SOURCE TEST REPORT
2019 COMPLIANCE AND RATA TESTING
GRAYS HARBOR ENERGY, LLC
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1 AND GAS TURBINE #2
ELMA, WASHINGTON

Prepared For:

Grays Harbor Energy, LLC
401 Keys Road
Elma, WA 98541

For Submittal To:

Olympic Region Clean Air Agency
2940 Limited Lane
Olympia, WA 98502

Prepared By:

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Test Dates:	**March 13-14, 2019**
Submittal Date:	**April 25, 2019 (Revised Nov. 4, 2019)**

REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature: Kristina M Schafer Date: 11/04/2019

for Rudy Nunez

Name: Rudy Nunez, QSTI Title: Client Project Manager

I have reviewed, technically and editorially, details calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: Dan Duncan Date: 11/04/2019

Name: Dan Duncan Title: Reporting Hub Manager

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1.0 SUMMARY OF TEST PROGRAM AND RESULTS

1.1 PROGRAM OBJECTIVES

Montrose Air Quality Services, LLC (Montrose) was contracted by Grays Harbor Energy, LLC (Grays Harbor) to perform a series of air emission tests at the facility located in Elma, Washington. The tests were conducted to determine compliance with the source testing limitations of 40 CFR Parts 60 and 75 as specified in the Energy Facility Site Evaluation Council (EFSEC) Approval of the Prevention of Significant Deterioration (PSD) and Notice of Construction (NOC) No. EFSEC/22001-01, Amendment 4. Tests were performed to audit the performance of the continuous emission monitoring systems (CEMS) and continuous emission rate monitoring systems (CERMS) in accordance with 40 CFR, Part 60, Appendix B and 40 CFR, Part 75, Appendix A.

The testing was conducted by Rudy Nunez, Nicholas Woltkamp, and Jaime Rios of Montrose on March 13-14, 2019. Chris Sherin of Grays Harbor coordinated the testing program. The tests were conducted according to a test plan dated February 19, 2019 that was submitted to the Olympia Region Clean Air Agency. The compliance tests referenced in the test plan were not performed. Please refer to Section 4.2 for details. Montrose performed the tests to measure the following emission parameters:

- Relative Accuracy Test Audit:
  - CO (ppm volume dry, ppmvd @ 15% O_2, lb/hr)
  - NO_x (ppm volume dry, ppmvd @ 15% O_2, lb/hr, lb/MMBtu)
  - NH_3 (ppm volume dry, ppmvd @ 15% O_2, lb/hr)
- O_2 and CO_2 (% volume dry) – for molecular weight
- Stack volumetric flow rate (dscfm) and moisture content (% by volume)

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their respective performance specifications in Table 1-1. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

**TABLE 1-1
SUMMARY OF AVERAGE RATA RESULTS
GRAYS HARBOR ENERGY CENTER
GAS TURBINES 1 & 2
MARCH 13-14, 2019**

CEMS Parameter	Gas Turbine 1 Results	Gas Turbine 2 Results	Performance Specification Part 60	Performance Specification Part 75	Performance Specification Incentive Program
O_2 Analyzer:					
% volume dry	<0.1[a]	0.2[a]	1.0	1.0	0.7
NO_X Analyzer:					
ppm @ 15% O_2	3.1[b]	9.0[b]	20	N/A	--
lb/hr as NO_2	3.0[b]	9.2[b]	20	N/A	--
lb/MMBtu as NO_2	3.7[b]	8.9[b]	20	N/A	N/A
lb/MMBtu as NO_2	<0.1[b]	0.001[e]	--	10	7.5
Bias Adj. Factor	1.000	1.111	--	--	--
Unit Load, MW	304	304	--	--	--
CO Analyzer:					
ppm @ 15% O_2	<1[d]	<1[d]	5	--	--
lb/hr	7[c]	8[c]	10	--	--
NH_3 Analyzer:					
ppm @ 15% O_2	13[f]	19[f]	--	--	--
lb/hr	13[f]	18[f]		--	--

Note: Compliance with Part 75 NO_X accuracy is based on lb/MMBtu, not ppm or lb/hr.
The RATA test results are calculated based on the best 9 available test runs performed.

[a] % O_2 (based on actual difference between analyzer readings).
[b] % of the mean value of the RM test data.
[c] % of the applicable standard (emission limit).
[d] ppm absolute difference between the RM and CEMS.
[e] actual difference between analyzer readings (alternate if lb/MMBtu does not pass 10% criteria).
[f] % of the applicable standard. The criteria for the NH_3 RATA were set by ORCAA to be no greater than 35% of the RM value or 20% of the applicable standard.

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1.2 PROJECT CONTACTS

A list of project participants is included below:

Facility Information

Source Location:	Grays Harbor Energy Center 401 Keys Road Elma, Washington 98541	
Project Contact:	Chris Sherin	Paul Hughes
Role:	Plant Manager	Operations Manager
Company:	Grays Harbor Energy Center	Grays Harbor Energy Center
Telephone:	360-482-4349	360-482-6291
Email:	csherin@invenergyllc.com	phughes@invernergyllc.com

Agency Information

Regulatory Agency:	Energy Facility Site Evaluation Council	Olympic Region Clean Air Agency
Agency Contact:	Sonia E. Bumpus	Robert Moody
Telephone:	360-664-1363	(360) 539-7610
Email:	Sonia.Bumpus@utc.wa.gov	Robert.Moody@orcaa.org

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC (Montrose)	
Contact:	Kristina Schafer	Rudy Nunez
Title:	District Manager	Client Project Manager
Telephone:	253-480-3801	714-279-6777
Email:	kschafer@montrose-env.com	rnunez@montrose-env.com

Laboratory Information

Laboratory:	Chester LabNet[1]
City, State:	Tigard, Oregon

1.3 QUALITY STATEMENT

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is included in the report appendices.

1 Montrose reserves the right to select a different laboratory than the one stated here.

2.0 SOURCE DESCRIPTION

2.1 FACILITY AND SOURCE DESCRIPTION

The Grays Harbor facility is located at 401 Keys Road in Elma, Washington. The facility includes two General Electric Frame 7FA combined cycle units. Each turbine is equipped with dry low-NOx combustors and a selective catalytic reduction (SCR) system for NOx emissions control and an oxidation catalyst for CO emissions control.

2.1.1 CEMS and DAS Description

Each stack has a dry extractive continuous emissions monitoring system (CEMS) to measure O_2, CO and NO_X emissions. The steam generated from each block of two units supplies a single steam turbine-generator set. The two units are arranged in combined cycle mode with a single steam turbine generator. Table 3-1 outlines the make, model and operating ranges of the individual analyzers.

TABLE 3-1
CEMS INFORMATION

Analyzer Type	Manufacturer / Model No	Serial No. Turbine 1	Serial No. Turbine 2
Low CO/O_2	Oxymat 6E	P6-0489	P6-0490
CO	Siemens / U23	P6-0444	P6-0445
NO_X	Thermo / 42i LS	1152020022	1162090003
NH_3	Thermo / 42i LS	1162090004	1152020023

2.2 SAMPLING LOCATIONS AND ACCESS

Information regarding the sampling locations is presented below:

Sample location ID:	Turbine Units 1 and 2 exhaust stacks (locations are identical)
Configuration:	Cylindrical, vertical
Dimensions:	18 ft. in diameter
Port locations:	Appx. 45 ft. (~2.5 duct diameters) upstream from stack exit Appx. 100 ft. (~5.6 duct diameters) downstream from nearest stack disturbance

Traverse point information is presented below:

- RATA testing will be conducted at 0.4, 1.2, and 2.0 meters from the stack wall

2.3 OPERATING CONDITIONS AND PROCESS DATA

Emission tests were performed while the source/units and air pollution control devices were operating at the conditions required by the permit. The units were tested when operating normally (at least 50% of rated load).

Plant personnel established the test conditions and collected all applicable unit-operating data. Montrose monitored the collection of process data. Data collected includes the following parameters:

- Fuel flow rates
- Gross power output
- CEMS data
- Manufacturer, Model and SN of the CEMS

3.0 TEST METHOD DETAILS

3.1 LIST OF TEST METHODS

The test procedures for this test program are summarized in Table 3-1 below. Additional information regarding specific applications or modifications to standard procedures is presented in the following sub-sections.

TABLE 3-1
TEST PROCEDURES

Parameter	Measurement Principle	Reference Method
Volumetric flow rate	Stoichiometry	EPA 19
Volumetric flow rate	Pitot/temperature traverse	EPA 1, 2
O_2	Paramagnetism	EPA 3A
CO_2	Non-dispersive infrared	EPA 3A
NO_x	Chemiluminescence	EPA 7E
CO	Gas filter correlation NDIR	EPA 10
Moisture	Impinger weight gain	EPA 4[1]
NH_3	Ion chromatography	BAAQMD ST-1B

3.1.1 Gaseous Emissions

Concentrations of the gaseous constituents of stack gas (O_2, CO_2, CO, and NO_X) were measured using Montrose's dry extractive reference method (RM) monitor system in accordance with EPA Method 7E. This system meets the requirements of EPA methods for gaseous species. Pertinent information regarding the performance of the method is presented below:

- Method Deviations: None
- Method Options: N/A
- Detection Limits: 2% of calibration span

Sampling traverse points for gaseous emissions were determined in accordance with EPA Method 7E. As required by 40 CFR Part 60, the stack gas was sampled at three traverse points on each source. The gas turbine stacks have a diameter greater than 7.8 feet; therefore, probe tips were located at 0.4, 1.2, and 2.0 meters from the stack wall as allowed in Performance

[1] It is anticipated that EPA Method 4 will be used to measure moisture levels along with BAAQMD ST-1B but they will not be used in gaseous calculations.

Specification 2, Section 8.1.3.2. Source gas was sampled for a period of 21 minutes for each of the 12 audit runs per source.

3.1.2 Ammonia Slip

Concentrations of ammonia slip were determined using Bay Area Air Quality Management District (BAAQMD) Method ST-1B. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations: Ion chromatography was used in place of ISE for analysis.
- Method Options: The H_2SO_4 fraction was not analyzed
- Target and/or Minimum Required Sample Duration: 60 minutes
- Analytical Laboratory: Chester LabNet, Tigard, OR

3.1.3 Volumetric Flow Rate

Stack gas volumetric flow rates were determined by the procedures outlined in EPA Method 19. Pertinent information regarding the performance of the method is presented below:

- F Factor: Oxygen based F factor, dry basis (F_d)
- F Factor Source: Published in EPA Method 19
- Heat Input Data: Calculated based on fuel flow rate and higher heating value
- Higher Heating Value Source: Analysis of fuel samples by Grays Harbor (1,077 Btu/scf)

Volumetric flow rates and moisture content were determined using EPA Methods 2 and 4 in conjunction with each particulate matter test. The measured flow rates were used to calculate particulate matter emissions in lb/hr.

3.1.4 Relative Accuracy Test Audit

The relative accuracy of each CEMS were audited per the procedures of 40 CFR, Part 60, Appendices B and F; and 40 CFR, Part 75, Appendix A. Pertinent information regarding the performance of the audit is presented below:

- Traverse Points: Three located along the measurement line
- Relevant Performance Specifications: 40 CFR 60, PS 2, 3 and 4A; 40 CFR 75 Sections 3.3.2 and 3.3.3

3.1.5 Fuel Analysis

Sample gas from the facility's natural gas fuel supply pipeline was collected and submitted for analysis. Pertinent information regarding the fuel analysis is presented below:

- Analytical Method: ASTM D-3588
- Sample Containers: Teflon-coated pressurized fuel bombs

- Target Analytes & Parameters: Ultimate Analysis (C, H, O, N content), heating value, density, compressibility factor, F Factor
- Analytical Laboratory: Saybolt Petroleum Services – Elma, WA

3.1.6 Alternative EPA Method 2 Thermocouple Calibration Procedure (ALT-011)

Approved Alternative Method 011 (ALT-011) is used as an alternative to the EPA Method 2 two-point thermocouple calibration. This procedure involves a single-point in-field check using a reference thermometer to confirm that the thermocouple system is operating properly. The temperatures of the thermocouple and reference thermometers shall agree to within ±2 °F.

4.0 TEST RESULTS AND OVERVIEW

4.1 DISCUSSION OF RESULTS

The average results are compared to the performance specifications in Table 1-1. Detailed results from the individual relative accuracy test runs are presented in Tables 4-1 through 4-18. The results were calculated using nine of the available test results for each CEMS component. All of the analyzers performed within their applicable performance specifications.

Additional information is included in the appendices. Appendix A presents the general and specific equations used for the emissions calculations and computer spreadsheets. Raw field data sheets and data acquisition printouts are included in Appendix B. Laboratory reports and chain of custody sheets for the samples are located in Appendix C. CEM and process data provided by the facility is located in Appendix D. Appendix E presents the quality assurance information, including instrument calibration data. Additional correspondence and relevant regulatory information are located in Appendix F.

4.2 DEVIATIONS AND EXCEPTIONS

Due to mechanical failures experienced by the test team, particulate matter testing was not able to be completed as planned. One test run was completed, however, the post-test leak checks failed. The data sheet is included in Appendix B.2, but no calculation of results was conducted. Several sample volumes from the ammonia tests were determined to be less than 21 dscf.

TABLE 4-1
RELATIVE ACCURACY TEST RESULTS
O_2 ANALYZER, % VOLUME DRY
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
~~Run 1~~	~~3/13/19~~	~~0929-0950~~	~~12.33~~	~~12.24~~	~~0.09~~
Run 2	3/13/19	1024-1045	12.29	12.22	0.07
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~-0.02~~	~~12.19~~	~~-12.21~~
Run 4	3/13/19	1240-1301	12.23	12.18	0.05
Run 5	3/13/19	1317-1338	12.22	12.16	0.06
Run 6	3/13/19	1358-1419	12.19	12.16	0.03
Run 7	3/13/19	1437-1458	12.20	12.17	0.03
Run 8	3/13/19	1515-1536	12.20	12.18	0.02
Run 9	3/13/19	1553-1614	12.21	12.19	0.02
Run 10	3/13/19	1629-1650	12.23	12.19	0.04
Run 11	3/13/19	1713-1734	12.23	12.19	0.04
AVERAGES:			12.22	12.18	0.04
STANDARD DEVIATION:					0.017
CONFIDENCE COEFFICIENT:					0.013
RELATIVE ACCURACY, %:					**<0.1**

Note: Percent relative accuracy is based on the absolute difference using nine of the eleven available test runs.

TABLE 4-2
RELATIVE ACCURACY TEST RESULTS
CO ANALYZER, PPM @ 15% O_2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-0950	0.00	0.22	-0.22
~~Run 2~~	~~3/13/19~~	~~1024-1045~~	~~-0.01~~	~~0.22~~	~~-0.23~~
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~1.26~~	~~0.20~~	~~1.06~~
Run 4	3/13/19	1240-1301	0.00	0.18	-0.18
Run 5	3/13/19	1317-1338	-0.01	0.19	-0.20
Run 6	3/13/19	1358-1419	0.01	0.20	-0.19
Run 7	3/13/19	1437-1458	0.00	0.19	-0.19
Run 8	3/13/19	1515-1536	0.00	0.19	-0.19
Run 9	3/13/19	1553-1614	-0.01	0.17	-0.18
Run 10	3/13/19	1629-1650	-0.01	0.18	-0.19
Run 11	3/13/19	1713-1734	-0.02	0.18	-0.20
AVERAGES:			0.00	0.19	-0.19
EMISSION LIMIT:					3.00
STANDARD DEVIATION:					0.013
CONFIDENCE COEFFICIENT:					0.010
RELATIVE ACCURACY, PPM:					**0.2**

Note: Relative accuracy is based on the absolute difference plus confidence coefficient using nine of the eleven available test runs.

TABLE 4-3
RELATIVE ACCURACY TEST RESULTS
CO ANALYZER, LB/HR
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-0950	0.00	1.12	-1.12
~~Run 2~~	~~3/13/19~~	~~1024-1045~~	~~-0.06~~	~~1.08~~	~~-1.14~~
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~6.43~~	~~1.03~~	~~5.40~~
Run 4	3/13/19	1240-1301	0.01	0.93	-0.92
Run 5	3/13/19	1317-1338	-0.04	0.98	-1.02
Run 6	3/13/19	1358-1419	0.03	0.98	-0.95
Run 7	3/13/19	1437-1458	0.00	0.97	-0.97
Run 8	3/13/19	1515-1536	0.00	0.96	-0.96
Run 9	3/13/19	1553-1614	-0.04	0.92	-0.96
Run 10	3/13/19	1629-1650	-0.05	0.91	-0.96
Run 11	3/13/19	1713-1734	-0.08	0.96	-1.04
AVERAGES:			-0.02	0.97	-0.99
EMISSION LIMIT:					15.9
STANDARD DEVIATION:					0.06
CONFIDENCE COEFFICIENT:					0.05
RELATIVE ACCURACY, %:					**6.5**

Note: Percent relative accuracy is based on the applicable standard using nine of the eleven available test runs.

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TABLE 4-4
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, PPM @ 15% O_2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-0950	1.59	1.64	-0.05
Run 2	3/13/19	1024-1045	1.62	1.64	-0.02
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~1.36~~	~~1.62~~	~~-0.26~~
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~1.54~~	~~1.63~~	~~-0.09~~
Run 5	3/13/19	1317-1338	1.58	1.64	-0.06
Run 6	3/13/19	1358-1419	1.58	1.62	-0.04
Run 7	3/13/19	1437-1458	1.61	1.62	-0.01
Run 8	3/13/19	1515-1536	1.61	1.60	0.01
Run 9	3/13/19	1553-1614	1.62	1.64	-0.02
Run 10	3/13/19	1629-1650	1.62	1.63	-0.01
Run 11	3/13/19	1713-1734	1.59	1.65	-0.06
AVERAGES:			1.60	1.63	-0.03
EMISSION LIMIT:					2.50
STANDARD DEVIATION:					0.026
CONFIDENCE COEFFICIENT:					0.020
RELATIVE ACCURACY, %:					**3.1**

Note: Percent relative accuracy is based on the reference method using nine of the eleven available test runs.

TABLE 4-5
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, LB/HR
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-0950	13.31	13.75	-0.44
Run 2	3/13/19	1024-1045	13.60	13.71	-0.11
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~11.39~~	~~13.54~~	~~-2.15~~
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~12.90~~	~~13.67~~	~~-0.77~~
Run 5	3/13/19	1317-1338	13.21	13.75	-0.54
Run 6	3/13/19	1358-1419	13.25	13.56	-0.31
Run 7	3/13/19	1437-1458	13.52	13.55	-0.03
Run 8	3/13/19	1515-1536	13.53	13.44	0.09
Run 9	3/13/19	1553-1614	13.60	13.76	-0.16
Run 10	3/13/19	1629-1650	13.59	13.71	-0.12
Run 11	3/13/19	1713-1734	13.37	13.84	-0.47
AVERAGES:			13.44	13.67	-0.23
EMISSION LIMIT:					21.70
STANDARD DEVIATION:					0.217
CONFIDENCE COEFFICIENT:					0.167
RELATIVE ACCURACY, %:					**3.0**

Note: Percent relative accuracy is based on the reference method using nine of the eleven available test runs.

TABLE 4-6
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, LB/MMBTU - PART 60
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-0950	0.0058	0.0061	-0.0003
Run 2	3/13/19	1024-1045	0.0060	0.0060	0.0000
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~0.0050~~	~~0.0060~~	~~-0.0010~~
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~0.0057~~	~~0.0060~~	~~-0.0003~~
Run 5	3/13/19	1317-1338	0.0058	0.0061	-0.0003
Run 6	3/13/19	1358-1419	0.0058	0.0060	-0.0002
Run 7	3/13/19	1437-1458	0.0059	0.0060	-0.0001
Run 8	3/13/19	1515-1536	0.0059	0.0059	0.0000
Run 9	3/13/19	1553-1614	0.0060	0.0060	0.0000
Run 10	3/13/19	1629-1650	0.0060	0.0060	0.0000
Run 11	3/13/19	1713-1734	0.0059	0.0061	-0.0002
AVERAGES:			0.0059	0.0060	-0.0001
STANDARD DEVIATION:					0.00012
CONFIDENCE COEFFICIENT:					0.000093
RELATIVE ACCURACY, %:					**3.7**

Note: Percent relative accuracy is based on the reference method using nine of the eleven available test runs.

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TABLE 4-7
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, LB/MMBTU – PART 75 EDR
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-0950	0.006	0.006	0.000
Run 2	3/13/19	1024-1045	0.006	0.006	0.000
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~0.005~~	~~0.006~~	~~-0.001~~
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~0.006~~	~~0.006~~	~~0.000~~
Run 5	3/13/19	1317-1338	0.006	0.006	0.000
Run 6	3/13/19	1358-1419	0.006	0.006	0.000
Run 7	3/13/19	1437-1458	0.006	0.006	0.000
Run 8	3/13/19	1515-1536	0.006	0.006	0.000
Run 9	3/13/19	1553-1614	0.006	0.006	0.000
Run 10	3/13/19	1629-1650	0.006	0.006	0.000
Run 11	3/13/19	1713-1734	0.006	0.006	0.000
AVERAGES:			0.006	0.006	0.000
BIAS ADJUSTMENT FACTOR:					**1.000**
STANDARD DEVIATION:					0.0000
CONFIDENCE COEFFICIENT:					0.0000
RELATIVE ACCURACY, %:					**<0.1**
UNIT LOAD, MW:					304

Note: Relative accuracy is based on the reference method using nine of the eleven available test runs.

TABLE 4-8
RELATIVE ACCURACY TEST RESULTS
NH_3 ANALYZER, PPM @ 15% O_2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-1011	0.61	1.30	-0.69
Run 2	3/13/19	1024-1101	1.08	1.30	-0.22
~~Run 3~~	~~3/13/19~~	~~1136-1226~~	~~0.44~~	~~1.40~~	~~-0.96~~
Run 4	3/13/19	1240-1310	0.96	1.50	-0.54
Run 5	3/13/19	1318-1348	1.21	1.50	-0.29
~~Run 6~~	~~3/13/19~~	~~1358-1428~~	~~0.74~~	~~1.60~~	~~-0.86~~
Run 7	3/13/19	1437-1507	1.20	1.60	-0.40
Run 8	3/13/19	1515-1545	0.97	1.60	-0.63
Run 9	3/13/19	1553-1623	0.97	1.60	-0.63
Run 10	3/13/19	1629-1659	0.88	1.60	-0.72
Run 11	3/13/19	1713-1743	1.03	1.60	-0.57
AVERAGES:			0.99	1.51	-0.52
EMISSION LIMIT:					5.00
STANDARD DEVIATION:					0.177
CONFIDENCE COEFFICIENT:					0.136
RELATIVE ACCURACY, %:					**13.1**

Note: Percent relative accuracy is based on the applicable standard using nine of the eleven available test runs.

TABLE 4-9
RELATIVE ACCURACY TEST RESULTS
NH_3 ANALYZER, LB/HR
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 1

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/13/19	0929-1011	1.90	3.96	-2.06
Run 2	3/13/19	1024-1101	3.34	4.08	-0.74
~~Run 3~~	~~3/13/19~~	~~1136-1226~~	~~1.35~~	~~4.51~~	~~-3.16~~
Run 4	3/13/19	1240-1310	2.97	4.70	-1.73
Run 5	3/13/19	1318-1348	3.75	4.63	-0.88
~~Run 6~~	~~3/13/19~~	~~1358-1428~~	~~2.29~~	~~5.01~~	~~-2.72~~
Run 7	3/13/19	1437-1507	3.74	5.08	-1.34
Run 8	3/13/19	1515-1545	3.01	5.01	-2.00
Run 9	3/13/19	1553-1623	3.02	5.09	-2.07
Run 10	3/13/19	1629-1659	2.75	5.16	-2.41
Run 11	3/13/19	1713-1743	3.20	5.13	-1.93
AVERAGES:			3.07	4.76	-1.69
EMISSION LIMIT:					16.10
STANDARD DEVIATION:					0.574
CONFIDENCE COEFFICIENT:					0.441
RELATIVE ACCURACY, %:					**13.2**

Note: Percent relative accuracy is based on the applicable standard using nine of the eleven available test runs.

TABLE 4-10
RELATIVE ACCURACY TEST RESULTS
O_2 ANALYZER, % VOLUME DRY
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1118	11.96	12.14	-0.18
Run 2	3/14/19	1137-1158	11.97	12.15	-0.18
Run 3	3/14/19	1212-1233	12.00	12.16	-0.16
Run 4	3/14/19	1249-1310	12.00	12.17	-0.17
Run 5	3/14/19	1324-1345	12.02	12.18	-0.16
Run 6	3/14/19	1405-1426	12.02	12.17	-0.15
Run 7	3/14/19	1441-1502	12.02	12.17	-0.15
Run 8	3/14/19	1515-1536	12.02	12.20	-0.18
Run 9	3/14/19	1605-1626	12.02	12.23	-0.21
AVERAGES:			12.00	12.17	-0.17
STANDARD DEVIATION:					0.018
CONFIDENCE COEFFICIENT:					0.014
RELATIVE ACCURACY, %:					**0.2**

Note: Percent relative accuracy is based on the absolute difference using nine of the available test runs.

**TABLE 4-11
RELATIVE ACCURACY TEST RESULTS
CO ANALYZER, PPM @ 15% O_2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2**

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1118	-0.21	0.01	-0.22
Run 2	3/14/19	1137-1158	-0.24	0.01	-0.25
Run 3	3/14/19	1212-1233	-0.23	0.00	-0.23
Run 4	3/14/19	1249-1310	-0.23	0.01	-0.24
Run 5	3/14/19	1324-1345	-0.24	0.00	-0.24
Run 6	3/14/19	1405-1426	-0.24	0.00	-0.24
Run 7	3/14/19	1441-1502	-0.22	0.00	-0.22
Run 8	3/14/19	1515-1536	-0.23	0.00	-0.23
Run 9	3/14/19	1605-1626	-0.25	0.00	-0.25
AVERAGES:			-0.23	0.00	-0.24
EMISSION LIMIT:					3.00
STANDARD DEVIATION:					0.011
CONFIDENCE COEFFICIENT:					0.008
RELATIVE ACCURACY, PPM:					**0.2**

Note: Relative accuracy is based on the absolute difference plus confidence coefficient using nine of the available test runs.

**TABLE 4-12
RELATIVE ACCURACY TEST RESULTS
CO ANALYZER, LB/HR
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2**

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1118	-1.04	0.04	-1.08
Run 2	3/14/19	1137-1158	-1.18	0.04	-1.22
Run 3	3/14/19	1212-1233	-1.14	0.02	-1.16
Run 4	3/14/19	1249-1310	-1.16	0.04	-1.20
Run 5	3/14/19	1324-1345	-1.22	0.00	-1.22
Run 6	3/14/19	1405-1426	-1.19	0.01	-1.20
Run 7	3/14/19	1441-1502	-1.12	0.00	-1.12
Run 8	3/14/19	1515-1536	-1.14	0.00	-1.14
Run 9	3/14/19	1605-1626	-1.22	0.00	-1.22
AVERAGES:			-1.16	0.02	-1.17
EMISSION LIMIT:					15.90
STANDARD DEVIATION:					0.051
CONFIDENCE COEFFICIENT:					0.039
RELATIVE ACCURACY, %:					**7.6**

Note: Percent relative accuracy is based on the applicable standard using nine of the available test runs.

TABLE 4-13
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, PPM @ 15% O_2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1118	1.89	1.70	0.19
Run 2	3/14/19	1137-1158	1.83	1.68	0.15
Run 3	3/14/19	1212-1233	1.83	1.70	0.13
Run 4	3/14/19	1249-1310	1.84	1.69	0.15
Run 5	3/14/19	1324-1345	1.79	1.69	0.10
Run 6	3/14/19	1405-1426	1.80	1.69	0.11
Run 7	3/14/19	1441-1502	1.80	1.69	0.11
Run 8	3/14/19	1515-1536	1.83	1.65	0.18
Run 9	3/14/19	1605-1626	1.84	1.69	0.15
AVERAGES:			1.83	1.69	0.14
EMISSION LIMIT:					2.50
STANDARD DEVIATION:					0.032
CONFIDENCE COEFFICIENT:					0.024
RELATIVE ACCURACY, %:					**9.0**

Note: Percent relative accuracy is based on the reference method using nine of the available test runs.

TABLE 4-14
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, LB/HR
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1118	15.59	13.99	1.60
Run 2	3/14/19	1137-1158	15.00	13.82	1.18
Run 3	3/14/19	1212-1233	15.02	13.92	1.10
Run 4	3/14/19	1249-1310	15.04	13.81	1.23
Run 5	3/14/19	1324-1345	14.65	13.80	0.85
Run 6	3/14/19	1405-1426	14.72	13.78	0.94
Run 7	3/14/19	1441-1502	14.74	13.78	0.96
Run 8	3/14/19	1515-1536	14.96	13.44	1.52
Run 9	3/14/19	1605-1626	14.97	13.68	1.29
AVERAGES:			14.96	13.78	1.18
EMISSION LIMIT:					21.70
STANDARD DEVIATION:					0.257
CONFIDENCE COEFFICIENT:					0.197
RELATIVE ACCURACY, %:					**9.2**

Note: Percent relative accuracy is based on the reference method using nine of the available test runs.

TABLE 4-15
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, LB/MMBTU – PART 60
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1118	0.0070	0.0063	0.0007
Run 2	3/14/19	1137-1158	0.0067	0.0062	0.0005
Run 3	3/14/19	1212-1233	0.0067	0.0063	0.0004
Run 4	3/14/19	1249-1310	0.0068	0.0062	0.0006
Run 5	3/14/19	1324-1345	0.0066	0.0062	0.0004
Run 6	3/14/19	1405-1426	0.0066	0.0062	0.0004
Run 7	3/14/19	1441-1502	0.0066	0.0062	0.0004
Run 8	3/14/19	1515-1536	0.0068	0.0061	0.0007
Run 9	3/14/19	1605-1626	0.0068	0.0062	0.0006
AVERAGES:			0.0067	0.0062	0.0005
STANDARD DEVIATION:					0.00010
CONFIDENCE COEFFICIENT:					0.00008
RELATIVE ACCURACY, %:					**8.9**

Note: Percent relative accuracy is based on the reference method using nine of the available test runs.

TABLE 4-16
RELATIVE ACCURACY TEST RESULTS
NO_X ANALYZER, LB/MMBTU – PART 75
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1118	0.007	0.006	0.001
Run 2	3/14/19	1137-1158	0.007	0.006	0.001
Run 3	3/14/19	1212-1233	0.007	0.006	0.001
Run 4	3/14/19	1249-1310	0.007	0.006	0.001
Run 5	3/14/19	1324-1345	0.007	0.006	0.001
Run 6	3/14/19	1405-1426	0.007	0.006	0.001
Run 7	3/14/19	1441-1502	0.007	0.006	0.001
Run 8	3/14/19	1515-1536	0.007	0.006	0.001
Run 9	3/14/19	1605-1626	0.007	0.006	0.001
AVERAGES:			0.007	0.006	0.001
BIAS ADJUSTMENT FACTOR:					**1.111**
STANDARD DEVIATION:					0.0000
CONFIDENCE COEFFICIENT:					0.0000
RELATIVE ACCURACY, LB/MMBTU:					**0.001**
UNIT LOAD, MW:					304

Note: Relative accuracy is based on the absolute difference using nine of the available test runs.

MONTROSE AIR QUALITY SERVICES

TABLE 4-17
RELATIVE ACCURACY TEST RESULTS
NH_3 ANALYZER, PPM @ 15% O_2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1127	1.3	1.9	-0.6
Run 2	3/14/19	1137-1207	1.2	1.9	-0.7
Run 3	3/14/19	1213-1243	0.8	1.9	-1.1
Run 4	3/14/19	1249-1319	1.1	1.9	-0.8
Run 5	3/14/19	1324-1354	1.1	2.0	-0.9
Run 6	3/14/19	1405-1435	1.0	2.0	-1.0
Run 7	3/14/19	1441-1511	1.1	2.0	-0.9
Run 8	3/14/19	1515-1545	1.1	1.9	-0.8
Run 9	3/14/19	1605-1635	1.3	1.8	-0.5
AVERAGES:			1.1	1.9	-0.8
EMISSION LIMIT:					5.00
STANDARD DEVIATION:					0.182
CONFIDENCE COEFFICIENT:					0.140
RELATIVE ACCURACY, %:					**19.2**

Note: Percent relative accuracy is based on the applicable standard using nine of the available test runs.

TABLE 4-18
RELATIVE ACCURACY TEST RESULTS
NH_3 ANALYZER, LB/HR
GRAYS HARBOR ENERGY CENTER
GAS TURBINE 2

Run Number	Date	Time	Montrose RM	Plant CEMS	Difference
Run 1	3/14/19	1057-1127	3.94	5.66	-1.72
Run 2	3/14/19	1137-1207	3.56	5.78	-2.22
Run 3	3/14/19	1213-1243	2.31	5.73	-3.42
Run 4	3/14/19	1249-1319	3.31	5.82	-2.51
Run 5	3/14/19	1324-1354	3.28	5.88	-2.60
Run 6	3/14/19	1405-1435	3.18	5.98	-2.80
Run 7	3/14/19	1441-1511	3.43	5.96	-2.53
Run 8	3/14/19	1515-1545	3.31	5.80	-2.49
Run 9	3/14/19	1605-1635	3.82	5.46	-1.64
AVERAGES:			3.35	5.79	-2.44
EMISSION LIMIT:					16.10
STANDARD DEVIATION:					0.542
CONFIDENCE COEFFICIENT:					0.416
RELATIVE ACCURACY, %:					**18**

Note: Percent relative accuracy is based on the applicable standard using nine of the available test runs.

APPENDIX A
CALCULATIONS

Appendix A.1
Gaseous Emissions Spreadsheets

RELATIVE ACCURACY TEST AUDIT DETERMINATION
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

Test No.	**Run 1**	**Run 2**	**Run 3**	**Run 4**	**Run 5**	**Run 6**	**Run 7**	**Run 8**	**Run 9**	**Run 10**	**Run 11**	**Average**
Date	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**Runs 1-11**
Start Time (reference method, local time)	**0929-0950**	**1024-1045**	**1136-1157**	**1240-1301**	**1317-1338**	**1358-1419**	**1437-1458**	**1515-1536**	**1553-1614**	**1629-1650**	**1713-1734**	**--**
Reference temperature, °F	68	68	68	68	68	68	68	68	68	68	68	**68**
Unit Load, MW	302	303	304	303	304	305	305	304	304	305	304	**303.9**
CT Gas Flow, hscfh	16,597	16,597	16,591	16,597	16,602	16,601	16,615	16,600	16,620	16,629	16,632	**16,441**
DT Gas Flow, hscfh	4,536	4,523	4,520	4,537	4,539	4,549	4,552	4,555	4,560	4,563	4,573	**4,511**
Total fuel flow @ 60 °F, scfh	2,113,280	2,112,010	2,111,080	2,113,480	2,114,140	2,114,950	2,116,720	2,115,500	2,117,920	2,119,160	2,120,480	**2,095,251**
"F_d" factor @ 68 °F, dscf/MMBtu	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	**8,710**
HHV @ 60 °F, btu/scf	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	**1,077.0**
Stack flow rate - based on fuel, dscfm	805,965	801,787	329,685	796,434	796,036	793,601	794,923	794,802	796,697	798,647	798,732	755,210
O_2, % volume dry	12.33	12.29	-0.02	12.23	12.22	12.19	12.20	12.20	12.21	12.23	12.23	**11.12**
CO_2, % volume dry	4.923	4.991	4.979	4.977	4.945	4.958	4.982	4.971	4.957	4.957	4.952	**4.96**
CO, ppm volume dry	0.000	-0.017	4.473	0.004	-0.013	0.009	-0.001	0.000	-0.010	-0.015	-0.022	**0.40**
CO, ppm dry @ 15% O_2	0.000	-0.012	1.261	0.003	-0.009	0.006	0.000	0.000	-0.007	-0.010	-0.015	**0.10**
CO, lb/hr	-0.001	-0.059	6.431	0.014	-0.044	0.032	-0.002	-0.001	-0.035	-0.051	-0.078	**0.52**
CO, lb/MMBtu	-2.8E-07	-2.6E-05	2.8E-03	6.1E-06	-1.9E-05	1.4E-05	-8.3E-07	-4.2E-07	-1.5E-05	-2.3E-05	-3.4E-05	**2.5E-04**
NO_X, ppm volume dry	2.305	2.369	4.822	2.262	2.317	2.331	2.373	2.376	2.382	2.375	2.336	**2.568**
NO_X, ppm dry @ 15% O_2	1.587	1.624	1.360	1.539	1.575	1.579	1.609	1.612	1.618	1.616	1.589	**1.573**
NO_X, lb/hr as NO_2	13.308	13.605	11.389	12.905	13.213	13.252	13.517	13.530	13.597	13.587	13.369	**13.206**
NO_X, lb/MMBtu as NO_2	5.8E-03	6.0E-03	5.0E-03	5.7E-03	5.8E-03	5.8E-03	5.9E-03	5.9E-03	6.0E-03	6.0E-03	5.9E-03	**5.8E-03**

RELATIVE ACCURACY TEST AUDIT DETERMINATION
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

Test No.	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Average
Date	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**Runs 1-9**
Start Time (reference method, local time)	**1057-1118**	**1137-1158**	**1212-1233**	**1249-1310**	**1324-1345**	**1405-1426**	**1441-1502**	**1515-1536**	**1605-1626**	**--**
Reference temperature, °F	68	68	68	68	68	68	68	68	68	**68**
Unit load, MW	307	305	304	304	304	304	305	303	302	**304**
CT Gas Flow, hscfh	16,943	16,849	16,830	16,784	16,789	16,776	16,789	16,711	16,698	**16,796**
DB Gas Flow, hscfh	3,848	3,846	3,832	3,834	3,835	3,835	3,839	3,839	3,843	**3,839**
Total fuel flow @ 60 °F, scfh	2,079,060	2,069,440	2,066,210	2,061,750	2,062,340	2,061,060	2,062,780	2,055,000	2,054,090	**2,063,526**
"F_d" factor @ 68 °F, dscf/MMBtu	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	**8,710**
"F_d" factor @ T_{ref} °F, dscf/MMBtu	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	**8,710**
HHV @ 60 °F, btu/scf	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	**1,077.0**
Stack flow rate - based on fuel, dscfm	759,782	757,504	758,425	756,928	758,985	758,108	758,665	755,887	755,852	**757,793**
Stack flow rate - based on fuel, dscfm	759,782	757,504	758,425	756,928	758,985	758,108	758,665	755,887	755,852	757,793
O_2, % volume dry	11.96	11.97	12.00	12.00	12.02	12.02	12.02	12.02	12.02	**12.00**
CO_2, % volume dry	5.033	5.051	5.056	5.100	5.087	5.085	5.085	5.061	5.060	**5.07**
CO, ppm volume dry	-0.315	-0.358	-0.345	-0.352	-0.368	-0.361	-0.338	-0.346	-0.370	**-0.350**
CO, ppm dry @ 15% O_2	-0.208	-0.237	-0.228	-0.233	-0.245	-0.240	-0.225	-0.230	-0.246	**-0.232**
CO, lb/hr	-1.043	-1.182	-1.140	-1.162	-1.218	-1.194	-1.119	-1.140	-1.218	**-1.16**
CO, lb/MMBtu	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	**-0.001**
NO_X, ppm volume dry	2.865	2.763	2.764	2.774	2.695	2.710	2.712	2.762	2.764	**2.757**
NO_X, ppm dry @ 15% O_2	1.890	1.826	1.832	1.839	1.791	1.800	1.801	1.834	1.837	**1.828**
NO_X, lb/hr as NO_2	15.594	14.996	15.017	15.041	14.654	14.718	14.739	14.956	14.969	**14.965**
NO_X, lb/MMBtu as NO_2	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	**0.007**

Appendix A.2
Ammonia Slip Spreadsheets

RELATIVE ACCURACY TEST AUDIT DETERMINATION
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

Test No.	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Run 11	Average
Date	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**3/13/19**	**Runs 1-11**
Start Time (reference method, local time)	**0929-1011**	**1024-1101**	**1136-1226**	**1240-1310**	**1318-1348**	**1358-1428**	**1437-1507**	**1515-1545**	**1553-1623**	**1629-1659**	**1713-1743**	--
Stack area, ft^2	254.469	254.469	254.469	254.469	254.469	254.469	254.469	254.469	254.469	254.469	254.469	--
Reference temperature, °F	68	68	68	68	68	68	68	68	68	68	68	**68**
Pitot coefficient	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	--
Meter calibration, Yd	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	--
Barometric pressure, in. Hg	29.80	29.80	29.80	29.80	29.80	29.80	29.80	29.80	29.80	29.80	29.80	**29.80**
Meter box volume, acf	19.123	15.236	16.594	16.772	18.619	20.036	21.500	22.405	22.700	22.423	22.810	**18.18**
Impinger liquid, g	33.4	35.6	8.8	39.1	45.0	34.8	44.2	48.9	39.0	48.7	54.9	**36.03**
Meter temperature, °F	70.8	81.0	89.5	92.7	91.0	88.2	87.6	85.7	85.3	83.0	83.9	**85.33**
Meter pressure (Δ H), iwg	1.00	1.00	1.00	1.00	1.17	1.50	1.91	2.00	2.00	2.00	2.00	**1.51**
Velocity head (Δ P), iwg	1.370	1.386	1.562	1.406	1.360	1.344	1.364	1.333	1.341	1.309	1.279	**1.37**
Static pressure, iwg	-0.70	-0.70	-0.70	-0.70	-0.70	-0.70	-0.73	-0.73	-0.73	-0.73	-0.73	**-0.71**
Stack temperature, °F	201.6	201.6	198.8	193.9	193.5	194.8	192.1	194.2	192.8	193.2	191.9	**195.3**
Standard sample volume, dscf	18.812	14.703	15.767	15.844	17.650	19.107	20.546	21.491	21.791	21.614	21.950	**17.440**
Water vapor volume, scf	1.5748	1.6785	0.4149	1.8436	2.1218	1.6408	2.0840	2.3056	1.8389	2.2962	2.5885	**1.8534**
Moisture fraction, nondimensional	0.0772	0.1025	0.0256	0.1042	0.1073	0.0791	0.0921	0.0969	0.0778	0.0960	0.1055	**0.0877**
Moisture fraction, % by volume	7.72%	10.25%	2.56%	10.42%	10.73%	7.91%	9.21%	9.69%	7.78%	9.60%	10.55%	**8.77%**
Stack gas molecular weight, dry	29.281	29.290	28.796	29.285	29.280	29.281	29.285	29.283	29.282	29.282	29.281	**29.239**
Stack gas molecular weight, wet	28.410	28.133	28.519	28.109	28.070	28.389	28.246	28.190	28.404	28.199	28.091	**28.251**
Absolute stack pressure, in. Hg	29.749	29.749	29.749	29.749	29.749	29.749	29.746	29.746	29.746	29.746	29.746	**29.748**
Stack gas velocity, ft/sec	74.377	75.162	79.083	75.300	74.082	73.302	73.892	73.243	73.093	72.506	71.730	**74.161**
Stack flow rate, acfm	1,135,601	1,147,586	1,207,443	1,149,684	1,131,097	1,119,178	1,128,198	1,118,288	1,115,994	1,107,026	1,095,178	**1,132,297**
Stack flow rate, wscfm	901,112	910,623	962,241	922,954	908,641	897,349	908,155	897,340	897,471	889,663	881,829	**907,034**
Stack flow rate - based on pitot, dscfm	831,505	817,316	937,569	826,753	811,134	826,385	824,522	810,397	827,629	804,224	788,805	**827,840**
Unit Load, MW	302	303	303	304	304	305	305	304	304	304	304	--
CT Gas Flow, hscfh	16,596.3	16,583.9	16,593.1	16,596.4	16,595.9	16,599.6	16,608.6	16,599.4	16,620.0	16,625.2	16,630.5	**16,439**
DT Gas Flow, hscfh	4,533.4	4,523.8	4,523.8	4,537.6	4,541.7	4,549.1	4,552.6	4,556.2	4,559.5	4,564.9	4,572.4	**4,511**
Total fuel flow, scfh	2,112,970	2,110,770	2,111,690	2,113,400	2,113,760	2,114,870	2,116,120	2,115,560	2,117,950	2,119,010	2,120,290	**2,095,052**
"F_d" factor @ 68 °F, dscf/MMBtu	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	**8,710**
"F_d" factor @ T_{ref} °F, dscf/MMBtu	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	**8,710**
HHV @ 60 °F, btu/scf	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	**1,077.0**
Stack flow rate - based on fuel, dscfm	805,847	801,316	329,781	796,404	795,892	793,571	794,698	794,825	796,708	798,590	798,660	**716,610**
O_2, % volume dry	12.33	12.29	-0.02	12.23	12.22	12.19	12.20	12.20	12.21	12.23	12.23	**11.12**
CO_2, % volume dry	4.92	4.99	4.98	4.98	4.95	4.96	4.98	4.97	4.96	4.96	4.95	**4.96**
<u>NH_3 ION CHROMATOGRAPHY</u>												
Sample volume - fraction 1 - (total), ml........................	372	460	475	482	488	468	458	468	470	470	460	**461**
Sample concentration - fraction 1 - (measured), ppm (	0.90	1.01	1.03	0.93	1.29	0.89	1.600	1.32	1.33	1.20	1.45	**1.18**
<u>EMISSIONS</u>												
NH_3 concentrations, ppm volume dry..........................	0.887	1.572	1.544	1.405	1.775	1.088	1.775	1.430	1.427	1.298	1.512	**1.428**
NH_3 concentrations, ppm @ 15% O_2 dry.....................	0.611	1.078	0.435	0.956	1.206	0.737	1.203	0.970	0.969	0.883	1.028	**0.916**
NH_3 mass emissions, lb/hr..	1.896	3.341	1.350	2.966	3.745	2.290	3.739	3.014	3.015	2.749	3.202	**2.846**
NH_3 mass emissions, lb/MMBtu..................................	8.3E-04	1.5E-03	5.9E-04	1.3E-03	1.6E-03	1.0E-03	1.6E-03	1.3E-03	1.3E-03	1.2E-03	1.4E-03	**0.001**

RELATIVE ACCURACY TEST AUDIT DETERMINATION
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

Test No.	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Average
Date	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**3/14/19**	**Runs 1-9**
Start Time (reference method, local time)	**1057-1127**	**1137-1207**	**1213-1243**	**1249-1319**	**1324-1354**	**1405-1435**	**1441-1511**	**1515-1545**	**1605-1635**	**--**
Stack area, ft^2	254.469	254.469	254.469	254.469	254.469	254.469	254.469	254.469	254.469	--
Reference temperature, °F	68	68	68	68	68	68	68	68	68	**68**
Pitot coefficient	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	--
Meter calibration, Yd	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	0.9904	--
Barometric pressure, in. Hg	29.81	29.81	30.38	30.38	30.38	30.38	30.38	30.38	30.38	**30.29**
Meter box volume, acf	21.222	22.393	21.172	21.578	21.856	21.854	21.904	21.332	22.244	**16.30**
Impinger liquid, g	47.4	33.0	43.7	23.2	47.5	44.4	43.5	40.3	38.9	**30.16**
Meter temperature, °F	69.0	74.8	79.8	78.8	74.3	67.9	66.0	68.4	66.5	**64.56**
Meter pressure (Δ H), iwg	1.80	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	**1.70**
Velocity head (Δ P), iwg	1.2864	1.2885	1.3474	1.3092	1.2789	1.3014	1.2966	1.2908	1.3099	**1.17**
Static pressure, iwg	-0.41	-0.41	-0.39	-0.38	-0.41	-0.41	-0.41	-0.41	-0.41	**-0.36**
Stack temperature, °F	196.1	197.4	197.6	195.9	195.6	194.5	195.6	195.6	196.1	**176.43**
Standard sample volume, dscf	20.994	21.916	20.920	21.361	21.818	22.083	22.213	21.535	22.536	**16.28**
Water vapor volume, scf	2.2349	1.5559	2.0605	1.0939	2.2396	2.0935	2.0510	1.9001	1.8341	**1.8960**
Moisture fraction, nondimensional	0.0962	0.0663	0.0897	0.0487	0.0931	0.0866	0.0845	0.0811	0.0753	**0.0802**
Moisture fraction, % by volume	9.62%	6.63%	8.97%	4.87%	9.31%	8.66%	8.45%	8.11%	7.53%	**8.02%**
Stack gas molecular weight, dry	29.284	29.287	29.289	29.296	29.295	29.294	29.294	29.290	29.290	**29.291**
Stack gas molecular weight, wet	28.198	28.539	28.277	28.746	28.243	28.316	28.339	28.375	28.441	**28.386**
Absolute stack pressure, in. Hg	29.780	29.780	30.351	30.352	30.350	30.350	30.350	30.350	30.350	**30.224**
Stack gas velocity, ft/sec	71.994	71.691	72.963	71.245	71.021	71.491	71.391	71.184	71.654	**71.626**
Stack flow rate, acfm	1,099,218	1,094,591	1,114,017	1,087,775	1,084,357	1,091,529	1,090,010	1,086,854	1,094,024	**1,093,597**
Stack flow rate, wscfm	880,431	875,062	907,412	888,247	885,916	893,223	890,449	887,956	893,132	**889,092**
Stack flow rate - based on pitot, dscfm	795,724	817,055	826,053	844,977	803,443	815,878	815,179	815,961	825,914	**817,798**
Unit load, MW	307	305	304	304	304	304	304	303	302	**304**
CT Gas Flow, hscfh	16936.2	16850.5	16822.0	16783.7	16784.6	16774.3	16787.0	16706.2	16697.5	**16793.6**
DT Gas Flow, hscfh	3847.7	3843.8	3832.3	3833.9	3835.1	3835.5	3838.3	3839.1	3843.4	**3838.8**
Total fuel flow @ 60 °F, scfh	2,078,390	2,069,430	2,065,430	2,061,760	2,061,970	2,060,980	2,062,530	2,054,530	2,054,090	
"F_d" factor @ 68 °F, dscf/MMBtu	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	8,710	**8,710**
HHV @ 60 °F, btu/scf	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	1,077.0	**1,077.0**
Stack flow rate - based on fuel, dscfm	759,537	757,500	758,139	756,931	758,849	758,079	758,573	755,714	755,852	757,686
O_2, % volume dry	11.96	11.97	12.00	12.00	12.02	12.02	12.02	12.02	12.02	**12.00**
CO_2, % volume dry	5.03	5.05	5.06	5.10	5.09	5.09	5.08	5.06	5.06	**5.07**
<u>NH_3 ION CHROMATOGRAPHY</u>										
Sample volume - fraction 1 - (total), ml............................	419	438	435	412	420	415	450	421	450	**409**
Sample concentration - fraction 1 - (measured), ppm (mg	1.97	1.78	1.11	1.72	1.70	1.69	1.69	1.70	1.92	**1.70**
<u>EMISSIONS</u>										
NH_3 concentrations, ppm volume dry..............................	1.956	1.770	1.148	1.651	1.628	1.580	1.703	1.654	1.907	**1.666**
NH_3 concentrations, ppm @ 15% O_2 dry........................	1.291	1.170	0.761	1.094	1.082	1.049	1.131	1.098	1.267	**1.105**
NH_3 mass emissions, lb/hr...	3.940	3.555	2.309	3.313	3.276	3.176	3.426	3.313	3.823	**3.348**
NH_3 mass emissions, lb/MMBtu.....................................	1.8E-03	1.6E-03	1.0E-03	1.5E-03	1.5E-03	1.4E-03	1.5E-03	1.5E-03	1.7E-03	**1.5E-03**

