.1
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

L4
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/21/2015 23:56 Through 09/22/2015 00:00
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/21/15	23:56	12.5	44,130,894.8	318	303.2	63.3
09/21/15	23:57	12.4	44,018,497.5	322	302.9	63.1
09/21/15	23:58	12.4	43,743,261.8	322	302.4	62.7
09/21/15	23:59	12.4	43,464,373.1	319	301.4	62.3
09/22/15	00:00	12.4	43,315,939.8	320	300.4	61.9
Average		12.4	43,734,593.4	320	302.1	62.7
Minimum		12.4	43,315,939.8	318	300.4	61.9
Maximum		12.5	44,130,894.8	322	303.2	63.3
Summation		62.1	218,672,967.0	1,601	1,510.3	313.3
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
! = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L5/03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:01 Through 09/22/2015 00:05
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:01	12.5	43,216,359.4	319	300.1	61.7
09/22/15	00:02	12.6	43,166,297.5	319	300.1	61.7
09/22/15	00:03	12.7	43,282,076.5	319	299.8	61.8
09/22/15	00:04	12.6	43,556,021.5	321	299.3	62.2
09/22/15	00:05	12.4	43,900,093.3	321	299.0	62.6
	Average	12.6	43,424,169.6	320	299.7	62.0
	Minimum	12.4	43,166,297.5	319	299.0	61.7
	Maximum	12.7	43,900,093.3	321	300.1	62.6
	Summation	62.8	217,120,848.2	1,599	1,498.3	310.0
	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

26/03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:06 Through 09/22/2015 00:10
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:06	12.4	44,156,163.7	321	298.7	63.0
09/22/15	00:07	12.3	44,142,701.9	320	298.0	62.9
09/22/15	00:08	12.4	43,880,626.6	321	297.1	62.5
09/22/15	00:09	12.4	43,507,183.7	321	296.7	61.9
09/22/15	00:10	12.5	43,262,521.2	320	297.0	61.5
	Average	12.4	43,789,839.4	321	297.5	62.4
	Minimum	12.3	43,262,521.2	320	296.7	61.5
	Maximum	12.5	44,156,163.7	321	298.7	63.0
	Summation	62.0	218,949,197.1	1,603	1,487.5	311.8
	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

27
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:11 Through 09/22/2015 00:15
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:11	12.5	43,282,002.7	318	297.7	61.6
09/22/15	00:12	12.5	43,562,649.3	317	298.6	62.1
09/22/15	00:13	12.6	44,036,258.6	319	299.2	62.8
09/22/15	00:14	12.5	44,400,013.2	320	299.1	63.4
09/22/15	00:15	12.4	44,522,051.1	320	298.9	63.5
	Average	12.5	43,960,595.0	319	298.7	62.7
	Minimum	12.4	43,282,002.7	317	297.7	61.6
	Maximum	12.6	44,522,051.1	320	299.2	63.5
	Summation	62.5	219,802,974.9	1,594	1,493.5	313.4
	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

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:16 Through 09/22/2015 00:20
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:16	12.4	44,615,070.6	321	298.4	63.6
09/22/15	00:17	12.3	44,638,781.9	320	297.7	63.6
09/22/15	00:18	12.3	44,289,086.2	321	297.2	63.0
09/22/15	00:19	12.4	43,783,052.9	319	296.6	62.3
09/22/15	00:20	12.5	43,474,769.3	323	295.8	61.8
	Average	12.4	44,160,152.2	321	297.1	62.9
	Minimum	12.3	43,474,769.3	319	295.8	61.8
	Maximum	12.5	44,638,781.9	323	298.4	63.6
	Summation	61.9	220,800,760.9	1,604	1,485.7	314.3
	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

L9
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:21 Through 09/22/2015 00:25
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:21	12.4	43,451,285.3	323	294.8	61.7
09/22/15	00:22	12.4	43,511,068.1	322	294.1	61.7
09/22/15	00:23	12.4	43,492,150.7	321	293.7	61.6
09/22/15	00:24	12.4	43,385,340.5	321	293.5	61.4
09/22/15	00:25	12.6	43,233,320.3	318	293.4	61.2
	Average	12.4	43,414,633.0	321	293.9	61.5
	Minimum	12.4	43,233,320.3	318	293.4	61.2
	Maximum	12.6	43,511,068.1	323	294.8	61.7
	Summation	62.2	217,073,164.9	1,605	1,469.5	307.6
	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

L10
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:26 Through 09/22/2015 00:30
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:26	12.6	43,092,516.2	320	293.0	61.0
09/22/15	00:27	12.7	43,108,312.7	320	292.6	61.0
09/22/15	00:28	12.7	43,272,709.9	323	292.2	61.2
09/22/15	00:29	12.7	43,393,598.8	320	292.0	61.3
09/22/15	00:30	12.6	43,477,159.8	320	292.3	61.5
	Average	12.7	43,268,859.5	321	292.4	61.2
	Minimum	12.6	43,092,516.2	320	292.0	61.0
	Maximum	12.7	43,477,159.8	323	293.0	61.5
	Summation	63.3	216,344,297.4	1,603	1,462.1	306.0
	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

L11
03

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:31 Through 09/22/2015 00:35
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:31	12.5	43,615,569.1	319	293.0	61.7
09/22/15	00:32	12.5	43,799,743.8	319	293.7	62.0
09/22/15	00:33	12.5	43,974,686.9	319	294.2	62.3
09/22/15	00:34	12.5	44,101,200.3	322	294.5	62.5
09/22/15	00:35	12.5	44,156,042.9	322	294.5	62.6
	Average	12.5	43,929,448.6	320	294.0	62.2
	Minimum	12.5	43,615,569.1	319	293.0	61.7
	Maximum	12.5	44,156,042.9	322	294.5	62.6
	Summation	62.5	219,647,243.0	1,601	1,469.9	311.1
	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
! = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

L12
U3

Average Data

Plant: LABADIE
Interval: 1 Minute
Type: Roll
Report Period: 09/22/2015 00:36 Through 09/22/2015 00:40
Time Online Criteria: 1 minute(s)

Source		LABU03				
Parameter)Unit(		CO2 (PERCENT)	FLWSCFH (SCFH)	MWLOAD3 (MW)	STKTMP (DEGF)	VELOCITY (FEET/SEC)
09/22/15	00:36	12.4	44,110,271.9	322	294.4	62.5
09/22/15	00:37	12.4	44,011,150.1	321	294.3	62.4
09/22/15	00:38	12.4	43,894,745.0	321	293.6	62.2
09/22/15	00:39	12.4	43,653,069.9	320	292.5	61.8
09/22/15	00:40	12.6	43,404,749.9	321	292.0	61.4
	Average	12.4	43,814,797.4	321	293.4	62.1
	Minimum	12.4	43,404,749.9	320	292.0	61.4
	Maximum	12.6	44,110,271.9	322	294.4	62.5
	Summation	62.2	219,073,986.8	1,605	1,466.8	310.3
	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