Appendix A.3
Relative Accuracy Spreadsheets

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 75, APPENDIX A
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

O_2, % volume dry

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
~~Run 1~~	~~3/13/19~~	~~0929-0950~~	~~12.33~~	~~12.24~~	~~0.09~~	1	100.00
Run 2	3/13/19	1024-1045	12.29	12.22	0.07	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~-0.02~~	~~12.19~~	~~-12.21~~	3	4.303
Run 4	3/13/19	1240-1301	12.23	12.18	0.05	4	3.182
Run 5	3/13/19	1317-1338	12.22	12.16	0.06	5	2.776
Run 6	3/13/19	1358-1419	12.19	12.16	0.03	6	2.571
Run 7	3/13/19	1437-1458	12.20	12.17	0.03	7	2.447
Run 8	3/13/19	1515-1536	12.20	12.18	0.02	8	2.365
Run 9	3/13/19	1553-1614	12.21	12.19	0.02	9	2.306
Run 10	3/13/19	1629-1650	12.23	12.19	0.04	10	2.262
Run 11	3/13/19	1713-1734	12.23	12.19	0.04	11	2.228
AVERAGES:			12.22	12.18	0.04		

choose only one of the two available criteria

		Criteria	Result
STANDARD DEVIATION:	0.017		
CONFIDENCE COEFFICIENT:	0.013		
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:		**≤10**	**0.4**
RELATIVE ACCURACY (BASED ON DIFFERENCE), %:		**≤1**	**0.0**
REDUCED RATA FREQ. (BASED ON DIFFERENCE), %:		**≤0.7**	**0.0**

Note: The relative accuracy (RA) of the CEMS shall not exceed 10.0 percent. The relative accuracy test results are also acceptable if the difference between the mean value of the CEMS O2 monitor measurements and the corresponding reference method (RM) measurement mean value does not exceed 1.0 percent O2.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 4/4A
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

CO, ppm @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/13/19	0929-0950	0.00	0.22	-0.22	1	100.00
~~Run 2~~	~~3/13/19~~	~~1024-1045~~	~~-0.01~~	~~0.22~~	~~-0.23~~	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~1.26~~	~~0.20~~	~~1.06~~	3	4.303
Run 4	3/13/19	1240-1301	0.00	0.18	-0.18	4	3.182
Run 5	3/13/19	1317-1338	-0.01	0.19	-0.20	5	2.776
Run 6	3/13/19	1358-1419	0.01	0.20	-0.19	6	2.571
Run 7	3/13/19	1437-1458	0.00	0.19	-0.19	7	2.447
Run 8	3/13/19	1515-1536	0.00	0.19	-0.19	8	2.365
Run 9	3/13/19	1553-1614	-0.01	0.17	-0.18	9	2.306
Run 10	3/13/19	1629-1650	-0.01	0.18	-0.19	10	2.262
Run 11	3/13/19	1713-1734	-0.02	0.18	-0.20	11	2.228

AVERAGES:	0.00	0.19	-0.19	***choose only one of the three available criteria***
EMISSION LIMIT:			3.00	
STANDARD DEVIATION:			0.013	
CONFIDENCE COEFFICIENT:			0.010	

		Criteria	Result
RELATIVE ACCURACY (BASED ON DIFFERENCE), PPM:	***- 4A only -***	**≤5**	**0.2**

Note: Performance Specification (PS) 4 is to be used on sources operating above 200 ppm analyzer span and PS 4A on sources operating below 200 ppm analyzer span. The relative accuracy (RA) of the CEMS must be no greater than 10 percent when the average reference method (RM) value is used to calculate RA, 5 percent when the applicable standard (AS) is used to calculate RA, or within 5 ppm (to be used with PS 4A only) when the RA is calculated as the absolute average difference between the RM and CEMS plus the 2.5 percent confidence coefficient.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 4(A) / 6
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

CO, lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/13/19	0929-0950	0.00	1.12	-1.12	1	100.00
~~Run 2~~	~~3/13/19~~	~~1024-1045~~	~~-0.06~~	~~1.08~~	~~-1.14~~	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~6.43~~	~~1.03~~	~~5.40~~	3	4.303
Run 4	3/13/19	1240-1301	0.01	0.93	-0.92	4	3.182
Run 5	3/13/19	1317-1338	-0.04	0.98	-1.02	5	2.776
Run 6	3/13/19	1358-1419	0.03	0.98	-0.95	6	2.571
Run 7	3/13/19	1437-1458	0.00	0.97	-0.97	7	2.447
Run 8	3/13/19	1515-1536	0.00	0.96	-0.96	8	2.365
Run 9	3/13/19	1553-1614	-0.04	0.92	-0.96	9	2.306
Run 10	3/13/19	1629-1650	-0.05	0.91	-0.96	10	2.262
Run 11	3/13/19	1713-1734	-0.08	0.96	-1.04	11	2.228

AVERAGES:	-0.02	0.97	-0.99
EMISSION LIMIT:			15.9
STANDARD DEVIATION:			0.06
CONFIDENCE COEFFICIENT:			0.05

choose only one of the three available criteria

Criteria	***Result***
≤10	**6.5**

RELATIVE ACCURACY (BASED ON APPLICABLE STANDARD), %: **≤10** **6.5**

Note: Since this unit incorporates the total equipment required for the determining and recording the pollutant mass emission rate (in terms of mass per unit of time), the unit is technically defined as a continuous emissions rate monitoring system (CERMS) and is subject to Performance Specification (PS) 6. The relative accuracy (RA) of the CERMS shall be no greater than 20 percent of the mean value of the reference method (RM) test data in terms of the units of the emission standard, or 10 percent of the applicable standard (AS), whichever is greater.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

NO_X, ppm @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/13/19	0929-0950	1.59	1.64	-0.05	1	100.00
Run 2	3/13/19	1024-1045	1.62	1.64	-0.02	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~1.36~~	~~1.62~~	~~-0.26~~	3	4.303
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~1.54~~	~~1.63~~	~~-0.09~~	4	3.182
Run 5	3/13/19	1317-1338	1.58	1.64	-0.06	5	2.776
Run 6	3/13/19	1358-1419	1.58	1.62	-0.04	6	2.571
Run 7	3/13/19	1437-1458	1.61	1.62	-0.01	7	2.447
Run 8	3/13/19	1515-1536	1.61	1.60	0.01	8	2.365
Run 9	3/13/19	1553-1614	1.62	1.64	-0.02	9	2.306
Run 10	3/13/19	1629-1650	1.62	1.63	-0.01	10	2.262
Run 11	3/13/19	1713-1734	1.59	1.65	-0.06	11	2.228

AVERAGES:	1.60	1.63	-0.03	*> 50% of limit,*
EMISSION LIMIT:			2.50	***must use RM criteria***
STANDARD DEVIATION:			0.026	
CONFIDENCE COEFFICIENT:			0.020	
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:				

Criteria	***Result***
≤20	**3.1**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2 / 6
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

NO_X, lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/13/19	0929-0950	13.31	13.75	-0.44	1	100.00
Run 2	3/13/19	1024-1045	13.60	13.71	-0.11	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~11.39~~	~~13.54~~	~~-2.15~~	3	4.303
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~12.90~~	~~13.67~~	~~-0.77~~	4	3.182
Run 5	3/13/19	1317-1338	13.21	13.75	-0.54	5	2.776
Run 6	3/13/19	1358-1419	13.25	13.56	-0.31	6	2.571
Run 7	3/13/19	1437-1458	13.52	13.55	-0.03	7	2.447
Run 8	3/13/19	1515-1536	13.53	13.44	0.09	8	2.365
Run 9	3/13/19	1553-1614	13.60	13.76	-0.16	9	2.306
Run 10	3/13/19	1629-1650	13.59	13.71	-0.12	10	2.262
Run 11	3/13/19	1713-1734	13.37	13.84	-0.47	11	2.228

AVERAGES:	13.44	13.67	-0.23	***> 50% of limit,***
EMISSION LIMIT:			21.70	***must use RM criteria***
STANDARD DEVIATION:			0.217	
CONFIDENCE COEFFICIENT:			0.167	

	Criteria	Result
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:	**≤20**	**3.0**

Note: Since this unit incorporates the total equipment required for the determining and recording the pollutant mass emission rate (in terms of mass per unit of time), the unit is technically defined as a continuous emissions rate monitoring system (CERMS) and is subject to Performance Specification (PS) 6. The relative accuracy (RA) of the CERMS shall be no greater than 20 percent of the mean value of the reference method (RM) test data in terms of the units of the emission standard, or 10 percent of the applicable standard (AS), whichever is greater.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2 / 6
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

NO_X, lb/MMBtu

Run #	**Date**	**Time**	**RM**	**CEMS**	**Difference**	**n**	$t_{0.975}$
Run 1	3/13/19	0929-0950	0.0058	0.0061	-0.0003	1	100.00
Run 2	3/13/19	1024-1045	0.0060	0.0060	0.0000	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~0.0050~~	~~0.0060~~	~~-0.0010~~	3	4.303
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~0.0057~~	~~0.0060~~	~~-0.0003~~	4	3.182
Run 5	3/13/19	1317-1338	0.0058	0.0061	-0.0003	5	2.776
Run 6	3/13/19	1358-1419	0.0058	0.0060	-0.0002	6	2.571
Run 7	3/13/19	1437-1458	0.0059	0.0060	-0.0001	7	2.447
Run 8	3/13/19	1515-1536	0.0059	0.0059	0.0000	8	2.365
Run 9	3/13/19	1553-1614	0.0060	0.0060	0.0000	9	2.306
Run 10	3/13/19	1629-1650	0.0060	0.0060	0.0000	10	2.262
Run 11	3/13/19	1713-1734	0.0059	0.0061	-0.0002	11	2.228

AVERAGES:	0.0059	0.0060	-0.0001	***> 50% of limit,***
EMISSION LIMIT:			N/A	***must use RM criteria***
STANDARD DEVIATION:			0.00012	
CONFIDENCE COEFFICIENT:			0.000093	

	Criteria	***Result***
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:	**≤20**	**3.69**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 75, APPENDIX A
EDR TABLE
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

NO_X, lb/MMBtu

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$	MW
Run 1	3/13/19	0929-0950	0.006	0.006	0.000	1	100.00	304
Run 2	3/13/19	1024-1045	0.006	0.006	0.000	2	12.706	303
~~Run 3~~	~~3/13/19~~	~~1136-1157~~	~~0.005~~	~~0.006~~	~~-0.001~~	3	4.303	~~300~~
~~Run 4~~	~~3/13/19~~	~~1240-1301~~	~~0.006~~	~~0.006~~	~~0.000~~	4	3.182	~~296~~
Run 5	3/13/19	1317-1338	0.006	0.006	0.000	5	2.776	293
Run 6	3/13/19	1358-1419	0.006	0.006	0.000	6	2.571	288
Run 7	3/13/19	1437-1458	0.006	0.006	0.000	7	2.447	289
Run 8	3/13/19	1515-1536	0.006	0.006	0.000	8	2.365	294
Run 9	3/13/19	1553-1614	0.006	0.006	0.000	9	2.306	293
Run 10	3/13/19	1629-1650	0.006	0.006	0.000	10	2.262	294
Run 11	3/13/19	1713-1734	0.006	0.006	0.000	11	2.228	296

AVERAGES:	0.006	0.006	0.0000	*> 50% of limit,*	304.0
EMISSION LIMIT:			N/A	***you may choose either the RM or the difference***	
BIAS ADJUSTMENT FACTOR:			**1.000**		
STANDARD DEVIATION:			0.0000		
CONFIDENCE COEFFICIENT:			0.0000		

	Criteria	*Result*
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:	**≤20**	**0.00**
RELATIVE ACCURACY (BASED ON lb/MMBtu DIFFERENCE), %:	**0.020**	**0.000**
REDUCED RATA FREQ. (BASED ON ABSOLUTE DIFFERENCE), %:	**≤0.015**	**0.000**
UNIT LOAD, MW:	**N/A**	**304**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

NH_3 ppmvd @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/13/19	0929-1011	0.61	1.30	-0.69	1	100.00
Run 2	3/13/19	1024-1101	1.08	1.30	-0.22	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1226~~	~~0.44~~	~~1.40~~	~~-0.96~~	3	4.303
Run 4	3/13/19	1240-1310	0.96	1.50	-0.54	4	3.182
Run 5	3/13/19	1318-1348	1.21	1.50	-0.29	5	2.776
~~Run 6~~	~~3/13/19~~	~~1358-1428~~	~~0.74~~	~~1.60~~	~~-0.86~~	6	2.571
Run 7	3/13/19	1437-1507	1.20	1.60	-0.40	7	2.447
Run 8	3/13/19	1515-1545	0.97	1.60	-0.63	8	2.365
Run 9	3/13/19	1553-1623	0.97	1.60	-0.63	9	2.306
Run 10	3/13/19	1629-1659	0.88	1.60	-0.72	10	2.262
Run 11	3/13/19	1713-1743	1.03	1.60	-0.57	11	2.228
AVERAGES:			0.99	1.51	-0.52	***< 50% of limit,***	
EMISSION LIMIT:					5.00	***you must use AS criteria***	
STANDARD DEVIATION:					0.177		
CONFIDENCE COEFFICIENT:					0.136		
RELATIVE ACCURACY (BASED ON APPLICABLE STANDARD), %:							

Criteria	***Result***
≤20	**13.1**

$$RA = \frac{\left[|\bar{d}| + |CC|\right]}{\overline{RM}} \times 100 \qquad Eq.\ 2\text{-}6$$

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1

NH_3 lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/13/19	0929-1011	1.90	3.96	-2.06	1	100.00
Run 2	3/13/19	1024-1101	3.34	4.08	-0.74	2	12.706
~~Run 3~~	~~3/13/19~~	~~1136-1226~~	~~1.35~~	~~4.51~~	~~-3.16~~	3	4.303
Run 4	3/13/19	1240-1310	2.97	4.70	-1.73	4	3.182
Run 5	3/13/19	1318-1348	3.75	4.63	-0.88	5	2.776
~~Run 6~~	~~3/13/19~~	~~1358-1428~~	~~2.29~~	~~5.01~~	~~-2.72~~	6	2.571
Run 7	3/13/19	1437-1507	3.74	5.08	-1.34	7	2.447
Run 8	3/13/19	1515-1545	3.01	5.01	-2.00	8	2.365
Run 9	3/13/19	1553-1623	3.02	5.09	-2.07	9	2.306
Run 10	3/13/19	1629-1659	2.75	5.16	-2.41	10	2.262
Run 11	3/13/19	1713-1743	3.20	5.13	-1.93	11	2.228
AVERAGES:			3.07	4.76	-1.69	***< 50% of limit,***	
EMISSION LIMIT:					16.10	***you must use AS criteria***	
STANDARD DEVIATION:					0.574		
CONFIDENCE COEFFICIENT:					0.441		

RELATIVE ACCURACY (BASED ON APPLICABLE STANDARD), %:	***Criteria***	***Result***
	≤20	**13.2**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

$$RA = \frac{\left[\left|\bar{d}\right| + \left|CC\right|\right]}{\overline{RM}} \times 100 \qquad Eq.\ 2\text{-}6$$

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 75, APPENDIX A
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

O_2, % volume dry

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1118	11.96	12.14	-0.18	1	100.00
Run 2	3/14/19	1137-1158	11.97	12.15	-0.18	2	12.706
Run 3	3/14/19	1212-1233	12.00	12.16	-0.16	3	4.303
Run 4	3/14/19	1249-1310	12.00	12.17	-0.17	4	3.182
Run 5	3/14/19	1324-1345	12.02	12.18	-0.16	5	2.776
Run 6	3/14/19	1405-1426	12.02	12.17	-0.15	6	2.571
Run 7	3/14/19	1441-1502	12.02	12.17	-0.15	7	2.447
Run 8	3/14/19	1515-1536	12.02	12.20	-0.18	8	2.365
Run 9	3/14/19	1605-1626	12.02	12.23	-0.21	9	2.306
AVERAGES:			12.00	12.17	-0.17		

choose only one of the two available criteria

		Criteria	Result
STANDARD DEVIATION:	0.018		
CONFIDENCE COEFFICIENT:	0.014		
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:		**≤10**	**1.6**
RELATIVE ACCURACY (BASED ON DIFFERENCE), %:		**≤1**	**0.2**
REDUCED RATA FREQ. (BASED ON DIFFERENCE), %:		**≤0.7**	**0.2**

Note: The relative accuracy (RA) of the CEMS shall not exceed 10.0 percent. The relative accuracy test results are also acceptable if the difference between the mean value of the CEMS O2 monitor measurements and the corresponding reference method (RM) measurement mean value does not exceed 1.0 percent O2.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 4/4A
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

CO, ppm @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1118	-0.21	0.01	-0.22	1	100.00
Run 2	3/14/19	1137-1158	-0.24	0.01	-0.25	2	12.706
Run 3	3/14/19	1212-1233	-0.23	0.00	-0.23	3	4.303
Run 4	3/14/19	1249-1310	-0.23	0.01	-0.24	4	3.182
Run 5	3/14/19	1324-1345	-0.24	0.00	-0.24	5	2.776
Run 6	3/14/19	1405-1426	-0.24	0.00	-0.24	6	2.571
Run 7	3/14/19	1441-1502	-0.22	0.00	-0.22	7	2.447
Run 8	3/14/19	1515-1536	-0.23	0.00	-0.23	8	2.365
Run 9	3/14/19	1605-1626	-0.25	0.00	-0.25	9	2.306

	RM	CEMS	Difference
AVERAGES:	-0.23	0.00	-0.24
EMISSION LIMIT:			3.00
STANDARD DEVIATION:			0.011
CONFIDENCE COEFFICIENT:			0.008
RELATIVE ACCURACY (BASED ON DIFFERENCE), PPM:			***- 4A only -***

choose only one of the three available criteria

Criteria	*Result*
≤5	**0.2**

Note: Performance Specification (PS) 4 is to be used on sources operating above 200 ppm analyzer span and PS 4A on sources operating below 200 ppm analyzer span. The relative accuracy (RA) of the CEMS must be no greater than 10 percent when the average reference method (RM) value is used to calculate RA, 5 percent when the applicable standard (AS) is used to calculate RA, or within 5 ppm (to be used with PS 4A only) when the RA is calculated as the absolute average difference between the RM and CEMS plus the 2.5 percent confidence coefficient.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 4(A) / 6
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

CO, lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1118	-1.04	0.04	-1.08	1	100.00
Run 2	3/14/19	1137-1158	-1.18	0.04	-1.22	2	12.706
Run 3	3/14/19	1212-1233	-1.14	0.02	-1.16	3	4.303
Run 4	3/14/19	1249-1310	-1.16	0.04	-1.20	4	3.182
Run 5	3/14/19	1324-1345	-1.22	0.00	-1.22	5	2.776
Run 6	3/14/19	1405-1426	-1.19	0.01	-1.20	6	2.571
Run 7	3/14/19	1441-1502	-1.12	0.00	-1.12	7	2.447
Run 8	3/14/19	1515-1536	-1.14	0.00	-1.14	8	2.365
Run 9	3/14/19	1605-1626	-1.22	0.00	-1.22	9	2.306

AVERAGES:	-1.16	0.02	-1.17	
EMISSION LIMIT:			15.90	
STANDARD DEVIATION:			0.051	
CONFIDENCE COEFFICIENT:			0.039	

choose only one of the three available criteria

Criteria	**Result**
≤10	**7.6**

RELATIVE ACCURACY (BASED ON APPLICABLE STANDARD), %: ≤10 / 7.6

Note: Since this unit incorporates the total equipment required for the determining and recording the pollutant mass emission rate (in terms of mass per unit of time), the unit is technically defined as a continuous emissions rate monitoring system (CERMS) and is subject to Performance Specification (PS) 6. The relative accuracy (RA) of the CERMS shall be no greater than 20 percent of the mean value of the reference method (RM) test data in terms of the units of the emission standard, or 10 percent of the applicable standard (AS), whichever is greater.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

NO_X, ppm @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1118	1.89	1.70	0.19	1	100.00
Run 2	3/14/19	1137-1158	1.83	1.68	0.15	2	12.706
Run 3	3/14/19	1212-1233	1.83	1.70	0.13	3	4.303
Run 4	3/14/19	1249-1310	1.84	1.69	0.15	4	3.182
Run 5	3/14/19	1324-1345	1.79	1.69	0.10	5	2.776
Run 6	3/14/19	1405-1426	1.80	1.69	0.11	6	2.571
Run 7	3/14/19	1441-1502	1.80	1.69	0.11	7	2.447
Run 8	3/14/19	1515-1536	1.83	1.65	0.18	8	2.365
Run 9	3/14/19	1605-1626	1.84	1.69	0.15	9	2.306
AVERAGES:			1.83	1.69	0.14	*> 50% of limit,*	
EMISSION LIMIT:					2.50	***must use RM criteria***	
STANDARD DEVIATION:					0.032	***Criteria***	***Result***
CONFIDENCE COEFFICIENT:					0.024		
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:						**≤20**	**9.0**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2 / 6
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

NO_X, lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1118	15.59	13.99	1.60	1	100.00
Run 2	3/14/19	1137-1158	15.00	13.82	1.18	2	12.706
Run 3	3/14/19	1212-1233	15.02	13.92	1.10	3	4.303
Run 4	3/14/19	1249-1310	15.04	13.81	1.23	4	3.182
Run 5	3/14/19	1324-1345	14.65	13.80	0.85	5	2.776
Run 6	3/14/19	1405-1426	14.72	13.78	0.94	6	2.571
Run 7	3/14/19	1441-1502	14.74	13.78	0.96	7	2.447
Run 8	3/14/19	1515-1536	14.96	13.44	1.52	8	2.365
Run 9	3/14/19	1605-1626	14.97	13.68	1.29	9	2.306
AVERAGES:			14.96	13.78	1.18	***> 50% of limit,***	
EMISSION LIMIT:					21.70	***must use RM criteria***	
STANDARD DEVIATION:					0.257		
CONFIDENCE COEFFICIENT:					0.197		

	Criteria	Result
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:	**≤20**	**9.2**

Note: Since this unit incorporates the total equipment required for the determining and recording the pollutant mass emission rate (in terms of mass per unit of time), the unit is technically defined as a continuous emissions rate monitoring system (CERMS) and is subject to Performance Specification (PS) 6. The relative accuracy (RA) of the CERMS shall be no greater than 20 percent of the mean value of the reference method (RM) test data in terms of the units of the emission standard, or 10 percent of the applicable standard (AS), whichever is greater.

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2 / 6
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

NO_X, lb/MMBtu

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1118	0.0070	0.0063	0.0007	1	100.00
Run 2	3/14/19	1137-1158	0.0067	0.0062	0.0005	2	12.706
Run 3	3/14/19	1212-1233	0.0067	0.0063	0.0004	3	4.303
Run 4	3/14/19	1249-1310	0.0068	0.0062	0.0006	4	3.182
Run 5	3/14/19	1324-1345	0.0066	0.0062	0.0004	5	2.776
Run 6	3/14/19	1405-1426	0.0066	0.0062	0.0004	6	2.571
Run 7	3/14/19	1441-1502	0.0066	0.0062	0.0004	7	2.447
Run 8	3/14/19	1515-1536	0.0068	0.0061	0.0007	8	2.365
Run 9	3/14/19	1605-1626	0.0068	0.0062	0.0006	9	2.306

AVERAGES:	0.0067	0.0062	0.0005	***> 50% of limit,***
EMISSION LIMIT:			N/A	***must use RM criteria***

		Criteria	Result
STANDARD DEVIATION:	0.00010		
CONFIDENCE COEFFICIENT:	0.00008		
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:		**≤20**	**8.90**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 75, APPENDIX A
EDR TABLE
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

NO_X, lb/MMBtu

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$	MW
Run 1	3/14/19	1057-1118	0.007	0.006	0.001	1	100.00	307
Run 2	3/14/19	1137-1158	0.007	0.006	0.001	2	12.706	305
Run 3	3/14/19	1212-1233	0.007	0.006	0.001	3	4.303	304
Run 4	3/14/19	1249-1310	0.007	0.006	0.001	4	3.182	304
Run 5	3/14/19	1324-1345	0.007	0.006	0.001	5	2.776	304
Run 6	3/14/19	1405-1426	0.007	0.006	0.001	6	2.571	304
Run 7	3/14/19	1441-1502	0.007	0.006	0.001	7	2.447	305
Run 8	3/14/19	1515-1536	0.007	0.006	0.001	8	2.365	303
Run 9	3/14/19	1605-1626	0.007	0.006	0.001	9	2.306	302

AVERAGES:	0.007	0.006	0.001	*> 50% of limit, you may choose either the RM or the difference*	304.2
EMISSION LIMIT:			0.000		
BIAS ADJUSTMENT FACTOR:			**1.111**		
STANDARD DEVIATION:			0.0000		
CONFIDENCE COEFFICIENT:			0.0000		

	Criteria	***Result***
RELATIVE ACCURACY (BASED ON REFERENCE METHOD), %:	**≤20**	**14.29**
RELATIVE ACCURACY (BASED ON LB/MMBtu DIFFERENCE), %:	**≤0.020**	**0.001**
REDUCED RATA FREQ. (BASED ON ABSOLUTE DIFFERENCE), %:	**≤0.015**	**0.001**
UNIT LOAD, MW:	**N/A**	**304**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

NH_3 ppmvd @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1127	1.3	1.9	-0.6	1	100.00
Run 2	3/14/19	1137-1207	1.2	1.9	-0.7	2	12.706
Run 3	3/14/19	1213-1243	0.8	1.9	-1.1	3	4.303
Run 4	3/14/19	1249-1319	1.1	1.9	-0.8	4	3.182
Run 5	3/14/19	1324-1354	1.1	2.0	-0.9	5	2.776
Run 6	3/14/19	1405-1435	1.0	2.0	-1.0	6	2.571
Run 7	3/14/19	1441-1511	1.1	2.0	-0.9	7	2.447
Run 8	3/14/19	1515-1545	1.1	1.9	-0.8	8	2.365
Run 9	3/14/19	1605-1635	1.3	1.8	-0.5	9	2.306

AVERAGES:	1.1	1.9	-0.8	***< 50% of limit,***
EMISSION LIMIT:			5.00	***you must use AS criteria***
STANDARD DEVIATION:			0.182	
CONFIDENCE COEFFICIENT:			0.140	

RELATIVE ACCURACY (BASED ON APPLICABLE STANDARD), %:	***Criteria***	***Result***
	≤20	**19.2**

$$RA = \frac{\left[|\bar{d}| + |CC| \right]}{\overline{RM}} \times 100 \qquad Eq.\ 2\text{-}6$$

RELATIVE ACCURACY TEST AUDIT DETERMINATION
EPA CFR 40, PART 60, APPENDIX B, PS 2
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2

NH_3 lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	$t_{0.975}$
Run 1	3/14/19	1057-1127	3.94	5.66	-1.72	1	100.00
Run 2	3/14/19	1137-1207	3.56	5.78	-2.22	2	12.706
Run 3	3/14/19	1213-1243	2.31	5.73	-3.42	3	4.303
Run 4	3/14/19	1249-1319	3.31	5.82	-2.51	4	3.182
Run 5	3/14/19	1324-1354	3.28	5.88	-2.60	5	2.776
Run 6	3/14/19	1405-1435	3.18	5.98	-2.80	6	2.571
Run 7	3/14/19	1441-1511	3.43	5.96	-2.53	7	2.447
Run 8	3/14/19	1515-1545	3.31	5.80	-2.49	8	2.365
Run 9	3/14/19	1605-1635	3.82	5.46	-1.64	9	2.306

AVERAGES:	3.35	5.79	-2.44	***< 50% of limit,***
EMISSION LIMIT:			16.10	***you must use AS criteria***
STANDARD DEVIATION:			0.542	
CONFIDENCE COEFFICIENT:			0.416	

	Criteria	***Result***
RELATIVE ACCURACY (BASED ON APPLICABLE STANDARD), %:	**≤20**	**18**

Note: The relative accuracy (RA) of the CEMS must be no greater than 20 percent when the reference method (RM) is used in the denominator of Equation 2–6 (the average emissions during the test are greater than 50 percent of the emission standard) or 10 percent when the applicable standard (AS) is used in the denominator of Equation 2–6 (the average emissions during the test are less than 50 percent of the emission standard).

$$RA = \frac{\left[\left|\bar{d}\right| + \left|CC\right|\right]}{\overline{RM}} \times 100 \qquad Eq.\ 2\text{-}6$$

Appendix A.4
Example Calculations

EXAMPLE CALCULATIONS
STACK GAS VOLUMETRIC FLOW RATE

Project name:	Grays Harbor	**Project number:**	005AS-555757
Computed by:	D. Duncan	**Calculation date:**	2019-10-31
Run number:	RATA Run 1	**Unit ID:**	Unit 1

FUEL AND OXYGEN DATA

Fuel flow, scf/h	2,113,280	Q_f
Fuel factor, dscf/MMBtu	8,710	F_d
Heating value, btu/scf	1,077	HHV
Stack O_2, % volume dry	12.33	O_2

1 VOLUMETRIC FLOW RATE

a. Standard stack gas flow rate, dscfm

$$Q_{ds} = (Q_f)(HHV)\left(\frac{1\ MMBtu}{10^6\ Btu}\right)(F_d)\frac{(20.9)}{(20.9 - O_2)}\left(\frac{1\ hr}{60\ min}\right)$$

$$Q_{ds} = \frac{(2{,}113{,}280)(1077)(8{,}710)(20.9)}{(1{,}000{,}000)(20.9 - 12.33)(60)}$$

Q_{ds} = 805,759 dscf

Note: The results calculated in the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

MONTROSE
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EXAMPLE CALCULATIONS
AMMONIA BY ION CHROMATOGRAPHY

Project name:	Grays Harbor	**Project number:**	005AS-555757
Computed by:	D. Duncan	**Calculation date:**	2019-10-31
Run number:	5-NH3-GHU2		

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Sample volume - total, ml	420.0	S_V
Sample concentration - measured, ppm	1.7	C_m
Dry meter volume at standard conditions, dscf	21.818	$V_{m\,std}$
Dry stack gas flow rate at standard conditions, dscfm	758,849	Q_{ds}
Stack O_2, % volume dry	12.02	O_2
Molecular weight of gaseous species, lb/lb-mol	17.03	MW_S, where
17.03 for NH_3		
Conversion factor from ppm to lb/scf	4.42E-08	CF where
4.419E-08 for NH_3		

1 NH_3 ION CHROMATOGRAPHY

a. Concentration, ppm

$$C = \frac{(0.049 \times S_v \times C_m)}{V_{mstd} \times \frac{520}{T_{ref}}}$$

$$C = \frac{(0.049 \times 420.0 \times 1.7)}{21.818 \times (520/528)}$$

C = 1.628 ppm

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

b. Concentration, ppm @ 15% O_2

$$C_{15} = C\,\frac{(20.9 - 15)}{(20.9 - \%O_2)}$$

C_{15} = *1.63* x $\frac{(20.9 - 15)}{(20.9 - 12.02)}$

C_{15} = *1.08* ppm @ 15% O_2

c. Mass emission rate, lb/hr

$$M = (C)(CF)(Q_{ds})(60\ min/hr)$$

M = *(1.628)(4.42E-08)(758,849)(60)*

M = *3.28* lb/hr

RELATIVE ACCURACY TEST AUDIT (RATA) EXAMPLE CALCULATIONS

Client: Grays Harbor   RATA Type: NOX   Parameter: lb/MMBtu
Unit: Unit 1   Test Date: #######

Emissions Data

Run #	RM	CEMS	Diff., d
1	0.006	0.006	0.000
2	0.006	0.006	0.000
3	0.005	0.005	0.000
4	0.006	0.006	0.000
5	0.006	0.006	0.000
6	0.006	0.006	0.000
7	0.006	0.006	0.000
8	0.006	0.006	0.000
9	0.006	0.006	0.000
10	0.006	0.006	0.000
11	0.006	0.006	0.000
12			0.00
13			0.00

Parameters

Number of runs	9	n
t-value associated with n, $t_{0.975}$	2.306	$t_{0.975}$
Applicable standard	N/A	AS
Average reference method	0.006	RM

1. RATA Calculations

a. Arithmetic Mean of differences, d_a

$$d_a = \frac{1}{n} \sum_{i-1}^{n} d_i$$

$$d_a = \frac{1}{9} \sum_{i-1}^{9} d_i$$

$d_a = \frac{1}{9}$ (0.00 + #N/A + #N/A + #N/A + …
… #N/A + #N/A + #N/A + #N/A + ...
… #N/A)

$$d_a = \frac{1}{9} \quad 0.00$$

$$d_a = 0.000$$

b. Standard Deviation, S_d

$$S_d = \left[\frac{\sum_{i-1}^{n} d_i^2 - \frac{1}{9}\left(\sum_{i-1}^{n} d_i \right)^2}{n-1} \right]^{1/2}$$

$$S_d = \left[\frac{\sum_{i-1}^{9} d_i^2 - \frac{1}{9}\left(\sum_{i-1}^{9} d_i \right)^2}{9-1} \right]^{1/2}$$

$$S_d = \left[\frac{0.00 - \frac{1}{9}\left(0.00 \right)^2}{8} \right]^{1/2}$$

$$S_d = \left[\frac{0.00 - 0.11 * 0.00}{8} \right]^{1/2}$$

$$S_d = 0.000$$

c. 2.5% Error Confidence Coefficient (one-tailed), CC

$$CC = t_{0.975} \left(\frac{Sd}{\sqrt{n}} \right)$$

$$CC = 2.306 \left(\frac{0.000}{\sqrt{9}} \right) = 2.306 \left(0.000 \right)$$

$$CC = 0.000$$

d. Relative accuracy based on applicable standard, RA

$$RA = \frac{(d_a + CC)}{AS} \times 100$$

$$RA = \frac{(0.000 + 0.000)}{N/A} \times 100$$

RA = #######

e. Relative accuracy based on reference method RA

$$RA = \frac{(d_a + CC)}{RM} \times 100$$

$$RA = \frac{(0.000 + 0.000)}{0.01} \times 100$$

$$RA = 0.00$$

Appendix A.5
General Emissions Calculations

EMISSION CALCULATIONS

1. Volumetric Flow and Isokinetics

   a. Standard sample gas volume, dscf

$$V_{m\,std} = (V_m)(Y)\frac{(T_{std} + 460)\left(P_{bar} + \frac{\Delta H}{13.6}\right)}{(T_m + 460)(P_{std})}$$

   b. Water vapor volume, scf

$$V_{w\,std} = (0.04715)(V_{lc})\left(\frac{T_{std} + 460}{528}\right)$$

   c. Moisture content, non-dimensional

$$B_{ws} = \frac{V_{w\,std}}{(V_{m\,std} + V_{w\,std})}$$

   d. Stack gas molecular weight, lb/lb mole (dry)

$$MW_{dry} = [0.44(\%CO_2)] + [0.32(\%O_2)] + [0.28(\%N_2)]$$

   e. Stack gas molecular weight, lb/lb mole (wet)

$$MW_{wet} = \left[MW_{dry}(1 - B_{ws})\right] + [18(B_{ws})]$$

   f. Absolute stack pressure, in Hg

$$P_s = P_{bar} + \left(\frac{P_{sg}}{13.6}\right)$$

   g. Stack velocity, ft/sec

$$v_s = (85.49)(C_p)(\sqrt{\Delta P})\sqrt{\frac{T_s}{(P_s)(MW_{wet})}}$$

   h. Actual stack flow rate, acfm

$$Q = (v_s)(A_s)(60\ min/hr)$$

   i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (v_s)(A_s)(60\ min/hr)\left(\frac{T_{std} + 460}{T_s + 460}\right)\left(\frac{P_s}{P_{std}}\right)$$

   j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (v_s)(A_s)(60\ min/hr)(1 - B_{ws})\left(\frac{T_{std} + 460}{T_s + 460}\right)\left(\frac{P_s}{P_{std}}\right)$$

   k. Percent isokinetic

$$I = \frac{(T_s)(V_{m\,std})(P_{std})(100)}{(T_{std} + 460)(v_s)(\theta)(A_n)(P_s)(60)(1 - B_{ws})}$$

2. Gaseous Emissions

a. Concentration, ppm volume wet (i.e. to calculate wet ppm from dry ppm)

$$C_w = (C)(1 - B_{ws})$$

b. Concentration, ppm @ 3% O_2 dry

$$C_3 = (C)\left[\frac{(20.9 - 3.0)}{(20.9 - \%\ O_2)}\right]$$

c. Concentration, ppm @ 12% CO_2 dry

$$C_{12} = (C)\left(\frac{12.0}{\%\ CO_2}\right)$$

d. Concentration, ppm volume dry (i.e. to calculate dry ppm from wet ppm)

$$C = \left[\frac{C_w}{(1 - B_{ws})}\right]$$

e. Mass emission rate, lb/hr

$$M = (C)(CF)(Q_{ds})(60\ min/hr)$$

where,

CF = conversion factor from ppm to lb/scf:

$$CF_{NOx} = 1.194 \times 10^{-7}\left(\frac{lb/_{scf}}{ppm}\right)$$

$$CF_{SO2} = 1.660 \times 10^{-7}\left(\frac{lb/_{scf}}{ppm}\right)$$

$CF_X = CF_{NOX}\left(\frac{MW_X}{MW_{NOX}}\right)$ for other compounds (x)

f. Emission rate, lb/MMBtu

$$E = (C)(CF)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

g. Mass emission rate, grams/bhp-hr

$$M_j = (M)\left(\frac{453.59\ g/lb}{J}\right)$$

3. Particulate Emissions

a. Grain loading, gr/dscf

$$G = (0.0154)\left(\frac{G_m}{V_{m\,std}}\right)$$

b. Grain loading corrected to 12% CO_2, gr/dscf @ 12% CO_2

$$G_{12} = (G)\left(\frac{12.0}{\%\ CO_2}\right)$$

c. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7{,}000\ gr/lb}\right)$$

d. Emission rate, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7{,}000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

4. Fuel Factor "F"

a. Choice #1 – use the values for F_d provided in Method 19, Table 19-1
Choice #2 – if you have fuel ultimate and proximate analysis, calculate F_d (need fuel weight %CHONS, HHV)
Stoichiometric fuel factor at 68 °F, dscf/MMBtu at 0% O_2:

$$F_d = \frac{(10^6)[3.64(\%\ H) + 1.53(\%\ C) + 0.14(\%\ N) + 0.57(\%\ S) - 0.46(\%\ O)]}{HHV, Btu/lb}$$

b. Fuel factor at 60 °F (use if all your volumes and flows are at 60 °F)

$$F_{d\ 60} = F_d\left(\frac{520°R}{528°R}\right)$$

5. Miscellaneous Equations

a. Standard stack gas flow rate, calculated from fuel flow and F factor, dscfm

Note: Q_f and HHV need to be in units of either lb/hr and Btu/lb, or scf/hr and Btu/scf. *Do not mix units!*

(calculation based on stack %O_2)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_d)\left(\frac{20.9}{20.9 - \%\,O_2}\right)/(60\;min/hr)$$

or (calculation based on stack %CO_2 – see EPA Method 19 for values of F_c)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_c)\left(\frac{100}{\%\,CO_2}\right)/(60\;min/hr)$$

b. Destruction efficiency of emission control device, %

$EFF = \left(\frac{C_{in}-C_{out}}{C_{in}}\right)(100\%)$ based on concentrations

or

$EFF = \left(\frac{M_{in}-M_{out}}{M_{in}}\right)(100\%)$ based on mass emission rates

c. Cylinder gas audit, % accuracy

$$A_c = \left(\frac{C_m - C_a}{C_a}\right)(100\%)$$

Nomenclature:

A_c	=	accuracy of CEMS during cylinder gas audit (CGA), % difference
A_n	=	nozzle area, in^2 (π r^2), where π = 3.1416 and r = radius (½ diameter) in inches
A_s	=	stack area, ft^2 (π r^2), where π = 3.1416 and r = radius (½ diameter) in feet
B_{ws}	=	flue gas moisture content (multiply by 100 for % by volume)
C	=	concentration of gaseous species, ppm volume dry
C_a	=	concentration of audit gas, ppm (for CGA, equation 5c)
C_m	=	concentration measured by CEMS, ppm (for CGA, equation 5c)
C_p	=	calibration factor for pitot tube, dimensionless
C_w	=	concentration of gaseous species, ppm volume wet
C_3	=	corrected concentration of gaseous species, ppm @ 3% O_2 dry
C_{12}	=	corrected concentration of gaseous species, ppm @ 12% CO_2 dry
E	=	mass emission rate, lb/MMBtu
EFF	=	destruction or removal efficiency of emission control device, % efficiency
F_c	=	stoichiometric "F" factor of fuel based on CO_2, dscf/MMBtu @ 100% CO_2
F_d	=	stoichiometric "F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2
G	=	particulate matter grain loading, grains/dscf
G_{12}	=	corrected particulate matter grain loading, grains/dscf @ 12% CO_2
G_m	=	mass of collected particulate matter, mg
HHV	=	higher heating value, Btu/cubic foot
I	=	% isokinetic sampling rate, %
J	=	brake horsepower, bhp
M_j	=	mass emission rate of measured species (s), g/hp-hr
M	=	mass emission rate, lb/hr
MW_{dry}	=	molecular weight of stack gas, dry basis
MW_{wet}	=	molecular weight of stack gas, wet basis
MW_s	=	molecular weight of gaseous species (s), lb/lb mole:

CO:	28.01	(can use 28)	NO_x as NO_2:	46.01	(can use 46)
SO_x as SO_2:	64.06	(can use 64)	Hydrocarbons as C:	12.01	(can use 12)
Hydrocarbons as CH_4:	16.04	(can use 16)	Hydrocarbons as C_3H_8:	44.10	(can use 44)
NH_3:	17.03	(can use 17)			

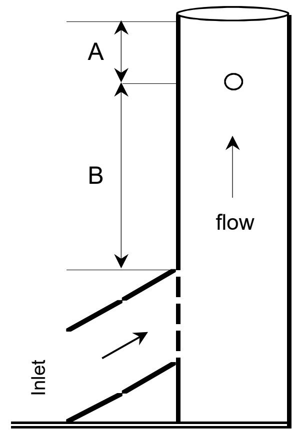
N_2	=	nitrogen content of stack gas, % volume dry
P_{bar}	=	barometric pressure, in. Hg
P_s	=	stack absolute pressure, in. Hg
P_{sg}	=	stack static pressure, inches of water, gauge (iwg)
Q	=	wet stack gas flow rate at actual conditions, acfm
Q_f	=	fuel flow rate, scfh or lb/hr (be careful of units)
Q_{ds}	=	dry stack gas flow rate at standard conditions, dscfm
Q_{ws}	=	wet stack gas flow rate at standard conditions, wscfm
SV	=	specific molar volume of an ideal gas at standard conditions, ft^3/lb mole
T_m	=	meter temperature, °R
T_{std}	=	reference temperature, °R
T_s	=	stack gas temperature, °R
v_s	=	stack gas velocity, ft/sec
V_{lc}	=	volume of liquid collected in impingers, ml
V_m	=	dry meter volume uncorrected, acf
$V_{m\ std}$	=	dry meter volume corrected to standard conditions, dscf
$V_{w\ std}$	=	volume of water vapor at standard conditions, scf
Y	=	meter calibration coefficient, dimensionless
ΔH	=	average pressure differential across meter, inches water
ΔP	=	average velocity head of stack gas, inches water
Θ	=	sampling time, minutes

APPENDIX B
FIELD AND COMPUTER-GENERATED DATA

Appendix B.1
Sampling Locations

Grays Harbor Energy Center / CT-1 & CT-2
TRAVERSE POINT LAYOUT (NON-PARTICULATE)
<u>CIRCULAR STACKS OVER 24 INCHES</u>

Stack diameter:	**216.0**	***inches***
Upstream diameter (A):	**540.0**	***inches***
Downstream diameter (B):	**600.0**	***inches***
Port length:	**6.50**	***inches***
Number of ports being used:	**2**	***see note***
Equivalent upstream diameter (A):	**2.500**	***Pass***
Equivalent downstream diameter (B):	**2.778**	***Pass***
All points at least 1.0" from stack wall:	**6.912**	***Pass***
Total points:	**16**	
Points per port:	**8**	

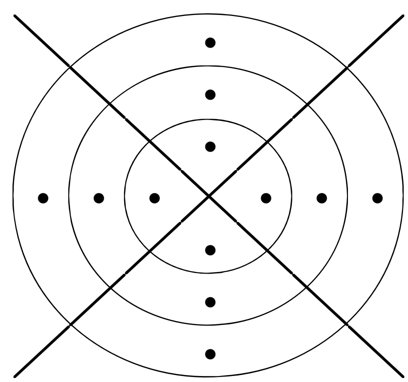


Typical vertical exhaust stack

Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	3.2	6.9	13.4
2	10.5	22.7	29.2
3	19.4	41.9	48.4
4	32.3	69.8	76.3
5	67.7	146.2	152.7
6	80.6	174.1	180.6
7	89.5	193.3	199.8
8	96.8	209.1	215.6
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A

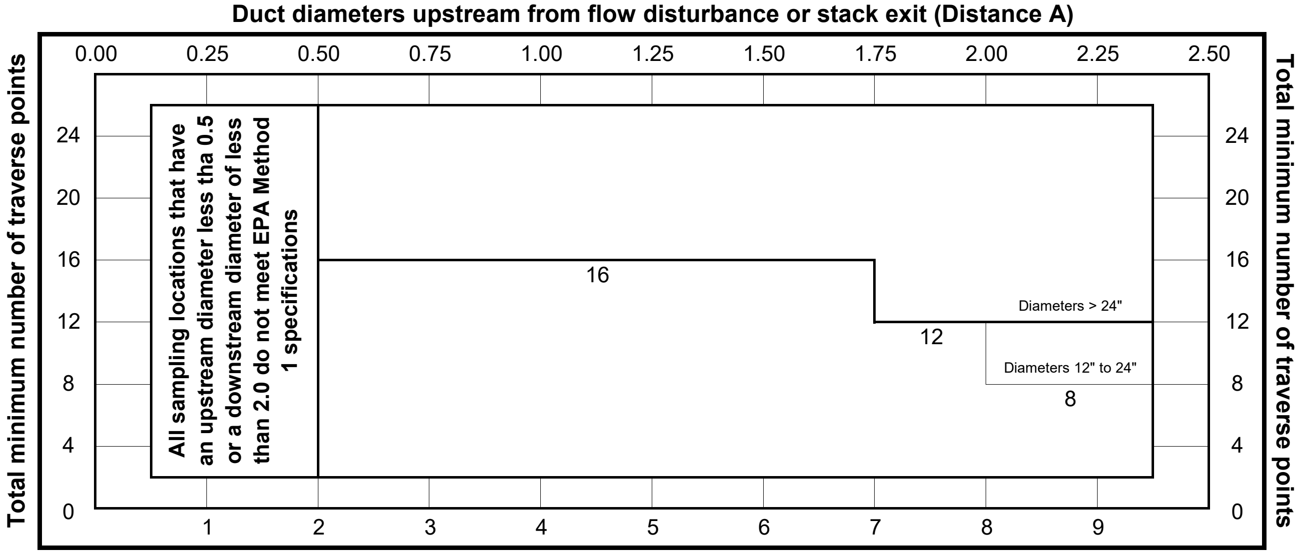
Note: No traverse point shall be within 1.0" of the stack walls (see Sections 11.3.1)

DUCT AREA = 254.469 ft^2



Example: Location of 12 points

Duct diameters upstream from flow disturbance or stack exit (Distance A)



Duct diameters downstream from flow disturbance (Distance B)

EPA METHOD 1 FIELD DATA

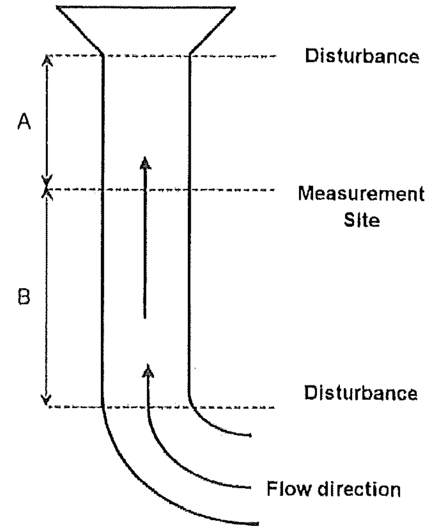
MONTROSE AIR QUALITY SERVICES

Project Information

Client / Facility	Grays Harbor / Elma WA	Date	3-13-19
Source / Location	CT-11 Outlet	Data taken by	AK

Duct Measurements

Type of duct (circular, rectangular, elliptical)	
Far wall to outside of port distance, in.: M1	222.85
Port length, in. (confirm flush with inside wall): M2	6.5
Duct inner diameter, in. (M1 - M2)	216
Duct ID using adjacent, 90° port (for elliptical ducts)	NA
Upstream distance (A), in.	~45'
Downstream distance (B), in.	~50'
Number of ports (for circular, must be 90° to each other)	4
Internal width (for rectangular ducts only), in. *	NA
Port inner diameter, in.	6"



Duct Parameters

Material (steel, fiberglass, PVC)	Steel
Type of port (flange, npt nipple, etc.)	Flange
Orientation (vertical, horizontal, if diagonal specify angle)	Vertical
Elevation of ports above ground, ft.	~170'

Cyclonic flow expected?	No
Pitot ID	P011
Manometer ID	SR-3
Angle finder / protractor ID	BEE013

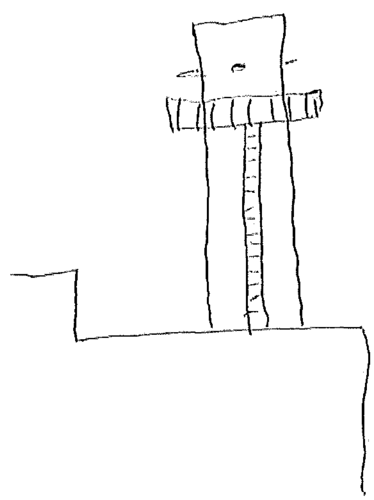
M2

M-5 Points

-1	11
-2	21
-3	32
-4	49.7
-5	60.5
-6	83.4

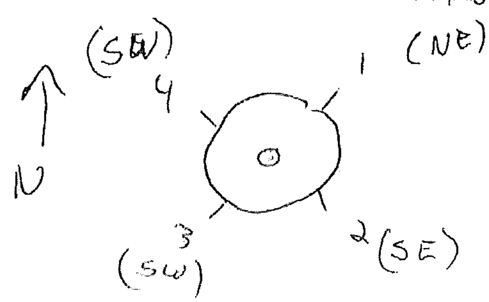
Traverse point	Outside port distance, in.	Null angle, α
1-1	13.4	2.5
-2	29.2	3.0
-3	48.4	3.0
-4	76.3	4.5
2-1		5.0
-2		4.5
-3		4.0
-4		4.0
3-1		3.5
-2		3.5
-3		4.0
-4		5.5
4-1		3.0
-2		2.5
-3		3.0
-4		4.5
Average of absolute α		

Diagram of duct and sampling location



Cross-section sketch showing port locations and numbering

Label the following: port number 1, 2, etc.
north direction or other landmark
flow direction - ⊗ into page ⊙ out of page



*If schematics are unavailable, internal width can be estimated by measuring the portion of the port length not visible on the outside of the duct, which would be an estimate of the insulation thickness. Double this distance and subtract it from the outside width.

MONTROSE AIR QUALITY SERVICES

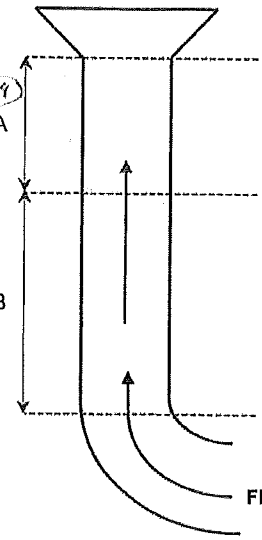
EPA METHOD 1 FIELD DATA

Project Information

Client / Facility	Grays Harbor / Elma WA	Date	3-14-19
Source / Location	CT-2 Outlet	Data taken by	AK / NW

Duct Measurements

Type of duct (circular, rectangular, elliptical)	Circular
Far wall to outside of port distance, in. M1	222.25
Port length, in. (confirm flush with inside wall): M2	6.5 ~~6.25~~ AK 3/14/19
Duct inner diameter, in. (M1 - M2)	216
Duct ID using adjacent, 90° port (for elliptical ducts)	NA
Upstream distance (A), in.	~45' ~~~33'~~
Downstream distance (B), in.	~50' ~~~30'~~
Number of ports (for circular, must be 90° to each other)	4
Internal width (for rectangular ducts only), in. *	NA
Port inner diameter, in.	6



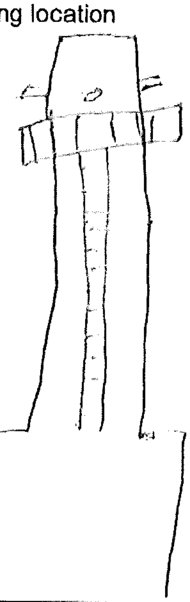
Duct Parameters

Material (steel, fiberglass, PVC)	Steel
Type of port (flange, npt nipple, etc.)	Flange
Orientation (vertical, horizontal, if diagonal specify angle)	Vertical
Elevation of ports above ground, ft.	~120'

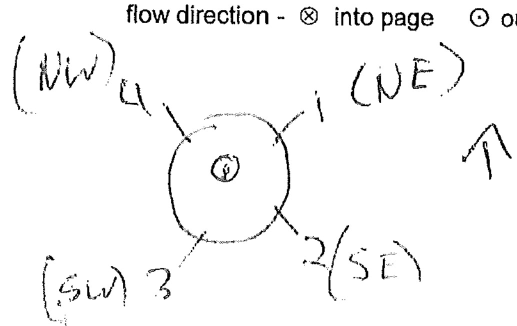
Cyclonic flow expected?	NO
Pitot ID	P011
Manometer ID	SR-3
Angle finder / protractor ID	REF-013

Traverse point	Outside port distance, in.	Null angle, α
1-1	13.4	14
-2	29.2	6
-3	48.4	1
-4	76.3	10
2-1	13.4	7
-2	29.2	10
-3	48.4	16
-4	76.3	10
3-1	13.4	2
-2	29.2	2
-3	48.4	3
-4	76.3	8
4-1	13.4	2
-2	29.2	5
-3	48.4	8
-4	76.3	4
Average of absolute α		

Diagram of duct and sampling location



Cross-section sketch showing port locations and numbering
Label the following: port number 1, 2, etc.
north direction or other landmark
flow direction - ⊗ into page ⊙ out of page



*If schematics are unavailable, internal width can be estimated by measuring the portion of the port length not visible on the outside of the duct, which would be an estimate of the insulation thickness. Double this distance and subtract it from the outside width.

Appendix B.2
Particulate Matter Data Sheet

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility	Grays Harbor / Elma WA	Page	1 of 1
Source / Location	CT 1 - Outlet	Method	5-202
Run no. 1PM-GH-01	Date 3/13/19	Operator / Assistant AK	Project No. 021AS-555757

Equipment Identification		Calibration	
Meter console ID	MB16	Meter Yd	0.9883
Stack TC ID	6-3	Meter ΔH@0.75cfm	1.7332
Probe/pitot ID	6-3	Pitot tube Cp	0.84
Nozzle ID	0.190	Nozzle diameter, in.	0.190
Imp. outlet TC ID	1-47	**ALT-011 TC Check** (see bottom of page)	
Filter TC ID	3308	Std. TC ID	see R-3
Micromanometer ID	MB16	Std. TC temp., °F	11
Sensitivity, in. H_2O	0.00	Continuity Check	☐ 11

Test / Sampling Parameters		Ambient / Stack Gas Conditions	
Run duration, min.	72	Baro. press., in. Hg	29.40
No. of traverse pts.	24	Ambient temp., °F	45
No. of ports	4	Static (P_g), in. H_2O	-0.74
Points per port	6	O_2 conc., % dry vol.	—
Time per point, min.	3	CO_2 conc., % dry vol.	—
Probe/filter range, °F	244 ± 25	Wet bulb temp., °F	—
Imp. outlet max., °F	68		

K Factor: ΔH = 0.85 x ΔP or dwell time = N/A x √ΔP

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.01 @ 15	0.08 @ 15
Pitot (+): in H_2O @ in H_2O	0 @ 4.3	0 @ 3.8
Pitot (-): in H_2O @ in H_2O	0 @ 4.7	0 @ 4.6
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	344.7	407.3	
EMPTY	592.0	606.1	
DI H2O	692.0	694.6	
SG	878.4	893.8	
Tared Line Rinse			
Total impinger weight gain, g			

Filter ID 16-0754 CPM Filter 1-PM CPM-01

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	CPM oF	Vaccum in. Hg
4-1	0	1010	338.050	1.5	1.28	199	253	259	52	62	63	67	5.0
-2	3		340.00	1.5	1.28	199	250	260	54	65	63	65	5.0
-3	6		341.85	1.6	1.36	198	246	260	56	68	64	65	5.0
-4	9		343.79	1.6	1.36	197	244	248	53	70	64	69	5.0
-5	12		345.79	1.5	1.28	196	247	247	49	71	65	69	5.0
-6	15		347.69	1.2	1.02	194	247	245	50	73	66	68	5.0
3-1	18	~~1030~~ AK-3-13-19 1032	349.440	1.5	1.28	198	250	255	53	73	69	68	5.0
-2	21		351.34	1.4	1.19	199	248	248	52	75	69	66	5.0
-3	24		353.18	1.4	1.19	198	246	247	53	76	70	65	5.0
-4	27		355.01	1.5	1.28	197	248	248	54	77	71	65	5.0
-5	30		356.87	1.4	1.19	197	248	246	54	78	72	67	5.5
-6	33		358.71	1.2	1.02	195	249	248	56	78	72	68	5.0
2-1	36	1054	360.545	1.2	1.02	202	247	248	55	76	74	65	5.0
-2	39		362.32	1.3	1.11	202	245	252	56	77	74	69	5.0
-3	42		364.07	1.4	1.19	202	246	247	56	77	74	66	5.0
-4	45		365.93	1.3	1.11	201	245	248	58	78	75	67	5.0
-5	48		367.68	1.4	1.19	201	245	246	59	78	75	67	5.0
-6	51		369.590	0.99	0.84	201	245	249	60	78	75	66	5.0
1-1	54	1133	370.494	1.2	1.02	201	245	245	63	69	72	66	5.0
-2	57		372.49	1.2	1.02	201	246	246	61	69	71	66	5.0
-3	60		374.89	1.3	1.11	201	246	246	60	69	70	68	5.0
-4	63		376.77	1.4	1.19	201	242	244	59	64	70	70	5.0
-5	66		378.67	1.4	1.19	200	244	243	60	70	69	69	5.0
-6	69		380.57	1.4	1.19	199	241	242	61	70	69	65	5.0
	72	1153	382.490										
			Helped	with	ST-1B	on	my	last	Port	change			
			took	longer	than	usual							

Failed leak check

ALT-011						

Comments:
BALANCE CHECK WEIGHT 500.0g / 500.0g

MAQS SampleTrainDataSheet

Appendix B.3
Ammonia Slip Data Sheets

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC
Source / Location: CT 1
Run no.: 1-NH3-GHU1
Date: 3/13/19
Operator / Assistant: NW / JA
Page: 1 of 1
Method: ST 1B
Project No.: 021AS-555757

Equipment Identification	
Meter console ID	MB34
Stack TC ID	6-18
Probe/pitot ID	6-18
Nozzle ID	SEA-GN
Imp. outlet TC ID	SEA-GN
Filter TC ID	—
Micromanometer ID	MB34
Sensitivity, in. H_2O	0.01

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)	
Std. TC ID	SEA R12
Std. TC temp., °F	" "
Continuity Check	☐

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0 @ 10	0 @ 10
Pitot (+): in. H_2O @ in. H_2O	0 @ 6	0 @ 6
Pitot (-): in. H_2O @ in. H_2O	0 @ 5.5	0 @ 4
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters	
Run duration, min.	36
No. of traverse pts.	~~3~~ 12
No. of ports	4
Points per port	3
Time per point, min.	3
Probe/filter range, °F	—
Imp. outlet max., °F	45

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.80
Ambient temp., °F	41.0
Static (P_g), in. H_2O	-0.70
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

K Factor: ΔH = N/A x ΔP or dwell time = N/A x √ΔP

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	627.4	752.3	
0.1N H_2SO_4	670.6	672.0	
EMPTY	653.7	655.3	
SG	950.0	955.5	
Tared Line Rinse	100.0	100.0	
Total impinger weight gain, g			

Filter ID: —

	Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
	1	0	9:29	877.880	1.2	1.0	202			44	67	65		9
	2	3	9:32	879.61	1.5	1.0	202			44	68	66		9
	3	~~6~~ 6	9:35	881.26	1.6	1.0	202			44	68	67		8
9:38	4	9	~~9:40~~ NW	882.930	1.3	1.0	202			43	70	68		8
9:41	5	12	~~9:40~~ NW	884.54	1.5	1.0	202			43	70	69		8
	6	15	9:43	886.12	1.2	1.0	201			43	71	69		8
9:46	7	18	~~9:51~~ NW	887.688	1.1	1.0	201			43	71	70		8
9:51	8	21	~~9:51~~	889.30	1.4	1.0	201			42	73	70		8
	9	24	9:54	890.92	1.3	1.0	201			42	75	71		8
	10	27	10:02	892.370	1.5	1.0	201			42	76	73		8
10:05	11	30	~~10:02~~ NW	894.04	1.6	1.0	202			42	77	73		8
	12	33	10:08	895.62	1.3	1.0	202			43	78	73		8
	end	36	10:11	897.003	—	—	—			—	—	—		—

CHECK WEIGHT 500.0/500.0

ALT-011						

Comments: 9:51 port 3 start 9:40 port 2 start

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility	GHEC	Page	1 of 1
Source / Location	CT 1	Method	ST LB
Run no. 2NH3-GHU1	Date 3/13/19	Operator / Assistant NW / JR	Project No. 021AS-555757

Equipment Identification

Meter console ID	MB34
Stack TC ID	6-14
Probe/pitot ID	6-18
Nozzle ID	—
Imp. outlet TC ID	5CA-GN
Filter TC ID	—
Micromanometer ID	MB81
Sensitivity, in. H_2O	0.01

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	12
No. of ports	4
Points per port	3
Time per point, min.	2.5
Probe/filter range, °F	—
Imp. outlet max., °F	45

K Factor: ΔH = N/A x ΔP or dwell time = N/A x √ΔP

Calibration

Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)

Std. TC ID	See R12
Std. TC temp., °F	" "
Continuity Check	☐

Ambient / Stack Gas Conditions

Baro. press., in. Hg	29.80
Ambient temp., °F	43.0
Static (P_g), in. H_2O	-0.70
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0 @ 5	0 @ 10
Pitot (+): in. H_2O @ in. H_2O	0 @ 4	0 @ 6
Pitot (-): in. H_2O @ in. H_2O	0 @ 5.5	0 @ 4
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	740.6	867.9	
0.1N H_2SO_4	760.4	762.9	
EMPTY	610.0	611.3	
SG	1004.2	1008.7	
Tared Line Rinse	100.0	-100.0	
Total impinger weight gain, g			

Filter ID —

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in H_2O	ΔH in H_2O	Stack temp °F	Probe temp °F	~~Filter temp~~ NOx Stack °F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vacuum in. Hg
1	0	10:24	897.435	1.3				202	44	82	77		6
2	2.5	10:26	898.59	1.5				201	44	83	78		6
3	5	10:29	899.83	1.6				202	43	83	78		6
4	7.5	10:35	901.175	1.2				200	43	84	78		6
5	10	10:38	902.34	1.4				202	~~44~~ 43	84	78		6
6	12.5	10:40	903.60	1.3				201	43	83	78		6
7	15	10:44	905.172	1.2				200	44	83	77		6
8	17.5	10:46	906.09	1.5				201	43	83	78		6
9	20	10:49	907.38	1.7				202	43	84	78		6
10	22.5	10:53	908.678	1.3				201	43	85	79		6
11	25	10:55	910.02	1.6				201	42	86	80		6
12	27.5	10:58	911.31	1.1				199	43	86	80		
end	30	11:01	912.671										

ALT-011						

Comments:
CHECK WEIGHT 500.0/500.0

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC
Source / Location: CT 1
Run no. 3-NH3-GHU1 Date 3/13/19 Operator / Assistant NW / JR
Page 1 of 1
Method ST 1B
Project No. 021AS-555757

Equipment Identification

Meter console ID	MB34
Stack TC ID	6-18
Probe/pitot ID	6-18
Nozzle ID	—
Imp. outlet TC ID	SEA-GM
Filter TC ID	—
Micromanometer ID	MB34
Sensitivity, in. H_2O	0.01

Calibration

Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)

Std. TC ID	SEA-B12
Std. TC temp., °F	
Continuity Check	☐

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0 @ 10	0 @ 10
Pitot (+): in. H_2O @ in. H_2O	0 @ 6	0 @ 5
Pitot (-): in. H_2O @ in. H_2O	0 @ 4	0 @ 4
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	12
No. of ports	4
Points per port	3
Time per point, min.	2.5
Probe/filter range, °F	—
Imp. outlet max., °F	45

K Factor: ΔH = NA x ΔP or dwell time = NA x √ΔP

Ambient / Stack Gas Conditions

Baro. press., in. Hg	29.80
Ambient temp., °F	45.0
Static (P_g), in. H_2O	-0.70
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Impingers

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	628.4	732.8	
0.1N H_2SO_4	677.7	679.0	
EMPTY	657.9	~~677.25~~ 657.9	
SG	955.5	958.6	
Tared Line Rinse	1000	-100.0	
Total impinger weight gain, g			

Filter ID —

Traverse pt. number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in. Hg
1	0	11:36	913.614	1.7	1.0	198			43	89	88		5
2	2.5	11:38	914.96	1.8	1.0	197			43	92	89		3
3	5	11:41	916.83	1.4	1.0	194			43	92	87		3
4	7.5	11:50	917.426	1.8	1.0	198			42	88	87		4
5	10	11:52	919.65	1.7	1.0	197			43	90	86		5
6	12.5	11:55	920.78	1.6	1.0	196			44	91	87		5
7	15	12:05	922.004	1.4	1.0	201			44	90	88		6
8	17.5	12:07	923.40	1.5	1.0	201			43	91	88		6
9	20	12:10	924.75	1.6	1.0	201			43	91	88		6
10	22.5	12:18	926.101	1.5	1.0	201			43	93	89		6
11	25	12:20	927.52	1.6	1.0	201			44	93	89		6
12	27.5	12:23	928.89	1.2	1.0	200			44	93	89		6
end	30	12:26	930.208										

ALT-011						

Comments:
CHECK WEIGHT 500.0/ 800.0 g

MAQS Sampl.

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC
Page 1 of 1
Source / Location: CT 1
Method: ST 1 13
Run no. 3-13-19, 35/ 4-NH3 ~~8~~ 10
Date: 3-13-19
Operator / Assistant: JR / NW
Project No. 021AS-555757

Equipment Identification	
Meter console ID	MB-34
Stack TC ID	6-18
Probe/pitot ID	6-18
Nozzle ID	—
Imp. outlet TC ID	SEA-GW
Filter TC ID	—
Micromanometer ID	~~MB-34~~ NW SR-3
Sensitivity, in. H_2O	~~0.01~~ NW 0.0001

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	

ALT-011 TC Check (see bottom of page)	
Std. TC ID	see R12
Std. TC temp., °F	" "
Continuity Check	☐

Test / Sampling Parameters	
Run duration, min.	30
No. of traverse pts.	1
No. of ports	1
Points per port	1
Time per point, min.	5
Probe/filter range, °F	—
Imp. outlet max., °F	45

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.85 see R12 NW
Ambient temp., °F	45.0
Static (P_g), in. H_2O	-0.70
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

K Factor: ΔH = NA x ΔP or dwell time = NA x √ΔP

Equipment Checks	Pre		Post	
Meter: cfm @ in. Hg	0	@ 10	0	@ 10
Pitot (+): in. H_2O @ in. H_2O	0	@ 5	0	@ 6
Pitot (-): in. H_2O @ in. H_2O	0	@ 4	0	@ 3
Pitot visual:	aligned / damaged		aligned / damaged	
Nozzle visual:	intact / damaged		intact / damaged	
Other:				

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	745.4	878.7	
0.1N H_2SO_4	767.6	768.9	
EMPTY	613.9	614.7	
SG	1008.7	1012.4	
Tared Line Rinse	100.0	-100.0	
Total impinger weight gain, g			

Filter ID: —

Traverse pt. number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in H_2O	ΔH in H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in Hg
1	0	1240	930.654	1.431	1.0	200			43	92	88		3
2	5	1245	933.63	1.608	1.0	201			43	93	89		3
3	10	1250	936.47	1.597	1.0	200			44	93	89		3
4	15	1255	939.16	1.418	1.0	191			43	96	90		3
5	20	1300	942.32	1.438	1.0	194			43	98	91		3
6	25	1305	944.67	1.739	1.0	192			43	99	91		3
7	30	1310	947.426	1.584	1.0	193			44	99	90		3
8				1.486		191							
9				1.381		190							
10				1.317		190							
11				1.467		190							
12				1.175		190							
13				0.9757		195							
14				1.303		195							
15				1.371		196							
16				1.298		195							

CHECK WEIGHT 500.0/500.0

ALT-011						

Comments: start 1258 Flow traverse
end 1304

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC
Source / Location: CT 1
Run no. 5 | Date 3/13/19 | Operator / Assistant NW/AK
Page 1 of 1 | Method ST 1B | Project No. 021AS-555757

Equipment Identification		Calibration		Equipment Checks	Pre	Post
Meter console ID	MB34	Meter Yd	0.9904	Meter: cfm @ in. Hg	0 @ 10	0 @ 12
Stack TC ID	P-011	Meter ΔH@0.75cfm	1.9855	Pitot (+): in H_2O @ in. H_2O	0 @ 6	0 @ 3
Probe/pitot ID	P-011	Pitot tube Cp	0.84	Pitot (-): in. H_2O @ in. H_2O	0 @ 3	0 @ 4
Nozzle ID	—	Nozzle diameter, in.	—	Pitot visual:	aligned / damaged	aligned / damaged
Imp. outlet TC ID	SEA-GM	ALT-011 TC Check (see bottom of page)		Nozzle visual:	intact / damaged	intact / damaged
Filter TC ID	—	Std. TC ID	See R12	Other:		
Micromanometer ID	SEA SR	Std. TC temp., °F	" "			
Sensitivity, in. H_2O	0.0001	Continuity Check	☐			

Impingers	Initial, g	Final, g	Difference
0.1N H2SO4	629.2	770.7	
0.1N H2SO4	677.2	677.7	
EMPTY	657.7	658.7	
SG	958.9	960.9	
Tared Line Rinse	100.0	-100.0	
Total impinger weight gain, g			
Filter ID	—		

Test / Sampling Parameters		Ambient / Stack Gas Conditions	
Run duration, min.	30	Baro. press., in. Hg	See R12
No. of traverse pts.	1	Ambient temp., °F	45.0
No. of ports	1	Static (P_g), in. H_2O	-0.70
Points per port	1	O_2 conc., % dry vol.	—
Time per point, min.	30	CO_2 conc., % dry vol.	—
Probe/filter range, °F	—	Wet bulb temp., °F	—
Imp. outlet max., °F	45		

K Factor: ΔH = NA x ΔP or dwell time = NA x √ΔP

Port	Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in H_2O	ΔH in H_2O	Stack temp °F	Probe temp °F	Filter temp °F	Imp. outlet °F	Meter temp. inlet °F	Meter temp. outlet °F		Vaccum in. Hg
1	1	0	1318	947.714	1.432	1.0	193			43	92	88		3
1	2	5	1323	950.53	1.448	1.0	193			43	93	88		3
	3	10	1328	953.36	1.478	1.0	192			44	94	88		3
	4	15	1333	956.23	1.368	1.0	191			43	95	88		3
2	5	20	1338	958.83	1.502	1.5	190			43	95	88		3
	6	25	1343	961.95	1.460	1.5	191			43	94	88		3
	7	30	1348	966.333	1.285	—	192			44	95	88		3
	8				1.298		191							
3	9				0.9956		194							
	10				1.361		196							
	11				1.439		196							
	12				1.219		195							
4	13				1.463		195							
	14				1.386		195							
	15				1.458		196							
	16				1.218		196							

CHECK WEIGHT 500.0/500.0

ALT-011						

Comments: 1326 start 1331 end Flow traverse was fold to increase ΔH

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC — Page 1 of 1

Source / Location: CT 1 — Method: 5t 1B

Run no. 6-NH3-GHUI — Date 3/13/19 — Operator / Assistant: NW/AK — Project No. 021AS-555757

Equipment Identification	
Meter console ID	MB34
Stack TC ID	P-011
Probe/pitot ID	~~6-18~~ NW (P011)
Nozzle ID	—
Imp. outlet TC ID	SEA-GN
Filter TC ID	—
Micromanometer ID	SR3
Sensitivity, in. H_2O	0.001

Test / Sampling Parameters	
Run duration, min.	30
No. of traverse pts.	1
No. of ports	1
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

K Factor: ΔH = NA x ΔP or dwell time = NA x √ΔP

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)	
Std. TC ID	see P12
Std. TC temp., °F	" "
Continuity Check	☐

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.80
Ambient temp., °F	45.0
Static (P_g), in. H_2O	-0.70
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0 @ 12	0 @ 10
Pitot (+): in H_2O @ in H_2O	0 @ 3	0 @ 5
Pitot (-): in H_2O @ in H_2O	0 @ 4	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	748.9	878.2	
0.1N H_2SO_4	770.0	772.5	
EMPTY	614.9	614.9	
SG	1012.4	1015.4	
Tared Line Rinse	100	~100.0	
Total impinger weight gain, g			

Filter ID

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in H_2O	ΔH in H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
4-1	0	1358	966.715	1.559	1.5	199			43	91	86		3
4-2	5	1403	970.16	1.429	1.5	200			43	91	86		3
4-3	10	1408	973.49	1.600	1.5	200			44	91	86		3
4-4	15	1413	976.84	1.257	1.5	198			44	90	85		3
3-1 ~~4~~ NW	20	1418	979.98	0.8119	1.5	195			43	91	85		3
3-2	25	1423	983.77	1.165	1.5	196			43	91	85		3
3-3	30	1428	986.751	1.436	—	197			—		—		
3-4				1.072		195							
2-1				1.462		191							
2-2				1.570		192							
2-3				1.236		193							
2-4				1.183		193							
1-1				1.481		192							
1-2				1.580		192							
1-3				1.442		192							
1-4				1.364		191							

CHECK WEIGHT 5000.3 — ALT-011

Comments: 1414 Start 1422 End Flow traverse

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Grays Harbor, Elma WA | Page 1 of 1
Source / Location: CT1 Outlet | Method ST-1B
Run no. 7-NH3-GHJ1 | Date 3-13-19 | Operator / Assistant AK / JR | Project No. 021AS-555787

Equipment Identification	
Meter console ID	MB34
Stack TC ID	P011
Probe/pitot ID	P011
Nozzle ID	NA
Imp. outlet TC ID	1-47
Filter TC ID	NA
Micromanometer ID	SR#3
Sensitivity, in. H_2O	0.0001

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	NA
ALT-011 TC Check (see bottom of page)	
Std. TC ID	See R-12
Std. TC temp., °F	"
Continuity Check	☐

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0 @ 14	0 @ 12
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.8	0 @ 4.2
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.7	0 @ 4.1
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	626.0	764.8	
0.1N H_2SO_4	673.4	675.2	
EMPTY	658.7	658.2	
S-G	961.0	965.1	
Tared Line Rinse	100.0	100.0	
Total impinger weight gain, g			
Filter ID	—		

Test / Sampling Parameters	
Run duration, min.	30
No. of traverse pts.	1
No. of ports	4
Points per port	1
Time per point, min.	5
Probe/filter range, °F	N/A
Imp. outlet max., °F	45

K Factor: ΔH = NA x ΔP or dwell time = NA x √ΔP

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.80
Ambient temp., °F	45
Static (P_g), in. H_2O	-0.73
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Traverse pt. number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp °F	Imp. outlet °F	Meter temp inlet °F	Meter temp outlet °F		Vaccum in. Hg
4-1	0	1437	987.135	1.545	1.5	190	NA	NA	45	89	87		3.0
-2	5	1442	990.56	1.832		190			45	91	84		3.0
-3	10	1447	993.99	1.531		190			48	91	84		4.0
-4	15	1452	997.42	1.301	2.0	190			44	91	84		4.0
3-1	20	1457	1001.15	1.452		189			44	91	84		4.0
-2	25	~~1457~~ 1502	1004.87	1.592		191			45	91	84		4.0
-3	30	1507	1008.636	1.395		192			—		—		—
-4				1.221		190							
2-1				0.952		192							
-2				1.125		195							
-3				1.312		195							
-4				1.252		194							
1-1				1.595		193							
-2				1.621		195							
-3				1.593		195							
-4				1.312		193							

Velocity Start - 1455
Velocity Stop - 1500

ALT-011						

Comments: Used thermocouple ME-0001 for Stack Temps
Changed ΔH to 2.0 at the 10 min mark - 1
CHECK WEIGHT 500.0 / 500.0

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Grays Harbor / Elma WA — Page 1 of 1
Source / Location: CT-1 Outlet — Method: ST-1B
Run no. 6-NH3-V1 — Date 3-13-14 — Operator / Assistant AK/JR — Project No. 021AS-555792

Equipment Identification	
Meter console ID	MB-34
Stack TC ID	P011
Probe/pitot ID	P011
Nozzle ID	NA
Imp. outlet TC ID	1-47
Filter TC ID	NA
Micromanometer ID	SR#3
Sensitivity, in. H_2O	0.000

Test / Sampling Parameters	
Run duration, min.	3
No. of traverse pts.	1
No. of ports	4
Points per port	1
Time per point, min.	30
Probe/filter range, °F	NA
Imp. outlet max., °F	45

K Factor: ΔH = NA x ΔP or dwell time = NA x √ΔP

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	NA
ALT-011 TC Check (see bottom of page)	
Std. TC ID	See R-12
Std. TC temp., °F	11
Continuity Check	☐
Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.80
Ambient temp., °F	45
Static (P_g), in. H_2O	-0.73
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0 @ 14	0 @ 13.5
Pitot (+): in H_2O @ in. H_2O	0 @ 3.8	0 @ 3.9
Pitot (-): in H_2O @ in. H_2O	0 @ 4.1	0 @ 3.5
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	749.0	890.0	
0.1N H_2SO_4	764.1	767.3	
EMPTY	614.9	615.6	
SG	1015.4	1019.4	
Tared Line Rinse	150.0	~100.0	
Total impinger weight gain, g			

Filter ID NA

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in. Hg
1-1	0	1515	9.415	1.112	2.0	196	NA	NA	43	89	82		3.0
-2	5	1520	13.17	1.501		196			44	89	83		3.0
-3	10	1525	16.92	1.302		195			43	89	82		3.0
-4	15	1530	20.63	1.312		194			44	89	82		3.0
2-1	20	1535	24.34	0.9912		195			45	90	82		3.0
-2	25	1540	28.05	1.212		196			45	89	82		3.0
-3	30	1545	31.820	1.359		198			—	—	—		—
-4				1.821		196							
3-1				1.371	AK	193							
-2				1.364		193							
-3				1.244		193							
-4				1.144		193							
4-1				1.388		192							
-2				1.518		193							
-3			1.501	1.501		192							
-4			AK 3-13-14	1.254		192							
		Velocity	Start - 1527										
		Velocity	Stop - 1536										

ALT-011

Comments: CHECK WEIGHT 500.0/500.0

MAQS SampleTrain

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Grays Harbor / Elma WA — Page 1 of 1
Source / Location: CT-1 Outlet — Method ST-13
Run no. 9NH3-01 — Date 3-13-19 — Operator / Assistant AK / JR — Project No. 021AS-555792

Equipment Identification	
Meter console ID	MB-34
Stack TC ID	P011
Probe/pitot ID	P011
Nozzle ID	NA
Imp. outlet TC ID	1-47
Filter TC ID	NA
Micromanometer ID	SR-3
Sensitivity, in. H_2O	0.000

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	NA
ALT-011 TC Check (see bottom of page)	
Std. TC ID	See R-12
Std. TC temp., °F	" " "
Continuity Check	" ☐ "

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0 @ 13	0 @ 14
Pitot (+): in H_2O @ in. H_2O	0 @ 3.2	0 @ 4.2
Pitot (-): in H_2O @ in. H_2O	0 @ 3.1	0 @ 4.6
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	631.4	765.7	
0.1N H_2SO_4	682.4	683.6	
EMPTY	659.5	659.4	
SG	965.1	968.3	
Tared Line Rinse	100.0	-100.0	
Total impinger weight gain, g			

Test / Sampling Parameters	
Run duration, min.	30
No. of traverse pts.	1
No. of ports	4
Points per port	1
Time per point, min.	30
Probe/filter range, °F	NA
Imp. outlet max., °F	45

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.80
Ambient temp., °F	45
Static (P_g), in. H_2O	-0.73
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

K Factor: ΔH = NA x ΔP or dwell time = NA x √ΔP

Filter ID NA

Traverse pt. number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
4-1	0	1553	32.860	1.613	2.0	191	NA	NA	45	88	81		3.0
-2	5	1558	36.66	1.432		190			44	89	81		3.0
-3	10	1603	40.40	1.693		191			43	90	81		3.0
-4	15	1608	44.13	1.216		197			43	90	82		3.0
3-1	20	1613	47.91	1.542		191			43	89	82		3.0
-2	25	1618	51.67	1.424		192			43	88	82		3.0
-3	30	1623	55.560	1.191		192			—	—	—	—	—
-4				1.102		190							
2-1				0.9621		193							
-2				1.207		196							
-3				1.422		196							
-4				1.241		196							
1-1				1.201		192							
-2				1.498		194							
-3				1.441		195							
-4				1.381		194							

Velocity Start - 1600
Velocity Stop - 1608

ALT-011						

Comments: CHECK WEIGHT 500.0/500.0

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Grays Harbor / Elma WA — Page 1 of 1

Source / Location: CT-1 Outlet — Method: ST-1B

Run no. 10NH3-01 — Date 3-13-19 — Operator / Assistant AF / JR — Project No. 021AS-555757

Equipment Identification		Calibration		Equipment Checks	Pre	Post
Meter console ID	MB34	Meter Yd	0.9904	Meter: cfm @ in. Hg	0.01 @ 15	0.01 @ 14
Stack TC ID	P011	Meter ΔH@0.75cfm	1.9853	Pitot (+): in H_2O @ in H_2O	0 @ 3.8	0 @ 3.9
Probe/pitot ID	P011	Pitot tube Cp	0.84	Pitot (-): in. H_2O @ in. H_2O	0 @ 4.1	0 @ 3.9
Nozzle ID	NA	Nozzle diameter, in.	NA	Pitot visual:	aligned / damaged	aligned / damaged
Imp. outlet TC ID	1-47	ALT-011 TC Check (see bottom of page)		Nozzle visual:	intact / damaged	intact / damaged
Filter TC ID	NA	Std. TC ID	See R.12	Other:		
Micromanometer ID	SR-3	Std. TC temp., °F	" "			
Sensitivity, in. H_2O	0.000	Continuity Check	" □ "			

Test / Sampling Parameters		Ambient / Stack Gas Conditions	
Run duration, min.	30	Baro. press., in. Hg	29.80
No. of traverse pts.	1	Ambient temp., °F	40
No. of ports	4	Static (P_g), in. H_2O	-0.73
Points per port	1	O_2 conc., % dry vol.	—
Time per point, min.	30	CO_2 conc., % dry vol.	—
Probe/filter range, °F	NA	Wet bulb temp., °F	—
Imp. outlet max., °F	45		

K Factor: ΔH = 3.15 x ΔP or dwell time = NA x √ΔP

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	750.4	894.0	
0.1N H_2SO_4	765.0	766.3	
EMPTY	614.0	614.5	
SG	1019.4	1022.1	
Tared Line Rinse	100.0	-100.0	
Total impinger weight gain, g			

Filter ID: NA

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in Hg
1-1	0	1629	56.715	1.364	2.0	193	NA	NA	45	85	79		3.0
-2	5	1634	60.45	1.471		194			45	86	79		3.0
-3	10	1639	64.19	1.492		194			44	87	79		3.0
-4	15	1644	67.92	1.285		192			44	87	79		3.0
2-1	20	1649	71.67	0.9982		195			45	88	79		3.0
-2	25	1655	75.42	1.262		197			45	89	79		3.0
-3	30	1659	79.138	1.247		198							
-4				1.032		196							
3-1				1.372		191							
-2				1.423		191							
-3				1.469		191							
-4				1.092		191							
4-1				1.407		192							
-2				1.521		193							
-3				1.365		192							
-4				1.225		191							
		velocity start - 1636											
		Velocity Stop - 1642											

ALT-011

Comments: CHECK WEIGHT 500.0 / 500.0

MAQS Samp

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Gray's Harbor Elma Washington — Page 1 of 1

Source / Location: CT? Outlet — Method: STI B? / Ind?

Run no.: 1-NH3-GH02 — Date: 3/14/19 — Operator / Assistant: JR / NW / A.K — Project No.: W021AS-555757

Equipment Identification	
Meter console ID	MB-34
Stack TC ID	P011
Probe/pitot ID	P011
Nozzle ID	—
Imp. outlet TC ID	SEA-GN
Filter TC ID	-
Micromanometer ID	SR#3
Sensitivity, in. H_2O	0.001

Test / Sampling Parameters	
Run duration, min.	30
No. of traverse pts.	1
No. of ports	4
Points per port	1
Time per point, min.	30
Probe/filter range, °F	-
Imp. outlet max., °F	75

K Factor: ΔH = — x ΔP or dwell time = — x √ΔP —

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)	
Std. TC ID	ST1 ~~[illegible]~~ JR
Std. TC temp., °F	
Continuity Check	☐

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.81
Ambient temp., °F	35
Static (P_g), in. H_2O	-0.407
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.002 @ 12	0.002 @ 10
Pitot (+): in. H_2O @ in. H_2O	0.0 @ 3	0.0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0.0 @ 4	0.0 @ 4
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H2SO4	748.3	889.5	
0.1N H2SO4	767.3	769.5	
MT	614.0	614.4	
SG	1022.8	1026.4	
Tared Line Rinse	100	1000	
Total impinger weight gain, g			

Filter ID:

Traverse pt. number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp JR °F	~~Probe temp~~ Spare JR °F	Filter temp °F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in. Hg
1	0	10:57	103.900	—	1.8	NA	—	-	44	67	67	-	~~2.5~~ 4.5 JR 3.14.19
1	10	11:07	110.741	—	↓	↓	—	—	44	70	68	-	4.5
	20	11:17	117.58	—			—	-	45	74	68	-	5.0
↓	30	11:27	125.122	—	↓	↓	-	-	-	-	-	-	-
NW NW-1				1.480		197							
-2				1.352		197							
-3				1.220		196							
-4				1.056		195							
SW-1				1.390		194							
-2				1.218		195							
-3				1.113		194							
-4				1.038		193							
SE-1				1.025		195							
-2				1.181		197							
-3				1.360		198							
-4				1.103		197							
NE-1				1.571		194							
-2				1.521		196							
-3				1.730		194							
-4				1.425		198							

CHECK WEIGHT 500.0 / 500.0

ALT-011						

Comments: Start - 11:13 Bumped The DH to 2.0
Flow traverse END - 11:17

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Gray's Harbor Energy Washington — Page 1 of 1

Source / Location: CT2 Ox Port — Method: ST/B [illegible]

Run no. 2-NH3-GH02 — Date 3/14/19 — Operator / Assistant SP — Project No. 021AS-555757

Equipment Identification

Meter console ID	MB-34
Stack TC ID	P011
Probe/pitot ID	P011
Nozzle ID	—
Imp. outlet TC ID	SEA-6N
Filter TC ID	—
Micromanometer ID	SR#3
Sensitivity, in. H_2O	0.001

Calibration

Meter Yd	0.9964
Meter ΔH@0.75cfm	1.8853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)

Std. TC ID	ST1-R
Std. TC temp., °F	see MR
Continuity Check	☐

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.002 @ 12	0.002 @ 10
Pitot (+): in H_2O @ in H_2O	0.0 @ 3	0.0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0.0 @ 4	0.0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	1
No. of ports	2
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

Ambient / Stack Gas Conditions

Baro. press., in. Hg	29.81
Ambient temp., °F	35
Static (P_g), in. H_2O	-0.405
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

K Factor: ΔH = — x ΔP or dwell time = — x √ΔP —

Impingers	Initial, g	Final, g	Difference
0.1N H2SO4	629.5	755.6	
0.1N H2SO4	675.6	678.4	
MT	660.7	661.6	
SG	974.2	977.4	
Tared Line Rinse	100.0	-100.0	
Total impinger weight gain, g			

Filter ID

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in Hg
—	0	11:37	126.411		1.9		—	—	45	74	68	—	4.0
—	10	11:47	133.83		1.9		—	—	44	74	68	—	4.0
—	20	11:57	141.38		1.9		—	—	44	83	72	—	4.0
—	30	12:07	148.804	—	—	—	—	—	—	—	—	—	—
				1	Temp°F								
4				1.355	199								
3				1.318	199								
2				1.290	198								
1				1.340	197								
4				1.264	193								
3				1.250	195								
2				1.302	196								
1				1.115	196								
4				1.072	197								
3				1.046	194								
2				1.290	201								
1				1.044	199								
4				1.611	198								
3				1.450	199								
2				1.486	199								
1				1.361	193								

CHECK WEIGHT 500.0/500.0 — ALT-011

Comments: Flow Traverse Start 11:58 / Stop 12:02

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Gray's Harbor / Elma Washington — Page 1 of 1
Source / Location: CT2 outlet — Method: STB STIB
Run no. B-NH3-GHUZ — Date 3-14-19 — Operator / Assistant: JD — Project No. 0319S-555757

Equipment Identification

Meter console ID	MB-34
Stack TC ID	TC11
Probe/pitot ID	P011
Nozzle ID	–
Imp. outlet TC ID	SEA-6W
Filter TC ID	–
Micromanometer ID	SRH3
Sensitivity, in. H_2O	0.000

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	1
No. of ports	4
Points per port	1
Time per point, min.	31
Probe/filter range, °F	–
Imp. outlet max., °F	45

K Factor: ΔH = – x ΔP or dwell time = – x √ΔP

Calibration

Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	–

ALT-011 TC Check (see bottom of page)

Std. TC ID	ST1 See Run #12
Std. TC temp., °F	" "
Continuity Check	☐

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.38
Ambient temp., °F	50
Static (P_g), in. H_2O	-0.340
O_2 conc., % dry vol.	–
CO_2 conc., % dry vol.	–
Wet bulb temp., °F	–

Equipment Checks

	Pre		Post	
Meter: cfm @ in. Hg	0.002	@ 10	0	@ 12
Pitot (+): in H_2O @ in. H_2O	0.0	@ 5	0	@ 3
Pitot (-): in H_2O @ in H_2O	0.0	@ 4.5	0	@ 4
Pitot visual:	aligned / damaged		aligned / damaged	
Nozzle visual:	intact / damaged		intact / damaged	
Other:				

Impingers	Initial, g	Final, g	Difference
0.1N H2SO4	748.0	882.6	
0.1 N H2SO4	764.6	767.9	
MT	614.2	615.6	
SG	1026.0	1031.2	
Tared Line Rinse	100.0	~100.0	
Total impinger weight gain, g			

Filter ID –

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in. Hg
–	0	12:13	149.401	49	1.9	–	–	–	45	83	79	–	4.0
–	10	12:23	155.990	–	1.9	–	–	–	44	81	77	–	4.0
–	20	12:33	163.20	–	1.9	–	–	–	45	82	77	–	4.0
–	30	12:43	170.576	–									
4				1.666		195							
3				1.643		199							
2				1.743		199							
1				1.340		198							
4				0.998		197							
3				1.053		200							
2				1.534		201							
1				1.300		200							
4				1.291		198							
3				1.253		197							
2				1.247		196							
1				1.085		195							
4				1.660		196							
3				1.450		197							
2				1.284		197							
1				1.163		196							

CH

ALT-011						

Comments: Start - 12:28
Check ST-5TS 500/500 END - 12:32
JD 3-14-19

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Grays Harbor / Elma Washington
Page 1 of 1
Source / Location: CT2 Output
Method: ST 13 / method 2
Run no. 4NH3-GH02 Date 3-11-19 Operator / Assistant JR / AK Project No. 021AS-555757

Equipment Identification	
Meter console ID	MB-34
Stack TC ID	PO-11
Probe/pitot ID	PO-11
Nozzle ID	~
Imp. outlet TC ID	SEA-CW
Filter TC ID	—
Micromanometer ID	SR #3
Sensitivity, in. H_2O	0.000

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	
ALT-011 TC Check (see bottom of page)	
Std. TC ID	ST1
Std. TC temp., °F	see below
Continuity Check	☐

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.002 @ 16	0.003 @ 16
Pitot (+): in. H_2O @ in. H_2O	0.0 @ 3	0.0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0.0 @ 3	0.0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	627.8	759.1	
0.1N H_2SO_4	677.3	681.0	
MT	660.0	661.3	
SG	997.4	984.3	
Tared Line Rinse	100.0	~100.0	

Total impinger weight gain, g

Filter ID —

Test / Sampling Parameters	
Run duration, min.	30
No. of traverse pts.	1
No. of ports	4
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	30.38
Ambient temp., °F	50
Static (P_g), in. H_2O	-0.383
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

K Factor: ΔH = — x ΔP or dwell time = — x √ΔP

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in Hg
—	0	12:49	171.792	—	1.9	—	—	—	45	80	76	—	11.0
—	10	12:59	179.06	—	1.9	—	—	—	44	81	77	—	11.0
—	20	13:09	186.22	—	1.9	—	—	—	44	82	77	—	11.0
—	30	13:19	193.370	—	—	—	—	—	—	—	—	—	—
					Stack	ΔP 3-11-19							
4				1.510	193								
3				1.222	194								
2				1.220	194								
1				1.171	194								
4				1.316	192								
3				1.235	194								
2				1.131	195								
1				1.066	194								
4			0.970	[illegible]	197								
3				1.395	200								
2				1.498	199								
1				1.147	199								
4				1.486	197								
3				1.614	198								
2				1.835	200								
1				1.420	195								

ALT-011						

Comments: 12:56
CHECK WEIGHT 500.0g / 500.0g

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Gray's Harbor / Elma Washington
Source / Location: CT2 Outlet
Run no. 5-NH3-GHZ Date 3-14-19 Operator / Assistant JP / AL
Page 1 of 1
Method STIB / method
Project No. 021AS-555757

Equipment Identification

Meter console ID	MQ-34
Stack TC ID	PO-11
Probe/pitot ID	PO-11
Nozzle ID	—
Imp. outlet TC ID	SEA-GN
Filter TC ID	—
Micromanometer ID	SR#3
Sensitivity, in. H_2O	0.000

Calibration

Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9855
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)

Std. TC ID	See field
Std. TC temp., °F	" "
Continuity Check	☐

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	1
No. of ports	4
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.38
Ambient temp., °F	50
Static (P_g), in. H_2O	-0.405
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

K Factor: ΔH = ____ x ΔP or dwell time = — ____ x √ΔP —

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0 @ 10	0.002 @ 7
Pitot (+): in. H_2O @ in. H_2O	0 @ 5.8	0.0 @ 4.5
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.8	0.0 @ 4.5
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	750.0	758.5	
0.1N H_2SO_4	769.1	770.9	
MT	614.0	614.3	
SG	1031.2	1034.6	
Tared Line Rinse	100.0	100.0	
Total impinger weight gain, g			
Filter ID	—		

Traverse pt. number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
—	0	13:24	194.051	—	1.9	—	—	—	44	76	76	—	4.5
—	10	13:34	201.19	—		—	—	—	44	78	77	—	4.5
—	20	13:44	208.44	—		—	—	—	43	72	67	—	3
—	30	13:54	215.407										
4				1.471		~~195~~ 194							
3				1.595		194							
2				1.635		197							
1				1.517		197							
4				1.093		195							
3				1.331		198							
2				1.342		200							
1				1.094		198							
4				1.214		195							
3				1.216		195							
2				1.191		194							
1				0.998		193							
4				1.227		194							
3				1.343		195							
2				1.297		195							
1				1.171		195							

SS 3/14/19 CHECK WEIGHT 5000/5000.0

ALT-011

Comments: Start - 13:28
End 13:35 Flow traverse

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC
Source / Location: CT-2 Outlet
Run no. 6-NH3-GHU2 Date 3/14/19 Operator / Assistant NW / SR
Page 1 of 1
Method ST173/method 62
Project No. 0215-555757

Equipment Identification	
Meter console ID	MB34
Stack TC ID	MB34
Probe/pitot ID	P-011
Nozzle ID	P-011
Imp. outlet TC ID	SEA 61
Filter TC ID	—
Micromanometer ID	SR-3
Sensitivity, in. H_2O	0.0001

Calibration	
Meter Yd	0.9904
Meter ΔH@0.75cfm	1.985
Pitot tube Cp	0.84
Nozzle diameter, in.	—
ALT-011 TC Check (see bottom of page)	
Std. TC ID	SR2-Run 17
Std. TC temp., °F	
Continuity Check	☐

Equipment Checks	Pre		Post	
Meter: cfm @ in. Hg	0.002	@ 12	0.003	@ 15
Pitot (+): in. H_2O @ in. H_2O	0.0	@ 3.5	0	@ 6.2
Pitot (-): in. H_2O @ in. H_2O	0.0	@ 4.3	0	@ 5.1
Pitot visual:	aligned / damaged		aligned / damaged	
Nozzle visual:	intact / damaged		intact / damaged	
Other:				

Impingers	Initial, g	Final, g	Difference
0.1N H2SO4	630.9	768.4	
0.1N H2SO4	674.6	677.2	
MT	660.0	660.5	
SG	984.3	988.1	
Tared Line Rinse	100	100.0	
Total impinger weight gain, g			

Filter ID

Test / Sampling Parameters	
Run duration, min.	30
No. of traverse pts.	1
No. of ports	1
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	30.38
Ambient temp., °F	51
Static (P_g), in. H_2O	-0.405
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

K Factor: ΔH = ____ x ΔP or dwell time = ____ x √ΔP —

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp, °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
—	0	14:05	216.323	—	1.4	—	—	—	43	68	67	—	3.5
—	10	14:15	223.61	—	|	—	—	—	44	69	65		3
—	20	14:25	230.88	—	|	—	—	—	44	70	66		3
—	30	14:35	238.177	—	↓	—	—	—	44	71	67		3
4				1.446		186							
3				1.433		191							
2				1.369		193							
1				1.057		193							
4				1.415		191							
3				1.405		191							
2				1.131		192							
1				1.061		193							
4				0.9412		195							
3				1.883		199							
2				1.424		199							
1				1.214		199							
4				1.334		196							
3				1.513		198							
2				1.485		199							
1				1.438		198							

ALT-011							

Comments:
Check weight 500.0g/500.0g

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC

Source / Location: CT-2 Outlet

Page 1 of 1

Run no. 7-NH3-GHU2 Date 3/14/19 Operator / Assistant NW / JR / AK

Method SI4 B / 2 Project No. 021AS-555757

Equipment Identification

Meter console ID	MB34
Stack TC ID	P-011
Probe/pitot ID	P-011
Nozzle ID	—
Imp. outlet TC ID	SEN-GN
Filter TC ID	—
Micromanometer ID	SR-3
Sensitivity, in. H_2O	0.001

Calibration

Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)

Std. TC ID	ST1 see Run 12
Std. TC temp., °F	" "
Continuity Check	☐

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.003 @ 12	0 @ 10
Pitot (+): in. H_2O @ in. H_2O	0 @ 6.2	0.0 @ 6.3
Pitot (-): in. H_2O @ in. H_2O	0 @ 5.1	0.0 @ 7.4
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	1
No. of ports	1
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

K Factor: ΔH = — x ΔP or dwell time = — x √ΔP

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.38
Ambient temp., °F	50
Static (P_g), in. H_2O	-0.405
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Impingers

Impingers	Initial, g	Final, g	Difference
0.1N H2SO4	746.9	883.4	
0.1N H_2SO_4	765.0	767.8	
MT	613.8	613.9	
SG	1034.6	1038.7	
Tared Line Rinse	100.0	100.0	
Total impinger weight gain, g			

Filter ID —

Traverse pt number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp, °F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in. Hg
—	0	1441	238.762	—	1.9	—							
—	10	1451	246.07	—	1.9	—			43	67	64		3
—	20	1501	253.34	—	1.9	—			44	67	63		3
—	30	1511	260.672	—	1.9	—			43	71	64		3
—					—	—			—	—	—		—
4				1.248		196							
3				1.513		197							
2				1.573		197							
1				1.619		198							
4				0.998		196							
3				1.367		197							
2				1.329		197							
1				1.042		197							
4				1.355		194							
3				1.395		194							
2				1.202		194							
1				1.168		193							
4				1.384		195							
3				1.238		196							
2				1.215		195							
1				1.189		194							

CHECK WEIGHT 500.0/500.0

ALT-011						

Comments: Flow traverse start 1444 end 1450

MAQS SampleTrainDataSheet R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC
Source / Location: CT-2 Outlet
Run no.: 8-NH3-GHV2 Date: 3/14/19 Operator / Assistant: NW/AK/TR
Page: 1 of 1
Method: ST4B/2
Project No. 021AS-555757

Equipment Identification

Meter console ID	MB34
Stack TC ID	P-011
Probe/pitot ID	P-011
Nozzle ID	—
Imp. outlet TC ID	SEA-CN
Filter TC ID	—
Micromanometer ID	SR#3
Sensitivity, in. H_2O	0.0001

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	1
No. of ports	1
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

K Factor: ΔH = — x ΔP or dwell time = — x √ΔP

Calibration

Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)

Std. TC ID	See run 12
Std. TC temp., °F	" "
Continuity Check	☐

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.38
Ambient temp., °F	49
Static (P_g), in. H_2O	-0.405
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0 @ 10	0 @ 10
Pitot (+): in. H_2O @ in. H_2O	0 @ 6.8	0 @ 5.2
Pitot (-): in. H_2O @ in. H_2O	0 @ 7.4	0 @ 5.7
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H_2SO_4	627.4	764.7	
0.1N H_2SO_4	676.8	679.0	
MT	657.7	658.0	
SG	988.1	991.6	
Tared Line Rinse	100.0	100.0	
Total impinger weight gain, g			

Filter ID: —

Traverse pt number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in H_2O	ΔH in H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp, °F inlet	Meter temp, °F outlet		Vaccum in. Hg
—	0	1515	261.315	—	1.9	—			43	67	63		3
—	10	1525	268.46	—	1.9	—			44	74	67		3
—	20	1535	275.68	—	1.9	—			43	73	65		3
—	30	1545	282.647	—	1.9	—			44	73	65		3
					Stack temp °F								
4				1.410	194								
3				1.373	195								
2				1.306	195								
1				1.110	193								
4				1.282	193								
3				1.270	194								
2				1.228	194								
1				1.072	193								
4				0.998	197								
3				1.232	198								
2				1.304	198								
1				1.099	197								
4				1.493	196								
3				1.560	197								
2				1.605	198								
1				1.325	197								

CHECK WEIGHT 500.0/500.0

ALT-011

Comments: start 1518
end 1525 Flow traverse

MAQS SampleTrainDataSheet

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: GHEC
Source / Location: CT2 outlet
Run no. 9-NH3-GH02 Date 3/14/19 Operator / Assistant NW/AK / JR
Page 1 of 1
Method ST1B/2
Project No. 021AS-555757

Equipment Identification

Meter console ID	MB34
Stack TC ID	P011
Probe/pitot ID	P011
Nozzle ID	—
Imp. outlet TC ID	SBAG-N
Filter TC ID	—
Micromanometer ID	SR #3
Sensitivity, in. H_2O	0.0001

Test / Sampling Parameters

Run duration, min.	30
No. of traverse pts.	1
No. of ports	1
Points per port	1
Time per point, min.	30
Probe/filter range, °F	—
Imp. outlet max., °F	45

K Factor: ΔH = — x ΔP or dwell time = — x √ΔP

Calibration

Meter Yd	0.9904
Meter ΔH@0.75cfm	1.9853
Pitot tube Cp	0.84
Nozzle diameter, in.	—

ALT-011 TC Check (see bottom of page)

Std. TC ID	ST1 NW
Std. TC temp., °F	47.3 See Font
Continuity Check	⊞

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.38
Ambient temp., °F	48
Static (P_g), in. H_2O	-0.405
O_2 conc., % dry vol.	—
CO_2 conc., % dry vol.	—
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0 @ 10	0 @ 12
Pitot (+): in H_2O @ in H_2O	0 @ 6.5	0 @ 5.5
Pitot (-): in. H_2O @ in H_2O	0 @ 4.3	0 @ 3.8
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N H2SO4	751.9	831.4	
0.1N H2SO4	763.5	767.2	
MT	613.6	614.6	
SG	1038.7	1043.4	
Tared Line Rinse	100.0	~100.0	

Total impinger weight gain, g

Filter ID —

Traverse pt. number	Sample or dwell time (Δt), min	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
—	0	1605	283.178	—	1.9	—			43	67	64		3
—	10	1615	290.62	—	1.9	—			44	70	64		3
—	20	1625	298.00	—	1.9	—			43	71	63		3
—	30	1635	305.422	—	—	—			—	—			—
—													
					Stack								
					Temp °F								
4				1.385	198								
3				1.675	198								
2				1.609	199								
1				1.497	198								
4				1.12	197								
3				1.224	198								
2				1.331	199								
1				1.172	197								
4				1.436	194								
3				1.281	194								
2				1.183	194								
1				1.003	193								
4				1.316	194								
3				1.466	195								
2				1.312	195								
1				1.102	194								

CHECK WEIGHTS 200g 500g

ALT-011 46.4/47 | 46/46.8 | 53.7/54 | 50.1/51

Comments: Start 1607 End 1633 Flow traverse

MAQS SampleTrainDataSheet R1

Appendix B.4
Reference Method Data

REFERENCE METHOD DATA LOGGER

Date	Time	O_2 %	CO_2 %	NO_x PPM	CO PPM	
3/13/19	6:23 AM	1.846	0.106	-0.092	-0.180	ZERO NOX MODE
3/13/19	6:24 AM	-0.001	0.081	-0.093	-0.265	
3/13/19	6:25 AM	0.097	0.593	-0.093	-0.113	ZERO NO MODE
3/13/19	6:26 AM	0.004	4.996	28.042	10.466	
3/13/19	6:27 AM	-0.001	5.034	48.892	10.749	
3/13/19	6:28 AM	-0.001	5.056	50.189	10.749	
3/13/19	6:29 AM	-0.001	5.072	51.004	10.749	
3/13/19	6:30 AM	-0.001	5.085	51.063	10.749	SPAN NOX MODE
3/13/19	6:31 AM	-0.001	5.093	51.211	10.749	
3/13/19	6:32 AM	-0.001	5.093	51.226	10.749	SPAN NO MODE
3/13/19	6:33 AM	0.063	1.601	37.265	8.851	
3/13/19	6:34 AM	0.087	0.143	1.820	-0.253	
3/13/19	6:35 AM	0.086	0.117	2.331	-0.287	
3/13/19	6:36 AM	0.085	0.100	36.253	-0.285	
3/13/19	6:37 AM	0.084	0.086	1.270	-0.282	
3/13/19	6:38 AM	0.084	0.077	1.179	-0.296	NO2 GAS NO MODE
3/13/19	6:39 AM	0.08	0.07	20.20	-0.29	
3/13/19	6:40 AM	0.08	0.07	49.21	-0.28	
3/13/19	6:41 AM	0.08	0.07	49.33	-0.30	NO2 GAS NOX MODE
3/13/19	6:42 AM	13.88	0.13	52.60	-0.15	
3/13/19	6:43 AM	19.49	0.16	13.40	-0.02	
3/13/19	6:44 AM	20.99	0.16	3.20	-0.09	
3/13/19	6:45 AM	8.38	0.13	2.30	0.06	
3/13/19	6:46 AM	0.06	0.10	1.57	-0.20	
3/13/19	6:47 AM	12.52	0.14	1.22	-0.18	
3/13/19	6:48 AM	20.98	0.16	1.03	-0.08	
3/13/19	6:49 AM	20.99	0.16	0.82	-0.07	
3/13/19	6:50 AM	NaN	NaN	NaN	NaN	CHANGE RANGE
3/13/19	6:51 AM	20.99	0.16	0.06	-0.07	
3/13/19	6:52 AM	17.38	0.15	0.07	-0.07	
3/13/19	6:53 AM	0.00	0.07	0.02	-0.13	
3/13/19	6:54 AM	0.00	0.06	-0.01	-0.01	ZERO
3/13/19	6:55 AM	0.00	0.06	-0.01	0.00	
3/13/19	6:56 AM	0.00	0.06	-0.02	-0.01	
3/13/19	6:57 AM	0.00	0.06	-0.02	-0.02	
3/13/19	6:58 AM	0.14	4.14	3.37	4.77	
3/13/19	6:59 AM	0.00	4.97	9.34	8.99	
3/13/19	7:00 AM	0.00	4.99	9.11	8.99	
3/13/19	7:01 AM	0.00	5.01	9.04	9.01	
3/13/19	7:02 AM	0.00	5.02	9.01	9.00	
3/13/19	7:03 AM	0.00	5.03	9.03	8.98	
3/13/19	7:04 AM	0.03	4.96	9.26	7.49	
3/13/19	7:05 AM	0.00	5.04	6.12	6.33	
3/13/19	7:06 AM	0.00	5.06	8.98	8.87	
3/13/19	7:07 AM	0.00	5.07	9.02	8.85	
3/13/19	7:08 AM	0.00	5.08	9.04	8.84	
3/13/19	7:09 AM	0.00	5.09	8.98	8.86	SPAN
3/13/19	7:10 AM	0.00	5.05	7.58	6.30	
3/13/19	7:11 AM	0.00	5.05	4.92	4.65	
3/13/19	7:12 AM	0.00	5.05	4.85	4.63	
3/13/19	7:13 AM	7.20	6.56	4.82	3.95	
3/13/19	7:14 AM	20.12	9.43	1.45	0.17	
3/13/19	7:15 AM	20.12	9.39	-0.03	-0.38	SPAN
3/13/19	7:16 AM	19.08	9.16	-0.03	-0.37	
3/13/19	7:17 AM	0.00	5.08	3.12	3.32	

3/13/19	7:18 AM	0.00	5.06	4.81	4.64	
3/13/19	7:19 AM	0.00	5.04	4.84	4.64	
3/13/19	7:20 AM	0.00	5.03	4.83	4.64	MID
3/13/19	7:21 AM	7.04	9.04	3.65	2.74	
3/13/19	7:22 AM	9.97	10.75	0.03	-0.45	MID
3/13/19	7:23 AM	18.34	3.28	0.01	0.16	
3/13/19	7:24 AM	20.85	0.71	0.04	0.37	
3/13/19	7:25 AM	13.08	2.00	0.19	0.96	
3/13/19	7:26 AM	2.43	4.62	3.13	3.57	
3/13/19	7:27 AM	0.03	5.13	4.68	4.71	
3/13/19	7:28 AM	0.03	5.10	4.73	4.73	
3/13/19	7:29 AM	0.02	5.08	4.76	4.73	CO2/NOX/BIAS
3/13/19	7:30 AM	0.02	5.06	4.76	4.73	
3/13/19	7:34 AM	6.52	7.30	0.02	-0.37	
3/13/19	7:35 AM	0.05	0.41	0.00	-0.06	
3/13/19	7:36 AM	0.04	0.32	-0.01	0.06	
3/13/19	7:37 AM	0.03	0.27	-0.02	0.06	ZEOR BIAS
3/13/19	7:40 AM	NaN	NaN	NaN	NaN	
3/13/19	7:40 AM	NaN	NaN	NaN	NaN	
3/13/19	7:41 AM	9.97	10.75	0.00	-0.38	
3/13/19	7:42 AM	NaN	NaN	NaN	NaN	
3/13/19	7:43 AM	12.17	5.44	2.33	0.00	
3/13/19	7:44 AM	12.18	5.34	2.58	0.03	STRAT CHECK
3/13/19	7:45 AM	12.20	5.27	2.57	0.03	PORT-1
3/13/19	7:46 AM	12.20	5.22	2.57	0.03	Point -3
3/13/19	7:47 AM	12.20	5.19	2.56	0.03	Point -3
3/13/19	7:48 AM	12.20	5.17	2.47	0.02	Point -3
3/13/19	7:49 AM	12.20	5.15	2.27	0.02	Point -2
3/13/19	7:50 AM	12.18	5.15	2.20	0.03	Point -2
3/13/19	7:51 AM	12.19	5.14	2.27	0.03	Point -2
3/13/19	7:52 AM	12.17	5.14	2.30	0.03	Point -1
3/13/19	7:53 AM	12.18	5.13	2.29	0.05	Point -1
3/13/19	7:54 AM	12.20	5.12	2.29	0.03	Point -1
3/13/19	7:55 AM	15.17	3.51	2.31	0.05	PC
3/13/19	7:56 AM	16.18	2.93	0.69	0.13	PC
3/13/19	7:57 AM	12.29	5.03	2.17	0.02	PORT-2
3/13/19	7:58 AM	12.30	5.03	2.28	0.04	Point -3
3/13/19	7:59 AM	12.30	5.04	2.28	0.03	Point -3
3/13/19	8:00 AM	12.30	5.04	2.31	0.03	Point -3
3/13/19	8:01 AM	12.24	5.07	2.43	0.04	Point -2
3/13/19	8:02 AM	12.24	5.07	2.49	0.04	Point -2
3/13/19	8:03 AM	12.22	5.09	2.47	0.03	Point -2
3/13/19	8:04 AM	12.24	5.08	2.54	0.03	Point -1
3/13/19	8:05 AM	12.22	5.09	2.50	0.04	Point -1
3/13/19	8:06 AM	12.21	5.09	2.51	0.04	Point -1
3/13/19	8:07 AM	16.04	3.03	2.34	0.04	PC
3/13/19	8:08 AM	14.77	3.69	0.69	0.12	PC
3/13/19	8:09 AM	12.28	5.04	2.48	0.01	PORT-3
3/13/19	8:10 AM	12.27	5.05	2.46	0.04	Point -3
3/13/19	8:11 AM	12.27	5.05	2.49	0.02	Point -3
3/13/19	8:12 AM	12.27	5.05	2.49	0.03	Point -3
3/13/19	8:13 AM	12.32	5.03	2.44	0.04	Point -2
3/13/19	8:14 AM	12.32	5.03	2.31	0.04	Point -2
3/13/19	8:15 AM	12.33	5.03	2.32	0.05	Point -2
3/13/19	8:16 AM	12.34	5.02	2.34	0.06	Point -1
3/13/19	8:17 AM	12.35	5.01	2.32	0.05	Point -1
3/13/19	8:18 AM	12.34	5.02	2.33	0.05	Point -1
3/13/19	8:19 AM	17.48	2.24	2.05	0.08	PC
3/13/19	8:20 AM	20.93	0.31	0.05	0.20	PC
3/13/19	8:21 AM	17.98	1.90	-0.01	0.18	PC
3/13/19	8:22 AM	12.19	5.05	2.12	0.03	PORT-4
3/13/19	8:23 AM	12.18	5.07	2.74	0.03	Point -3
3/13/19	8:24 AM	12.18	5.09	2.84	0.03	Point -3

3/13/19	8:25 AM	12.19	5.09	2.80	0.01	Point -3
3/13/19	8:26 AM	12.20	5.09	2.65	0.03	Point -2
3/13/19	8:27 AM	12.20	5.10	2.58	0.02	Point -2
3/13/19	8:28 AM	12.20	5.10	2.58	0.04	Point -2
3/13/19	8:29 AM	12.22	5.09	2.58	0.03	Point -1
3/13/19	8:30 AM	12.22	5.09	2.54	0.05	Point -1
3/13/19	8:31 AM	12.22	5.09	2.54	0.05	Point -1
3/13/19	8:32 AM	12.21	5.10	2.57	0.04	
3/13/19	8:33 AM	12.21	5.10	2.67	0.02	
3/13/19	8:34 AM	12.21	5.10	2.75	0.00	
3/13/19	8:35 AM	12.20	5.11	2.62	0.01	
3/13/19	8:36 AM	12.21	5.10	2.54	0.02	
3/13/19	8:37 AM	7.03	5.55	2.64	0.69	
3/13/19	8:38 AM	0.03	5.09	4.34	4.58	
3/13/19	8:39 AM	0.03	5.09	4.69	4.72	
3/13/19	8:40 AM	0.03	5.09	4.68	4.71	
3/13/19	8:41 AM	0.02	5.09	4.69	4.71	
3/13/19	8:42 AM	0.02	5.08	4.70	4.71	
3/13/19	8:43 AM	0.02	5.08	4.69	4.72	CO2/NOX/BIAS
3/13/19	8:44 AM	7.45	9.27	3.84	2.69	
3/13/19	8:45 AM	10.26	10.75	0.34	-0.31	
3/13/19	8:46 AM	10.25	10.75	0.29	-0.35	
3/13/19	8:47 AM	10.25	10.75	0.27	-0.35	
3/13/19	8:48 AM	10.23	10.75	0.26	-0.35	
3/13/19	8:49 AM	9.98	10.75	0.10	-0.36	
3/13/19	8:50 AM	9.98	10.75	-0.01	-0.38	
3/13/19	8:51 AM	9.98	10.75	-0.01	-0.37	O2 BIAS
3/13/19	8:52 AM	9.02	9.92	-0.01	-0.37	
3/13/19	8:53 AM	0.06	0.75	-0.03	-0.18	
3/13/19	8:54 AM	0.06	0.57	-0.04	0.04	
3/13/19	8:55 AM	0.08	0.46	-0.04	0.05	
3/13/19	8:56 AM	0.06	0.37	-0.04	0.09	
3/13/19	8:57 AM	0.06	0.33	-0.04	0.08	
3/13/19	8:58 AM	0.06	0.28	-0.04	0.09	ZERO/BIAS
3/13/19	8:59 AM	0.07	0.49	-0.04	0.25	
3/13/19	9:00 AM	0.06	0.24	1.32	0.79	
3/13/19	9:01 AM	1.38	0.70	-0.03	0.08	
3/13/19	9:02 AM	2.58	1.10	0.64	0.02	
3/13/19	9:03 AM	0.00	0.12	-0.06	-0.01	
3/13/19	9:04 AM	0.00	0.11	-0.06	-0.02	
3/13/19	9:05 AM	0.00	0.10	-0.06	-0.03	
3/13/19	9:06 AM	0.00	0.00	-0.06	-0.03	ZERO
3/13/19	9:07 AM	15.34	8.45	-0.05	-0.20	
3/13/19	9:08 AM	20.13	9.28	-0.06	-0.35	
3/13/19	9:09 AM	20.13	9.40	-0.06	-0.36	SPAN
3/13/19	9:10 AM	5.93	6.62	0.66	1.38	
3/13/19	9:11 AM	0.00	5.04	4.67	4.49	MID
3/13/19	9:12 AM	8.18	4.95	4.44	3.25	
3/13/19	9:13 AM	12.37	4.78	2.27	0.59	
3/13/19	9:14 AM	0.11	0.10	1.37	0.16	
3/13/19	9:15 AM	0.00	0.05	-0.05	-0.04	
3/13/19	9:16 AM	0.00	0.03	-0.06	-0.05	
3/13/19	9:17 AM	4.32	4.65	-0.06	-0.09	
3/13/19	9:18 AM	10.02	10.75	-0.03	-0.42	
3/13/19	9:19 AM	3.41	3.86	0.22	0.13	
3/13/19	9:20 AM	0.05	4.90	2.31	3.27	
3/13/19	9:21 AM	0.04	5.04	4.63	4.64	CO2/NOX/BIAS
3/13/19	9:22 AM	0.04	3.97	4.66	4.49	
3/13/19	9:23 AM	0.05	0.17	0.96	0.54	
3/13/19	9:24 AM	0.05	0.12	0.00	0.05	ZERO BIAS
3/13/19	9:25 AM	0.13	0.20	-0.02	0.05	
3/13/19	9:26 AM	9.84	10.72	-0.02	-0.17	
3/13/19	9:27 AM	10.00	10.75	-0.01	-0.37	O2 BIAS

3/13/19	9:28 AM	11.83	6.50	0.71	-0.20	
3/13/19	9:29 AM	12.34	5.04	2.17	0.04	RUN 1
3/13/19	9:30 AM	12.34	5.02	2.15	0.05	Point -3
3/13/19	9:31 AM	12.34	5.00	2.19	0.04	Point -3
3/13/19	9:32 AM	12.33	4.99	2.21	0.04	Point -3
3/13/19	9:33 AM	12.32	4.99	2.22	0.05	Point -3
3/13/19	9:34 AM	12.33	4.98	2.22	0.04	Point -3
3/13/19	9:35 AM	12.34	4.97	2.21	0.05	Point -3
3/13/19	9:36 AM	12.34	4.97	2.21	0.05	Point -3
3/13/19	9:37 AM	12.36	4.96	2.23	0.04	Point -2
3/13/19	9:38 AM	12.37	4.94	2.20	0.04	Point -2
3/13/19	9:39 AM	12.37	4.94	2.20	0.04	Point -2
3/13/19	9:40 AM	12.37	4.95	2.19	0.04	Point -2
3/13/19	9:41 AM	12.37	4.95	2.17	0.05	Point -2
3/13/19	9:42 AM	12.36	4.95	2.26	0.04	Point -2
3/13/19	9:43 AM	12.37	4.95	2.31	0.05	Point -2
3/13/19	9:44 AM	12.35	4.95	2.29	0.04	Point -1
3/13/19	9:45 AM	12.36	4.95	2.27	0.06	Point -1
3/13/19	9:46 AM	12.35	4.95	2.27	0.04	Point -1
3/13/19	9:47 AM	12.35	4.95	2.31	0.03	Point -1
3/13/19	9:48 AM	12.35	4.95	2.32	0.05	Point -1
3/13/19	9:49 AM	12.36	4.95	2.31	0.05	Point -1
3/13/19	9:50 AM	12.35	4.95	2.31	0.04	Point -1
3/13/19	9:51 AM	10.83	5.60	2.31	0.07	
3/13/19	9:52 AM	0.06	5.03	3.34	3.76	
3/13/19	9:53 AM	0.04	5.02	4.65	4.69	
3/13/19	9:54 AM	0.04	5.01	4.68	4.69	CO2/NOX/CO BIAS
3/13/19	9:55 AM	4.30	7.58	4.62	3.95	
3/13/19	9:56 AM	10.00	10.75	0.63	-0.15	O2/BIAS
3/13/19	9:57 AM	10.01	10.75	0.02	-0.40	
3/13/19	9:58 AM	10.01	10.75	0.04	-0.38	
3/13/19	9:59 AM	2.18	2.79	-0.01	-0.32	
3/13/19	10:00 AM	0.06	0.28	-0.03	0.02	
3/13/19	10:01 AM	0.05	0.21	-0.04	0.04	ZERO BIAS
3/13/19	10:02 AM	6.72	2.77	0.32	0.01	
3/13/19	10:03 AM	12.31	5.00	2.13	0.03	
3/13/19	10:04 AM	12.34	5.00	2.14	0.01	
3/13/19	10:05 AM	12.32	5.01	2.12	0.01	
3/13/19	10:06 AM	12.31	5.02	2.26	0.03	
3/13/19	10:07 AM	12.33	5.01	2.27	0.03	
3/13/19	10:08 AM	12.35	5.00	2.18	0.02	
3/13/19	10:09 AM	12.32	5.02	2.17	0.02	
3/13/19	10:10 AM	12.34	5.01	2.22	0.01	
3/13/19	10:11 AM	12.33	5.02	2.26	0.01	
3/13/19	10:12 AM	12.33	5.02	2.27	0.03	
3/13/19	10:13 AM	12.33	5.02	2.28	0.01	
3/13/19	10:14 AM	12.34	5.02	2.32	0.02	
3/13/19	10:15 AM	12.33	5.02	2.29	0.02	
3/13/19	10:16 AM	12.32	5.02	2.30	0.02	
3/13/19	10:17 AM	12.33	5.01	2.28	0.01	
3/13/19	10:18 AM	12.34	5.01	2.28	0.01	
3/13/19	10:19 AM	12.34	5.01	2.27	0.02	
3/13/19	10:20 AM	12.35	5.00	2.26	0.02	
3/13/19	10:21 AM	12.35	5.00	2.24	0.01	
3/13/19	10:22 AM	12.35	5.00	2.28	0.01	
3/13/19	10:23 AM	12.35	4.99	2.30	0.02	
3/13/19	10:24 AM	12.35	4.99	2.24	0.02	RUN 2
3/13/19	10:25 AM	12.34	5.00	2.26	0.00	Point -3
3/13/19	10:26 AM	12.34	5.00	2.29	0.01	Point -3
3/13/19	10:27 AM	12.34	5.00	2.33	0.01	Point -3
3/13/19	10:28 AM	12.33	5.00	2.34	0.00	Point -3
3/13/19	10:29 AM	12.31	5.01	2.34	0.01	Point -3
3/13/19	10:30 AM	12.31	5.01	2.40	0.01	Point -3

3/13/19	10:31 AM	12.32	5.01	2.46	0.01	Point -3
3/13/19	10:32 AM	12.34	5.00	2.28	0.02	Point -2
3/13/19	10:33 AM	12.32	5.01	2.16	0.01	Point -2
3/13/19	10:34 AM	12.31	5.01	2.20	0.03	Point -2
3/13/19	10:35 AM	12.32	5.00	2.18	0.01	Point -2
3/13/19	10:36 AM	12.32	5.00	2.22	0.02	Point -2
3/13/19	10:37 AM	12.32	5.01	2.23	0.01	Point -2
3/13/19	10:38 AM	12.32	5.00	2.19	0.01	Point -2
3/13/19	10:39 AM	12.32	5.00	2.19	0.00	Point -1
3/13/19	10:40 AM	12.32	5.00	2.22	0.01	Point -1
3/13/19	10:41 AM	12.29	5.02	2.31	0.02	Point -1
3/13/19	10:42 AM	12.29	5.02	2.40	0.01	Point -1
3/13/19	10:43 AM	12.29	5.02	2.41	0.02	Point -1
3/13/19	10:44 AM	12.29	5.02	2.40	0.02	Point -1
3/13/19	10:45 AM	12.29	5.01	2.40	0.00	Point -1
3/13/19	10:46 AM	12.31	5.00	2.37	0.03	
3/13/19	10:47 AM	12.31	5.00	2.31	0.03	
3/13/19	10:48 AM	12.32	4.99	2.27	0.02	
3/13/19	10:49 AM	12.29	5.01	2.34	0.00	
3/13/19	10:50 AM	12.28	5.01	2.50	0.02	
3/13/19	10:51 AM	11.84	4.91	2.49	0.01	
3/13/19	10:52 AM	0.12	4.89	3.62	3.15	
3/13/19	10:53 AM	0.04	5.00	4.62	4.68	
3/13/19	10:54 AM	0.04	5.00	4.65	4.69	CO2/NOX/CO BIAS
3/13/19	10:55 AM	8.92	10.23	2.62	1.83	
3/13/19	10:56 AM	10.00	10.75	0.02	-0.40	
3/13/19	10:57 AM	10.00	10.75	0.00	-0.39	O2/BIAS
3/13/19	10:58 AM	3.28	3.93	-0.01	-0.34	
3/13/19	10:59 AM	0.06	0.27	-0.03	0.00	
3/13/19	11:00 AM	0.05	0.20	-0.04	0.02	ZERO BIAS
3/13/19	11:01 AM	0.05	0.15	-0.04	0.03	
3/13/19	11:02 AM	7.55	3.10	0.45	0.03	
3/13/19	11:03 AM	12.24	5.01	2.22	0.02	
3/13/19	11:04 AM	12.25	5.02	2.27	0.02	
3/13/19	11:05 AM	12.26	5.02	2.24	0.04	
3/13/19	11:06 AM	12.28	5.01	2.21	0.03	
3/13/19	11:07 AM	12.27	5.02	2.24	0.02	
3/13/19	11:08 AM	12.28	5.01	2.26	0.02	
3/13/19	11:09 AM	12.28	5.02	2.23	0.02	
3/13/19	11:10 AM	12.27	5.02	2.24	0.03	
3/13/19	11:11 AM	12.28	5.02	2.33	0.02	
3/13/19	11:12 AM	12.27	5.02	2.31	0.03	
3/13/19	11:13 AM	12.26	5.02	2.31	0.02	
3/13/19	11:14 AM	12.26	5.02	2.28	0.03	
3/13/19	11:15 AM	12.26	5.02	2.22	0.02	
3/13/19	11:16 AM	12.29	5.01	2.14	0.02	
3/13/19	11:17 AM	12.30	5.01	2.11	0.02	
3/13/19	11:18 AM	12.27	5.02	2.13	0.02	
3/13/19	11:19 AM	12.25	5.02	2.23	0.03	
3/13/19	11:20 AM	12.25	5.02	2.31	0.04	
3/13/19	11:21 AM	12.25	5.02	2.32	0.03	
3/13/19	11:22 AM	12.25	5.01	2.30	0.03	
3/13/19	11:23 AM	12.26	5.00	2.26	0.03	
3/13/19	11:24 AM	12.25	5.00	2.31	0.03	
3/13/19	11:25 AM	12.27	4.99	2.36	0.04	
3/13/19	11:26 AM	12.28	4.98	2.22	0.05	
3/13/19	11:27 AM	12.26	4.98	2.11	0.04	
3/13/19	11:28 AM	12.26	4.98	2.20	0.03	
3/13/19	11:29 AM	12.27	4.98	2.21	0.03	
3/13/19	11:30 AM	12.27	4.98	2.19	0.04	
3/13/19	11:31 AM	12.26	4.99	2.23	0.03	
3/13/19	11:32 AM	9.31	4.71	2.21	0.15	
3/13/19	11:33 AM	0.05	4.96	3.49	4.07	

3/13/19	11:34 AM	0.04	4.97	4.68	4.71	
3/13/19	11:35 AM	0.04	4.97	4.68	4.70	
3/13/19	11:36 AM	0.03	4.98	4.70	4.72	RUN 3
3/13/19	11:37 AM	0.03	4.98	4.73	4.73	Point -3
3/13/19	11:38 AM	0.03	4.98	4.72	4.73	Point -3
3/13/19	11:39 AM	0.03	4.98	4.74	4.73	Point -3
3/13/19	11:40 AM	0.03	4.98	4.77	4.75	Point -3
3/13/19	11:41 AM	0.03	4.98	4.90	4.73	Point -3
3/13/19	11:42 AM	0.03	4.98	4.77	4.72	Point -3
3/13/19	11:43 AM	0.03	4.99	4.74	4.73	Point -3
3/13/19	11:44 AM	0.03	4.99	4.74	4.73	Point -2
3/13/19	11:45 AM	0.03	4.99	4.72	4.74	Point -2
3/13/19	11:46 AM	0.03	4.98	4.73	4.73	Point -2
3/13/19	11:47 AM	0.03	4.99	4.75	4.73	Point -2
3/13/19	11:48 AM	0.03	4.99	4.75	4.72	Point -2
3/13/19	11:49 AM	0.03	4.99	4.74	4.71	Point -2
3/13/19	11:50 AM	0.03	4.99	4.74	4.70	Point -2
3/13/19	11:51 AM	0.03	4.99	4.75	4.72	Point -1
3/13/19	11:52 AM	0.03	4.99	4.76	4.72	Point -1
3/13/19	11:53 AM	0.03	4.98	4.74	4.71	Point -1
3/13/19	11:54 AM	0.03	4.99	4.73	4.73	Point -1
3/13/19	11:55 AM	0.03	4.99	4.75	4.71	Point -1
3/13/19	11:56 AM	0.03	4.99	4.74	4.72	Point -1
3/13/19	11:57 AM	0.03	4.99	4.75	4.72	Point -1
3/13/19	11:58 AM	0.03	4.99	4.74	4.73	
3/13/19	11:59 AM	0.03	4.99	4.73	4.73	
3/13/19	12:00 PM	0.03	4.99	4.74	4.72	
3/13/19	12:01 PM	0.03	4.99	4.74	4.72	
3/13/19	12:02 PM	0.03	4.99	4.72	4.72	
3/13/19	12:03 PM	0.03	5.00	4.74	4.71	
3/13/19	12:04 PM	0.03	5.00	4.73	4.72	
3/13/19	12:05 PM	0.03	5.00	4.73	4.72	
3/13/19	12:06 PM	0.03	5.00	4.75	4.73	
3/13/19	12:07 PM	0.03	5.00	4.74	4.71	
3/13/19	11:58 AM	0.03	4.99	4.74	4.73	
3/13/19	11:59 AM	0.03	4.99	4.73	4.73	
3/13/19	12:00 PM	0.03	4.99	4.74	4.72	
3/13/19	12:01 PM	0.03	4.99	4.74	4.72	
3/13/19	12:02 PM	0.03	4.99	4.72	4.72	
3/13/19	12:03 PM	0.03	5.00	4.74	4.71	
3/13/19	12:04 PM	0.03	5.00	4.73	4.72	
3/13/19	12:05 PM	0.03	5.00	4.73	4.72	
3/13/19	12:06 PM	0.03	5.00	4.75	4.73	
3/13/19	12:07 PM	0.03	5.00	4.74	4.71	
3/13/19	12:08 PM	0.03	5.00	4.75	4.72	
3/13/19	12:09 PM	0.41	5.00	4.75	4.72	CO2/NOX/CO BIAS
3/13/19	12:10 PM	12.15	5.01	3.43	1.34	
3/13/19	12:11 PM	9.56	10.02	1.84	0.21	
3/13/19	12:12 PM	9.99	10.75	0.03	-0.38	O2/BIAS
3/13/19	12:13 PM	10.28	10.21	0.00	-0.37	
3/13/19	12:14 PM	12.24	5.20	1.39	-0.08	
3/13/19	12:15 PM	12.24	5.12	2.21	0.04	
3/13/19	12:16 PM	1.32	1.40	1.12	-0.03	
3/13/19	12:17 PM	0.06	0.16	-0.03	0.06	
3/13/19	12:18 PM	0.05	0.12	-0.04	0.05	ZERO BIAS
3/13/19	12:19 PM	1.00	0.45	-0.05	0.06	
3/13/19	12:20 PM	12.20	4.95	1.36	0.04	
3/13/19	12:21 PM	12.23	4.99	2.25	0.04	
3/13/19	12:22 PM	12.25	4.98	2.21	0.04	
3/13/19	12:23 PM	12.27	4.98	2.14	0.05	
3/13/19	12:24 PM	12.24	5.00	2.12	0.05	
3/13/19	12:25 PM	12.24	5.00	2.28	0.05	
3/13/19	12:26 PM	12.24	5.00	2.30	0.05	

3/13/19	12:27 PM	12.24	5.00	2.25	0.06	
3/13/19	12:28 PM	12.23	5.01	2.30	0.04	
3/13/19	12:29 PM	12.23	5.01	2.39	0.05	
3/13/19	12:30 PM	12.23	5.01	2.39	0.04	
3/13/19	12:31 PM	12.23	5.00	2.33	0.05	
3/13/19	12:32 PM	12.24	5.00	2.24	0.04	
3/13/19	12:33 PM	12.23	5.00	2.22	0.04	
3/13/19	12:34 PM	12.23	5.01	2.28	0.05	
3/13/19	12:35 PM	12.23	5.01	2.27	0.05	
3/13/19	12:36 PM	12.23	5.01	2.23	0.05	
3/13/19	12:37 PM	12.24	5.00	2.26	0.05	
3/13/19	12:38 PM	12.24	5.00	2.25	0.04	
3/13/19	12:39 PM	12.24	5.00	2.22	0.04	
3/13/19	12:40 PM	12.25	5.00	2.24	0.04	RUN 4
3/13/19	12:41 PM	12.24	5.01	2.26	0.04	Point -3
3/13/19	12:42 PM	12.24	5.01	2.25	0.04	Point -3
3/13/19	12:43 PM	12.23	5.01	2.25	0.05	Point -3
3/13/19	12:44 PM	12.22	5.02	2.32	0.05	Point -3
3/13/19	12:45 PM	12.25	5.00	2.30	0.05	Point -3
3/13/19	12:46 PM	12.24	5.01	2.28	0.05	Point -3
3/13/19	12:47 PM	12.25	5.00	2.19	0.06	Point -3
3/13/19	12:48 PM	12.21	5.03	2.33	0.06	Point -2
3/13/19	12:49 PM	12.22	5.02	2.49	0.05	Point -2
3/13/19	12:50 PM	12.22	5.02	2.40	0.06	Point -2
3/13/19	12:51 PM	12.26	5.00	2.23	0.04	Point -2
3/13/19	12:52 PM	12.27	5.00	2.04	0.04	Point -2
3/13/19	12:53 PM	12.26	5.01	2.01	0.06	Point -2
3/13/19	12:54 PM	12.21	5.03	2.20	0.07	Point -2
3/13/19	12:55 PM	12.24	5.02	2.19	0.06	Point -1
3/13/19	12:56 PM	12.25	5.01	2.05	0.05	Point -1
3/13/19	12:57 PM	12.21	5.04	2.21	0.05	Point -1
3/13/19	12:58 PM	12.22	5.03	2.22	0.04	Point -1
3/13/19	12:59 PM	12.22	5.03	2.16	0.05	Point -1
3/13/19	1:00 PM	12.25	5.02	2.15	0.06	Point -1
3/13/19	1:01 PM	12.25	5.02	2.10	0.05	Point -1
3/13/19	1:02 PM	12.23	5.03	2.15	0.06	
3/13/19	1:03 PM	12.24	5.03	2.20	0.05	
3/13/19	1:04 PM	8.35	3.55	2.20	0.05	
3/13/19	1:05 PM	0.07	0.14	0.42	0.03	
3/13/19	1:06 PM	0.06	0.11	-0.03	0.05	ZERO BIAS
3/13/19	1:07 PM	0.05	0.10	-0.04	0.06	
3/13/19	1:08 PM	7.53	8.24	-0.04	-0.09	
3/13/19	1:09 PM	9.99	10.75	-0.02	-0.39	O2/BIAS
3/13/19	1:10 PM	9.78	10.51	-0.02	-0.38	
3/13/19	1:11 PM	0.08	5.20	2.93	3.26	
3/13/19	1:12 PM	0.04	5.10	4.63	4.70	
3/13/19	1:13 PM	0.04	5.07	4.69	4.69	CO2/NOX/CO BIAS
3/13/19	1:14 PM	7.95	5.06	4.24	3.01	
3/13/19	1:15 PM	12.25	5.05	2.15	0.05	
3/13/19	1:16 PM	12.26	5.03	2.09	0.04	
3/13/19	1:17 PM	12.27	5.03	2.09	0.04	RUN 5
3/13/19	1:18 PM	12.26	5.03	2.11	0.03	Point -3
3/13/19	1:19 PM	12.26	5.03	2.18	0.03	Point -3
3/13/19	1:20 PM	12.24	5.03	2.24	0.04	Point -3
3/13/19	1:21 PM	12.24	5.03	2.32	0.04	Point -3
3/13/19	1:22 PM	12.27	5.01	2.24	0.04	Point -3
3/13/19	1:23 PM	12.27	5.01	2.15	0.03	Point -3
3/13/19	1:24 PM	12.28	5.00	2.12	0.02	Point -3
3/13/19	1:25 PM	12.28	5.00	2.13	0.03	Point -2
3/13/19	1:26 PM	12.26	5.01	2.19	0.05	Point -2
3/13/19	1:27 PM	12.24	5.02	2.25	0.05	Point -2
3/13/19	1:28 PM	12.26	5.01	2.28	0.06	Point -2
3/13/19	1:29 PM	12.27	5.01	2.16	0.04	Point -2

3/13/19	1:30 PM	12.24	5.02	2.26	0.05	Point -2
3/13/19	1:31 PM	12.23	5.03	2.34	0.06	Point -2
3/13/19	1:32 PM	12.23	5.03	2.38	0.07	Point -1
3/13/19	1:33 PM	12.23	5.03	2.34	0.05	Point -1
3/13/19	1:34 PM	12.24	5.02	2.27	0.05	Point -1
3/13/19	1:35 PM	12.24	5.02	2.17	0.06	Point -1
3/13/19	1:36 PM	12.24	5.02	2.18	0.05	Point -1
3/13/19	1:37 PM	12.25	5.01	2.20	0.05	Point -1
3/13/19	1:38 PM	12.25	5.01	2.12	0.04	Point -1
3/13/19	1:39 PM	12.25	5.01	2.14	0.05	
3/13/19	1:40 PM	12.26	5.01	2.18	0.07	
3/13/19	1:41 PM	12.26	5.01	2.13	0.05	
3/13/19	1:42 PM	12.26	5.01	2.11	0.06	
3/13/19	1:43 PM	12.25	5.02	2.12	0.05	
3/13/19	1:44 PM	5.75	2.69	2.00	0.27	
3/13/19	1:45 PM	0.07	0.14	0.07	0.07	
3/13/19	1:46 PM	0.06	0.11	-0.03	0.05	
3/13/19	1:47 PM	0.06	0.10	-0.03	0.05	
3/13/19	1:48 PM	0.06	0.10	-0.03	0.07	ZERO BIAS
3/13/19	1:49 PM	2.72	3.09	-0.04	0.02	
3/13/19	1:50 PM	9.97	10.75	0.01	-0.26	
3/13/19	1:51 PM	10.03	10.75	0.07	-0.37	O2/BIAS
3/13/19	1:52 PM	0.88	5.74	1.96	2.62	
3/13/19	1:53 PM	0.05	5.09	4.46	4.72	
3/13/19	1:54 PM	0.05	5.06	4.52	4.72	CO2/NOX/CO BIAS
3/13/19	1:55 PM	0.04	5.05	4.51	4.69	
3/13/19	1:56 PM	8.72	5.06	3.92	2.76	
3/13/19	1:57 PM	12.21	5.06	2.13	0.07	
3/13/19	1:58 PM	12.20	5.07	2.17	0.09	RUN 6
3/13/19	1:59 PM	12.23	5.05	2.19	0.07	Point -3
3/13/19	2:00 PM	12.22	5.05	2.16	0.05	Point -3
3/13/19	2:01 PM	12.23	5.05	2.16	0.06	Point -3
3/13/19	2:02 PM	12.23	5.05	2.18	0.06	Point -3
3/13/19	2:03 PM	12.22	5.05	2.16	0.06	Point -3
3/13/19	2:04 PM	12.21	5.05	2.17	0.06	Point -3
3/13/19	2:05 PM	12.22	5.05	2.20	0.06	Point -3
3/13/19	2:06 PM	12.23	5.04	2.17	0.07	Point -2
3/13/19	2:07 PM	12.24	5.03	2.11	0.07	Point -2
3/13/19	2:08 PM	12.23	5.04	2.12	0.06	Point -2
3/13/19	2:09 PM	12.22	5.04	2.21	0.06	Point -2
3/13/19	2:10 PM	12.21	5.05	2.29	0.07	Point -2
3/13/19	2:11 PM	12.22	5.05	2.24	0.07	Point -2
3/13/19	2:12 PM	12.22	5.05	2.21	0.06	Point -2
3/13/19	2:13 PM	12.22	5.04	2.22	0.07	Point -1
3/13/19	2:14 PM	12.20	5.06	2.34	0.05	Point -1
3/13/19	2:15 PM	12.24	5.03	2.23	0.04	Point -1
3/13/19	2:16 PM	12.21	5.05	2.16	0.05	Point -1
3/13/19	2:17 PM	12.22	5.05	2.27	0.04	Point -1
3/13/19	2:18 PM	12.23	5.05	2.16	0.05	Point -1
3/13/19	2:19 PM	12.19	5.07	2.21	0.06	Point -1
3/13/19	2:20 PM	12.19	5.07	2.38	0.06	
3/13/19	2:21 PM	12.19	5.07	2.29	0.05	
3/13/19	2:22 PM	12.20	5.07	2.22	0.04	
3/13/19	2:23 PM	12.10	5.06	2.18	0.05	
3/13/19	2:24 PM	0.26	0.47	1.33	0.27	
3/13/19	2:25 PM	0.06	0.14	-0.01	0.03	ZERO BIAS
3/13/19	2:26 PM	0.06	0.12	-0.02	0.04	
3/13/19	2:27 PM	5.01	5.54	-0.01	-0.04	
3/13/19	2:28 PM	9.99	10.75	0.01	-0.37	
3/13/19	2:29 PM	9.99	10.75	0.00	-0.42	O2/BIAS
3/13/19	2:30 PM	4.64	7.91	0.52	0.74	
3/13/19	2:31 PM	0.05	5.15	4.33	4.54	
3/13/19	2:32 PM	0.04	5.10	4.52	4.67	CO2/NOX/CO BIAS

3/13/19	2:33 PM	4.87	5.09	4.32	3.98	
3/13/19	2:34 PM	12.19	5.10	2.42	0.27	
3/13/19	2:35 PM	12.20	5.09	2.27	0.01	
3/13/19	2:36 PM	12.17	5.10	2.25	0.02	
3/13/19	2:37 PM	12.18	5.10	2.28	0.03	RUN 7
3/13/19	2:38 PM	12.19	5.09	2.28	0.03	Point -3
3/13/19	2:39 PM	12.20	5.08	2.29	0.01	Point -3
3/13/19	2:40 PM	12.20	5.08	2.35	0.01	Point -3
3/13/19	2:41 PM	12.19	5.09	2.32	0.01	Point -3
3/13/19	2:42 PM	12.23	5.06	2.24	0.00	Point -3
3/13/19	2:43 PM	12.22	5.07	2.21	0.02	Point -3
3/13/19	2:44 PM	12.22	5.07	2.24	0.01	Point -3
3/13/19	2:45 PM	12.18	5.09	2.30	0.01	Point -2
3/13/19	2:46 PM	12.18	5.09	2.42	0.01	Point -2
3/13/19	2:47 PM	12.22	5.07	2.40	-0.02	Point -2
3/13/19	2:48 PM	12.23	5.07	2.15	0.02	Point -2
3/13/19	2:49 PM	12.22	5.08	2.07	0.01	Point -2
3/13/19	2:50 PM	12.20	5.09	2.16	0.01	Point -2
3/13/19	2:51 PM	12.20	5.09	2.21	0.03	Point -2
3/13/19	2:52 PM	12.20	5.09	2.20	0.01	Point -1
3/13/19	2:53 PM	12.17	5.11	2.21	-0.01	Point -1
3/13/19	2:54 PM	12.18	5.11	2.37	0.02	Point -1
3/13/19	2:55 PM	12.23	5.08	2.31	0.02	Point -1
3/13/19	2:56 PM	12.24	5.07	2.04	0.00	Point -1
3/13/19	2:57 PM	12.21	5.09	2.03	0.02	Point -1
3/13/19	2:58 PM	12.21	5.09	2.11	0.00	Point -1
3/13/19	2:59 PM	12.21	5.09	2.17	0.02	
3/13/19	3:00 PM	12.24	5.07	2.11	0.02	
3/13/19	3:01 PM	12.23	5.08	2.03	0.01	
3/13/19	3:02 PM	12.22	5.09	2.11	0.00	
3/13/19	3:03 PM	0.79	0.75	1.18	0.24	
3/13/19	3:04 PM	0.06	0.17	-0.03	-0.01	ZERO BIAS
3/13/19	3:05 PM	0.06	0.15	-0.01	0.00	
3/13/19	3:06 PM	0.06	0.14	-0.02	0.01	
3/13/19	3:07 PM	9.22	10.07	-0.01	-0.19	
3/13/19	3:08 PM	9.99	10.74	0.00	-0.42	O2/BIAS
3/13/19	3:09 PM	8.38	9.99	-0.01	-0.33	
3/13/19	3:10 PM	0.06	5.20	3.36	3.67	
3/13/19	3:11 PM	0.04	5.12	4.48	4.65	
3/13/19	3:12 PM	0.04	5.09	4.50	4.65	CO2/NOX/CO BIAS
3/13/19	3:13 PM	1.38	5.07	4.51	4.64	
3/13/19	3:14 PM	12.19	5.09	3.08	0.91	
3/13/19	3:15 PM	12.20	5.09	2.19	0.01	RUN 8
3/13/19	3:16 PM	12.21	5.08	2.15	0.00	Point -3
3/13/19	3:17 PM	12.21	5.08	2.24	0.00	Point -3
3/13/19	3:18 PM	12.21	5.08	2.25	0.00	Point -3
3/13/19	3:19 PM	12.21	5.07	2.22	0.00	Point -3
3/13/19	3:20 PM	12.21	5.07	2.22	0.01	Point -3
3/13/19	3:21 PM	12.21	5.07	2.23	0.00	Point -3
3/13/19	3:22 PM	12.21	5.07	2.26	0.01	Point -3
3/13/19	3:23 PM	12.22	5.06	2.29	0.01	Point -2
3/13/19	3:24 PM	12.22	5.06	2.23	0.00	Point -2
3/13/19	3:25 PM	12.23	5.06	2.16	0.01	Point -2
3/13/19	3:26 PM	12.22	5.06	2.23	0.00	Point -2
3/13/19	3:27 PM	12.19	5.07	2.30	0.01	Point -2
3/13/19	3:28 PM	12.21	5.07	2.36	0.00	Point -2
3/13/19	3:29 PM	12.21	5.06	2.32	0.00	Point -2
3/13/19	3:30 PM	12.22	5.06	2.19	0.01	Point -1
3/13/19	3:31 PM	12.22	5.06	2.09	-0.02	Point -1
3/13/19	3:32 PM	12.20	5.07	2.15	-0.01	Point -1
3/13/19	3:33 PM	12.18	5.08	2.24	0.01	Point -1
3/13/19	3:34 PM	12.19	5.08	2.32	0.00	Point -1
3/13/19	3:35 PM	12.21	5.06	2.16	0.00	Point -1

3/13/19	3:36 PM	12.22	5.05	2.10	0.01	Point -1
3/13/19	3:37 PM	12.22	5.06	2.09	-0.01	
3/13/19	3:38 PM	12.22	5.05	2.06	-0.01	
3/13/19	3:39 PM	12.22	5.05	2.06	-0.01	
3/13/19	3:40 PM	12.22	5.05	2.12	0.00	
3/13/19	3:41 PM	11.08	4.84	2.12	0.01	
3/13/19	3:42 PM	0.08	0.18	1.18	0.21	
3/13/19	3:43 PM	0.06	0.13	-0.04	0.01	ZERO BIAS
3/13/19	3:44 PM	0.90	1.15	-0.05	0.01	
3/13/19	3:45 PM	9.98	10.75	-0.04	-0.25	
3/13/19	3:46 PM	9.99	10.75	-0.03	-0.43	
3/13/19	3:47 PM	5.98	8.65	0.00	0.18	
3/13/19	3:48 PM	0.05	5.14	3.80	4.33	
3/13/19	3:49 PM	0.04	5.09	4.50	4.62	
3/13/19	3:50 PM	0.04	5.07	4.53	4.63	
3/13/19	3:51 PM	9.32	5.08	4.00	2.47	
3/13/19	3:52 PM	12.20	5.08	2.16	0.00	
3/13/19	3:53 PM	12.21	5.08	2.12	0.02	RUN 9
3/13/19	3:54 PM	12.21	5.07	2.15	-0.01	Point -3
3/13/19	3:55 PM	12.21	5.07	2.16	0.00	Point -3
3/13/19	3:56 PM	12.21	5.07	2.17	-0.01	Point -3
3/13/19	3:57 PM	12.21	5.06	2.18	0.00	Point -3
3/13/19	3:58 PM	12.21	5.07	2.19	0.00	Point -3
3/13/19	3:59 PM	12.21	5.06	2.22	-0.01	Point -3
3/13/19	4:00 PM	12.21	5.07	2.25	0.01	Point -3
3/13/19	4:01 PM	12.21	5.06	2.23	-0.01	Point -2
3/13/19	4:02 PM	12.24	5.05	2.17	0.00	Point -2
3/13/19	4:03 PM	12.23	5.06	2.12	-0.02	Point -2
3/13/19	4:04 PM	12.22	5.06	2.20	0.00	Point -2
3/13/19	4:05 PM	12.22	5.06	2.23	0.01	Point -2
3/13/19	4:06 PM	12.22	5.06	2.21	0.01	Point -2
3/13/19	4:07 PM	12.20	5.07	2.31	-0.03	Point -2
3/13/19	4:08 PM	12.22	5.06	2.35	-0.02	Point -1
3/13/19	4:09 PM	12.22	5.06	2.20	-0.01	Point -1
3/13/19	4:10 PM	12.23	5.06	2.13	-0.01	Point -1
3/13/19	4:11 PM	12.21	5.07	2.14	-0.01	Point -1
3/13/19	4:12 PM	12.20	5.08	2.31	-0.02	Point -1
3/13/19	4:13 PM	12.21	5.07	2.31	-0.01	Point -1
3/13/19	4:14 PM	12.22	5.06	2.22	-0.01	Point -1
3/13/19	4:15 PM	12.24	5.05	2.11	-0.03	
3/13/19	4:16 PM	12.24	5.05	2.05	-0.03	
3/13/19	4:17 PM	2.31	1.34	1.77	0.20	
3/13/19	4:18 PM	0.06	0.15	-0.03	0.00	
3/13/19	4:19 PM	0.10	0.18	-0.05	0.00	
3/13/19	4:20 PM	9.79	10.67	-0.05	-0.23	
3/13/19	4:21 PM	9.99	10.75	-0.03	-0.44	
3/13/19	4:22 PM	2.26	6.52	1.18	1.82	
3/13/19	4:23 PM	0.05	5.11	4.45	4.60	
3/13/19	4:24 PM	0.04	5.08	4.48	4.62	
3/13/19	4:25 PM	11.27	5.08	3.34	1.75	
3/13/19	4:26 PM	12.23	5.07	2.18	0.01	
3/13/19	4:27 PM	12.23	5.06	2.16	-0.01	
3/13/19	4:28 PM	12.23	5.06	2.14	0.01	
3/13/19	4:29 PM	12.23	5.06	2.15	0.00	RUN 10
3/13/19	4:30 PM	12.24	5.05	2.16	0.00	Point -3
3/13/19	4:31 PM	12.25	5.04	2.09	-0.02	Point -3
3/13/19	4:32 PM	12.22	5.06	2.16	0.00	Point -3
3/13/19	4:33 PM	12.20	5.07	2.27	0.01	Point -3
3/13/19	4:34 PM	12.23	5.06	2.35	-0.01	Point -3
3/13/19	4:35 PM	12.23	5.05	2.20	-0.01	Point -3
3/13/19	4:36 PM	12.23	5.05	2.17	0.00	Point -3
3/13/19	4:37 PM	12.23	5.05	2.18	-0.01	Point -2
3/13/19	4:38 PM	12.21	5.06	2.20	0.00	Point -2

3/13/19	4:39 PM	12.21	5.06	2.25	-0.01	Point -2
3/13/19	4:40 PM	12.21	5.06	2.30	-0.01	Point -2
3/13/19	4:41 PM	12.22	5.06	2.27	0.00	Point -2
3/13/19	4:42 PM	12.22	5.06	2.25	-0.01	Point -2
3/13/19	4:43 PM	12.23	5.05	2.24	-0.01	Point -2
3/13/19	4:44 PM	12.23	5.05	2.29	-0.02	Point -1
3/13/19	4:45 PM	12.23	5.05	2.22	-0.01	Point -1
3/13/19	4:46 PM	12.20	5.07	2.24	-0.02	Point -1
3/13/19	4:47 PM	12.23	5.05	2.39	-0.03	Point -1
3/13/19	4:48 PM	12.24	5.05	2.24	-0.02	Point -1
3/13/19	4:49 PM	12.24	5.05	2.11	-0.03	Point -1
3/13/19	4:50 PM	12.23	5.05	2.11	-0.04	Point -1
3/13/19	4:51 PM	12.24	5.05	2.14	-0.04	
3/13/19	4:52 PM	1.53	1.04	1.69	0.19	
3/13/19	4:53 PM	0.06	0.16	-0.05	-0.01	
3/13/19	4:54 PM	0.06	0.15	-0.06	-0.01	
3/13/19	4:55 PM	0.06	0.13	-0.07	0.00	
3/13/19	4:56 PM	0.05	0.12	-0.07	-0.01	
3/13/19	4:57 PM	0.05	0.11	-0.07	0.01	
3/13/19	4:58 PM	0.05	0.11	-0.06	0.00	
3/13/19	4:59 PM	0.05	0.10	-0.07	-0.01	
3/13/19	5:00 PM	0.05	0.10	-0.06	0.00	
3/13/19	5:01 PM	0.05	0.10	-0.05	0.02	
3/13/19	5:02 PM	0.07	0.12	-0.07	0.01	ZERO BIAS
3/13/19	5:03 PM	9.72	10.61	-0.06	-0.22	
3/13/19	5:04 PM	9.98	10.75	-0.05	-0.41	
3/13/19	5:05 PM	9.98	10.75	-0.05	-0.40	O2/BIAS
3/13/19	5:06 PM	9.98	10.75	-0.04	-0.41	
3/13/19	5:07 PM	3.24	6.86	1.28	1.48	
3/13/19	5:08 PM	0.05	5.14	4.47	4.59	
3/13/19	5:09 PM	0.04	5.10	4.57	4.62	
3/13/19	5:10 PM	0.04	5.07	4.60	4.63	
3/13/19	5:12 PM	12.20	5.07	2.54	0.27	
3/13/19	5:13 PM	12.21	5.06	2.31	0.01	RUN 11
3/13/19	5:14 PM	12.21	5.06	2.30	0.01	Point -3
3/13/19	5:15 PM	12.23	5.04	2.25	0.01	Point -3
3/13/19	5:16 PM	12.23	5.04	2.19	-0.01	Point -3
3/13/19	5:17 PM	12.23	5.04	2.25	0.01	Point -3
3/13/19	5:18 PM	12.22	5.04	2.26	0.00	Point -3
3/13/19	5:19 PM	12.22	5.04	2.28	0.01	Point -3
3/13/19	5:20 PM	12.22	5.04	2.29	0.01	Point -3
3/13/19	5:21 PM	12.20	5.05	2.35	0.00	Point -2
3/13/19	5:22 PM	12.19	5.05	2.47	0.01	Point -2
3/13/19	5:23 PM	12.20	5.05	2.43	0.01	Point -2
3/13/19	5:24 PM	12.22	5.04	2.32	0.01	Point -2
3/13/19	5:25 PM	12.22	5.04	2.15	0.01	Point -2
3/13/19	5:26 PM	12.22	5.04	2.17	0.01	Point -2
3/13/19	5:27 PM	12.20	5.05	2.26	0.01	Point -2
3/13/19	5:28 PM	12.20	5.05	2.28	0.02	Point -1
3/13/19	5:29 PM	12.22	5.04	2.22	0.02	Point -1
3/13/19	5:30 PM	12.23	5.03	2.14	0.00	Point -1
3/13/19	5:31 PM	12.23	5.03	2.17	0.02	Point -1
3/13/19	5:32 PM	12.22	5.03	2.20	0.02	Point -1
3/13/19	5:33 PM	12.22	5.03	2.24	0.02	Point -1
3/13/19	5:34 PM	12.22	5.03	2.23	0.01	Point -1
3/13/19	5:35 PM	12.22	5.03	2.25	0.01	
3/13/19	5:36 PM	12.22	5.03	2.25	0.03	
3/13/19	5:37 PM	12.21	5.03	2.32	0.03	
3/13/19	5:38 PM	12.22	5.03	2.33	0.02	
3/13/19	5:39 PM	12.22	5.03	2.36	0.03	
3/13/19	5:40 PM	12.22	5.03	2.40	0.01	
3/13/19	5:41 PM	6.04	2.81	2.34	0.22	
3/13/19	5:42 PM	0.06	0.11	0.22	0.06	

3/13/19	5:43 PM	0.05	0.08	-0.04	0.06	ZERO BIAS
3/13/19	5:44 PM	0.05	0.07	-0.04	0.04	
3/13/19	5:45 PM	9.14	9.99	-0.04	-0.16	
3/13/19	5:46 PM	9.97	10.75	-0.03	-0.39	O2/BIAS
3/13/19	5:47 PM	10.18	10.42	-0.02	-0.40	
3/13/19	5:48 PM	7.87	5.78	1.39	0.34	
3/13/19	5:49 PM	0.04	5.13	4.39	4.41	
3/13/19	5:50 PM	0.03	5.09	4.73	4.67	CO2/NOX/CO BIAS
3/13/19	5:51 PM	0.03	5.07	4.72	4.69	
3/13/19	5:52 PM	0.42	5.05	4.75	4.68	
3/13/19	5:53 PM	12.12	5.07	3.35	1.30	
3/13/19	5:54 PM	12.22	5.05	2.37	0.03	
3/13/19	5:55 PM	12.23	5.04	2.33	0.06	
3/13/19	5:56 PM	19.38	1.06	1.58	0.10	
3/13/19	5:57 PM	20.93	0.14	-0.01	0.19	
3/13/19	5:58 PM	20.94	0.12	-0.03	0.18	
3/13/19	5:59 PM	20.94	0.10	-0.04	0.19	
3/13/19	6:00 PM	20.94	0.08	-0.04	0.19	
3/13/19	6:01 PM	20.94	0.07	-0.05	0.18	
3/13/19	6:02 PM	20.95	0.06	-0.05	0.18	
3/13/19	6:03 PM	20.95	0.06	-0.05	0.17	
3/13/19	6:04 PM	20.95	0.06	-0.05	0.17	
3/13/19	6:05 PM	20.94	0.06	-0.04	0.18	
3/13/19	6:06 PM	20.95	0.05	-0.05	0.17	
3/13/19	6:07 PM	20.95	0.05	-0.05	0.19	
3/13/19	6:08 PM	20.95	0.05	-0.05	0.18	
3/13/19	6:09 PM	20.95	0.05	-0.05	0.19	
3/13/19	6:10 PM	20.94	0.05	-0.05	0.19	
3/13/19	6:11 PM	20.94	0.04	-0.05	0.20	
3/13/19	6:12 PM	20.94	0.04	-0.05	0.17	

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 1

TEST VARIABLES

Start Date:	3/13/19	
Start/End Time:	9:29	9:50
Test Condition:	302	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA

	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.05	0.12	0.00	0.05
Pre-Test System Span	10.00	5.04	4.63	4.64
Post-Test System Zero	0.05	0.21	-0.04	0.04
Post-Test System Span	10.00	5.01	4.68	4.69
Raw Test Average	12.35	4.96	2.24	0.04
Cal Corrected Average	12.33	4.92	2.30	0.00
Pre-test zero bias	0.2%	1.3%	0.1%	0.7%
Pre-test span bias	0.1%	0.1%	-2.2%	0.0%
Post-test zero bias	0.3%	2.2%	-0.4%	0.6%
Post-test span bias	0.2%	-0.3%	-1.6%	0.6%
Zero drift	0.0%	0.9%	-0.4%	-0.2%
Span drift	0.0%	-0.3%	0.6%	0.6%

REFERENCE METHOD 1-MINUTE AVERAGE DATA RUN NUMBER 1					
Date	Time	O_2	CO_2	NO_x	CO
3/13/19	9:30 AM	12.34	5.02	2.15	0.05
3/13/19	9:31 AM	12.34	5.00	2.19	0.04
3/13/19	9:32 AM	12.33	4.99	2.21	0.04
3/13/19	9:33 AM	12.32	4.99	2.22	0.05
3/13/19	9:34 AM	12.33	4.98	2.22	0.04
3/13/19	9:35 AM	12.34	4.97	2.21	0.05
3/13/19	9:36 AM	12.34	4.97	2.21	0.05
3/13/19	9:37 AM	12.36	4.96	2.23	0.04
3/13/19	9:38 AM	12.37	4.94	2.20	0.04
3/13/19	9:39 AM	12.37	4.94	2.20	0.04
3/13/19	9:40 AM	12.37	4.95	2.19	0.04
3/13/19	9:41 AM	12.37	4.95	2.17	0.05
3/13/19	9:42 AM	12.36	4.95	2.26	0.04
3/13/19	9:43 AM	12.37	4.95	2.31	0.05
3/13/19	9:44 AM	12.35	4.95	2.29	0.04
3/13/19	9:45 AM	12.36	4.95	2.27	0.06
3/13/19	9:46 AM	12.35	4.95	2.27	0.04
3/13/19	9:47 AM	12.35	4.95	2.31	0.03
3/13/19	9:48 AM	12.35	4.95	2.32	0.05
3/13/19	9:49 AM	12.36	4.95	2.31	0.05
3/13/19	9:50 AM	12.35	4.95	2.31	0.04
	Average	12.35	4.96	2.24	0.04

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 2

TEST VARIABLES

Start Date:	3/13/19	
Start/End Time:	10:24	10:45
Test Condition:	303	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA

	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.05	0.21	-0.04	0.04
Pre-Test System Span	10.00	5.01	4.68	4.69
Post-Test System Zero	0.05	0.20	-0.04	0.02
Post-Test System Span	10.00	5.00	4.65	4.69
Raw Test Average	12.32	5.01	2.30	0.01
Cal Corrected Average	12.29	4.99	2.37	-0.02
Pre-test zero bias	0.3%	2.2%	-0.4%	0.6%
Pre-test span bias	0.2%	-0.3%	-1.6%	0.6%
Post-test zero bias	0.3%	2.1%	-0.4%	0.4%
Post-test span bias	0.2%	-0.4%	-2.0%	0.6%
Zero drift	0.0%	-0.1%	0.0%	-0.1%
Span drift	0.0%	-0.1%	-0.4%	0.0%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 2

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	10:25 AM	12.34	5.00	2.26	0.00
3/13/19	10:26 AM	12.34	5.00	2.29	0.01
3/13/19	10:27 AM	12.34	5.00	2.33	0.01
3/13/19	10:28 AM	12.33	5.00	2.34	0.00
3/13/19	10:29 AM	12.31	5.01	2.34	0.01
3/13/19	10:30 AM	12.31	5.01	2.40	0.01
3/13/19	10:31 AM	12.32	5.01	2.46	0.01
3/13/19	10:32 AM	12.34	5.00	2.28	0.02
3/13/19	10:33 AM	12.32	5.01	2.16	0.01
3/13/19	10:34 AM	12.31	5.01	2.20	0.03
3/13/19	10:35 AM	12.32	5.00	2.18	0.01
3/13/19	10:36 AM	12.32	5.00	2.22	0.02
3/13/19	10:37 AM	12.32	5.01	2.23	0.01
3/13/19	10:38 AM	12.32	5.00	2.19	0.01
3/13/19	10:39 AM	12.32	5.00	2.19	0.00
3/13/19	10:40 AM	12.32	5.00	2.22	0.01
3/13/19	10:41 AM	12.29	5.02	2.31	0.02
3/13/19	10:42 AM	12.29	5.02	2.40	0.01
3/13/19	10:43 AM	12.29	5.02	2.41	0.02
3/13/19	10:44 AM	12.29	5.02	2.40	0.02
3/13/19	10:45 AM	12.29	5.01	2.40	0.00
	Average	12.32	5.01	2.30	0.01

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 3

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	11:36	11:57
Test Condition:	304	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.05	0.20	-0.04	0.02
Pre-Test System Span	10.00	5.00	4.65	4.69
Post-Test System Zero	0.05	0.12	-0.04	0.05
Post-Test System Span	9.99	5.00	4.75	4.72
Raw Test Average	0.03	4.99	4.75	4.72
Cal Corrected Average	-0.02	4.98	4.82	4.47
Pre-test zero bias	0.3%	2.1%	-0.4%	0.4%
Pre-test span bias	0.2%	-0.4%	-2.0%	0.6%
Post-test zero bias	0.3%	1.3%	-0.4%	0.7%
Post-test span bias	0.1%	-0.5%	-0.9%	1.0%
Zero drift	0.0%	-0.8%	0.0%	0.3%
Span drift	-0.1%	-0.1%	1.2%	0.4%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 3

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	11:37 AM	0.03	4.98	4.73	4.73
3/13/19	11:38 AM	0.03	4.98	4.72	4.73
3/13/19	11:39 AM	0.03	4.98	4.74	4.73
3/13/19	11:40 AM	0.03	4.98	4.77	4.75
3/13/19	11:41 AM	0.03	4.98	4.90	4.73
3/13/19	11:42 AM	0.03	4.98	4.77	4.72
3/13/19	11:43 AM	0.03	4.99	4.74	4.73
3/13/19	11:44 AM	0.03	4.99	4.74	4.73
3/13/19	11:45 AM	0.03	4.99	4.72	4.74
3/13/19	11:46 AM	0.03	4.98	4.73	4.73
3/13/19	11:47 AM	0.03	4.99	4.75	4.73
3/13/19	11:48 AM	0.03	4.99	4.75	4.72
3/13/19	11:49 AM	0.03	4.99	4.74	4.71
3/13/19	11:50 AM	0.03	4.99	4.74	4.70
3/13/19	11:51 AM	0.03	4.99	4.75	4.72
3/13/19	11:52 AM	0.03	4.99	4.76	4.72
3/13/19	11:53 AM	0.03	4.98	4.74	4.71
3/13/19	11:54 AM	0.03	4.99	4.73	4.73
3/13/19	11:55 AM	0.03	4.99	4.75	4.71
3/13/19	11:56 AM	0.03	4.99	4.74	4.72
3/13/19	11:57 AM	0.03	4.99	4.75	4.72
	Average	0.03	4.99	4.75	4.72

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 4

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	12:40	13:01
Test Condition:	303	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.05	0.12	-0.04	0.05
Pre-Test System Span	9.99	5.00	4.75	4.72
Post-Test System Zero	0.06	0.11	-0.03	0.05
Post-Test System Span	9.99	5.07	4.69	4.69
Raw Test Average	12.24	5.02	2.22	0.05
Cal Corrected Average	12.23	4.98	2.26	0.00
Pre-test zero bias	0.3%	1.3%	-0.4%	0.7%
Pre-test span bias	0.1%	-0.5%	-0.9%	1.0%
Post-test zero bias	0.3%	1.2%	-0.3%	0.7%
Post-test span bias	0.1%	0.3%	-1.5%	0.6%
Zero drift	0.0%	-0.1%	0.1%	0.0%
Span drift	0.0%	0.8%	-0.6%	-0.3%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 4

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	12:41 PM	12.24	5.01	2.26	0.04
3/13/19	12:42 PM	12.24	5.01	2.25	0.04
3/13/19	12:43 PM	12.23	5.01	2.25	0.05
3/13/19	12:44 PM	12.22	5.02	2.32	0.05
3/13/19	12:45 PM	12.25	5.00	2.30	0.05
3/13/19	12:46 PM	12.24	5.01	2.28	0.05
3/13/19	12:47 PM	12.25	5.00	2.19	0.06
3/13/19	12:48 PM	12.21	5.03	2.33	0.06
3/13/19	12:49 PM	12.22	5.02	2.49	0.05
3/13/19	12:50 PM	12.22	5.02	2.40	0.06
3/13/19	12:51 PM	12.26	5.00	2.23	0.04
3/13/19	12:52 PM	12.27	5.00	2.04	0.04
3/13/19	12:53 PM	12.26	5.01	2.01	0.06
3/13/19	12:54 PM	12.21	5.03	2.20	0.07
3/13/19	12:55 PM	12.24	5.02	2.19	0.06
3/13/19	12:56 PM	12.25	5.01	2.05	0.05
3/13/19	12:57 PM	12.21	5.04	2.21	0.05
3/13/19	12:58 PM	12.22	5.03	2.22	0.04
3/13/19	12:59 PM	12.22	5.03	2.16	0.05
3/13/19	1:00 PM	12.25	5.02	2.15	0.06
3/13/19	1:01 PM	12.25	5.02	2.10	0.05
	Average	12.24	5.02	2.22	0.05

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 5

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	13:17	13:38
Test Condition:	304	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.06	0.11	-0.03	0.05
Pre-Test System Span	9.99	5.07	4.69	4.69
Post-Test System Zero	0.06	0.10	-0.03	0.07
Post-Test System Span	10.03	5.06	4.52	4.72
Raw Test Average	12.25	5.02	2.22	0.04
Cal Corrected Average	12.22	4.95	2.32	-0.01
Pre-test zero bias	0.3%	1.2%	-0.3%	0.7%
Pre-test span bias	0.1%	0.3%	-1.5%	0.6%
Post-test zero bias	0.3%	1.0%	-0.3%	0.9%
Post-test span bias	0.3%	0.3%	-3.5%	0.9%
Zero drift	0.0%	-0.2%	0.0%	0.2%
Span drift	0.2%	0.0%	-2.0%	0.3%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 5

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	1:18 PM	12.26	5.03	2.11	0.03
3/13/19	1:19 PM	12.26	5.03	2.18	0.03
3/13/19	1:20 PM	12.24	5.03	2.24	0.04
3/13/19	1:21 PM	12.24	5.03	2.32	0.04
3/13/19	1:22 PM	12.27	5.01	2.24	0.04
3/13/19	1:23 PM	12.27	5.01	2.15	0.03
3/13/19	1:24 PM	12.28	5.00	2.12	0.02
3/13/19	1:25 PM	12.28	5.00	2.13	0.03
3/13/19	1:26 PM	12.26	5.01	2.19	0.05
3/13/19	1:27 PM	12.24	5.02	2.25	0.05
3/13/19	1:28 PM	12.26	5.01	2.28	0.06
3/13/19	1:29 PM	12.27	5.01	2.16	0.04
3/13/19	1:30 PM	12.24	5.02	2.26	0.05
3/13/19	1:31 PM	12.23	5.03	2.34	0.06
3/13/19	1:32 PM	12.23	5.03	2.38	0.07
3/13/19	1:33 PM	12.23	5.03	2.34	0.05
3/13/19	1:34 PM	12.24	5.02	2.27	0.05
3/13/19	1:35 PM	12.24	5.02	2.17	0.06
3/13/19	1:36 PM	12.24	5.02	2.18	0.05
3/13/19	1:37 PM	12.25	5.01	2.20	0.05
3/13/19	1:38 PM	12.25	5.01	2.12	0.04
	Average	12.25	5.02	2.22	0.04

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 7

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	14:37	14:58
Test Condition:	305	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.06	0.14	-0.01	0.03
Pre-Test System Span	9.99	5.10	4.52	4.67
Post-Test System Zero	0.06	0.17	-0.03	-0.01
Post-Test System Span	9.99	5.09	4.50	4.65
Raw Test Average	12.20	5.08	2.23	0.01
Cal Corrected Average	12.20	4.98	2.37	0.00
Pre-test zero bias	0.3%	1.5%	0.0%	0.5%
Pre-test span bias	0.1%	0.7%	-3.4%	0.4%
Post-test zero bias	0.3%	1.8%	-0.3%	0.1%
Post-test span bias	0.1%	0.5%	-3.7%	0.2%
Zero drift	0.0%	0.4%	-0.2%	-0.4%
Span drift	0.0%	-0.1%	-0.2%	-0.2%

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 6

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	13:58	14:19
Test Condition:	305	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.06	0.10	-0.03	0.07
Pre-Test System Span	10.03	5.06	4.52	4.72
Post-Test System Zero	0.06	0.14	-0.01	0.03
Post-Test System Span	9.99	5.10	4.52	4.67
Raw Test Average	12.22	5.05	2.20	0.06
Cal Corrected Average	12.19	4.96	2.33	0.01
Pre-test zero bias	0.3%	1.0%	-0.3%	0.9%
Pre-test span bias	0.3%	0.3%	-3.5%	0.9%
Post-test zero bias	0.3%	1.5%	0.0%	0.5%
Post-test span bias	0.1%	0.7%	-3.4%	0.4%
Zero drift	0.0%	0.4%	0.2%	-0.5%
Span drift	-0.2%	0.4%	0.0%	-0.5%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 6

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	1:59 PM	12.23	5.05	2.19	0.07
3/13/19	2:00 PM	12.22	5.05	2.16	0.05
3/13/19	2:01 PM	12.23	5.05	2.16	0.06
3/13/19	2:02 PM	12.23	5.05	2.18	0.06
3/13/19	2:03 PM	12.22	5.05	2.16	0.06
3/13/19	2:04 PM	12.21	5.05	2.17	0.06
3/13/19	2:05 PM	12.22	5.05	2.20	0.06
3/13/19	2:06 PM	12.23	5.04	2.17	0.07
3/13/19	2:07 PM	12.24	5.03	2.11	0.07
3/13/19	2:08 PM	12.23	5.04	2.12	0.06
3/13/19	2:09 PM	12.22	5.04	2.21	0.06
3/13/19	2:10 PM	12.21	5.05	2.29	0.07
3/13/19	2:11 PM	12.22	5.05	2.24	0.07
3/13/19	2:12 PM	12.22	5.05	2.21	0.06
3/13/19	2:13 PM	12.22	5.04	2.22	0.07
3/13/19	2:14 PM	12.20	5.06	2.34	0.05
3/13/19	2:15 PM	12.24	5.03	2.23	0.04
3/13/19	2:16 PM	12.21	5.05	2.16	0.05
3/13/19	2:17 PM	12.22	5.05	2.27	0.04
3/13/19	2:18 PM	12.23	5.05	2.16	0.05
3/13/19	2:19 PM	12.19	5.07	2.21	0.06
	Average	12.22	5.05	2.20	0.06

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 7

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	2:38 PM	12.19	5.09	2.28	0.03
3/13/19	2:39 PM	12.20	5.08	2.29	0.01
3/13/19	2:40 PM	12.20	5.08	2.35	0.01
3/13/19	2:41 PM	12.19	5.09	2.32	0.01
3/13/19	2:42 PM	12.23	5.06	2.24	0.00
3/13/19	2:43 PM	12.22	5.07	2.21	0.02
3/13/19	2:44 PM	12.22	5.07	2.24	0.01
3/13/19	2:45 PM	12.18	5.09	2.30	0.01
3/13/19	2:46 PM	12.18	5.09	2.42	0.01
3/13/19	2:47 PM	12.22	5.07	2.40	-0.02
3/13/19	2:48 PM	12.23	5.07	2.15	0.02
3/13/19	2:49 PM	12.22	5.08	2.07	0.01
3/13/19	2:50 PM	12.20	5.09	2.16	0.01
3/13/19	2:51 PM	12.20	5.09	2.21	0.03
3/13/19	2:52 PM	12.20	5.09	2.20	0.01
3/13/19	2:53 PM	12.17	5.11	2.21	-0.01
3/13/19	2:54 PM	12.18	5.11	2.37	0.02
3/13/19	2:55 PM	12.23	5.08	2.31	0.02
3/13/19	2:56 PM	12.24	5.07	2.04	0.00
3/13/19	2:57 PM	12.21	5.09	2.03	0.02
3/13/19	2:58 PM	12.21	5.09	2.11	0.00
	Average	12.20	5.08	2.23	0.01

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 8

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	15:15	15:36
Test Condition:	304	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.06	0.17	-0.03	-0.01
Pre-Test System Span	9.99	5.09	4.50	4.65
Post-Test System Zero	0.06	0.13	-0.04	0.01
Post-Test System Span	9.99	5.09	4.50	4.62
Raw Test Average	12.21	5.07	2.22	0.00
Cal Corrected Average	12.20	4.97	2.38	0.00
Pre-test zero bias	0.3%	1.8%	-0.3%	0.1%
Pre-test span bias	0.1%	0.5%	-3.7%	0.2%
Post-test zero bias	0.3%	1.4%	-0.4%	0.3%
Post-test span bias	0.1%	0.6%	-3.7%	-0.1%
Zero drift	0.0%	-0.4%	-0.1%	0.2%
Span drift	0.0%	0.1%	0.0%	-0.3%

REFERENCE METHOD 1-MINUTE AVERAGE DATA RUN NUMBER 8					
Date	Time	O_2	CO_2	NO_x	CO
3/13/19	3:16 PM	12.21	5.08	2.15	0.00
3/13/19	3:17 PM	12.21	5.08	2.24	0.00
3/13/19	3:18 PM	12.21	5.08	2.25	0.00
3/13/19	3:19 PM	12.21	5.07	2.22	0.00
3/13/19	3:20 PM	12.21	5.07	2.22	0.01
3/13/19	3:21 PM	12.21	5.07	2.23	0.00
3/13/19	3:22 PM	12.21	5.07	2.26	0.01
3/13/19	3:23 PM	12.22	5.06	2.29	0.01
3/13/19	3:24 PM	12.22	5.06	2.23	0.00
3/13/19	3:25 PM	12.23	5.06	2.16	0.01
3/13/19	3:26 PM	12.22	5.06	2.23	0.00
3/13/19	3:27 PM	12.19	5.07	2.30	0.01
3/13/19	3:28 PM	12.21	5.07	2.36	0.00
3/13/19	3:29 PM	12.21	5.06	2.32	0.00
3/13/19	3:30 PM	12.22	5.06	2.19	0.01
3/13/19	3:31 PM	12.22	5.06	2.09	-0.02
3/13/19	3:32 PM	12.20	5.07	2.15	-0.01
3/13/19	3:33 PM	12.18	5.08	2.24	0.01
3/13/19	3:34 PM	12.19	5.08	2.32	0.00
3/13/19	3:35 PM	12.21	5.06	2.16	0.00
3/13/19	3:36 PM	12.22	5.05	2.10	0.01
	Average	12.21	5.07	2.22	0.00

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 9

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	15:53	16:14
Test Condition:	304	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.06	0.13	-0.04	0.01
Pre-Test System Span	9.99	5.09	4.50	4.62
Post-Test System Zero	0.10	0.18	-0.05	0.00
Post-Test System Span	9.99	5.11	4.45	4.60
Raw Test Average	12.22	5.06	2.21	-0.01
Cal Corrected Average	12.21	4.96	2.38	-0.01
Pre-test zero bias	0.3%	1.4%	-0.4%	0.3%
Pre-test span bias	0.1%	0.6%	-3.7%	-0.1%
Post-test zero bias	0.5%	2.0%	-0.5%	0.1%
Post-test span bias	0.1%	0.7%	-4.2%	-0.4%
Zero drift	0.2%	0.5%	-0.1%	-0.2%
Span drift	0.0%	0.2%	-0.6%	-0.3%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 9

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	3:54 PM	12.21	5.07	2.15	-0.01
3/13/19	3:55 PM	12.21	5.07	2.16	0.00
3/13/19	3:56 PM	12.21	5.07	2.17	-0.01
3/13/19	3:57 PM	12.21	5.06	2.18	0.00
3/13/19	3:58 PM	12.21	5.07	2.19	0.00
3/13/19	3:59 PM	12.21	5.06	2.22	-0.01
3/13/19	4:00 PM	12.21	5.07	2.25	0.01
3/13/19	4:01 PM	12.21	5.06	2.23	-0.01
3/13/19	4:02 PM	12.24	5.05	2.17	0.00
3/13/19	4:03 PM	12.23	5.06	2.12	-0.02
3/13/19	4:04 PM	12.22	5.06	2.20	0.00
3/13/19	4:05 PM	12.22	5.06	2.23	0.01
3/13/19	4:06 PM	12.22	5.06	2.21	0.01
3/13/19	4:07 PM	12.20	5.07	2.31	-0.03
3/13/19	4:08 PM	12.22	5.06	2.35	-0.02
3/13/19	4:09 PM	12.22	5.06	2.20	-0.01
3/13/19	4:10 PM	12.23	5.06	2.13	-0.01
3/13/19	4:11 PM	12.21	5.07	2.14	-0.01
3/13/19	4:12 PM	12.20	5.08	2.31	-0.02
3/13/19	4:13 PM	12.21	5.07	2.31	-0.01
3/13/19	4:14 PM	12.22	5.06	2.22	-0.01
	Average	12.22	5.06	2.21	-0.01

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 10

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	16:29	16:50
Test Condition:	305	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.10	0.18	-0.05	0.00
Pre-Test System Span	9.99	5.11	4.45	4.60
Post-Test System Zero	0.07	0.12	-0.07	0.01
Post-Test System Span	9.98	5.07	4.60	4.63
Raw Test Average	12.23	5.05	2.22	-0.01
Cal Corrected Average	12.23	4.96	2.37	-0.01
Pre-test zero bias	0.5%	2.0%	-0.5%	0.1%
Pre-test span bias	0.1%	0.7%	-4.2%	-0.4%
Post-test zero bias	0.4%	1.3%	-0.7%	0.3%
Post-test span bias	0.1%	0.4%	-2.5%	-0.1%
Zero drift	-0.1%	-0.7%	-0.2%	0.2%
Span drift	0.0%	-0.4%	1.7%	0.4%

REFERENCE METHOD 1-MINUTE AVERAGE DATA RUN NUMBER 10					
Date	Time	O_2	CO_2	NO_x	CO
3/13/19	4:30 PM	12.24	5.05	2.16	0.00
3/13/19	4:31 PM	12.25	5.04	2.09	-0.02
3/13/19	4:32 PM	12.22	5.06	2.16	0.00
3/13/19	4:33 PM	12.20	5.07	2.27	0.01
3/13/19	4:34 PM	12.23	5.06	2.35	-0.01
3/13/19	4:35 PM	12.23	5.05	2.20	-0.01
3/13/19	4:36 PM	12.23	5.05	2.17	0.00
3/13/19	4:37 PM	12.23	5.05	2.18	-0.01
3/13/19	4:38 PM	12.21	5.06	2.20	0.00
3/13/19	4:39 PM	12.21	5.06	2.25	-0.01
3/13/19	4:40 PM	12.21	5.06	2.30	-0.01
3/13/19	4:41 PM	12.22	5.06	2.27	0.00
3/13/19	4:42 PM	12.22	5.06	2.25	-0.01
3/13/19	4:43 PM	12.23	5.05	2.24	-0.01
3/13/19	4:44 PM	12.23	5.05	2.29	-0.02
3/13/19	4:45 PM	12.23	5.05	2.22	-0.01
3/13/19	4:46 PM	12.20	5.07	2.24	-0.02
3/13/19	4:47 PM	12.23	5.05	2.39	-0.03
3/13/19	4:48 PM	12.24	5.05	2.24	-0.02
3/13/19	4:49 PM	12.24	5.05	2.11	-0.03
3/13/19	4:50 PM	12.23	5.05	2.11	-0.04
	Average	12.23	5.05	2.22	-0.01

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 11

TEST VARIABLES		
Start Date:	3/13/19	
Start/End Time:	17:13	17:34
Test Condition:	304	MW
Barom. Pressure:	29.68	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	4.99	4.77	4.46
Pre-Test Direct Zero	-0.001	0.00	-0.01	-0.01
Pre-Test Direct Span	9.97	5.04	4.83	4.64
Pre-Test System Zero	0.07	0.12	-0.07	0.01
Pre-Test System Span	9.98	5.07	4.60	4.63
Post-Test System Zero	0.05	0.08	-0.04	0.06
Post-Test System Span	9.97	5.09	4.73	4.67
Raw Test Average	12.22	5.04	2.26	0.01
Cal Corrected Average	12.23	4.95	2.34	-0.02
Pre-test zero bias	0.4%	1.3%	-0.7%	0.3%
Pre-test span bias	0.1%	0.4%	-2.5%	-0.1%
Post-test zero bias	0.3%	0.9%	-0.4%	0.8%
Post-test span bias	0.0%	0.6%	-1.1%	0.4%
Zero drift	-0.1%	-0.4%	0.3%	0.5%
Span drift	0.0%	0.2%	1.4%	0.5%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 11

Date	Time	O_2	CO_2	NO_x	CO
3/13/19	5:14 PM	12.21	5.06	2.30	0.01
3/13/19	5:15 PM	12.23	5.04	2.25	0.01
3/13/19	5:16 PM	12.23	5.04	2.19	-0.01
3/13/19	5:17 PM	12.23	5.04	2.25	0.01
3/13/19	5:18 PM	12.22	5.04	2.26	0.00
3/13/19	5:19 PM	12.22	5.04	2.28	0.01
3/13/19	5:20 PM	12.22	5.04	2.29	0.01
3/13/19	5:21 PM	12.20	5.05	2.35	0.00
3/13/19	5:22 PM	12.19	5.05	2.47	0.01
3/13/19	5:23 PM	12.20	5.05	2.43	0.01
3/13/19	5:24 PM	12.22	5.04	2.32	0.01
3/13/19	5:25 PM	12.22	5.04	2.15	0.01
3/13/19	5:26 PM	12.22	5.04	2.17	0.01
3/13/19	5:27 PM	12.20	5.05	2.26	0.01
3/13/19	5:28 PM	12.20	5.05	2.28	0.02
3/13/19	5:29 PM	12.22	5.04	2.22	0.02
3/13/19	5:30 PM	12.23	5.03	2.14	0.00
3/13/19	5:31 PM	12.23	5.03	2.17	0.02
3/13/19	5:32 PM	12.22	5.03	2.20	0.02
3/13/19	5:33 PM	12.22	5.03	2.24	0.02
3/13/19	5:34 PM	12.22	5.03	2.23	0.01
	Average	12.22	5.04	2.26	0.01

REFERENCE METHOD DATA LOGGER

Date	Time	O_2 %	CO_2 %	NO_x PPM	CO PPM	
3/14/19	7:17	0.00	0.00	-0.50	-0.04	
3/14/19	7:18	0.00	0.00	0.01	-0.03	ZERO/ NOX MODE
3/14/19	7:19	0.00	0.00	0.41	-0.03	
3/14/19	7:20	0.00	0.00	0.41	-0.05	ZERO/ NOX MODE
3/14/19	7:21	0.02	2.90	12.94	5.14	
3/14/19	7:22	0.00	4.96	49.01	10.75	
3/14/19	7:23	0.00	5.00	84.84	10.75	
3/14/19	7:24	0.00	5.03	83.92	10.75	
3/14/19	7:25	0.00	5.05	54.01	10.75	
3/14/19	7:26	0.00	5.07	51.04	10.75	
3/14/19	7:27	0.00	5.08	50.99	10.75	SPAN NOX MODE
3/14/19	7:28	0.00	5.09	51.04	10.75	
3/14/19	7:29	0.00	5.09	51.21	10.75	SPAN NO MODE
3/14/19	7:30	0.06	0.67	18.76	7.00	
3/14/19	7:31	0.05	0.05	0.89	-0.06	
3/14/19	7:32	0.05	0.01	0.56	-0.06	NO2 GAS/ NO MODE
3/14/19	7:34	0.04	0.00	0.43	-0.07	
3/14/19	7:35	0.04	0.00	39.93	-0.07	
3/14/19	7:36	0.04	0.00	48.88	-0.06	
3/14/19	7:37	0.03	0.00	48.96	-0.06	
3/14/19	7:38	0.05	0.00	25.07	0.27	
3/14/19	7:39	0.12	0.00	2.81	0.76	
3/14/19	7:40	0.00	0.00	5.45	0.26	
3/14/19	7:41	0.00	0.00	0.50	0.37	
3/14/19	7:42	0.03	0.00	0.74	0.74	
3/14/19	7:43	0.09	0.00	0.73	0.90	
3/14/19	7:44	0.14	0.00	0.69	1.04	
3/14/19	7:45	0.17	0.00	0.60	1.09	
3/14/19	7:46	0.19	0.00	0.55	1.07	
3/14/19	7:47	0.22	0.00	0.52	1.09	
3/14/19	7:48	15.65	0.16	0.53	0.90	
3/14/19	7:49	18.93	0.02	0.26	0.31	
3/14/19	7:50	0.06	0.00	0.12	0.09	
3/14/19	7:52	0.00	0.00	-0.01	0.01	ZERO
3/14/19	7:53	0.01	2.80	0.82	3.50	
3/14/19	7:54	0.00	5.02	9.02	8.99	
3/14/19	7:55	0.00	5.04	9.18	8.90	
3/14/19	7:56	0.00	5.06	9.05	8.84	SPAN
3/14/19	7:57	0.00	5.07	9.05	8.83	
3/14/19	7:58	16.21	9.53	5.46	3.69	
3/14/19	7:59	20.18	9.51	0.01	-0.31	
3/14/19	8:00	20.12	9.39	-0.02	-0.30	SPAN
3/14/19	8:01	7.34	6.53	0.56	1.17	
3/14/19	8:02	0.00	5.02	4.78	4.14	
3/14/19	8:03	0.00	5.01	4.42	4.20	
3/14/19	8:04	0.00	5.00	4.41	4.19	
3/14/19	8:05	0.00	5.00	4.43	4.18	
3/14/19	8:06	0.00	4.99	4.40	4.19	
3/14/19	8:07	6.07	8.42	3.96	2.92	

3/14/19	8:08	10.01	10.75	0.12	-0.34	
3/14/19	8:09	10.01	10.75	0.00	-0.42	MID
3/14/19	8:10	6.62	8.90	0.04	-0.14	
3/14/19	8:11	0.01	5.27	4.64	5.55	
3/14/19	8:12	0.00	5.23	8.99	8.83	
3/14/19	8:13	0.00	5.14	6.37	7.98	
3/14/19	8:14	0.01	5.07	0.83	5.84	
3/14/19	8:15	0.00	5.09	4.14	4.25	
3/14/19	8:16	0.00	5.08	4.38	4.18	MID
3/14/19	8:17	0.00	5.03	4.17	4.11	
3/14/19	8:18	0.01	5.00	1.34	3.76	
3/14/19	8:19	0.00	5.02	4.16	4.24	
3/14/19	8:20	0.01	5.02	4.30	4.28	
3/14/19	8:21	0.00	5.01	4.77	4.62	
3/14/19	8:22	0.00	5.00	4.87	4.65	
3/14/19	8:23	0.00	5.00	4.89	4.63	
3/14/19	8:24	0.00	5.00	4.91	4.64	
3/14/19	8:25	0.27	2.07	4.35	3.39	
3/14/19	8:26	11.59	7.26	0.28	1.87	
3/14/19	8:27	10.02	10.75	0.06	-0.26	
3/14/19	8:28	10.01	10.75	0.08	0.02	
3/14/19	8:29	1.76	6.11	3.63	4.20	
3/14/19	8:30	0.00	5.10	8.95	8.83	
3/14/19	8:31	0.00	5.06	8.21	7.24	
3/14/19	8:32	0.00	5.06	4.89	4.65	
3/14/19	8:33	0.00	5.05	4.88	4.64	
3/14/19	8:34	0.00	5.04	4.88	4.62	
3/14/19	8:35	0.00	2.34	4.29	3.41	
3/14/19	8:36	0.10	0.13	0.09	0.03	
3/14/19	8:37	14.57	6.34	0.11	0.65	
3/14/19	8:38	0.32	0.42	0.39	0.71	
3/14/19	8:39	0.08	0.15	0.04	0.21	
3/14/19	8:40	0.13	0.13	0.06	1.23	
3/14/19	8:41	0.18	0.12	0.06	1.87	
3/14/19	8:42	0.22	0.11	0.08	2.22	
3/14/19	8:43	0.25	0.11	0.10	2.41	
3/14/19	8:44	0.27	0.11	0.12	2.62	
3/14/19	8:45	0.29	0.11	0.13	2.72	
3/14/19	8:46	0.31	0.11	0.13	2.80	
3/14/19	8:47	0.34	0.11	0.13	2.79	
3/14/19	8:48	0.36	0.12	0.14	2.80	
3/14/19	8:49	0.38	0.12	0.13	2.91	
3/14/19	8:50	0.40	0.13	0.13	3.00	
3/14/19	8:51	0.42	0.14	0.13	3.10	
3/14/19	8:52	0.31	1.61	0.12	3.24	
3/14/19	8:53	0.00	4.95	3.41	4.20	
3/14/19	8:54	0.00	4.98	4.37	4.22	
3/14/19	8:54	0.00	4.98	4.37	4.22	
3/14/19	8:55	0.00	5.00	4.39	4.22	
3/14/19	8:56	0.00	5.01	4.38	4.23	
3/14/19	8:57	0.10	5.02	4.39	4.20	
3/14/19	8:58	0.10	4.98	1.12	3.84	
3/14/19	8:59	8.31	2.96	0.09	3.18	
3/14/19	9:00	11.09	0.42	0.03	0.53	
3/14/19	9:01	6.20	0.11	0.01	0.17	
3/14/19	9:02	8.12	0.09	-0.01	0.16	
3/14/19	9:03	15.12	0.11	0.01	0.21	

3/14/19	9:04	20.95	0.11	-0.01	0.31	
3/14/19	9:05	20.95	0.10	-0.01	0.31	
3/14/19	9:06	20.98	0.09	0.03	0.95	
3/14/19	9:07	20.96	0.09	0.07	2.02	
3/14/19	9:08	20.95	0.09	0.08	2.63	
3/14/19	9:09	20.95	0.09	0.06	2.82	
3/14/19	9:10	20.84	0.15	0.08	2.86	
3/14/19	9:11	12.45	0.12	0.02	0.52	
3/14/19	9:12	0.08	0.07	0.00	0.47	
3/14/19	9:13	0.06	0.06	-0.01	0.45	
3/14/19	9:14	0.06	0.06	-0.01	0.01	ZERO BIAS
3/14/19	9:15	4.30	1.99	-0.01	-0.04	
3/14/19	9:16	19.50	9.29	-0.01	-0.51	
3/14/19	9:17	10.02	10.75	-0.01	-0.58	O2 BIAS
3/14/19	9:18	9.98	10.75	-0.01	-0.60	
3/14/19	9:19	9.97	10.75	-0.01	-0.60	
3/14/19	9:20	4.76	8.08	0.69	0.39	
3/14/19	9:21	0.05	5.25	4.52	4.11	
3/14/19	9:22	0.04	5.18	4.70	4.22	
3/14/19	9:23	0.04	5.14	4.75	4.22	CO2/NOX/CO BIAS
3/14/19	9:24	6.46	3.66	4.75	3.92	
3/14/19	9:25	20.09	0.72	0.98	0.14	
3/14/19	9:26	12.06	5.15	1.56	-0.29	
3/14/19	9:27	12.04	5.17	2.77	-0.36	NORTH EAST PORT
3/14/19	9:28	12.06	5.16	2.72	-0.35	Point -3
3/14/19	9:29	12.02	5.19	2.77	-0.36	Point -3
3/14/19	9:30	12.05	5.18	2.86	-0.37	Point -3
3/14/19	9:31	12.02	5.19	2.84	-0.37	Point -2
3/14/19	9:32	12.02	5.19	2.91	-0.35	Point -2
3/14/19	9:33	12.05	5.17	2.85	-0.36	Point -2
3/14/19	9:34	12.03	5.18	2.81	-0.38	Point -1
3/14/19	9:35	12.02	5.19	2.89	-0.35	Point -1
3/14/19	9:36	12.02	5.19	2.94	-0.35	Point -1
3/14/19	9:37	14.38	3.90	2.54	-0.35	PC
3/14/19	9:38	12.14	5.12	2.33	-0.33	NORTH WEST PORT
3/14/19	9:39	12.15	5.11	2.74	-0.36	Point -3
3/14/19	9:40	12.17	5.10	2.64	-0.37	Point -3
3/14/19	9:41	12.15	5.12	2.62	-0.38	Point -3
3/14/19	9:42	12.08	5.15	2.80	-0.36	Point -2
3/14/19	9:43	12.07	5.16	2.99	-0.38	Point -2
3/14/19	9:44	12.08	5.15	2.99	-0.35	Point -2
3/14/19	9:45	12.06	5.16	2.95	-0.36	Point -1
3/14/19	9:46	12.06	5.17	3.03	-0.35	Point -1
3/14/19	9:47	12.09	5.15	2.78	-0.36	Point -1
3/14/19	9:48	14.74	3.70	2.69	-0.34	PC
3/14/19	9:49	12.19	5.08	2.16	-0.32	SOUTH WEST PORT
3/14/19	9:50	12.21	5.07	2.41	-0.35	Point -3
3/14/19	9:51	12.19	5.09	2.44	-0.35	Point -3
3/14/19	9:52	12.18	5.09	2.47	-0.35	Point -3
3/14/19	9:53	12.19	5.09	2.55	-0.34	Point -2
3/14/19	9:54	12.22	5.07	2.40	-0.34	Point -2
3/14/19	9:55	12.22	5.07	2.44	-0.35	Point -2
3/14/19	9:56	12.22	5.07	2.42	-0.34	Point -1
3/14/19	9:57	12.21	5.08	2.44	-0.33	Point -1
3/14/19	9:58	12.21	5.08	2.51	-0.32	Point -1
3/14/19	9:59	16.66	2.62	2.23	-0.31	PC
3/14/19	10:00	15.80	3.06	0.67	-0.24	PC

3/14/19	10:01	12.07	5.13	2.70	-0.36	SOUTH EAST PORT
3/14/19	10:02	12.03	5.16	2.81	-0.37	Point -3
3/14/19	10:03	12.03	5.17	2.89	-0.37	Point -3
3/14/19	10:04	12.02	5.18	2.86	-0.38	Point -3
3/14/19	10:05	12.04	5.17	2.90	-0.36	Point -2
3/14/19	10:06	12.05	5.16	2.70	-0.34	Point -2
3/14/19	10:07	12.02	5.18	2.88	-0.35	Point -2
3/14/19	10:08	12.05	5.17	2.94	-0.35	Point -1
3/14/19	10:09	12.04	5.17	2.71	-0.35	Point -1
3/14/19	10:10	12.01	5.19	2.93	-0.35	Point -1
3/14/19	10:11	12.02	5.18	2.82	-0.36	
3/14/19	10:12	11.99	5.20	2.99	-0.39	
3/14/19	10:13	11.97	5.21	3.11	-0.39	
3/14/19	10:14	11.99	5.20	3.09	-0.38	
3/14/19	10:15	7.73	3.77	2.91	-0.17	
3/14/19	10:16	0.07	0.17	0.45	0.06	
3/14/19	10:17	0.06	0.13	-0.01	-0.03	
3/14/19	10:18	0.06	0.10	-0.01	-0.05	
3/14/19	10:19	0.06	0.09	-0.01	-0.03	
3/14/19	10:20	0.06	0.07	-0.02	-0.03	ZERO BIAS
3/14/19	10:21	7.26	7.95	-0.01	-0.26	
3/14/19	10:22	9.98	10.75	0.00	-0.60	
3/14/19	10:23	9.98	10.75	0.00	-0.60	
3/14/19	10:24	9.98	10.75	-0.01	-0.60	O2 BIAS
3/14/19	10:25	6.22	8.87	0.00	-0.12	
3/14/19	10:23	9.98	10.75	0.00	-0.60	
3/14/19	10:24	9.98	10.75	-0.01	-0.60	
3/14/19	10:25	6.22	8.87	0.00	-0.12	
3/14/19	10:26	0.06	5.30	4.03	3.88	
3/14/19	10:27	0.05	5.21	4.72	4.22	MID
3/14/19	10:28	0.02	2.49	3.86	3.14	
3/14/19	10:29	0.00	0.15	0.08	-0.08	
3/14/19	10:30	0.00	0.11	-0.03	-0.09	
3/14/19	10:31	0.00	0.01	-0.03	0.00	ZERO
3/14/19	10:32	0.00	2.67	1.45	2.18	
3/14/19	10:33	0.00	4.95	8.77	8.31	
3/14/19	10:34	0.00	4.98	9.08	8.61	
3/14/19	10:35	0.00	5.00	9.08	8.81	SPAN
3/14/19	10:36	13.15	8.83	6.63	4.33	
3/14/19	10:37	20.10	9.43	0.03	-0.59	
3/14/19	10:38	20.11	9.42	-0.03	-0.60	SPAN
3/14/19	10:39	2.00	5.47	2.23	1.59	
3/14/19	10:40	0.00	5.04	4.36	3.98	MID
3/14/19	10:41	1.62	5.92	4.38	3.94	
3/14/19	10:42	10.02	10.75	1.68	0.23	
3/14/19	10:43	10.02	10.75	0.00	-0.60	
3/14/19	10:44	9.92	10.75	-0.01	-0.60	
3/14/19	10:45	3.73	2.39	1.00	-0.04	
3/14/19	10:46	0.07	0.33	0.05	0.07	
3/14/19	10:47	0.06	0.24	0.00	0.08	ZERO BIAS
3/14/19	10:48	5.29	5.93	0.00	-0.05	
3/14/19	10:49	9.96	10.75	0.01	-0.57	
3/14/19	10:50	9.97	10.75	0.01	-0.60	O2 BIAS
3/14/19	10:51	9.97	10.75	0.01	-0.59	
3/14/19	10:52	2.32	6.68	1.00	1.43	
3/14/19	10:53	0.05	5.20	4.14	4.11	

3/14/19	10:54	0.05	5.12	4.21	4.13	CO2/NOX/CO BIAS
3/14/19	10:55	0.56	5.08	4.25	4.14	
3/14/19	10:56	11.82	5.21	3.61	0.92	
3/14/19	10:57	11.91	5.18	3.05	-0.23	RUN 1
3/14/19	10:58	11.92	5.16	2.97	-0.22	Point -3
3/14/19	10:59	11.92	5.15	3.01	-0.21	Point -3
3/14/19	11:00	11.94	5.13	2.93	-0.25	Point -3
3/14/19	11:01	11.95	5.12	2.82	-0.22	Point -3
3/14/19	11:02	11.94	5.12	2.78	-0.23	Point -3
3/14/19	11:03	11.91	5.14	2.99	-0.21	Point -3
3/14/19	11:04	11.93	5.12	2.97	-0.22	Point -3
3/14/19	11:05	11.95	5.11	2.86	-0.23	Point -2
3/14/19	11:06	11.96	5.10	2.82	-0.23	Point -2
3/14/19	11:07	11.94	5.11	2.81	-0.22	Point -2
3/14/19	11:08	11.93	5.12	2.92	-0.23	Point -2
3/14/19	11:09	11.95	5.10	2.78	-0.21	Point -2
3/14/19	11:10	11.96	5.10	2.71	-0.21	Point -2
3/14/19	11:11	11.96	5.10	2.71	-0.19	Point -2
3/14/19	11:12	11.94	5.11	2.77	-0.20	Point -1
3/14/19	11:13	11.96	5.10	2.74	-0.20	Point -1
3/14/19	11:14	11.96	5.10	2.72	-0.19	Point -1
3/14/19	11:15	11.95	5.10	2.71	-0.19	Point -1
3/14/19	11:16	11.96	5.10	2.70	-0.20	Point -1
3/14/19	11:17	11.95	5.10	2.71	-0.20	Point -1
3/14/19	11:18	11.95	5.10	2.69	-0.19	Point -1
3/14/19	11:19	10.52	7.51	2.63	-0.01	
3/14/19	11:20	9.98	10.75	0.30	-0.46	O2 BIAS
3/14/19	11:21	9.98	10.75	0.01	-0.60	
3/14/19	11:22	9.98	10.75	0.01	-0.60	
3/14/19	11:23	1.13	5.97	1.74	2.01	
3/14/19	11:24	0.07	5.13	4.19	4.12	
3/14/19	11:25	0.06	5.07	4.23	4.13	CO2/NOX/CO BIAS
3/14/19	11:26	0.07	4.18	4.22	4.03	
3/14/19	11:27	0.08	0.21	1.48	0.65	
3/14/19	11:28	0.08	0.15	-0.01	0.13	
3/14/19	11:29	0.08	0.12	-0.02	0.13	ZERO BIAS
3/14/19	11:30	5.53	2.34	0.04	0.07	
3/14/19	11:31	11.93	5.05	2.33	-0.20	
3/14/19	11:32	11.94	5.07	2.61	-0.22	
3/14/19	11:33	11.95	5.08	2.59	-0.22	
3/14/19	11:34	11.95	5.09	2.62	-0.22	
3/14/19	11:35	11.95	5.10	2.63	-0.22	
3/14/19	11:36	11.95	5.10	2.64	-0.25	
3/14/19	11:37	11.95	5.10	2.67	-0.23	RUN 2
3/14/19	11:38	11.95	5.11	2.70	-0.24	Point -3
3/14/19	11:39	11.95	5.10	2.68	-0.22	Point -3
3/14/19	11:40	11.96	5.10	2.67	-0.23	Point -3
3/14/19	11:41	11.95	5.11	2.69	-0.22	Point -3
3/14/19	11:42	11.96	5.10	2.68	-0.23	Point -3
3/14/19	11:43	11.96	5.11	2.69	-0.22	Point -3
3/14/19	11:44	11.96	5.11	2.68	-0.23	Point -3
3/14/19	11:45	11.96	5.11	2.69	-0.23	Point -2
3/14/19	11:46	11.96	5.11	2.69	-0.23	Point -2
3/14/19	11:47	11.96	5.11	2.73	-0.23	Point -2
3/14/19	11:48	11.96	5.10	2.74	-0.24	Point -2
3/14/19	11:49	11.97	5.10	2.73	-0.23	Point -2
3/14/19	11:50	11.97	5.09	2.73	-0.22	Point -2

3/14/19	11:51	11.96	5.09	2.74	-0.23	Point -2
3/14/19	11:52	11.97	5.08	2.73	-0.22	Point -1
3/14/19	11:53	11.97	5.08	2.67	-0.23	Point -1
3/14/19	11:54	11.97	5.08	2.67	-0.23	Point -1
3/14/19	11:55	11.97	5.07	2.67	-0.23	Point -1
3/14/19	11:56	11.97	5.08	2.69	-0.24	Point -1
3/14/19	11:57	11.97	5.07	2.67	-0.23	Point -1
3/14/19	11:58	11.97	5.08	2.71	-0.22	Point -1
3/14/19	11:59	11.97	5.07	2.71	-0.24	
3/14/19	12:00	11.97	5.07	2.76	-0.23	
3/14/19	12:01	11.97	5.07	2.75	-0.23	
3/14/19	12:02	11.81	5.02	2.74	-0.23	
3/14/19	12:03	0.26	0.25	1.10	0.00	
3/14/19	12:04	0.09	0.09	-0.02	0.12	
3/14/19	12:05	0.08	0.07	-0.03	0.13	ZERO
3/14/19	12:06	8.10	8.87	-0.03	-0.19	
3/14/19	12:07	9.98	10.75	-0.01	-0.60	
3/14/19	12:07	9.98	10.75	-0.01	-0.60	O2 BIAS
3/14/19	12:08	7.72	9.55	0.02	-0.44	
3/14/19	12:09	0.08	5.13	2.86	3.44	
3/14/19	12:10	0.07	5.05	4.16	4.12	CO2/NOX/CO BIAS
3/14/19	12:11	2.11	5.04	4.19	4.04	
3/14/19	12:12	11.94	5.12	3.27	0.42	RUN 3
3/14/19	12:13	11.96	5.11	2.70	-0.23	Point -3
3/14/19	12:14	11.97	5.10	2.72	-0.22	Point -3
3/14/19	12:15	11.97	5.10	2.69	-0.23	Point -3
3/14/19	12:16	11.97	5.09	2.70	-0.23	Point -3
3/14/19	12:17	11.98	5.09	2.69	-0.24	Point -3
3/14/19	12:18	11.98	5.09	2.68	-0.23	Point -3
3/14/19	12:19	11.98	5.08	2.70	-0.23	Point -3
3/14/19	12:20	11.98	5.08	2.72	-0.24	Point -2
3/14/19	12:21	12.00	5.07	2.66	-0.21	Point -2
3/14/19	12:22	11.99	5.07	2.60	-0.22	Point -2
3/14/19	12:23	11.99	5.08	2.61	-0.22	Point -2
3/14/19	12:24	11.99	5.08	2.64	-0.23	Point -2
3/14/19	12:25	11.99	5.08	2.64	-0.22	Point -2
3/14/19	12:26	11.99	5.08	2.65	-0.23	Point -2
3/14/19	12:27	11.99	5.08	2.66	-0.22	Point -1
3/14/19	12:28	11.99	5.08	2.65	-0.22	Point -1
3/14/19	12:29	11.99	5.08	2.63	-0.22	Point -1
3/14/19	12:30	11.99	5.08	2.66	-0.22	Point -1
3/14/19	12:31	11.99	5.08	2.68	-0.23	Point -1
3/14/19	12:32	11.99	5.08	2.66	-0.23	Point -1
3/14/19	12:33	11.99	5.08	2.66	-0.24	Point -1
3/14/19	12:34	11.98	5.08	2.68	-0.23	
3/14/19	12:35	11.99	5.08	2.62	-0.22	
3/14/19	12:36	11.99	5.08	2.63	-0.23	
3/14/19	12:37	11.99	5.08	2.63	-0.21	
3/14/19	12:38	11.99	5.08	2.63	-0.24	
3/14/19	12:39	11.99	5.08	2.65	-0.24	
3/14/19	12:40	1.50	1.16	1.81	0.30	
3/14/19	12:41	0.10	0.13	0.00	0.11	
3/14/19	12:42	0.09	0.11	-0.03	0.11	ZERO BIAS
3/14/19	12:43	8.92	9.75	-0.03	-0.25	
3/14/19	12:44	9.98	10.75	-0.01	-0.60	O2 BIAS
3/14/19	12:45	3.06	6.94	1.20	1.11	
3/14/19	12:46	0.08	5.08	4.09	4.08	

3/14/19	12:47	0.08	5.04	4.14	4.11	CO2/NOX/CO BIAS
3/14/19	12:48	7.41	5.10	3.99	2.70	
3/14/19	12:49	11.95	5.14	2.71	-0.23	RUN 4
3/14/19	12:50	11.97	5.13	2.69	-0.26	Point -3
3/14/19	12:51	11.97	5.13	2.70	-0.24	Point -3
3/14/19	12:52	11.97	5.13	2.70	-0.26	Point -3
3/14/19	12:53	11.98	5.12	2.73	-0.26	Point -3
3/14/19	12:54	11.98	5.12	2.72	-0.26	Point -3
3/14/19	12:55	11.98	5.12	2.71	-0.25	Point -3
3/14/19	12:56	11.98	5.12	2.70	-0.25	Point -3
3/14/19	12:57	11.98	5.12	2.70	-0.25	Point -2
3/14/19	12:58	11.98	5.11	2.69	-0.25	Point -2
3/14/19	12:59	11.98	5.11	2.69	-0.25	Point -2
3/14/19	13:00	11.98	5.11	2.69	-0.25	Point -2
3/14/19	13:01	11.98	5.11	2.70	-0.26	Point -2
3/14/19	13:02	11.99	5.11	2.64	-0.24	Point -2
3/14/19	13:03	11.99	5.10	2.62	-0.26	Point -2
3/14/19	13:04	12.00	5.10	2.62	-0.24	Point -1
3/14/19	13:05	12.00	5.10	2.63	-0.23	Point -1
3/14/19	13:06	12.00	5.10	2.64	-0.23	Point -1
3/14/19	13:07	12.00	5.09	2.64	-0.25	Point -1
3/14/19	13:08	12.01	5.09	2.66	-0.24	Point -1
3/14/19	13:09	12.00	5.09	2.62	-0.24	Point -1
3/14/19	13:10	12.00	5.09	2.64	-0.24	Point -1
3/14/19	13:11	2.86	1.75	2.05	0.23	
3/14/19	13:12	0.10	0.16	0.00	0.10	ZERO BIAS
3/14/19	13:13	2.10	2.43	-0.03	0.06	
3/14/19	13:14	9.98	10.75	-0.02	-0.46	O2 BIAS
3/14/19	13:15	4.19	7.56	0.30	0.61	
3/14/19	13:16	0.08	5.06	4.00	4.00	
3/14/19	13:17	0.08	5.01	4.13	4.06	CO2/NOX/CO BIAS
3/14/19	13:18	0.08	5.00	4.14	4.08	
3/14/19	13:19	11.35	5.10	3.55	1.27	
3/14/19	13:20	12.00	5.10	2.59	-0.26	
3/14/19	13:21	11.98	5.12	2.65	-0.26	
3/14/19	13:22	11.97	5.12	2.85	-0.27	
3/14/19	13:23	11.97	5.12	2.82	-0.29	
3/14/19	13:24	11.97	5.11	2.79	-0.29	RUN 5
3/14/19	13:25	11.99	5.10	2.74	-0.28	Point -3
3/14/19	13:26	11.99	5.10	2.67	-0.28	Point -3
3/14/19	13:27	11.99	5.10	2.66	-0.27	Point -3
3/14/19	13:28	11.99	5.10	2.67	-0.26	Point -3
3/14/19	13:29	11.99	5.09	2.69	-0.27	Point -3
3/14/19	13:30	12.00	5.09	2.70	-0.28	Point -3
3/14/19	13:31	12.00	5.09	2.71	-0.27	Point -3
3/14/19	13:32	12.01	5.08	2.65	-0.27	Point -2
3/14/19	13:33	12.01	5.08	2.60	-0.26	Point -2
3/14/19	13:34	12.02	5.08	2.61	-0.26	Point -2
3/14/19	13:35	12.02	5.08	2.60	-0.26	Point -2
3/14/19	13:36	12.02	5.08	2.59	-0.26	Point -2
3/14/19	13:37	12.02	5.08	2.53	-0.26	Point -2
3/14/19	13:38	12.02	5.08	2.51	-0.25	Point -2
3/14/19	13:39	12.02	5.08	2.51	-0.26	Point -1
3/14/19	13:40	12.02	5.08	2.52	-0.26	Point -1
3/14/19	13:41	12.02	5.08	2.57	-0.26	Point -1
3/14/19	13:42	12.02	5.08	2.53	-0.26	Point -1
3/14/19	13:43	12.02	5.08	2.52	-0.26	Point -1

3/14/19	13:44	12.02	5.08	2.53	-0.26	Point -1
3/14/19	13:45	12.02	5.08	2.52	-0.26	Point -1
3/14/19	13:46	12.02	5.07	2.55	-0.25	
3/14/19	13:47	12.02	5.07	2.54	-0.24	
3/14/19	13:48	12.02	5.07	2.58	-0.26	
3/14/19	13:49	12.02	5.07	2.58	-0.25	
3/14/19	13:50	12.02	5.06	2.59	-0.26	
3/14/19	13:51	12.02	5.06	2.60	-0.26	
3/14/19	13:52	12.03	5.06	2.59	-0.27	
3/14/19	13:53	12.02	5.07	2.63	-0.27	
3/14/19	13:54	12.01	5.07	2.72	-0.27	
3/14/19	13:55	9.08	4.24	2.72	-0.15	
3/14/19	13:56	0.11	0.16	0.72	0.22	
3/14/19	13:57	0.09	0.12	-0.03	0.10	ZERO
3/14/19	13:58	8.15	8.93	-0.04	-0.23	
3/14/19	13:59	9.98	10.75	-0.02	-0.60	O2 BIAS
3/14/19	14:00	2.45	6.56	1.41	1.35	
3/14/19	14:01	0.08	5.05	4.12	4.01	
3/14/19	14:02	0.07	5.02	4.17	4.03	CO2/NOX/CO BIAS
3/14/19	14:03	7.37	5.07	4.04	2.68	
3/14/19	14:04	11.99	5.10	2.72	-0.24	
3/14/19	14:05	11.99	5.09	2.66	-0.25	RUN 6
3/14/19	14:06	12.00	5.09	2.66	-0.27	Point -3
3/14/19	14:07	12.00	5.09	2.65	-0.27	Point -3
3/14/19	14:08	12.01	5.08	2.63	-0.27	Point -3
3/14/19	14:09	12.00	5.08	2.64	-0.26	Point -3
3/14/19	14:10	12.00	5.08	2.65	-0.26	Point -3
3/14/19	14:11	12.00	5.08	2.66	-0.26	Point -3
3/14/19	14:12	12.00	5.08	2.64	-0.25	Point -3
3/14/19	14:13	12.00	5.07	2.68	-0.27	Point -2
3/14/19	14:14	12.01	5.07	2.71	-0.26	Point -2
3/14/19	14:15	12.01	5.07	2.69	-0.26	Point -2
3/14/19	14:16	12.01	5.07	2.65	-0.27	Point -2
3/14/19	14:17	12.01	5.06	2.63	-0.27	Point -2
3/14/19	14:18	12.01	5.06	2.61	-0.27	Point -2
3/14/19	14:19	12.01	5.06	2.62	-0.27	Point -2
3/14/19	14:20	12.01	5.06	2.62	-0.27	Point -1
3/14/19	14:21	12.02	5.06	2.64	-0.26	Point -1
3/14/19	14:22	12.02	5.06	2.63	-0.26	Point -1
3/14/19	14:23	12.01	5.06	2.65	-0.27	Point -1
3/14/19	14:24	12.02	5.05	2.66	-0.27	Point -1
3/14/19	14:25	12.02	5.06	2.62	-0.25	Point -1
3/14/19	14:26	12.02	5.06	2.63	-0.27	Point -1
3/14/19	14:27	5.46	2.76	2.35	0.10	
3/14/19	14:28	0.09	0.12	0.10	0.12	
3/14/19	14:29	0.09	0.09	-0.02	0.09	ZERO
3/14/19	14:30	5.71	6.30	-0.02	-0.07	
3/14/19	14:31	9.98	10.75	-0.01	-0.59	O2 BIAS
3/14/19	14:32	1.74	6.15	1.72	1.69	
3/14/19	14:33	0.07	5.03	4.19	4.10	
3/14/19	14:34	0.07	5.00	4.21	4.09	
3/14/19	14:35	0.06	4.98	4.24	4.10	CO2/NOX/CO BIAS
3/14/19	14:36	1.11	4.98	4.24	4.08	
3/14/19	14:37	11.98	5.08	3.29	0.69	
3/14/19	14:38	12.00	5.08	2.70	-0.25	
3/14/19	14:39	12.00	5.08	2.74	-0.26	
3/14/19	14:40	11.99	5.08	2.77	-0.26	

3/14/19	14:41	12.00	5.08	2.78	-0.25	RUN 7
3/14/19	14:42	12.01	5.08	2.72	-0.27	Point -3
3/14/19	14:43	12.01	5.08	2.69	-0.27	Point -3
3/14/19	14:44	12.01	5.08	2.68	-0.27	Point -3
3/14/19	14:45	12.01	5.07	2.69	-0.26	Point -3
3/14/19	14:46	12.01	5.07	2.71	-0.26	Point -3
3/14/19	14:47	12.01	5.07	2.73	-0.25	Point -3
3/14/19	14:48	12.01	5.07	2.73	-0.25	Point -3
3/14/19	14:49	12.01	5.07	2.75	-0.26	Point -2
3/14/19	14:50	12.01	5.07	2.72	-0.26	Point -2
3/14/19	14:51	12.01	5.08	2.74	-0.27	Point -2
3/14/19	14:52	12.02	5.08	2.74	-0.25	Point -2
3/14/19	14:53	12.02	5.07	2.69	-0.25	Point -2
3/14/19	14:54	12.02	5.07	2.73	-0.26	Point -2
3/14/19	14:55	12.02	5.07	2.72	-0.25	Point -2
3/14/19	14:56	12.02	5.07	2.74	-0.26	Point -1
3/14/19	14:57	12.02	5.07	2.73	-0.26	Point -1
3/14/19	14:58	12.02	5.07	2.74	-0.26	Point -1
3/14/19	14:59	12.02	5.07	2.74	-0.26	Point -1
3/14/19	15:00	12.02	5.07	2.75	-0.26	Point -1
3/14/19	15:01	12.02	5.07	2.75	-0.26	Point -1
3/14/19	15:02	12.02	5.07	2.73	-0.27	Point -1
3/14/19	15:03	12.02	5.07	2.72	-0.27	
3/14/19	15:04	12.02	5.07	2.77	-0.25	
3/14/19	15:05	3.17	1.80	2.50	0.19	
3/14/19	15:06	0.09	0.11	0.15	0.07	ZERO
3/14/19	15:07	0.08	0.09	0.08	0.09	
3/14/19	15:08	5.40	5.95	0.07	-0.06	
3/14/19	15:09	9.99	10.75	0.08	-0.57	O2 BIAS
3/14/19	15:10	1.57	6.05	1.93	1.76	
3/14/19	15:11	0.07	5.03	4.30	4.08	CO2/NOX/CO BIAS
3/14/19	15:12	8.97	5.08	4.03	2.15	
3/14/19	15:13	12.00	5.10	2.87	-0.26	
3/14/19	15:14	12.00	5.09	2.91	-0.26	
3/14/19	15:15	12.00	5.09	2.87	-0.29	RUN 8
3/14/19	15:16	12.01	5.08	2.87	-0.28	Point -3
3/14/19	15:17	12.02	5.07	2.85	-0.28	Point -3
3/14/19	15:18	12.01	5.07	2.81	-0.28	Point -3
3/14/19	15:19	12.02	5.07	2.84	-0.29	Point -3
3/14/19	15:20	12.02	5.06	2.82	-0.28	Point -3
3/14/19	15:21	12.02	5.06	2.83	-0.28	Point -3
3/14/19	15:22	12.02	5.06	2.84	-0.27	Point -3
3/14/19	15:23	12.02	5.05	2.80	-0.27	Point -2
3/14/19	15:24	12.01	5.06	2.80	-0.28	Point -2
3/14/19	15:25	12.01	5.06	2.81	-0.27	Point -2
3/14/19	15:26	12.02	5.05	2.76	-0.28	Point -2
3/14/19	15:27	12.02	5.06	2.77	-0.28	Point -2
3/14/19	15:28	12.02	5.06	2.79	-0.27	Point -2
3/14/19	15:29	12.02	5.05	2.79	-0.28	Point -2
3/14/19	15:30	12.03	5.05	2.78	-0.28	Point -1
3/14/19	15:31	12.02	5.06	2.75	-0.28	Point -1
3/14/19	15:32	12.03	5.05	2.74	-0.27	Point -1
3/14/19	15:33	12.03	5.05	2.71	-0.26	Point -1
3/14/19	15:34	12.03	5.05	2.68	-0.27	Point -1
3/14/19	15:35	12.03	5.05	2.69	-0.26	Point -1
3/14/19	15:36	12.03	5.05	2.70	-0.26	Point -1
3/14/19	15:37	0.81	0.81	1.48	0.24	

3/14/19	15:38	$\boxed{0.08}$	$\boxed{0.09}$	$\boxed{0.02}$	$\boxed{0.08}$	ZERO
3/14/19	15:39	0.08	0.07	0.01	0.08	
3/14/19	15:40	9.49	10.36	0.01	-0.34	
3/14/19	15:41	$\boxed{9.99}$	10.75	0.01	-0.60	O2 BIAS
3/14/19	15:42	4.16	7.58	0.72	0.60	
3/14/19	15:43	0.07	5.08	4.09	3.99	
3/14/19	15:44	0.06	5.03	4.21	4.09	
3/14/19	15:45	0.06	$\boxed{5.00}$	$\boxed{4.24}$	$\boxed{4.09}$	CO2/NOX/CO BIAS
3/14/19	15:46	1.78	5.00	4.26	4.03	
3/14/19	15:47	12.00	5.09	3.27	0.47	
3/14/19	15:48	12.02	5.08	2.68	-0.26	
3/14/19	15:49	12.02	5.08	2.69	-0.28	
3/14/19	15:50	12.02	5.07	2.68	-0.27	
3/14/19	15:51	12.02	5.07	2.70	-0.28	
3/14/19	15:52	12.01	5.08	2.67	-0.29	
3/14/19	15:53	11.99	5.09	2.83	-0.31	
3/14/19	15:54	11.99	5.09	2.89	-0.32	
3/14/19	15:55	11.99	5.08	2.81	-0.29	
3/14/19	15:56	5.25	2.70	2.66	0.06	
3/14/19	15:57	0.08	0.11	0.26	0.11	
3/14/19	15:58	0.07	0.08	-0.02	0.07	
3/14/19	15:59	2.77	3.12	-0.02	0.01	
3/14/19	16:00	9.99	10.75	-0.02	-0.49	
3/14/19	16:01	2.29	6.48	1.02	1.42	
3/14/19	16:02	0.06	5.02	4.13	4.07	
3/14/19	16:03	0.06	4.99	4.20	4.09	
3/14/19	16:04	9.58	5.08	3.83	1.89	
3/14/19	16:05	12.00	5.09	2.70	-0.28	RUN 9
3/14/19	16:06	12.00	5.09	2.69	-0.28	Point -3
3/14/19	16:07	12.00	5.08	2.73	-0.29	Point -3
3/14/19	16:08	12.00	5.08	2.74	-0.31	Point -3
3/14/19	16:09	12.00	5.08	2.75	-0.31	Point -3
3/14/19	16:10	12.00	5.08	2.76	-0.31	Point -3
3/14/19	16:11	12.00	5.07	2.79	-0.30	Point -3
3/14/19	16:12	12.06	5.04	2.69	-0.31	Point -3
3/14/19	16:13	12.06	5.04	2.54	-0.30	Point -2
3/14/19	16:14	12.03	5.05	2.66	-0.29	Point -2
3/14/19	16:15	12.02	5.05	2.80	-0.30	Point -2
3/14/19	16:16	12.03	5.04	2.76	-0.30	Point -2
3/14/19	16:17	12.05	5.03	2.72	-0.29	Point -2
3/14/19	16:18	12.05	5.04	2.66	-0.30	Point -2
3/14/19	16:19	12.04	5.04	2.69	-0.30	Point -2
3/14/19	16:20	12.05	5.03	2.64	-0.30	Point -1
3/14/19	16:21	12.03	5.05	2.81	-0.30	Point -1
3/14/19	16:22	12.04	5.04	2.76	-0.29	Point -1
3/14/19	16:23	12.04	5.04	2.73	-0.29	Point -1
3/14/19	16:24	12.05	5.04	2.72	-0.29	Point -1
3/14/19	16:25	12.04	5.04	2.73	-0.30	Point -1
3/14/19	16:26	12.05	5.04	2.75	-0.29	Point -1
3/14/19	16:27	1.54	1.11	2.21	0.20	
3/14/19	16:28	0.08	0.08	0.02	0.07	
3/14/19	16:29	$\boxed{0.07}$	$\boxed{0.06}$	$\boxed{-0.01}$	$\boxed{0.07}$	ZERO
3/14/19	16:30	5.03	5.54	-0.02	-0.06	
3/14/19	16:31	9.99	10.75	-0.01	-0.57	
3/14/19	16:32	$\boxed{10.00}$	10.75	0.00	-0.60	O2 BIAS
3/14/19	16:33	1.52	6.07	1.56	1.78	
3/14/19	16:34	0.06	5.06	4.16	4.05	

3/14/19	16:35	0.06	5.02	4.19	4.07	CO2/NOX/CO BIAS
3/14/19	16:36	0.05	4.99	4.22	4.08	
3/14/19	16:37	0.05	4.97	4.21	4.08	
3/14/19	16:38	8.38	5.03	3.89	2.33	
3/14/19	16:39	12.02	5.07	2.79	-0.29	
3/14/19	16:40	12.04	5.06	2.74	-0.32	
3/14/19	16:41	12.05	5.04	2.75	-0.31	
3/14/19	16:42	12.06	5.04	2.63	-0.31	
3/14/19	16:43	12.05	5.04	2.71	-0.30	
3/14/19	16:44	12.04	5.03	2.79	-0.29	
3/14/19	16:45	12.06	4.97	1.48	0.54	
3/14/19	16:46	12.08	4.91	0.03	1.53	
3/14/19	16:47	12.10	4.85	0.01	2.19	
3/14/19	16:48	12.13	4.81	0.01	2.65	

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 1

TEST VARIABLES		
Start Date:	3/14/19	
Start/End Time:	10:57	11:18
Test Condition:	307	MW
Barom. Pressure:	29.81	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.01	-0.03	0.00
Pre-Test Direct Span	9.92	5.04	4.36	3.98
Pre-Test System Zero	0.06	0.24	0.00	0.08
Pre-Test System Span	9.97	5.12	4.21	4.13
Post-Test System Zero	0.08	0.12	-0.02	0.13
Post-Test System Span	9.98	5.07	4.23	4.13
Raw Test Average	11.94	5.11	2.82	-0.21
Cal Corrected Average	11.96	5.03	2.86	-0.31
Pre-test zero bias	0.3%	2.5%	0.3%	0.9%
Pre-test span bias	0.2%	0.9%	-1.6%	1.7%
Post-test zero bias	0.4%	1.2%	0.1%	1.4%
Post-test span bias	0.3%	0.4%	-1.4%	1.7%
Zero drift	0.1%	-1.3%	-0.3%	0.5%
Span drift	0.1%	-0.5%	0.3%	0.0%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 1

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	10:58 AM	11.92	5.16	2.97	-0.22
3/14/19	10:59 AM	11.92	5.15	3.01	-0.21
3/14/19	11:00 AM	11.94	5.13	2.93	-0.25
3/14/19	11:01 AM	11.95	5.12	2.82	-0.22
3/14/19	11:02 AM	11.94	5.12	2.78	-0.23
3/14/19	11:03 AM	11.91	5.14	2.99	-0.21
3/14/19	11:04 AM	11.93	5.12	2.97	-0.22
3/14/19	11:05 AM	11.95	5.11	2.86	-0.23
3/14/19	11:06 AM	11.96	5.10	2.82	-0.23
3/14/19	11:07 AM	11.94	5.11	2.81	-0.22
3/14/19	11:08 AM	11.93	5.12	2.92	-0.23
3/14/19	11:09 AM	11.95	5.10	2.78	-0.21
3/14/19	11:10 AM	11.96	5.10	2.71	-0.21
3/14/19	11:11 AM	11.96	5.10	2.71	-0.19
3/14/19	11:12 AM	11.94	5.11	2.77	-0.20
3/14/19	11:13 AM	11.96	5.10	2.74	-0.20
3/14/19	11:14 AM	11.96	5.10	2.72	-0.19
3/14/19	11:15 AM	11.95	5.10	2.71	-0.19
3/14/19	11:16 AM	11.96	5.10	2.70	-0.20
3/14/19	11:17 AM	11.95	5.10	2.71	-0.20
3/14/19	11:18 AM	11.95	5.10	2.69	-0.19
	Average	11.94	5.11	2.82	-0.21

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 2

TEST VARIABLES				
Start Date:	3/14/19			
Start/End Time:	11:37	11:58		
Test Condition:	303	MW		
Barom. Pressure:	29.81			

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.08	0.12	-0.02	0.13
Pre-Test System Span	9.98	5.07	4.23	4.13
Post-Test System Zero	0.08	0.07	-0.03	0.13
Post-Test System Span	9.98	5.05	4.16	4.12
Raw Test Average	11.96	5.09	2.70	-0.23
Cal Corrected Average	11.97	5.05	2.76	-0.36
Pre-test zero bias	0.4%	1.3%	-0.2%	1.3%
Pre-test span bias	-0.1%	-0.1%	-1.6%	-0.6%
Post-test zero bias	0.4%	0.7%	-0.2%	1.3%
Post-test span bias	-0.2%	-0.3%	-2.3%	-0.7%
Zero drift	0.0%	-0.6%	-0.1%	0.0%
Span drift	0.0%	-0.3%	-0.8%	-0.1%

REFERENCE METHOD 1-MINUTE AVERAGE DATA RUN NUMBER 2					
Date	Time	O_2	CO_2	NO_x	CO
3/14/19	11:38 AM	11.95	5.11	2.70	-0.24
3/14/19	11:39 AM	11.95	5.10	2.68	-0.22
3/14/19	11:40 AM	11.96	5.10	2.67	-0.23
3/14/19	11:41 AM	11.95	5.11	2.69	-0.22
3/14/19	11:42 AM	11.96	5.10	2.68	-0.23
3/14/19	11:43 AM	11.96	5.11	2.69	-0.22
3/14/19	11:44 AM	11.96	5.11	2.68	-0.23
3/14/19	11:45 AM	11.96	5.11	2.69	-0.23
3/14/19	11:46 AM	11.96	5.11	2.69	-0.23
3/14/19	11:47 AM	11.96	5.11	2.73	-0.23
3/14/19	11:48 AM	11.96	5.10	2.74	-0.24
3/14/19	11:49 AM	11.97	5.10	2.73	-0.23
3/14/19	11:50 AM	11.97	5.09	2.73	-0.22
3/14/19	11:51 AM	11.96	5.09	2.74	-0.23
3/14/19	11:52 AM	11.97	5.08	2.73	-0.22
3/14/19	11:53 AM	11.97	5.08	2.67	-0.23
3/14/19	11:54 AM	11.97	5.08	2.67	-0.23
3/14/19	11:55 AM	11.97	5.07	2.67	-0.23
3/14/19	11:56 AM	11.97	5.08	2.69	-0.24
3/14/19	11:57 AM	11.97	5.07	2.67	-0.23
3/14/19	11:58 AM	11.97	5.08	2.71	-0.22
	Average	11.96	5.09	2.70	-0.23

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 3

TEST VARIABLES		
Start Date:	3/14/19	
Start/End Time:	12:12	12:33
Test Condition:	304	MW
Barom. Pressure:	29.81	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.08	0.07	-0.03	0.13
Pre-Test System Span	9.98	5.05	4.16	4.12
Post-Test System Zero	0.09	0.11	-0.03	0.11
Post-Test System Span	9.98	5.04	4.14	4.11
Raw Test Average	11.98	5.08	2.67	-0.23
Cal Corrected Average	12.00	5.06	2.76	-0.34
Pre-test zero bias	0.4%	0.7%	-0.2%	1.3%
Pre-test span bias	-0.2%	-0.3%	-2.3%	-0.7%
Post-test zero bias	0.4%	1.2%	-0.2%	1.0%
Post-test span bias	-0.1%	-0.4%	-2.6%	-0.8%
Zero drift	0.0%	0.5%	0.0%	-0.3%
Span drift	0.0%	0.0%	-0.2%	-0.1%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 3

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	12:13 PM	11.96	5.11	2.70	-0.23
3/14/19	12:14 PM	11.97	5.10	2.72	-0.22
3/14/19	12:15 PM	11.97	5.10	2.69	-0.23
3/14/19	12:16 PM	11.97	5.09	2.70	-0.23
3/14/19	12:17 PM	11.98	5.09	2.69	-0.24
3/14/19	12:18 PM	11.98	5.09	2.68	-0.23
3/14/19	12:19 PM	11.98	5.08	2.70	-0.23
3/14/19	12:20 PM	11.98	5.08	2.72	-0.24
3/14/19	12:21 PM	12.00	5.07	2.66	-0.21
3/14/19	12:22 PM	11.99	5.07	2.60	-0.22
3/14/19	12:23 PM	11.99	5.08	2.61	-0.22
3/14/19	12:24 PM	11.99	5.08	2.64	-0.23
3/14/19	12:25 PM	11.99	5.08	2.64	-0.22
3/14/19	12:26 PM	11.99	5.08	2.65	-0.23
3/14/19	12:27 PM	11.99	5.08	2.66	-0.22
3/14/19	12:28 PM	11.99	5.08	2.65	-0.22
3/14/19	12:29 PM	11.99	5.08	2.63	-0.22
3/14/19	12:30 PM	11.99	5.08	2.66	-0.22
3/14/19	12:31 PM	11.99	5.08	2.68	-0.23
3/14/19	12:32 PM	11.99	5.08	2.66	-0.23
3/14/19	12:33 PM	11.99	5.08	2.66	-0.24
	Average	11.98	5.08	2.67	-0.23

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 4

TEST VARIABLES		
Start Date:	3/14/19	
Start/End Time:	12:49	13:10
Test Condition:	304	MW
Barom. Pressure:	29.81	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.09	0.11	-0.03	0.11
Pre-Test System Span	9.98	5.04	4.14	4.11
Post-Test System Zero	0.10	0.16	0.00	0.10
Post-Test System Span	9.98	5.01	4.13	4.06
Raw Test Average	11.99	5.11	2.67	-0.25
Cal Corrected Average	12.00	5.10	2.77	-0.35
Pre-test zero bias	0.4%	1.2%	-0.2%	1.0%
Pre-test span bias	-0.1%	-0.4%	-2.6%	-0.8%
Post-test zero bias	0.5%	1.7%	0.1%	1.0%
Post-test span bias	-0.1%	-0.7%	-2.7%	-1.4%
Zero drift	0.0%	0.5%	0.3%	-0.1%
Span drift	0.0%	-0.3%	-0.1%	-0.6%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 4

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	12:50 PM	11.97	5.13	2.69	-0.26
3/14/19	12:51 PM	11.97	5.13	2.70	-0.24
3/14/19	12:52 PM	11.97	5.13	2.70	-0.26
3/14/19	12:53 PM	11.98	5.12	2.73	-0.26
3/14/19	12:54 PM	11.98	5.12	2.72	-0.26
3/14/19	12:55 PM	11.98	5.12	2.71	-0.25
3/14/19	12:56 PM	11.98	5.12	2.70	-0.25
3/14/19	12:57 PM	11.98	5.12	2.70	-0.25
3/14/19	12:58 PM	11.98	5.11	2.69	-0.25
3/14/19	12:59 PM	11.98	5.11	2.69	-0.25
3/14/19	1:00 PM	11.98	5.11	2.69	-0.25
3/14/19	1:01 PM	11.98	5.11	2.70	-0.26
3/14/19	1:02 PM	11.99	5.11	2.64	-0.24
3/14/19	1:03 PM	11.99	5.10	2.62	-0.26
3/14/19	1:04 PM	12.00	5.10	2.62	-0.24
3/14/19	1:05 PM	12.00	5.10	2.63	-0.23
3/14/19	1:06 PM	12.00	5.10	2.64	-0.23
3/14/19	1:07 PM	12.00	5.09	2.64	-0.25
3/14/19	1:08 PM	12.01	5.09	2.66	-0.24
3/14/19	1:09 PM	12.00	5.09	2.62	-0.24
3/14/19	1:10 PM	12.00	5.09	2.64	-0.24
	Average	11.99	5.11	2.67	-0.25

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 5

TEST VARIABLES			
Start Date:	3/14/19		
Start/End Time:	13:24	13:45	
Test Condition:	304	MW	
Barom. Pressure:	29.81		

METHOD 3A, 7E, 10 DATA				
	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.10	0.16	0.00	0.10
Pre-Test System Span	9.98	5.01	4.13	4.06
Post-Test System Zero	0.09	0.12	-0.03	0.10
Post-Test System Span	9.98	5.02	4.17	4.03
Raw Test Average	12.01	5.08	2.60	-0.26
Cal Corrected Average	12.02	5.09	2.69	-0.37
Pre-test zero bias	0.5%	1.7%	0.1%	1.0%
Pre-test span bias	-0.1%	-0.7%	-2.7%	-1.4%
Post-test zero bias	0.5%	1.3%	-0.3%	1.0%
Post-test span bias	-0.1%	-0.6%	-2.3%	-1.8%
Zero drift	0.0%	-0.4%	-0.4%	0.0%
Span drift	0.0%	0.0%	0.4%	-0.3%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 5

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	1:25 PM	11.99	5.10	2.74	-0.28
3/14/19	1:26 PM	11.99	5.10	2.67	-0.28
3/14/19	1:27 PM	11.99	5.10	2.66	-0.27
3/14/19	1:28 PM	11.99	5.10	2.67	-0.26
3/14/19	1:29 PM	11.99	5.09	2.69	-0.27
3/14/19	1:30 PM	12.00	5.09	2.70	-0.28
3/14/19	1:31 PM	12.00	5.09	2.71	-0.27
3/14/19	1:32 PM	12.01	5.08	2.65	-0.27
3/14/19	1:33 PM	12.01	5.08	2.60	-0.26
3/14/19	1:34 PM	12.02	5.08	2.61	-0.26
3/14/19	1:35 PM	12.02	5.08	2.60	-0.26
3/14/19	1:36 PM	12.02	5.08	2.59	-0.26
3/14/19	1:37 PM	12.02	5.08	2.53	-0.26
3/14/19	1:38 PM	12.02	5.08	2.51	-0.25
3/14/19	1:39 PM	12.02	5.08	2.51	-0.26
3/14/19	1:40 PM	12.02	5.08	2.52	-0.26
3/14/19	1:41 PM	12.02	5.08	2.57	-0.26
3/14/19	1:42 PM	12.02	5.08	2.53	-0.26
3/14/19	1:43 PM	12.02	5.08	2.52	-0.26
3/14/19	1:44 PM	12.02	5.08	2.53	-0.26
3/14/19	1:45 PM	12.02	5.08	2.52	-0.26
	Average	12.01	5.08	2.60	-0.26

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 6

TEST VARIABLES		
Start Date:	3/14/19	
Start/End Time:	14:05	14:26
Test Condition:	304	MW
Barom. Pressure:	29.81	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.09	0.12	-0.03	0.10
Pre-Test System Span	9.98	5.02	4.17	4.03
Post-Test System Zero	0.09	0.09	-0.02	0.09
Post-Test System Span	9.98	4.98	4.24	4.10
Raw Test Average	12.01	5.07	2.65	-0.26
Cal Corrected Average	12.02	5.09	2.71	-0.36
Pre-test zero bias	0.5%	1.3%	-0.3%	1.0%
Pre-test span bias	-0.1%	-0.6%	-2.3%	-1.8%
Post-test zero bias	0.4%	1.0%	-0.1%	0.8%
Post-test span bias	-0.1%	-1.0%	-1.5%	-1.0%
Zero drift	0.0%	-0.3%	0.1%	-0.1%
Span drift	0.0%	-0.4%	0.8%	0.8%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 6

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	14:06	12.00	5.09	2.66	-0.27
3/14/19	14:07	12.00	5.09	2.65	-0.27
3/14/19	14:08	12.01	5.08	2.63	-0.27
3/14/19	14:09	12.00	5.08	2.64	-0.26
3/14/19	14:10	12.00	5.08	2.65	-0.26
3/14/19	14:11	12.00	5.08	2.66	-0.26
3/14/19	14:12	12.00	5.08	2.64	-0.25
3/14/19	14:13	12.00	5.07	2.68	-0.27
3/14/19	14:14	12.01	5.07	2.71	-0.26
3/14/19	14:15	12.01	5.07	2.69	-0.26
3/14/19	14:16	12.01	5.07	2.65	-0.27
3/14/19	14:17	12.01	5.06	2.63	-0.27
3/14/19	14:18	12.01	5.06	2.61	-0.27
3/14/19	14:19	12.01	5.06	2.62	-0.27
3/14/19	14:20	12.01	5.06	2.62	-0.27
3/14/19	14:21	12.02	5.06	2.64	-0.26
3/14/19	14:22	12.02	5.06	2.63	-0.26
3/14/19	14:23	12.01	5.06	2.65	-0.27
3/14/19	14:24	12.02	5.05	2.66	-0.27
3/14/19	14:25	12.02	5.06	2.62	-0.25
3/14/19	14:26	12.02	5.06	2.63	-0.27
	Average	12.01	5.07	2.65	-0.26

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 7

TEST VARIABLES		
Start Date:	3/14/19	
Start/End Time:	14:41	15:02
Test Condition:	305	MW
Barom. Pressure:	29.81	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.09	0.09	-0.02	0.09
Pre-Test System Span	9.98	4.98	4.24	4.10
Post-Test System Zero	0.09	0.11	0.15	0.07
Post-Test System Span	9.99	5.03	4.30	4.08
Raw Test Average	12.01	5.07	2.73	-0.26
Cal Corrected Average	12.02	5.08	2.71	-0.34
Pre-test zero bias	0.4%	1.0%	-0.1%	0.8%
Pre-test span bias	-0.1%	-1.0%	-1.5%	-1.0%
Post-test zero bias	0.4%	1.2%	1.7%	0.6%
Post-test span bias	-0.1%	-0.5%	-0.8%	-1.1%
Zero drift	0.0%	0.2%	1.8%	-0.2%
Span drift	0.0%	0.5%	0.7%	-0.2%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 7

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	14:42	12.01	5.08	2.72	-0.27
3/14/19	14:43	12.01	5.08	2.69	-0.27
3/14/19	14:44	12.01	5.08	2.68	-0.27
3/14/19	14:45	12.01	5.07	2.69	-0.26
3/14/19	14:46	12.01	5.07	2.71	-0.26
3/14/19	14:47	12.01	5.07	2.73	-0.25
3/14/19	14:48	12.01	5.07	2.73	-0.25
3/14/19	14:49	12.01	5.07	2.75	-0.26
3/14/19	14:50	12.01	5.07	2.72	-0.26
3/14/19	14:51	12.01	5.08	2.74	-0.27
3/14/19	14:52	12.02	5.08	2.74	-0.25
3/14/19	14:53	12.02	5.07	2.69	-0.25
3/14/19	14:54	12.02	5.07	2.73	-0.26
3/14/19	14:55	12.02	5.07	2.72	-0.25
3/14/19	14:56	12.02	5.07	2.74	-0.26
3/14/19	14:57	12.02	5.07	2.73	-0.26
3/14/19	14:58	12.02	5.07	2.74	-0.26
3/14/19	14:59	12.02	5.07	2.74	-0.26
3/14/19	15:00	12.02	5.07	2.75	-0.26
3/14/19	15:01	12.02	5.07	2.75	-0.26
3/14/19	15:02	12.02	5.07	2.73	-0.27
	Average	12.01	5.07	2.73	-0.26

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 8

TEST VARIABLES		
Start Date:	3/14/19	
Start/End Time:	15:15	15:36
Test Condition:	303	MW
Barom. Pressure:	29.81	

METHOD 3A, 7E, 10 DATA

	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.09	0.11	0.15	0.07
Pre-Test System Span	9.99	5.03	4.30	4.08
Post-Test System Zero	0.08	0.09	0.02	0.08
Post-Test System Span	9.99	5.00	4.24	4.09
Raw Test Average	12.02	5.06	2.78	-0.27
Cal Corrected Average	12.02	5.06	2.76	-0.35
Pre-test zero bias	0.4%	1.2%	1.7%	0.6%
Pre-test span bias	-0.1%	-0.5%	-0.8%	-1.1%
Post-test zero bias	0.4%	1.0%	0.3%	0.7%
Post-test span bias	-0.1%	-0.8%	-1.5%	-1.1%
Zero drift	0.0%	-0.2%	-1.4%	0.1%
Span drift	0.0%	-0.3%	-0.7%	0.0%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 8

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	15:16	12.01	5.08	2.87	-0.28
3/14/19	15:17	12.02	5.07	2.85	-0.28
3/14/19	15:18	12.01	5.07	2.81	-0.28
3/14/19	15:19	12.02	5.07	2.84	-0.29
3/14/19	15:20	12.02	5.06	2.82	-0.28
3/14/19	15:21	12.02	5.06	2.83	-0.28
3/14/19	15:22	12.02	5.06	2.84	-0.27
3/14/19	15:23	12.02	5.05	2.80	-0.27
3/14/19	15:24	12.01	5.06	2.80	-0.28
3/14/19	15:25	12.01	5.06	2.81	-0.27
3/14/19	15:26	12.02	5.05	2.76	-0.28
3/14/19	15:27	12.02	5.06	2.77	-0.28
3/14/19	15:28	12.02	5.06	2.79	-0.27
3/14/19	15:29	12.02	5.05	2.79	-0.28
3/14/19	15:30	12.03	5.05	2.78	-0.28
3/14/19	15:31	12.02	5.06	2.75	-0.28
3/14/19	15:32	12.03	5.05	2.74	-0.27
3/14/19	15:33	12.03	5.05	2.71	-0.26
3/14/19	15:34	12.03	5.05	2.68	-0.27
3/14/19	15:35	12.03	5.05	2.69	-0.26
3/14/19	15:36	12.03	5.05	2.70	-0.26
	Average	12.02	5.06	2.78	-0.27

GRAYS HARBOR ENERGY CENTER
DATA AND WORKSHEET
RUN NUMBER 9

TEST VARIABLES		
Start Date:	3/14/19	
Start/End Time:	16:05	16:26
Test Condition:	302	MW
Barom. Pressure:	29.81	

METHOD 3A, 7E, 10 DATA	O_2	CO_2	NO_x	CO
Analyzer Range	20.03	9.33	9.08	8.83
Cal Gas Value	9.97	5.02	4.29	4.02
Pre-Test Direct Zero	0.000	0.00	-0.01	0.01
Pre-Test Direct Span	10.01	5.08	4.38	4.18
Pre-Test System Zero	0.08	0.09	0.02	0.08
Pre-Test System Span	9.99	5.00	4.24	4.09
Post-Test System Zero	0.07	0.06	-0.01	0.07
Post-Test System Span	10.00	5.02	4.19	4.07
Raw Test Average	12.03	5.05	2.72	-0.30
Cal Corrected Average	12.02	5.06	2.76	-0.37
Pre-test zero bias	0.4%	1.0%	0.3%	0.7%
Pre-test span bias	-0.1%	-0.8%	-1.5%	-1.1%
Post-test zero bias	0.4%	0.6%	0.0%	0.6%
Post-test span bias	0.0%	-0.7%	-2.1%	-1.3%
Zero drift	0.0%	-0.4%	-0.4%	-0.1%
Span drift	0.0%	0.1%	-0.6%	-0.2%

REFERENCE METHOD 1-MINUTE AVERAGE DATA
RUN NUMBER 9

Date	Time	O_2	CO_2	NO_x	CO
3/14/19	16:06	12.00	5.09	2.69	-0.28
3/14/19	16:07	12.00	5.08	2.73	-0.29
3/14/19	16:08	12.00	5.08	2.74	-0.31
3/14/19	16:09	12.00	5.08	2.75	-0.31
3/14/19	16:10	12.00	5.08	2.76	-0.31
3/14/19	16:11	12.00	5.07	2.79	-0.30
3/14/19	16:12	12.06	5.04	2.69	-0.31
3/14/19	16:13	12.06	5.04	2.54	-0.30
3/14/19	16:14	12.03	5.05	2.66	-0.29
3/14/19	16:15	12.02	5.05	2.80	-0.30
3/14/19	16:16	12.03	5.04	2.76	-0.30
3/14/19	16:17	12.05	5.03	2.72	-0.29
3/14/19	16:18	12.05	5.04	2.66	-0.30
3/14/19	16:19	12.04	5.04	2.69	-0.30
3/14/19	16:20	12.05	5.03	2.64	-0.30
3/14/19	16:21	12.03	5.05	2.81	-0.30
3/14/19	16:22	12.04	5.04	2.76	-0.29
3/14/19	16:23	12.04	5.04	2.73	-0.29
3/14/19	16:24	12.05	5.04	2.72	-0.29
3/14/19	16:25	12.04	5.04	2.73	-0.30
3/14/19	16:26	12.05	5.04	2.75	-0.29
	Average	12.03	5.05	2.72	-0.30

APPENDIX C
LABORATORY ANALYSIS DATA

Appendix C.1
Ammonia Analyses

MONTROSE AIR QUALITY SERVICES

PROJECT: 021AS-555757
GRAYS HARBOR ENERGY CENTER

CLIENT # M041
REPORT # 19-109

SUBMITTED BY:
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Case Narrative

Date: March 22, 2019

General Information

Client:	Montrose Air Quality Services
Client Number:	M041
Report Number:	19-109
Sample Description:	Impinger Solutions
Sample Numbers:	19-S310 – 19-S331

Analysis

Analytes:	NH_3
Analytical Protocols:	Ion Chromatography: EPA Conditional Test Method 027 (8/14/17 version)
Analytical Notes:	Per client request, the method BAAQMD ST-1B samples were analyzed by ion chromatography instead of by ion selective electrode. No problems were encountered during the analyses. Results have not been blank corrected.
QA/QC Review:	All of the data have been reviewed by the analysts performing the analyses and the project manager. All of the quality control and sample-specific information in this package is complete and meets or exceeds the minimum requirements for acceptability.
Comments:	If you have any questions or concerns regarding this analysis, please feel free to contact the project manager.
Disclaimer:	This report shall not be reproduced, except in full, without the written approval of the laboratory. The results only represent that of the samples as received into the laboratory.

Paul Duda 3/22/19
Project Manager Date
Paul Duda

Lab ID: 19-S310
Client ID: 1-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 9:29
Sample Volume: 372. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	0.902	0.009	335.	3.51

Lab ID: 19-S311
Client ID: 2-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 10:24
Sample Volume: 460. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.01	0.009	466.	4.34

Lab ID: 19-S312
Client ID: 3-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 11:36
Sample Volume: 475. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.03	0.009	489.	4.48

Lab ID: 19-S313
Client ID: 4-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 12:40
Sample Volume: 482. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	0.928	0.009	447.	4.55

Lab ID: 19-S314
Client ID: 5-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 13:18
Sample Volume: 488. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.29	0.009	630.	4.61

Lab ID: 19-S315
Client ID: 6-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 13:59
Sample Volume: 468. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	0.893	0.009	418.	4.42

Lab ID: 19-S316
Client ID: 7-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 14:37
Sample Volume: 458. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.60	0.009	733.	4.32

Lab ID: 19-S317
Client ID: 8-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 15:15
Sample Volume: 468. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.32	0.009	617.	4.42

Lab ID: 19-S318
Client ID: 9-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 15:51
Sample Volume: 470. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.33	0.009	625.	4.44

Lab ID: 19-S319
Client ID: 10-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 16:30
Sample Volume: 470. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.20	0.009	562.	4.44

Client: M041 - Montrose Air Quality Services
Report Number: 19-109

Lab ID: 19-S320
Client ID: 11-NH3-GHU1
Site: Grays Harbor Energy Center
Source: Turbine 1
Sample Date: 3/13/19
Sample Time: 17:14
Sample Volume: 460. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.45	0.009	666.	4.34

Lab ID: 19-S321
Client ID: 1-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 10:57
Sample Volume: 419. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.97	0.009	825.	3.96

Lab ID: 19-S322
Client ID: 2-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 11:37
Sample Volume: 438. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.78	0.009	780.	4.13

Lab ID: 19-S323
Client ID: 3-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 12:13
Sample Volume: 435. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.11	0.009	485.	4.11

Lab ID: 19-S324
Client ID: 4-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 12:49
Sample Volume: 412. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.72	0.009	707.	3.89

Analysis performed by: ***CHESTER LabNet***
12242 SW Garden Place ♦ Tigard, OR 97223 ♦ (503) 624-2183 ♦ www.chesterlab.net

Lab ID: 19-S325
Client ID: 5-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 13:24
Sample Volume: 420. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.70	0.009	712.	3.96

Lab ID: 19-S326
Client ID: 6-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 14:05
Sample Volume: 415. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.69	0.009	700.	3.92

Lab ID: 19-S327
Client ID: 7-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 14:14
Sample Volume: 450. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.69	0.009	762.	4.25

Lab ID: 19-S328
Client ID: 8-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 15:15
Sample Volume: 421. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.70	0.009	717.	3.97

Lab ID: 19-S329
Client ID: 9-NH3-GHU2
Site: Grays Harbor Energy Center
Source: Turbine 2
Sample Date: 3/14/19
Sample Time: 16:05
Sample Volume: 450. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH3	1.92	0.009	865.	4.25

Client: M041 - Montrose Air Quality Services
Report Number: 19-109

Lab ID: 19-S330
Client ID: RB-GH 1+2
Site: Grays Harbor Energy Center
Sample Date: 3/14/19
Sample Time: 17:00
Comments: Reagent Blank
Sample Volume: 490. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH_3	< DL	0.009	< DL	4.63

Lab ID: 19-S331
Client ID: FB-GH-NH3
Site: Grays Harbor Energy Center
Sample Date: 3/14/19
Sample Time: 14:00
Comments: Field Blank
Sample Volume: 460. mL

Analyte	mg/L Conc.	mg/L DL	µg/sample Conc.	µg/sample DL
NH_3	< DL	0.009	< DL	4.34

QA/QC Report

Client Name: Montrose Air Quality Services
Project Number: M041
Analytical Technique: Ion Chromatography
Sample Description: BAAQMD ST-1B 0.1N H2SO4
Report Number: 19-109
==

Blank Data

Analyte	Sample ID	Measured Conc. mg/L	DL Conc. mg/L
NH4	ICB	< DL	0.010
NH4	CCB	< DL	0.010
NH4	CCB	< DL	0.010
NH4	CCB	< DL	0.010
NH4	ICB	< DL	0.010
NH4	CCB	< DL	0.010

ICB: Initial Calibration Blank CCB: Continuing Calibration Blank

Calibration QC

Analyte	Sample ID	Standard Conc. mg/L	Measured Conc. mg/L	Percent Recovery
NH4	ICV	0.500	0.53	105.2
NH4	LL-LCS	0.030	0.03	100.0
NH4	CCV	0.500	0.52	104.4
NH4	CCV	0.500	0.52	104.4
NH4	CCV	0.500	0.51	102.2
NH4	ICV	0.500	0.53	105.8
NH4	CCV	0.500	0.51	102.6

ICV: Initial Calibration Verification CCV: Continuing Calibration Verification
Calibration Verification Limits: 90% - 110% Recovery
LL-LCS Limits: 50% - 150% Recovery

Duplicate Data

Analyte	Sample ID	Sample Conc. mg/L	Duplicate Conc. mg/L	RPD
NH4	19-S310	0.955	0.956	0.10
NH4	19-S321	2.09	2.06	1.25

RPD = {(sample-duplicate)/[(sample+duplicate)/2]}x100
N/C: RPD is not calculated when sample or duplicate is below detection limit
Duplicate Limit: 20% RPD
#: per EPA CLP protocol, control limits do not apply if sample and/or duplicate concentration is less than 5x the detection limit

Matrix Spike Analysis

Analyte	Sample ID	Sample Conc. mg/L	Spike Conc. mg/L	Spike Amount mg/L	Percent Recovery
NH4	19-S310	0.955	1.46	0.500	100.
NH4	19-S321	2.09	3.00	1.00	91.7

Spike Limit: 75% - 125% Recovery
*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

LCS Limit: 80% - 120% Recovery

CHESTER LABNET

SOURCE SAMPLE RECEIPT CHECKLIST

Client: Montrose Air Quality Services — Date: 3/19/19

Runs: 20 + blanks — Report #: 19-109

Custody Seals Inspected, If Present	N/A	
Chain-of-Custody Form Inspected	✓	
CoC present with samples?	✓	*
CoC indicate analytical methodology to be used? (eg M29 etc)	ST-1B	!!
CoC indicate if compliance testing? (esp. M26)	—	!!
M26 samples have Thiosulfate added in field?	N/A	!!
M29 indicate FH/BH separate or combined?	N/A	!!
Has Form Been Signed?	✓	
Have Date and Time Custody Released Been Noted on Form?	✓	
All Sample Containers Inspected	✓	
Does Number of Samples Match Number on CoC Form?	✓	!!
Do All Sample ID Numbers Match Those on the CoC Form?	No	!!
Did client mark sample volumes prior to shipment?	No	*
If required by method, did client vent samples prior to shipment?	N/A	
Are the Sample Containers Intact?	✓	!!
Are signs of leakage present?	No	*
Chain-of-Custody Form Signed and Dated by CLN	✓	
Corrective Actions		
Client Contacted Due to Mismatching Sample ID Numbers	✓	
Client Contacted Due to Broken Sample Container(s)	—	
Client Contacted Due to Leaking Sample Container(s)	—	
Client contacted for verification of methodology?	✓	
Corrective Actions Documented?	✓	
Corrective Actions Accomplished?	✓	

Items marked !! shall be addressed ***prior to any analytical work being started.***
*Items marked * shall be* ***noted in case narrative*** *upon reporting of results to client.*

Signed: Paul D[illegible]

Notes: Sample labels did not match the CoC. Used the IDs from the labels for the report, per Allan K. 3/20/19
IC is ok for analysis

MONTROSE AIR QUALITY SERVICES

CHAIN OF COUSTODY

Seattle Location
4150 B Place NW, Suite 106
Auburn, WA 98001
(253) 480-3800

Lab info:

CHESTER LABNET
TIGARD, OR

Client / Project:	**Project / Sample Location:**	**Test / Analytical Method:**
Grays Harbor Energy Center	Turbine 1	BAAQMD ST-1B
Project No.: 021AS-555757	**Purchase Order No:**	**Special Analysis / Reporting Instructions:**
Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com Rudy Nunez	**Sampler or PM Signature:**	

Run / Sample No.	Date	Time	Containers	ID	Sample Fraction	Reagent	Lab / Sample ID No.
~~1-NH3-GHU1~~	3/13/19	0929	500 ml HDPE	1-NH3-GHU1	Impinger	0.1N H2SO4	19-S310
~~1-NH3-GHU2~~	3/13/19	1024	500 ml HDPE	2-NH3-GHU1	Impinger	0.1N H2SO4	311
~~1-NH3-GHU3~~	3/13/19	1136	500 ml HDPE	3-NH3-GHU1	Impinger	0.1N H2SO4	312
~~1-NH3-GHU4~~	3/13/19	1240	500 ml HDPE	4-NH3-GHU1	Impinger	0.1N H2SO4	313
~~1-NH3-GHU5~~	3/13/19	1318	500 ml HDPE	5-NH3-GHU1	Impinger	0.1N H2SO4	314
~~1-NH3-GHU6~~	3/13/19	1359	500 ml HDPE	6-NH3-GHU1	Impinger	0.1N H2SO4	315
~~1-NH3-GHU7~~	3/13/19	1437	500 ml HDPE	7-NH3-GHU1	Impinger	0.1N H2SO4	316
~~1-NH3-GHU8~~	3/13/19	1515	500 ml HDPE	8-NH3-GHU1	Impinger	0.1N H2SO4	317
~~1-NH3-GHU9~~	3/13/19	1551	500 ml HDPE	9-NH3-GHU1	Impinger	0.1N H2SO4	318
~~1-NH3-GHU10~~	3/13/19	1630	500 ml HDPE	10-NH3-GHU1	Impinger	0.1N H2SO4	319
~~1-NH3-GHU11~~	3/13/19	1714	500 ml HDPE	11-NH3-GHU1	Impinger	0.1N H2SO4	320
IDs incorrect							
Total Containers							

Relinquished by	Date	Time	Received by	Date	Time	Temp.
MAQS	3/14/19	1805	Allon Kienitz	3-14-19	1810	
Allon Kienitz	3-18-19	1000	Fedex			
				3/19/19	940	9.5°C

MAQS Chain of Custody (UNIT 1)

MONTROSE AIR QUALITY SERVICES

CHAIN OF COUSTODY

Seattle Location
4150 B Place NW, Suite 106
Auburn, WA 98001
(253) 480-3800

Lab info:
CHESTER LABNET
TIGARD, OR

Client / Project: Grays Harbor Energy Center	**Project / Sample Location:** Turbine 2	**Test / Analytical Method:** BAAQMD ST-1B
Project No.: 021AS-555757	**Purchase Order No:**	**Special Analysis / Reporting Instructions:**
Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com Rudy Nunez	**Sampler or PM Signature:**	

Run / Sample No.	Date	Time	Containers	ID	Sample Fraction	Reagent	Lab / Sample ID No.
~~1-NH3-GHU1~~	3/14/19	1057	500 ml HDPE	1-NH3-GHU2	Impinger	0.1N H2SO4	19-5321
~~1-NH3-GHU2~~	3/14/19	1137	500 ml HDPE	2-NH3-GHU2	Impinger	0.1N H2SO4	322
~~1-NH3-GHU3~~	3/14/19	1213	500 ml HDPE	3-NH3-GHU2	Impinger	0.1N H2SO4	323
~~1-NH3-GHU4~~	3/14/19	1249	500 ml HDPE	4-NH3-GHU2	Impinger	0.1N H2SO4	324
~~1-NH3-GHU5~~	3/14/19	1324	500 ml HDPE	5-NH3-GHU2	Impinger	0.1N H2SO4	325
~~1-NH3-GHU6~~	3/14/19	1405	500 ml HDPE	6-NH3-GHU2	Impinger	0.1N H2SO4	326
~~1-NH3-GHU7~~	3/14/19	1414	500 ml HDPE	7-NH3-GHU2	Impinger	0.1N H2SO4	327
~~1-NH3-GHU8~~	3/14/19	1515	500 ml HDPE	8-NH3-GHU2	Impinger	0.1N H2SO4	328
~~1-NH3-GHU9~~	3/14/19	1605	500 ml HDPE	9-NH3-GHU2	Impinger	0.1N H2SO4	329
RB-GH 1+2	3/14/19	1700	500 ml HDPE		REAGENT BLANK	0.1N H2SO4	330
FB-GH-NH3	3/14/19	1400	500 ml HDPE		FIELD BLANK	0.1N H2SO4	331
IDs incorrect							
Total Containers							

Relinquished by	Date	Time	Received by	Date	Time	Temp.
MAQS	3/14/19	1805	Allon Kienitz	3-14-19	1810	
Allon Kienitz	3-18-19	1000	Fedex			
				3/19/19	940	9.5°C

MAQS Chain of Custody (UNIT 2)

RAW DATA

Available upon request

Appendix C.2
Fuel Analyses

Saybolt
A CORE LABORATORIES COMPANY

Saybolt Petroleum Services
A Core Laboratories Company
201 Deerwood Glen Dr
Deer Park, TX 77536
281-478-1300

GRAYS HARBOR ENERGY
Paul Hughes
401 KEYS ROAD
ELMA, WA 98541

Report Number : 13071- 15731
Date Reported: 3/15/2019
Date Received: 3/12/2019

Analytical Report

Sample No.: 7911065 **Sample ID Monthly Gas** **Date Sampled 3/6/2019 8:45:00 AM**

Test	Result	Units	Method	Date	Analyst
Sulfur, Total Volatile	0.182	Gr / 100 SCF	ASTM D-6667	3/12/2019	CB
Ultimate Gas Analysis					
Hydrogen	<0.01	Mol %	ASTM D-1945	3/13/2019	KTN
Oxygen	0.02	Mol %			
Nitrogen	0.42	Mol %			
Carbon Dioxide	0.20	Mol %			
Methane	92.28	Mol %			
Ethane	5.36	Mol %			
Propane	1.26	Mol %			
Isobutane	0.18	Mol %			
n-Butane	0.19	Mol %			
Isopentane	0.04	Mol %			
n-Pentane	0.03	Mol %			
Hexanes Plus	0.02	Mol %			
Total	100.00	Mol %			
Molecular Weight	17.5	Kg/Kg-mole	ASTM D-3588		
Molar Mass Ratio	0.60310				
Relative Density	0.60428				
Compressibility Factor	0.99763				
Gross Heating Value (Dry)	1074.5	BTU/CF (Ideal)			
Gross Heating Value (Dry)	1077.0	BTU/CF (Real)			
Net Heating Value (Dry)	969.8	BTU/CF (Ideal)			
Net Heating Value (Dry)	972.1	BTU/CF (Real)			
F Factor @ 20°C & 29.92 in.	8650	dscf/mmBTU			
Pressure Base	14.696	psia			
Carbon Content	74.91	WT %	ASTM D-1945		
Hydrogen Content	24.02	WT %			
Oxygen Content	0.40	WT %			
Nitrogen Content	0.67	WT %			
Sulfur Content	<0.01	WT %			

Approved By: C. Cogdell

Cecile Cogdell
Laboratory Supervisor

Core Lab
RESERVOIR OPTIMIZATION
201 Deerwood Glen Drive
Deer Park, Texas 77536
Phone: 281-478-1300
Fax: 281-476-9209

SAYBOLT PETROLEUM SERVICES

No. 11371

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION

COMPANY: GRAYS HARBOR ENERGY LLC
SEND REPORT TO: PAUL HUGHES
ADDRESS: 401 Keys Rd
Elma, WA 98541
PHONE: 360 482 6291
FAX: 360 482 4376

PROJECT INFORMATION

PROJECT NAME/NUMBER: MONTHLY GAS

BILLING INFORMATION

BILL TO: ↑
ADDRESS: Same
PHONE: ↓
FAX:
PO NO.:

ANALYSIS / METHOD REQUEST: GCV; Total Sulfur ASTM D-6667

LAB JOB NO.:

SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV.	NUMBER OF CONTAINERS	GCV	Total Sulfur ASTM D-6667	REMARKS / PRECAUTIONS
2618	NATURAL GAS	3-6-19	0845	NAT. GAS	Cyl.		1	X	X	

SAMPLER: Kyle Filla Kyle Filla
SHIPMENT METHOD:
AIRBILL NO.:

REQUIRED TURNAROUND:* ☐ SAME DAY ☐ 24 HOURS ☐ 48 HOURS ☐ 72 HOURS ☐ 5 DAYS ☒ 10 DAYS ☐ ROUTINE OTHER

1. RELINQUISHED BY:		2. RELINQUISHED BY:		3. RELINQUISHED BY:	
SIGNATURE: [signature]	DATE 3-6-19	SIGNATURE:	DATE	SIGNATURE:	DATE
PRINTED NAME/COMPANY: ERIC PAGE / Invenergy	TIME 0900	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME

1. RECEIVED BY:		2. RECEIVED BY:		3. RECEIVED BY:	
SIGNATURE: [signature]	DATE 3/12/19	SIGNATURE:	DATE	SIGNATURE:	DATE
PRINTED NAME/COMPANY: Jennifer Titterington-James Saybolt	TIME 1:45p	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME

* RUSH TURNAROUND MAY REQUIRE SURCHARGE

ORIGINAL

APPENDIX D
FACILITY CEMS AND PROCESS DATA

Appendix D.1
Process Data and CEMS Data during RATA

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 9:30 AM thru 3/13/2019 9:50 AM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 9:30	2.54	1.73	0.0064	14.54	0.31	0.21	0.0005	1.13	12.25
3/13 9:31	2.34	1.60	0.0059	13.41	0.28	0.19	0.0004	0.91	12.26
3/13 9:32	2.31	1.57	0.0058	13.20	0.27	0.18	0.0004	0.92	12.24
3/13 9:33	2.31	1.57	0.0058	13.19	0.34	0.23	0.0005	1.13	12.24
3/13 9:34	2.30	1.57	0.0058	13.20	0.29	0.20	0.0004	0.92	12.25
3/13 9:35	2.38	1.62	0.0060	13.65	0.32	0.22	0.0005	1.13	12.25
3/13 9:36	2.32	1.58	0.0058	13.21	0.32	0.22	0.0005	1.13	12.25
3/13 9:37	2.30	1.57	0.0058	13.19	0.36	0.25	0.0006	1.36	12.26
3/13 9:38	2.29	1.56	0.0058	12.94	0.38	0.26	0.0006	1.36	12.25
3/13 9:39	2.32	1.58	0.0058	13.20	0.33	0.22	0.0005	1.13	12.24
3/13 9:40	2.48	1.69	0.0062	14.11	0.38	0.26	0.0006	1.36	12.22
3/13 9:41	2.49	1.69	0.0062	14.12	0.36	0.24	0.0005	1.13	12.23
3/13 9:42	2.49	1.69	0.0062	14.13	0.32	0.22	0.0005	1.14	12.22
3/13 9:43	2.50	1.70	0.0063	14.13	0.30	0.20	0.0005	1.14	12.22
3/13 9:44	2.49	1.69	0.0062	14.13	0.32	0.22	0.0005	1.13	12.23
3/13 9:45	2.47	1.68	0.0062	14.10	0.34	0.23	0.0005	1.13	12.24
3/13 9:46	2.41	1.65	0.0061	13.64	0.32	0.22	0.0005	1.13	12.26
3/13 9:47	2.36	1.61	0.0059	13.42	0.29	0.20	0.0004	0.91	12.27
3/13 9:48	2.47	1.68	0.0062	14.12	0.33	0.22	0.0005	1.13	12.23
3/13 9:49	2.57	1.75	0.0064	14.59	0.30	0.20	0.0005	1.14	12.22
3/13 9:50	2.56	1.74	0.0064	14.59	0.31	0.21	0.0005	1.14	12.22
Average (all)	2.41	1.64	0.0061	13.75	0.32	0.22	0.0005	1.12	12.24
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.29	1.56	0.0058	12.94	0.27	0.18	0.0004	0.91	12.22
Maximum (all)	2.57	1.75	0.0064	14.59	0.38	0.26	0.0006	1.36	12.27
Average (valid values only)	2.41	1.64	0.0061	13.75	0.32	0.22	0.0005	1.12	12.24
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 9:30 AM thru 3/13/2019 9:50 AM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 9:30	16558.5	4537.7	21096	2272.1	301
3/13 9:31	16577.9	4538.8	21117	2274.2	302
3/13 9:32	16604.8	4536.8	21142	2276.9	302
3/13 9:33	16577.7	4531.7	21109	2273.5	302
3/13 9:34	16600.9	4532.1	21133	2276.0	302
3/13 9:35	16584.3	4540.1	21124	2275.1	302
3/13 9:36	16602.4	4539.6	21142	2277.0	302
3/13 9:37	16582.3	4537.7	21120	2274.6	301
3/13 9:38	16551.8	4535.0	21087	2271.0	301
3/13 9:39	16598.0	4531.3	21129	2275.6	301
3/13 9:40	16611.9	4527.9	21140	2276.8	302
3/13 9:41	16619.6	4530.2	21150	2277.8	303
3/13 9:42	16621.4	4540.3	21162	2279.1	303
3/13 9:43	16630.2	4538.1	21168	2279.9	303
3/13 9:44	16617.9	4541.0	21159	2278.8	303
3/13 9:45	16575.7	4535.5	21111	2273.7	302
3/13 9:46	16569.1	4533.2	21102	2272.7	302
3/13 9:47	16581.2	4537.2	21118	2274.5	302
3/13 9:48	16614.5	4533.9	21148	2277.7	302
3/13 9:49	16638.2	4533.0	21171	2280.1	302
3/13 9:50	16624.3	4535.0	21159	2278.8	303
Average (all)	16597.3	4535.5	21133	2276.0	302
Total (all)	--	--	--	--	--
Minimum (all)	16551.8	4527.9	21087	2271.0	301
Maximum (all)	16638.2	4541.0	21171	2280.1	303
Average (valid values only)	16597.3	4535.5	21133	2276.0	302
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 10:25 AM thru 3/13/2019 10:45 AM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 10:25	2.35	1.60	0.0059	13.40	0.28	0.19	0.0004	0.90	12.22
3/13 10:26	2.31	1.57	0.0058	13.20	0.35	0.24	0.0005	1.13	12.21
3/13 10:27	2.38	1.62	0.0060	13.43	0.36	0.24	0.0005	1.13	12.21
3/13 10:28	2.36	1.60	0.0059	13.43	0.38	0.26	0.0006	1.36	12.22
3/13 10:29	2.34	1.59	0.0059	13.19	0.37	0.25	0.0006	1.36	12.21
3/13 10:30	2.40	1.63	0.0060	13.67	0.33	0.22	0.0005	1.14	12.21
3/13 10:31	2.39	1.62	0.0060	13.64	0.33	0.22	0.0005	1.13	12.21
3/13 10:32	2.35	1.60	0.0059	13.42	0.28	0.19	0.0004	0.91	12.22
3/13 10:33	2.39	1.62	0.0060	13.65	0.28	0.19	0.0004	0.91	12.22
3/13 10:34	2.44	1.66	0.0061	13.88	0.34	0.23	0.0005	1.13	12.21
3/13 10:35	2.47	1.68	0.0062	14.10	0.31	0.21	0.0005	1.13	12.21
3/13 10:36	2.46	1.67	0.0062	13.88	0.33	0.22	0.0005	1.13	12.21
3/13 10:37	2.44	1.66	0.0061	13.88	0.30	0.20	0.0005	1.13	12.22
3/13 10:38	2.41	1.64	0.0060	13.63	0.31	0.21	0.0005	1.13	12.21
3/13 10:39	2.48	1.68	0.0062	14.11	0.26	0.18	0.0004	0.92	12.21
3/13 10:40	2.46	1.67	0.0062	13.88	0.29	0.20	0.0004	0.91	12.22
3/13 10:41	2.40	1.63	0.0060	13.64	0.32	0.22	0.0005	1.13	12.23
3/13 10:42	2.42	1.65	0.0061	13.88	0.32	0.22	0.0005	1.13	12.23
3/13 10:43	2.47	1.68	0.0062	14.09	0.35	0.24	0.0005	1.13	12.22
3/13 10:44	2.47	1.68	0.0062	14.10	0.29	0.20	0.0004	0.91	12.22
3/13 10:45	2.44	1.66	0.0061	13.85	0.29	0.20	0.0004	0.90	12.22
Average (all)	2.41	1.64	0.0060	13.71	0.32	0.22	0.0005	1.08	12.22
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.31	1.57	0.0058	13.19	0.26	0.18	0.0004	0.90	12.21
Maximum (all)	2.48	1.68	0.0062	14.11	0.38	0.26	0.0006	1.36	12.23
Average (valid values only)	2.41	1.64	0.0060	13.71	0.32	0.22	0.0005	1.08	12.22
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 10:25 AM thru 3/13/2019 10:45 AM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 10:25	16573.5	4514.5	21088	2271.2	302
3/13 10:26	16607.3	4528.2	21136	2276.3	302
3/13 10:27	16601.7	4528.8	21131	2275.8	304
3/13 10:28	16621.2	4524.4	21146	2277.4	304
3/13 10:29	16604.8	4521.1	21126	2275.2	304
3/13 10:30	16637.7	4514.9	21153	2278.2	303
3/13 10:31	16584.3	4520.0	21104	2272.9	304
3/13 10:32	16602.6	4521.1	21124	2275.0	304
3/13 10:33	16609.7	4517.6	21127	2275.4	303
3/13 10:34	16604.8	4518.9	21124	2275.0	303
3/13 10:35	16589.8	4523.8	21114	2273.9	303
3/13 10:36	16607.0	4522.0	21129	2275.6	303
3/13 10:37	16608.6	4518.7	21127	2275.4	303
3/13 10:38	16581.2	4526.0	21107	2273.3	303
3/13 10:39	16607.5	4528.8	21136	2276.4	303
3/13 10:40	16584.1	4531.3	21115	2274.1	303
3/13 10:41	16587.4	4520.2	21108	2273.3	303
3/13 10:42	16594.9	4528.4	21123	2275.0	304
3/13 10:43	16572.1	4526.0	21098	2272.3	303
3/13 10:44	16598.0	4526.0	21124	2275.1	303
3/13 10:45	16560.7	4523.3	21084	2270.8	302
Average (all)	16597.1	4523.0	21120	2274.6	303
Total (all)	--	--	--	--	--
Minimum (all)	16560.7	4514.5	21084	2270.8	302
Maximum (all)	16637.7	4531.3	21153	2278.2	304
Average (valid values only)	16597.1	4523.0	21120	2274.6	303
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 11:37 AM thru 3/13/2019 11:57 AM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 11:37	2.42	1.64	0.0060	13.65	0.24	0.16	0.0004	0.91	12.19
3/13 11:38	2.39	1.62	0.0060	13.63	0.31	0.21	0.0005	1.13	12.19
3/13 11:39	2.40	1.63	0.0060	13.63	0.30	0.20	0.0005	1.13	12.20
3/13 11:40	2.42	1.64	0.0060	13.62	0.33	0.22	0.0005	1.13	12.19
3/13 11:41	2.42	1.64	0.0060	13.63	0.26	0.18	0.0004	0.90	12.19
3/13 11:42	2.42	1.64	0.0060	13.66	0.27	0.18	0.0004	0.91	12.19
3/13 11:43	2.51	1.70	0.0063	14.11	0.29	0.20	0.0004	0.91	12.18
3/13 11:44	2.44	1.66	0.0061	13.87	0.32	0.22	0.0005	1.13	12.21
3/13 11:45	2.42	1.64	0.0060	13.62	0.40	0.27	0.0006	1.36	12.20
3/13 11:46	2.37	1.61	0.0059	13.44	0.36	0.24	0.0005	1.14	12.20
3/13 11:47	2.58	1.74	0.0064	14.56	0.31	0.21	0.0005	1.13	12.16
3/13 11:48	2.63	1.78	0.0065	14.78	0.27	0.18	0.0004	0.91	12.16
3/13 11:49	2.51	1.70	0.0063	14.08	0.33	0.22	0.0005	1.13	12.18
3/13 11:50	2.29	1.55	0.0057	12.92	0.33	0.22	0.0005	1.13	12.21
3/13 11:51	2.14	1.45	0.0054	12.01	0.34	0.23	0.0005	1.13	12.22
3/13 11:52	2.20	1.49	0.0055	12.55	0.33	0.22	0.0005	1.14	12.20
3/13 11:53	2.41	1.63	0.0060	13.65	0.29	0.20	0.0004	0.91	12.17
3/13 11:54	2.29	1.55	0.0057	12.93	0.26	0.18	0.0004	0.90	12.19
3/13 11:55	2.26	1.53	0.0056	12.75	0.28	0.19	0.0004	0.91	12.19
3/13 11:56	2.42	1.63	0.0060	13.66	0.22	0.15	0.0003	0.69	12.16
3/13 11:57	2.40	1.62	0.0060	13.64	0.25	0.17	0.0004	0.91	12.17
Average (all)	2.40	1.62	0.0060	13.54	0.30	0.20	0.0005	1.03	12.19
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.14	1.45	0.0054	12.01	0.22	0.15	0.0003	0.69	12.16
Maximum (all)	2.63	1.78	0.0065	14.78	0.40	0.27	0.0006	1.36	12.22
Average (valid values only)	2.40	1.62	0.0060	13.54	0.30	0.20	0.0005	1.03	12.19
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 11:37 AM thru 3/13/2019 11:57 AM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 11:37	16600.2	4522.0	21122	2274.8	304
3/13 11:38	16569.3	4526.2	21096	2272.0	303
3/13 11:39	16577.2	4526.4	21104	2272.9	303
3/13 11:40	16559.1	4522.2	21081	2270.4	303
3/13 11:41	16576.6	4523.5	21100	2272.5	303
3/13 11:42	16626.5	4520.9	21147	2277.6	304
3/13 11:43	16609.5	4524.6	21134	2276.1	304
3/13 11:44	16590.9	4517.3	21108	2273.3	304
3/13 11:45	16554.5	4522.6	21077	2270.0	303
3/13 11:46	16637.5	4523.1	21161	2279.0	304
3/13 11:47	16608.8	4512.0	21121	2274.7	304
3/13 11:48	16603.9	4518.5	21122	2274.8	304
3/13 11:49	16560.2	4528.2	21088	2271.2	303
3/13 11:50	16537.3	4518.0	21055	2267.7	303
3/13 11:51	16541.7	4507.9	21050	2267.0	303
3/13 11:52	16656.7	4517.3	21174	2280.4	304
3/13 11:53	16602.2	4522.0	21124	2275.1	303
3/13 11:54	16550.3	4519.3	21070	2269.2	303
3/13 11:55	16637.9	4512.9	21151	2277.9	304
3/13 11:56	16616.3	4520.2	21137	2276.4	304
3/13 11:57	16599.1	4507.0	21106	2273.1	304
Average (all)	16591.2	4519.6	21111	2273.6	304
Total (all)	--	--	--	--	--
Minimum (all)	16537.3	4507.0	21050	2267.0	303
Maximum (all)	16656.7	4528.2	21174	2280.4	304
Average (valid values only)	16591.2	4519.6	21111	2273.6	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 12:41 PM thru 3/13/2019 1:01 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 12:41	2.29	1.56	0.0057	12.97	0.25	0.17	0.0004	0.92	12.22
3/13 12:42	2.33	1.58	0.0058	13.20	0.26	0.18	0.0004	0.91	12.21
3/13 12:43	2.36	1.60	0.0059	13.43	0.25	0.17	0.0004	0.91	12.20
3/13 12:44	2.36	1.60	0.0059	13.43	0.24	0.16	0.0004	0.91	12.21
3/13 12:45	2.37	1.61	0.0059	13.43	0.30	0.20	0.0005	1.13	12.21
3/13 12:46	2.41	1.63	0.0060	13.65	0.30	0.20	0.0005	1.13	12.20
3/13 12:47	2.44	1.65	0.0061	13.88	0.27	0.18	0.0004	0.92	12.19
3/13 12:48	2.44	1.65	0.0061	13.90	0.28	0.19	0.0004	0.92	12.20
3/13 12:49	2.50	1.69	0.0062	14.12	0.22	0.15	0.0003	0.69	12.18
3/13 12:50	2.57	1.74	0.0064	14.57	0.31	0.21	0.0005	1.13	12.18
3/13 12:51	2.55	1.72	0.0063	14.35	0.29	0.20	0.0004	0.92	12.17
3/13 12:52	2.55	1.72	0.0063	14.36	0.22	0.15	0.0003	0.69	12.17
3/13 12:53	2.53	1.71	0.0063	14.37	0.20	0.14	0.0003	0.69	12.16
3/13 12:54	2.54	1.71	0.0063	14.32	0.30	0.20	0.0005	1.13	12.15
3/13 12:55	2.34	1.58	0.0058	13.19	0.23	0.16	0.0003	0.69	12.18
3/13 12:56	2.31	1.56	0.0057	12.97	0.29	0.20	0.0004	0.92	12.16
3/13 12:57	2.41	1.63	0.0060	13.66	0.25	0.17	0.0004	0.92	12.16
3/13 12:58	2.36	1.60	0.0059	13.44	0.29	0.20	0.0004	0.91	12.18
3/13 12:59	2.34	1.58	0.0058	13.18	0.31	0.21	0.0005	1.13	12.17
3/13 13:00	2.34	1.58	0.0058	13.19	0.29	0.20	0.0004	0.91	12.17
3/13 13:01	2.38	1.61	0.0059	13.42	0.32	0.22	0.0005	1.13	12.17
Average (all)	2.42	1.63	0.0060	13.67	0.27	0.18	0.0004	0.93	12.18
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.29	1.56	0.0057	12.97	0.20	0.14	0.0003	0.69	12.15
Maximum (all)	2.57	1.74	0.0064	14.57	0.32	0.22	0.0005	1.13	12.22
Average (valid values only)	2.42	1.63	0.0060	13.67	0.27	0.18	0.0004	0.93	12.18
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 12:41 PM thru 3/13/2019 1:01 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 12:41	16599.7	4535.2	21135	2276.2	303
3/13 12:42	16587.6	4542.5	21130	2275.7	303
3/13 12:43	16585.8	4544.3	21130	2275.7	303
3/13 12:44	16589.2	4545.6	21135	2276.3	303
3/13 12:45	16596.9	4535.9	21133	2276.0	303
3/13 12:46	16585.8	4535.9	21122	2274.8	303
3/13 12:47	16597.3	4540.1	21137	2276.5	303
3/13 12:48	16615.4	4535.5	21151	2278.0	303
3/13 12:49	16607.5	4531.0	21139	2276.6	303
3/13 12:50	16596.9	4537.9	21135	2276.2	303
3/13 12:51	16615.9	4543.8	21160	2278.9	304
3/13 12:52	16620.3	4534.1	21154	2278.3	304
3/13 12:53	16632.9	4533.0	21166	2279.6	304
3/13 12:54	16569.1	4540.3	21109	2273.5	303
3/13 12:55	16571.0	4542.3	21113	2273.9	303
3/13 12:56	16606.4	4536.3	21143	2277.1	303
3/13 12:57	16602.4	4540.8	21143	2277.1	304
3/13 12:58	16611.5	4526.0	21138	2276.6	304
3/13 12:59	16575.2	4537.2	21112	2273.8	303
3/13 13:00	16586.7	4533.5	21120	2274.7	304
3/13 13:01	16591.1	4533.7	21125	2275.2	303
Average (all)	16597.4	4537.4	21135	2276.2	303
Total (all)	--	--	--	--	--
Minimum (all)	16569.1	4526.0	21109	2273.5	303
Maximum (all)	16632.9	4545.6	21166	2279.6	304
Average (valid values only)	16597.4	4537.4	21135	2276.2	303
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 1:18 PM thru 3/13/2019 1:38 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 13:18	2.53	1.70	0.0063	14.36	0.30	0.20	0.0005	1.14	12.13
3/13 13:19	2.56	1.73	0.0064	14.34	0.25	0.17	0.0004	0.92	12.15
3/13 13:20	2.43	1.64	0.0060	13.63	0.39	0.26	0.0006	1.36	12.16
3/13 13:21	2.38	1.61	0.0059	13.42	0.37	0.25	0.0006	1.36	12.17
3/13 13:22	2.35	1.59	0.0059	13.19	0.30	0.20	0.0005	1.13	12.18
3/13 13:23	2.35	1.59	0.0059	13.19	0.32	0.22	0.0005	1.13	12.18
3/13 13:24	2.36	1.59	0.0059	13.41	0.25	0.17	0.0004	0.91	12.16
3/13 13:25	2.37	1.60	0.0059	13.44	0.30	0.20	0.0005	1.13	12.17
3/13 13:26	2.45	1.65	0.0061	13.90	0.28	0.19	0.0004	0.92	12.15
3/13 13:27	2.54	1.71	0.0063	14.36	0.29	0.20	0.0004	0.92	12.14
3/13 13:28	2.48	1.67	0.0062	14.13	0.23	0.16	0.0003	0.69	12.16
3/13 13:29	2.40	1.62	0.0060	13.65	0.22	0.15	0.0003	0.69	12.16
3/13 13:30	2.40	1.62	0.0060	13.67	0.21	0.14	0.0003	0.69	12.16
3/13 13:31	2.44	1.65	0.0061	13.89	0.24	0.16	0.0004	0.92	12.16
3/13 13:32	2.40	1.62	0.0060	13.67	0.24	0.16	0.0004	0.92	12.16
3/13 13:33	2.35	1.59	0.0059	13.21	0.27	0.18	0.0004	0.92	12.17
3/13 13:34	2.39	1.62	0.0060	13.41	0.30	0.20	0.0005	1.13	12.17
3/13 13:35	2.45	1.65	0.0061	13.88	0.23	0.15	0.0003	0.69	12.14
3/13 13:36	2.46	1.66	0.0061	13.91	0.26	0.18	0.0004	0.92	12.14
3/13 13:37	2.48	1.67	0.0062	13.91	0.30	0.20	0.0005	1.14	12.14
3/13 13:38	2.49	1.68	0.0062	14.13	0.29	0.20	0.0004	0.92	12.15
Average (all)	2.43	1.64	0.0061	13.75	0.28	0.19	0.0004	0.98	12.16
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.35	1.59	0.0059	13.19	0.21	0.14	0.0003	0.69	12.13
Maximum (all)	2.56	1.73	0.0064	14.36	0.39	0.26	0.0006	1.36	12.18
Average (valid values only)	2.43	1.64	0.0061	13.75	0.28	0.19	0.0004	0.98	12.16
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 1:18 PM thru 3/13/2019 1:38 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 13:18	16622.3	4533.9	21156	2278.5	304
3/13 13:19	16600.4	4535.0	21135	2276.3	304
3/13 13:20	16560.7	4538.5	21099	2272.4	303
3/13 13:21	16582.5	4531.5	21114	2273.9	303
3/13 13:22	16580.3	4532.1	21112	2273.8	303
3/13 13:23	16586.3	4533.2	21120	2274.5	303
3/13 13:24	16577.9	4539.2	21117	2274.3	303
3/13 13:25	16609.2	4540.3	21150	2277.8	303
3/13 13:26	16614.8	4534.3	21149	2277.7	304
3/13 13:27	16626.5	4542.7	21169	2279.9	304
3/13 13:28	16611.7	4546.5	21158	2278.8	305
3/13 13:29	16596.2	4535.7	21132	2275.9	305
3/13 13:30	16625.1	4539.0	21164	2279.4	305
3/13 13:31	16598.6	4545.2	21144	2277.2	305
3/13 13:32	16613.9	4536.6	21151	2277.9	305
3/13 13:33	16600.4	4543.2	21144	2277.2	305
3/13 13:34	16565.5	4538.1	21104	2272.9	303
3/13 13:35	16585.6	4543.4	21129	2275.6	303
3/13 13:36	16621.6	4547.4	21169	2279.9	305
3/13 13:37	16640.4	4543.2	21184	2281.5	305
3/13 13:38	16627.3	4542.3	21170	2280.0	305
Average (all)	16602.3	4539.1	21141	2276.9	304
Total (all)	--	--	--	--	--
Minimum (all)	16560.7	4531.5	21099	2272.4	303
Maximum (all)	16640.4	4547.4	21184	2281.5	305
Average (valid values only)	16602.3	4539.1	21141	2276.9	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 1:59 PM thru 3/13/2019 2:19 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 13:59	2.28	1.54	0.0057	12.96	0.28	0.19	0.0004	0.91	12.18
3/13 14:00	2.27	1.54	0.0057	12.73	0.22	0.15	0.0003	0.69	12.18
3/13 14:01	2.34	1.58	0.0058	13.22	0.27	0.18	0.0004	0.92	12.16
3/13 14:02	2.46	1.66	0.0061	13.90	0.29	0.20	0.0004	0.92	12.15
3/13 14:03	2.55	1.72	0.0063	14.38	0.27	0.18	0.0004	0.92	12.13
3/13 14:04	2.57	1.73	0.0064	14.57	0.34	0.23	0.0005	1.13	12.14
3/13 14:05	2.37	1.60	0.0059	13.42	0.32	0.22	0.0005	1.13	12.18
3/13 14:06	2.26	1.53	0.0056	12.73	0.32	0.22	0.0005	1.13	12.18
3/13 14:07	2.31	1.56	0.0057	13.00	0.24	0.16	0.0004	0.92	12.16
3/13 14:08	2.46	1.66	0.0061	13.90	0.30	0.20	0.0005	1.13	12.15
3/13 14:09	2.44	1.65	0.0061	13.87	0.36	0.24	0.0005	1.13	12.16
3/13 14:10	2.33	1.57	0.0058	13.21	0.29	0.20	0.0004	0.91	12.16
3/13 14:11	2.39	1.61	0.0059	13.44	0.37	0.25	0.0006	1.36	12.16
3/13 14:12	2.45	1.65	0.0061	13.91	0.29	0.20	0.0004	0.92	12.16
3/13 14:13	2.39	1.62	0.0060	13.45	0.29	0.20	0.0004	0.92	12.17
3/13 14:14	2.39	1.61	0.0059	13.45	0.24	0.16	0.0004	0.92	12.16
3/13 14:15	2.38	1.61	0.0059	13.44	0.25	0.17	0.0004	0.92	12.17
3/13 14:16	2.46	1.66	0.0061	13.90	0.27	0.18	0.0004	0.92	12.16
3/13 14:17	2.44	1.65	0.0061	13.91	0.29	0.20	0.0004	0.92	12.16
3/13 14:18	2.42	1.64	0.0060	13.68	0.27	0.18	0.0004	0.92	12.17
3/13 14:19	2.43	1.64	0.0061	13.67	0.28	0.19	0.0004	0.92	12.17
Average (all)	2.40	1.62	0.0060	13.56	0.29	0.20	0.0004	0.98	12.16
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.26	1.53	0.0056	12.73	0.22	0.15	0.0003	0.69	12.13
Maximum (all)	2.57	1.73	0.0064	14.57	0.37	0.25	0.0006	1.36	12.18
Average (valid values only)	2.40	1.62	0.0060	13.56	0.29	0.20	0.0004	0.98	12.16
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 1:59 PM thru 3/13/2019 2:19 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 13:59	16565.1	4540.5	21106	2273.1	304
3/13 14:00	16564.2	4550.7	21115	2274.1	304
3/13 14:01	16623.4	4542.5	21166	2279.5	305
3/13 14:02	16599.3	4550.0	21149	2277.7	305
3/13 14:03	16635.1	4550.5	21186	2281.7	305
3/13 14:04	16598.4	4545.8	21144	2277.2	304
3/13 14:05	16564.9	4547.6	21113	2273.8	304
3/13 14:06	16556.9	4549.1	21106	2273.1	304
3/13 14:07	16625.4	4546.7	21172	2280.3	305
3/13 14:08	16613.2	4544.1	21157	2278.6	305
3/13 14:09	16563.5	4549.1	21113	2273.8	304
3/13 14:10	16594.5	4549.8	21144	2277.2	305
3/13 14:11	16606.2	4544.3	21151	2277.9	305
3/13 14:12	16618.7	4549.4	21168	2279.8	305
3/13 14:13	16618.5	4555.1	21174	2280.4	305
3/13 14:14	16612.6	4544.1	21157	2278.6	305
3/13 14:15	16605.9	4550.5	21156	2278.6	305
3/13 14:16	16613.2	4554.7	21168	2279.7	305
3/13 14:17	16613.4	4559.3	21173	2280.3	305
3/13 14:18	16620.7	4546.9	21168	2279.7	305
3/13 14:19	16605.9	4550.7	21157	2278.6	305
Average (all)	16600.9	4548.6	21150	2277.8	305
Total (all)	--	--	--	--	--
Minimum (all)	16556.9	4540.5	21106	2273.1	304
Maximum (all)	16635.1	4559.3	21186	2281.7	305
Average (valid values only)	16600.9	4548.6	21150	2277.8	305
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 2:38 PM thru 3/13/2019 2:58 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 14:38	2.29	1.55	0.0057	12.99	0.25	0.17	0.0004	0.91	12.18
3/13 14:39	2.33	1.58	0.0058	13.20	0.25	0.17	0.0004	0.91	12.18
3/13 14:40	2.33	1.58	0.0058	13.22	0.28	0.19	0.0004	0.92	12.18
3/13 14:41	2.37	1.60	0.0059	13.44	0.27	0.18	0.0004	0.92	12.18
3/13 14:42	2.38	1.61	0.0059	13.44	0.26	0.18	0.0004	0.92	12.18
3/13 14:43	2.38	1.61	0.0059	13.43	0.29	0.20	0.0004	0.91	12.18
3/13 14:44	2.34	1.59	0.0059	13.20	0.24	0.16	0.0004	0.91	12.21
3/13 14:45	2.41	1.63	0.0060	13.69	0.28	0.19	0.0004	0.92	12.17
3/13 14:46	2.55	1.72	0.0063	14.39	0.34	0.23	0.0005	1.14	12.15
3/13 14:47	2.55	1.72	0.0063	14.38	0.33	0.22	0.0005	1.15	12.15
3/13 14:48	2.52	1.70	0.0063	14.14	0.34	0.23	0.0005	1.14	12.15
3/13 14:49	2.43	1.64	0.0060	13.67	0.34	0.23	0.0005	1.14	12.16
3/13 14:50	2.37	1.60	0.0059	13.45	0.28	0.19	0.0004	0.92	12.16
3/13 14:51	2.34	1.58	0.0058	13.22	0.25	0.17	0.0004	0.92	12.17
3/13 14:52	2.34	1.58	0.0058	13.22	0.25	0.17	0.0004	0.92	12.17
3/13 14:53	2.37	1.60	0.0059	13.45	0.30	0.20	0.0005	1.15	12.17
3/13 14:54	2.38	1.61	0.0059	13.45	0.32	0.22	0.0005	1.15	12.17
3/13 14:55	2.39	1.62	0.0060	13.46	0.26	0.18	0.0004	0.92	12.17
3/13 14:56	2.39	1.62	0.0060	13.46	0.26	0.18	0.0004	0.92	12.17
3/13 14:57	2.41	1.63	0.0060	13.70	0.24	0.16	0.0004	0.92	12.16
3/13 14:58	2.44	1.65	0.0061	13.90	0.23	0.16	0.0003	0.69	12.17
Average (all)	2.40	1.62	0.0060	13.55	0.28	0.19	0.0004	0.97	12.17
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.29	1.55	0.0057	12.99	0.23	0.16	0.0003	0.69	12.15
Maximum (all)	2.55	1.72	0.0063	14.39	0.34	0.23	0.0005	1.15	12.21
Average (valid values only)	2.40	1.62	0.0060	13.55	0.28	0.19	0.0004	0.97	12.17
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 2:38 PM thru 3/13/2019 2:58 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 14:38	16592.5	4554.9	21147	2277.6	304
3/13 14:39	16578.3	4550.5	21129	2275.6	304
3/13 14:40	16614.1	4546.1	21160	2278.9	305
3/13 14:41	16608.8	4551.6	21160	2279.0	305
3/13 14:42	16613.4	4540.1	21154	2278.3	305
3/13 14:43	16579.7	4554.2	21134	2276.1	304
3/13 14:44	16581.4	4552.9	21134	2276.1	304
3/13 14:45	16642.6	4554.4	21197	2282.9	304
3/13 14:46	16657.8	4548.3	21206	2283.9	305
3/13 14:47	16639.9	4552.5	21192	2282.4	305
3/13 14:48	16617.9	4552.5	21170	2280.0	305
3/13 14:49	16595.1	4558.2	21153	2278.2	305
3/13 14:50	16624.0	4547.2	21171	2280.1	305
3/13 14:51	16620.3	4542.1	21162	2279.2	305
3/13 14:52	16613.2	4551.6	21165	2279.4	305
3/13 14:53	16624.5	4553.8	21178	2280.9	305
3/13 14:54	16620.9	4550.0	21171	2280.1	305
3/13 14:55	16631.1	4554.4	21186	2281.7	305
3/13 14:56	16629.3	4553.6	21183	2281.4	305
3/13 14:57	16630.0	4565.0	21195	2282.8	305
3/13 14:58	16609.0	4554.0	21163	2279.3	305
Average (all)	16615.4	4551.8	21167	2279.7	305
Total (all)	--	--	--	--	--
Minimum (all)	16578.3	4540.1	21129	2275.6	304
Maximum (all)	16657.8	4565.0	21206	2283.9	305
Average (valid values only)	16615.4	4551.8	21167	2279.7	305
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 3:16 PM thru 3/13/2019 3:36 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 15:16	2.25	1.52	0.0056	12.74	0.31	0.21	0.0005	1.14	12.19
3/13 15:17	2.26	1.53	0.0056	12.74	0.25	0.17	0.0004	0.91	12.19
3/13 15:18	2.28	1.55	0.0057	12.98	0.24	0.16	0.0004	0.91	12.20
3/13 15:19	2.30	1.56	0.0057	12.98	0.28	0.19	0.0004	0.91	12.19
3/13 15:20	2.36	1.59	0.0059	13.47	0.27	0.18	0.0004	0.92	12.17
3/13 15:21	2.55	1.72	0.0063	14.35	0.28	0.19	0.0004	0.92	12.16
3/13 15:22	2.46	1.66	0.0061	13.90	0.30	0.20	0.0005	1.14	12.18
3/13 15:23	2.35	1.59	0.0059	13.44	0.25	0.17	0.0004	0.91	12.19
3/13 15:24	2.35	1.59	0.0059	13.44	0.29	0.20	0.0004	0.92	12.19
3/13 15:25	2.37	1.61	0.0059	13.45	0.28	0.19	0.0004	0.92	12.20
3/13 15:26	2.35	1.59	0.0059	13.21	0.23	0.16	0.0003	0.69	12.18
3/13 15:27	2.34	1.58	0.0058	13.23	0.26	0.18	0.0004	0.92	12.18
3/13 15:28	2.39	1.62	0.0060	13.67	0.28	0.19	0.0004	0.91	12.19
3/13 15:29	2.33	1.58	0.0058	13.19	0.29	0.20	0.0004	0.91	12.20
3/13 15:30	2.29	1.55	0.0057	12.98	0.30	0.20	0.0005	1.14	12.20
3/13 15:31	2.41	1.63	0.0060	13.70	0.33	0.22	0.0005	1.15	12.18
3/13 15:32	2.53	1.71	0.0063	14.39	0.34	0.23	0.0005	1.15	12.16
3/13 15:33	2.50	1.69	0.0062	14.12	0.27	0.18	0.0004	0.91	12.18
3/13 15:34	2.37	1.60	0.0059	13.46	0.29	0.20	0.0004	0.92	12.18
3/13 15:35	2.38	1.61	0.0059	13.44	0.28	0.19	0.0004	0.91	12.19
3/13 15:36	2.39	1.62	0.0060	13.44	0.29	0.20	0.0004	0.92	12.18
Average (all)	2.37	1.60	0.0059	13.44	0.28	0.19	0.0004	0.96	12.18
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.25	1.52	0.0056	12.74	0.23	0.16	0.0003	0.69	12.16
Maximum (all)	2.55	1.72	0.0063	14.39	0.34	0.23	0.0005	1.15	12.20
Average (valid values only)	2.37	1.60	0.0059	13.44	0.28	0.19	0.0004	0.96	12.18
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 3:16 PM thru 3/13/2019 3:36 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 15:16	16557.1	4553.6	21111	2273.6	304
3/13 15:17	16563.8	4558.2	21122	2274.8	304
3/13 15:18	16588.7	4560.4	21149	2277.8	303
3/13 15:19	16591.4	4548.7	21140	2276.8	303
3/13 15:20	16650.8	4546.5	21197	2283.0	304
3/13 15:21	16610.3	4544.5	21155	2278.3	304
3/13 15:22	16605.9	4554.4	21160	2279.0	305
3/13 15:23	16591.6	4565.5	21157	2278.6	304
3/13 15:24	16598.6	4554.7	21153	2278.2	303
3/13 15:25	16603.7	4556.6	21160	2278.9	304
3/13 15:26	16584.1	4557.5	21142	2276.9	304
3/13 15:27	16617.2	4558.6	21176	2280.7	303
3/13 15:28	16591.1	4560.2	21151	2278.0	304
3/13 15:29	16558.5	4556.2	21115	2274.1	304
3/13 15:30	16600.2	4552.0	21152	2278.1	303
3/13 15:31	16630.2	4558.2	21188	2282.0	304
3/13 15:32	16650.5	4560.8	21211	2284.5	305
3/13 15:33	16586.3	4547.8	21134	2276.1	303
3/13 15:34	16616.1	4557.8	21174	2280.5	304
3/13 15:35	16584.5	4558.6	21143	2277.2	303
3/13 15:36	16610.6	4551.8	21162	2279.2	303
Average (all)	16599.6	4555.4	21155	2278.4	304
Total (all)	--	--	--	--	--
Minimum (all)	16557.1	4544.5	21111	2273.6	303
Maximum (all)	16650.8	4565.5	21211	2284.5	305
Average (valid values only)	16599.6	4555.4	21155	2278.4	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 3:54 PM thru 3/13/2019 4:14 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 15:54	2.40	1.63	0.0060	13.67	0.36	0.24	0.0005	1.14	12.20
3/13 15:55	2.39	1.62	0.0060	13.67	0.31	0.21	0.0005	1.14	12.19
3/13 15:56	2.45	1.66	0.0061	13.91	0.30	0.20	0.0005	1.14	12.19
3/13 15:57	2.46	1.67	0.0061	13.90	0.25	0.17	0.0004	0.92	12.19
3/13 15:58	2.44	1.65	0.0061	13.93	0.26	0.18	0.0004	0.92	12.19
3/13 15:59	2.52	1.70	0.0063	14.39	0.27	0.18	0.0004	0.92	12.16
3/13 16:00	2.61	1.76	0.0065	14.81	0.24	0.16	0.0004	0.91	12.16
3/13 16:01	2.48	1.68	0.0062	14.18	0.25	0.17	0.0004	0.92	12.20
3/13 16:02	2.45	1.66	0.0061	13.92	0.30	0.20	0.0005	1.15	12.17
3/13 16:03	2.41	1.63	0.0060	13.70	0.25	0.17	0.0004	0.92	12.18
3/13 16:04	2.34	1.59	0.0058	13.21	0.26	0.18	0.0004	0.91	12.20
3/13 16:05	2.31	1.56	0.0058	13.23	0.22	0.15	0.0003	0.69	12.19
3/13 16:06	2.35	1.59	0.0059	13.47	0.18	0.12	0.0003	0.69	12.19
3/13 16:07	2.42	1.64	0.0060	13.70	0.18	0.12	0.0003	0.69	12.17
3/13 16:08	2.45	1.66	0.0061	13.89	0.26	0.18	0.0004	0.91	12.18
3/13 16:09	2.33	1.58	0.0058	13.21	0.21	0.14	0.0003	0.69	12.20
3/13 16:10	2.33	1.58	0.0058	13.23	0.24	0.16	0.0004	0.92	12.19
3/13 16:11	2.42	1.64	0.0060	13.69	0.30	0.20	0.0005	1.15	12.18
3/13 16:12	2.48	1.68	0.0062	14.16	0.25	0.17	0.0004	0.92	12.18
3/13 16:13	2.45	1.66	0.0061	13.91	0.24	0.16	0.0004	0.92	12.18
3/13 16:14	2.34	1.59	0.0058	13.22	0.22	0.15	0.0003	0.69	12.20
Average (all)	2.42	1.64	0.0060	13.76	0.25	0.17	0.0004	0.92	12.19
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.31	1.56	0.0058	13.21	0.18	0.12	0.0003	0.69	12.16
Maximum (all)	2.61	1.76	0.0065	14.81	0.36	0.24	0.0005	1.15	12.20
Average (valid values only)	2.42	1.64	0.0060	13.76	0.25	0.17	0.0004	0.92	12.19
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 3:54 PM thru 3/13/2019 4:14 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 15:54	16600.6	4556.0	21157	2278.6	303
3/13 15:55	16609.0	4557.1	21166	2279.6	304
3/13 15:56	16612.1	4560.0	21172	2280.2	305
3/13 15:57	16602.2	4556.0	21158	2278.8	304
3/13 15:58	16636.8	4560.2	21197	2282.9	304
3/13 15:59	16655.4	4557.8	21213	2284.7	305
3/13 16:00	16594.2	4560.0	21154	2278.3	304
3/13 16:01	16679.9	4558.0	21238	2287.3	305
3/13 16:02	16641.5	4556.4	21198	2283.0	305
3/13 16:03	16630.9	4559.3	21190	2282.1	304
3/13 16:04	16581.6	4564.2	21146	2277.4	304
3/13 16:05	16619.2	4561.7	21181	2281.2	304
3/13 16:06	16639.9	4557.5	21197	2282.9	305
3/13 16:07	16642.6	4561.1	21204	2283.6	305
3/13 16:08	16573.3	4562.6	21136	2276.3	304
3/13 16:09	16579.0	4560.0	21139	2276.7	304
3/13 16:10	16624.0	4559.7	21184	2281.5	305
3/13 16:11	16640.6	4555.8	21196	2282.9	305
3/13 16:12	16638.2	4560.8	21199	2283.1	305
3/13 16:13	16605.7	4567.5	21173	2280.3	304
3/13 16:14	16602.0	4561.9	21164	2279.3	304
Average (all)	16619.5	4559.7	21179	2281.0	304
Total (all)	--	--	--	--	--
Minimum (all)	16573.3	4555.8	21136	2276.3	303
Maximum (all)	16679.9	4567.5	21238	2287.3	305
Average (valid values only)	16619.5	4559.7	21179	2281.0	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 4:30 PM thru 3/13/2019 4:50 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 16:30	2.30	1.56	0.0057	13.00	0.22	0.15	0.0003	0.69	12.20
3/13 16:31	2.35	1.59	0.0059	13.46	0.26	0.18	0.0004	0.92	12.19
3/13 16:32	2.36	1.60	0.0059	13.46	0.24	0.16	0.0004	0.92	12.19
3/13 16:33	2.35	1.59	0.0059	13.47	0.25	0.17	0.0004	0.92	12.19
3/13 16:34	2.36	1.60	0.0059	13.47	0.22	0.15	0.0003	0.69	12.19
3/13 16:35	2.39	1.62	0.0060	13.71	0.27	0.18	0.0004	0.92	12.19
3/13 16:36	2.45	1.66	0.0061	13.93	0.24	0.16	0.0004	0.92	12.19
3/13 16:37	2.45	1.66	0.0061	13.95	0.26	0.18	0.0004	0.92	12.19
3/13 16:38	2.54	1.72	0.0063	14.41	0.29	0.20	0.0004	0.92	12.18
3/13 16:39	2.52	1.71	0.0063	14.39	0.24	0.16	0.0004	0.92	12.19
3/13 16:40	2.51	1.70	0.0063	14.17	0.28	0.19	0.0004	0.92	12.18
3/13 16:41	2.44	1.65	0.0061	13.92	0.27	0.18	0.0004	0.92	12.19
3/13 16:42	2.37	1.61	0.0059	13.47	0.25	0.17	0.0004	0.92	12.19
3/13 16:43	2.36	1.60	0.0059	13.45	0.30	0.20	0.0005	1.14	12.20
3/13 16:44	2.36	1.60	0.0059	13.44	0.35	0.24	0.0005	1.14	12.21
3/13 16:45	2.33	1.58	0.0058	13.21	0.22	0.15	0.0003	0.69	12.20
3/13 16:46	2.32	1.58	0.0058	13.22	0.28	0.19	0.0004	0.92	12.21
3/13 16:47	2.35	1.59	0.0059	13.48	0.29	0.20	0.0004	0.92	12.19
3/13 16:48	2.45	1.66	0.0061	13.93	0.29	0.20	0.0004	0.92	12.19
3/13 16:49	2.51	1.70	0.0063	14.16	0.26	0.18	0.0004	0.92	12.18
3/13 16:50	2.48	1.68	0.0062	14.16	0.27	0.18	0.0004	0.92	12.18
Average (all)	2.41	1.63	0.0060	13.71	0.26	0.18	0.0004	0.91	12.19
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.30	1.56	0.0057	13.00	0.22	0.15	0.0003	0.69	12.18
Maximum (all)	2.54	1.72	0.0063	14.41	0.35	0.24	0.0005	1.14	12.21
Average (valid values only)	2.41	1.63	0.0060	13.71	0.26	0.18	0.0004	0.91	12.19
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 4:30 PM thru 3/13/2019 4:50 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 16:30	16613.4	4554.0	21167	2279.8	304
3/13 16:31	16615.6	4563.3	21179	2281.0	305
3/13 16:32	16615.6	4556.0	21172	2280.2	304
3/13 16:33	16629.1	4565.5	21195	2282.7	305
3/13 16:34	16630.7	4557.8	21189	2282.0	305
3/13 16:35	16647.9	4564.6	21213	2284.6	305
3/13 16:36	16637.1	4561.3	21198	2283.1	305
3/13 16:37	16663.3	4562.4	21226	2286.0	305
3/13 16:38	16667.3	4562.2	21230	2286.4	305
3/13 16:39	16659.8	4553.1	21213	2284.7	305
3/13 16:40	16646.3	4566.8	21213	2284.6	305
3/13 16:41	16622.0	4559.5	21182	2281.3	304
3/13 16:42	16629.6	4558.2	21188	2281.9	304
3/13 16:43	16605.3	4558.2	21164	2279.3	304
3/13 16:44	16592.9	4565.7	21159	2278.8	303
3/13 16:45	16586.3	4570.1	21156	2278.5	304
3/13 16:46	16602.6	4554.9	21158	2278.7	304
3/13 16:47	16636.2	4572.1	21208	2284.1	305
3/13 16:48	16634.4	4573.4	21208	2284.1	305
3/13 16:49	16636.6	4567.5	21204	2283.7	305
3/13 16:50	16636.0	4568.6	21205	2283.7	305
Average (all)	16629.0	4562.6	21192	2282.3	305
Total (all)	--	--	--	--	--
Minimum (all)	16586.3	4553.1	21156	2278.5	303
Maximum (all)	16667.3	4573.4	21230	2286.4	305
Average (valid values only)	16629.0	4562.6	21192	2282.3	305
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 5:14 PM thru 3/13/2019 5:34 PM

Timestamp	(Turbine 1) 75-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min	(Turbine 1) CO lb/mmBtu 1-Min	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 75-O2% 1-Min
3/13 17:14	2.35	1.60	0.0059	13.44	0.33	0.22	0.0005	1.14	12.21
3/13 17:15	2.34	1.59	0.0058	13.25	0.26	0.18	0.0004	0.92	12.20
3/13 17:16	2.46	1.66	0.0061	13.95	0.28	0.19	0.0004	0.92	12.17
3/13 17:17	2.48	1.68	0.0062	14.18	0.27	0.18	0.0004	0.92	12.18
3/13 17:18	2.52	1.70	0.0063	14.39	0.27	0.18	0.0004	0.92	12.17
3/13 17:19	2.48	1.68	0.0062	14.18	0.26	0.18	0.0004	0.92	12.18
3/13 17:20	2.50	1.69	0.0062	14.17	0.31	0.21	0.0005	1.15	12.18
3/13 17:21	2.47	1.67	0.0062	13.94	0.30	0.20	0.0005	1.15	12.18
3/13 17:22	2.47	1.67	0.0062	13.94	0.27	0.18	0.0004	0.92	12.18
3/13 17:23	2.43	1.64	0.0061	13.69	0.28	0.19	0.0004	0.92	12.18
3/13 17:24	2.44	1.65	0.0061	13.93	0.30	0.20	0.0005	1.15	12.19
3/13 17:25	2.45	1.66	0.0061	13.93	0.25	0.17	0.0004	0.92	12.19
3/13 17:26	2.42	1.64	0.0060	13.70	0.27	0.18	0.0004	0.92	12.19
3/13 17:27	2.39	1.62	0.0060	13.69	0.19	0.13	0.0003	0.69	12.19
3/13 17:28	2.35	1.60	0.0059	13.44	0.25	0.17	0.0004	0.91	12.21
3/13 17:29	2.32	1.58	0.0058	13.21	0.21	0.14	0.0003	0.69	12.22
3/13 17:30	2.32	1.58	0.0058	13.24	0.24	0.16	0.0004	0.92	12.22
3/13 17:31	2.46	1.67	0.0061	13.96	0.20	0.14	0.0003	0.69	12.19
3/13 17:32	2.53	1.71	0.0063	14.40	0.30	0.20	0.0005	1.15	12.19
3/13 17:33	2.52	1.71	0.0063	14.39	0.34	0.23	0.0005	1.15	12.20
3/13 17:34	2.41	1.64	0.0060	13.67	0.32	0.22	0.0005	1.14	12.21
Average (all)	2.43	1.65	0.0061	13.84	0.27	0.18	0.0004	0.96	12.19
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.32	1.58	0.0058	13.21	0.19	0.13	0.0003	0.69	12.17
Maximum (all)	2.53	1.71	0.0063	14.40	0.34	0.23	0.0005	1.15	12.22
Average (valid values only)	2.43	1.65	0.0061	13.84	0.27	0.18	0.0004	0.96	12.19
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 5:14 PM thru 3/13/2019 5:34 PM

Timestamp	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 17:14	16590.7	4569.0	21160	2278.9	303
3/13 17:15	16650.8	4564.8	21216	2284.9	304
3/13 17:16	16673.5	4569.9	21243	2287.9	304
3/13 17:17	16668.0	4570.3	21238	2287.3	304
3/13 17:18	16646.3	4569.7	21216	2285.0	304
3/13 17:19	16655.4	4575.2	21231	2286.5	304
3/13 17:20	16648.5	4573.7	21222	2285.6	305
3/13 17:21	16643.2	4578.7	21222	2285.6	304
3/13 17:22	16642.1	4579.8	21222	2285.6	304
3/13 17:23	16627.1	4565.5	21193	2282.4	304
3/13 17:24	16633.1	4561.9	21195	2282.7	304
3/13 17:25	16618.5	4578.1	21197	2282.9	304
3/13 17:26	16626.2	4579.6	21206	2283.8	305
3/13 17:27	16611.2	4585.6	21197	2282.9	303
3/13 17:28	16583.2	4570.3	21154	2278.2	303
3/13 17:29	16585.0	4565.7	21151	2277.9	303
3/13 17:30	16626.7	4562.6	21189	2282.1	304
3/13 17:31	16673.3	4577.4	21251	2288.7	304
3/13 17:32	16660.2	4575.6	21236	2287.1	304
3/13 17:33	16640.2	4570.8	21211	2284.4	304
3/13 17:34	16575.5	4577.6	21153	2278.2	303
Average (all)	16632.3	4572.5	21205	2283.7	304
Total (all)	--	--	--	--	--
Minimum (all)	16575.5	4561.9	21151	2277.9	303
Maximum (all)	16673.5	4585.6	21251	2288.7	305
Average (valid values only)	16632.3	4572.5	21205	2283.7	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 9:30 AM thru 3/13/2019 10:11 AM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 9:30	1.86	1.3	3.86	16558.5	4537.7	21096	2272.1	301
3/13 9:31	1.85	1.3	3.87	16577.9	4538.8	21117	2274.2	302
3/13 9:32	1.79	1.2	3.87	16604.8	4536.8	21142	2276.9	302
3/13 9:33	1.82	1.2	3.87	16577.7	4531.7	21109	2273.5	302
3/13 9:34	1.82	1.2	3.87	16600.9	4532.1	21133	2276.0	302
3/13 9:35	1.82	1.2	3.87	16584.3	4540.1	21124	2275.1	302
3/13 9:36	1.85	1.3	3.87	16602.4	4539.6	21142	2277.0	302
3/13 9:37	1.85	1.3	3.87	16582.3	4537.7	21120	2274.6	301
3/13 9:38	1.82	1.2	3.86	16551.8	4535.0	21087	2271.0	301
3/13 9:39	1.80	1.2	3.87	16598.0	4531.3	21129	2275.6	301
3/13 9:40	1.82	1.2	3.87	16611.9	4527.9	21140	2276.8	302
3/13 9:41	1.87	1.3	3.87	16619.6	4530.2	21150	2277.8	303
3/13 9:42	1.86	1.3	3.87	16621.4	4540.3	21162	2279.1	303
3/13 9:43	1.85	1.3	3.87	16630.2	4538.1	21168	2279.9	303
3/13 9:44	1.85	1.3	3.87	16617.9	4541.0	21159	2278.8	303
3/13 9:45	1.86	1.3	3.86	16575.7	4535.5	21111	2273.7	302
3/13 9:46	1.87	1.3	3.86	16569.1	4533.2	21102	2272.7	302
3/13 9:47	1.87	1.3	3.87	16581.2	4537.2	21118	2274.5	302
3/13 9:48	1.88	1.3	3.87	16614.5	4533.9	21148	2277.7	302
3/13 9:49	1.91	1.3	4.11	16638.2	4533.0	21171	2280.1	302
3/13 9:50	1.88	1.3	3.87	16624.3	4535.0	21159	2278.8	303
3/13 9:51	1.89	1.3	3.87	16593.3	4535.9	21129	2275.6	303
3/13 9:52	1.89	1.3	3.87	16585.4	4539.2	21125	2275.1	302
3/13 9:53	1.88	1.3	3.87	16581.2	4544.5	21126	2275.2	302
3/13 9:54	1.89	1.3	4.10	16592.9	4536.1	21129	2275.6	302
3/13 9:55	1.88	1.3	3.87	16629.6	4535.5	21165	2279.5	303
3/13 9:56	1.83	1.2	3.88	16655.2	4526.6	21182	2281.3	303
3/13 9:57	1.84	1.2	3.88	16634.4	4524.6	21159	2278.8	303
3/13 9:58	1.90	1.3	4.10	16633.1	4524.2	21157	2278.7	303
3/13 9:59	1.91	1.3	4.10	16597.3	4535.9	21133	2276.0	303

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 10:00	1.91	1.3	4.09	16558.0	4530.6	21089	2271.2	302
3/13 10:01	1.91	1.3	4.10	16597.5	4522.4	21120	2274.7	303
3/13 10:02	1.89	1.3	3.87	16610.1	4529.9	21140	2276.8	303
3/13 10:03	1.84	1.3	3.87	16605.3	4534.6	21140	2276.8	302
3/13 10:04	1.87	1.3	3.86	16575.9	4531.3	21107	2273.2	302
3/13 10:05	1.89	1.3	3.86	16570.4	4529.7	21100	2272.4	302
3/13 10:06	1.87	1.3	3.86	16553.4	4530.8	21084	2270.8	302
3/13 10:07	1.90	1.3	4.09	16550.3	4533.9	21084	2270.8	302
3/13 10:08	1.88	1.3	3.86	16575.7	4530.8	21107	2273.2	302
3/13 10:09	1.87	1.3	3.87	16588.3	4529.9	21118	2274.5	302
3/13 10:10	1.89	1.3	3.87	16606.8	4522.9	21130	2275.7	303
3/13 10:11	1.90	1.3	4.10	16606.6	4528.8	21135	2276.3	303
Average (all)	1.87	1.3	3.91	16596.3	4533.4	21130	2275.7	302
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	1.79	1.2	3.86	16550.3	4522.4	21084	2270.8	301
Maximum (all)	1.91	1.3	4.11	16655.2	4544.5	21182	2281.3	303
Average (valid values only)	1.87	1.3	3.91	16596.3	4533.4	21130	2275.7	302
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	42	42	42	42	42	42	42	42

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 10:25 AM thru 3/13/2019 11:01 AM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 10:25	1.91	1.3	4.09	16573.5	4514.5	21088	2271.2	302
3/13 10:26	1.88	1.3	3.87	16607.3	4528.2	21136	2276.3	302
3/13 10:27	1.85	1.3	3.87	16601.7	4528.8	21131	2275.8	304
3/13 10:28	1.87	1.3	3.87	16621.2	4524.4	21146	2277.4	304
3/13 10:29	1.89	1.3	3.87	16604.8	4521.1	21126	2275.2	304
3/13 10:30	1.89	1.3	3.88	16637.7	4514.9	21153	2278.2	303
3/13 10:31	1.93	1.3	4.10	16584.3	4520.0	21104	2272.9	304
3/13 10:32	1.92	1.3	4.10	16602.6	4521.1	21124	2275.0	304
3/13 10:33	1.89	1.3	3.87	16609.7	4517.6	21127	2275.4	303
3/13 10:34	1.89	1.3	3.87	16604.8	4518.9	21124	2275.0	303
3/13 10:35	1.92	1.3	4.10	16589.8	4523.8	21114	2273.9	303
3/13 10:36	1.93	1.3	4.10	16607.0	4522.0	21129	2275.6	303
3/13 10:37	1.93	1.3	4.10	16608.6	4518.7	21127	2275.4	303
3/13 10:38	1.91	1.3	4.09	16581.2	4526.0	21107	2273.3	303
3/13 10:39	1.91	1.3	4.10	16607.5	4528.8	21136	2276.4	303
3/13 10:40	1.89	1.3	3.87	16584.1	4531.3	21115	2274.1	303
3/13 10:41	1.91	1.3	4.10	16587.4	4520.2	21108	2273.3	303
3/13 10:42	1.91	1.3	4.10	16594.9	4528.4	21123	2275.0	304
3/13 10:43	1.92	1.3	4.09	16572.1	4526.0	21098	2272.3	303
3/13 10:44	1.93	1.3	4.10	16598.0	4526.0	21124	2275.1	303
3/13 10:45	1.95	1.3	4.09	16560.7	4523.3	21084	2270.8	302
3/13 10:46	1.89 <25>	1.3 <25>	3.86 <25>	16556.5	4524.9	21081	2270.4	302
3/13 10:47	0.10 <25>	0.1 <25>	0.23 <25>	16587.6	4520.4	21108	2273.3	303
3/13 10:48	0.18	0.1	0.46	16590.3	4527.5	21118	2274.4	303
3/13 10:49	0.16	0.1	0.23	16547.9	4525.5	21073	2269.6	302
3/13 10:50	0.21	0.1	0.46	16599.5	4528.4	21128	2275.5	303
3/13 10:51	0.53	0.4	1.14	16631.1	4517.3	21148	2277.7	303
3/13 10:52	2.26	1.5	4.78	16603.5	4518.5	21122	2274.8	304
3/13 10:53	2.75	1.9	5.67	16528.4	4523.8	21052	2267.3	302
3/13 10:54	2.61	1.8	5.45	16573.0	4528.2	21101	2272.6	302

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 10:55	2.47	1.7	5.22	16548.5	4526.8	21075	2269.8	302
3/13 10:56	2.35	1.6	4.99	16565.3	4519.6	21085	2270.9	302
3/13 10:57	2.24	1.5	4.77	16568.6	4527.7	21096	2272.0	302
3/13 10:58	2.15	1.5	4.54	16533.5	4528.6	21062	2268.4	303
3/13 10:59	2.09	1.4	4.31	16540.1	4529.5	21070	2269.2	302
3/13 11:00	2.04	1.4	4.31	16533.3	4529.1	21062	2268.4	302
3/13 11:01	2.05	1.4	4.32	16559.1	4522.2	21081	2270.4	302
Average (all)	1.79	1.2	3.76	16583.9	4523.8	21108	2273.3	303
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	0.10	0.1	0.23	16528.4	4514.5	21052	2267.3	302
Maximum (all)	2.75	1.9	5.67	16637.7	4531.3	21153	2278.2	304
Average (valid values only)	1.83	1.2	3.85	16583.9	4523.8	21108	2273.3	303
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	35	35	35	37	37	37	37	37

<25> = Backflush

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 11:37 AM thru 3/13/2019 12:26 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 11:37	2.08	1.4	4.33	16600.2	4522.0	21122	2274.8	304
3/13 11:38	2.07	1.4	4.32	16569.3	4526.2	21096	2272.0	303
3/13 11:39	2.11	1.4	4.32	16577.2	4526.4	21104	2272.9	303
3/13 11:40	2.12	1.4	4.54	16559.1	4522.2	21081	2270.4	303
3/13 11:41	2.09	1.4	4.32	16576.6	4523.5	21100	2272.5	303
3/13 11:42	2.06	1.4	4.33	16626.5	4520.9	21147	2277.6	304
3/13 11:43	2.07	1.4	4.33	16609.5	4524.6	21134	2276.1	304
3/13 11:44	2.12	1.4	4.54	16590.9	4517.3	21108	2273.3	304
3/13 11:45	2.13	1.4	4.54	16554.5	4522.6	21077	2270.0	303
3/13 11:46	2.11	1.4	4.33	16637.5	4523.1	21161	2279.0	304
3/13 11:47	2.08	1.4	4.32	16608.8	4512.0	21121	2274.7	304
3/13 11:48	2.12	1.4	4.32	16603.9	4518.5	21122	2274.8	304
3/13 11:49	2.14	1.4	4.55	16560.2	4528.2	21088	2271.2	303
3/13 11:50	2.16	1.5	4.53	16537.3	4518.0	21055	2267.7	303
3/13 11:51	2.14	1.5	4.53	16541.7	4507.9	21050	2267.0	303
3/13 11:52	2.11	1.4	4.33	16656.7	4517.3	21174	2280.4	304
3/13 11:53	2.11	1.4	4.33	16602.2	4522.0	21124	2275.1	303
3/13 11:54	2.15	1.5	4.53	16550.3	4519.3	21070	2269.2	303
3/13 11:55	2.13	1.4	4.55	16637.9	4512.9	21151	2277.9	304
3/13 11:56	2.18	1.5	4.55	16616.3	4520.2	21137	2276.4	304
3/13 11:57	2.17	1.5	4.55	16599.1	4507.0	21106	2273.1	304
3/13 11:58	2.18	1.5	4.54	16579.0	4513.6	21093	2271.7	303
3/13 11:59	2.17	1.5	4.54	16566.6	4512.5	21079	2270.2	303
3/13 12:00	2.17	1.5	4.54	16595.3	4516.2	21112	2273.7	303
3/13 12:01	2.19	1.5	4.54	16584.1	4514.0	21098	2272.3	303
3/13 12:02	2.20	1.5	4.55	16606.8	4512.5	21119	2274.6	304
3/13 12:03	2.23	1.5	4.55	16626.9	4516.7	21144	2277.1	304
3/13 12:04	2.25	1.5	4.78	16623.4	4524.6	21148	2277.6	304
3/13 12:05	2.22	1.5	4.56	16627.3	4527.3	21155	2278.4	304
3/13 12:06	2.21	1.5	4.55	16585.2	4527.9	21113	2273.9	303

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 12:07	2.21	1.5	4.54	16577.9	4523.3	21101	2272.6	303
3/13 12:08	2.21	1.5	4.54	16571.0	4519.8	21091	2271.5	303
3/13 12:09	2.20	1.5	4.55	16641.9	4521.5	21163	2279.3	304
3/13 12:10	2.19	1.5	4.56	16641.3	4527.7	21169	2279.9	304
3/13 12:11	2.21	1.5	4.56	16631.3	4529.3	21161	2279.0	304
3/13 12:12	2.21	1.5	4.55	16588.5	4529.3	21118	2274.4	303
3/13 12:13	2.21	1.5	4.55	16552.1	4535.2	21087	2271.1	303
3/13 12:14	2.21	1.5	4.55	16555.6	4528.2	21084	2270.7	303
3/13 12:15	2.24	1.5	4.77	16573.7	4525.1	21099	2272.4	303
3/13 12:16	2.22	1.5	4.55	16580.5	4527.5	21108	2273.3	303
3/13 12:17	2.18	1.5	4.55	16585.0	4527.3	21112	2273.8	303
3/13 12:18	2.19	1.5	4.55	16616.8	4526.0	21143	2277.1	304
3/13 12:19	2.20	1.5	4.56	16635.5	4528.2	21164	2279.3	304
3/13 12:20	2.22	1.5	4.55	16582.7	4542.1	21125	2275.2	303
3/13 12:21	2.25	1.5	4.78	16576.3	4537.2	21114	2274.0	303
3/13 12:22	2.22	1.5	4.55	16563.5	4538.1	21102	2272.7	303
3/13 12:23	2.18	1.5	4.55	16558.7	4534.8	21094	2271.8	303
3/13 12:24	2.18	1.5	4.55	16592.2	4533.0	21125	2275.2	303
3/13 12:25	2.20	1.5	4.56	16602.6	4539.6	21142	2277.0	304
3/13 12:26	2.21	1.5	4.56	16615.6	4537.2	21153	2278.2	304
Average (all)	2.17	1.5	4.51	16593.1	4523.8	21117	2274.3	303
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.06	1.4	4.32	16537.3	4507.0	21050	2267.0	303
Maximum (all)	2.25	1.5	4.78	16656.7	4542.1	21174	2280.4	304
Average (valid values only)	2.17	1.5	4.51	16593.1	4523.8	21117	2274.3	303
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	50	50	50	50	50	50	50	50

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 12:41 PM thru 3/13/2019 1:10 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 12:41	2.21	1.5	4.56	16599.7	4535.2	21135	2276.2	303
3/13 12:42	2.17	1.5	4.55	16587.6	4542.5	21130	2275.7	303
3/13 12:43	2.18	1.5	4.55	16585.8	4544.3	21130	2275.7	303
3/13 12:44	2.22	1.5	4.55	16589.2	4545.6	21135	2276.3	303
3/13 12:45	2.21	1.5	4.55	16596.9	4535.9	21133	2276.0	303
3/13 12:46	2.20	1.5	4.55	16585.8	4535.9	21122	2274.8	303
3/13 12:47	2.21	1.5	4.56	16597.3	4540.1	21137	2276.5	303
3/13 12:48	2.23	1.5	4.79	16615.4	4535.5	21151	2278.0	303
3/13 12:49	2.23	1.5	4.56	16607.5	4531.0	21139	2276.6	303
3/13 12:50	2.27	1.5	4.78	16596.9	4537.9	21135	2276.2	303
3/13 12:51	2.29	1.5	4.79	16615.9	4543.8	21160	2278.9	304
3/13 12:52	2.27	1.5	4.79	16620.3	4534.1	21154	2278.3	304
3/13 12:53	2.25	1.5	4.79	16632.9	4533.0	21166	2279.6	304
3/13 12:54	2.20	1.5	4.55	16569.1	4540.3	21109	2273.5	303
3/13 12:55	2.23	1.5	4.55	16571.0	4542.3	21113	2273.9	303
3/13 12:56	2.22	1.5	4.56	16606.4	4536.3	21143	2277.1	303
3/13 12:57	2.22	1.5	4.56	16602.4	4540.8	21143	2277.1	304
3/13 12:58	2.25	1.5	4.78	16611.5	4526.0	21138	2276.6	304
3/13 12:59	2.19	1.5	4.55	16575.2	4537.2	21112	2273.8	303
3/13 13:00	2.19	1.5	4.55	16586.7	4533.5	21120	2274.7	304
3/13 13:01	2.23	1.5	4.55	16591.1	4533.7	21125	2275.2	303
3/13 13:02	2.25	1.5	4.79	16613.0	4534.6	21148	2277.6	305
3/13 13:03	2.28	1.5	4.78	16588.9	4540.8	21130	2275.6	305
3/13 13:04	2.25	1.5	4.78	16587.8	4534.6	21122	2274.9	305
3/13 13:05	2.26	1.5	4.78	16562.0	4535.5	21098	2272.2	303
3/13 13:06	2.23	1.5	4.78	16577.2	4539.0	21116	2274.3	303
3/13 13:07	2.22	1.5	4.56	16599.1	4543.0	21142	2277.0	304
3/13 13:08	2.21	1.5	4.56	16642.6	4537.2	21180	2281.1	305
3/13 13:09	2.25	1.5	4.78	16602.2	4541.2	21143	2277.2	304
3/13 13:10	2.25	1.5	4.78	16573.0	4536.1	21109	2273.4	303

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
Average (all)	2.23	1.5	4.65	16596.4	4537.6	21134	2276.1	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.17	1.5	4.55	16562.0	4526.0	21098	2272.2	303
Maximum (all)	2.29	1.5	4.79	16642.6	4545.6	21180	2281.1	305
Average (valid values only)	2.23	1.5	4.65	16596.4	4537.6	21134	2276.1	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 1:19 PM thru 3/13/2019 1:48 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 13:19	2.21	1.5	4.56	16600.4	4535.0	21135	2276.3	304
3/13 13:20	2.21	1.5	4.55	16560.7	4538.5	21099	2272.4	303
3/13 13:21	2.20	1.5	4.55	16582.5	4531.5	21114	2273.9	303
3/13 13:22	2.20	1.5	4.55	16580.3	4532.1	21112	2273.8	303
3/13 13:23	2.21	1.5	4.55	16586.3	4533.2	21120	2274.5	303
3/13 13:24	2.19	1.5	4.55	16577.9	4539.2	21117	2274.3	303
3/13 13:25	2.21	1.5	4.56	16609.2	4540.3	21150	2277.8	303
3/13 13:26	2.21	1.5	4.56	16614.8	4534.3	21149	2277.7	304
3/13 13:27	2.20	1.5	4.56	16626.5	4542.7	21169	2279.9	304
3/13 13:28	2.23	1.5	4.56	16611.7	4546.5	21158	2278.8	305
3/13 13:29	2.18	1.5	4.55	16596.2	4535.7	21132	2275.9	305
3/13 13:30	2.14	1.4	4.56	16625.1	4539.0	21164	2279.4	305
3/13 13:31	2.15	1.5	4.56	16598.6	4545.2	21144	2277.2	305
3/13 13:32	2.18	1.5	4.56	16613.9	4536.6	21151	2277.9	305
3/13 13:33	2.21	1.5	4.56	16600.4	4543.2	21144	2277.2	305
3/13 13:34	2.20	1.5	4.55	16565.5	4538.1	21104	2272.9	303
3/13 13:35	2.19	1.5	4.55	16585.6	4543.4	21129	2275.6	303
3/13 13:36	2.18	1.5	4.56	16621.6	4547.4	21169	2279.9	305
3/13 13:37	2.18	1.5	4.56	16640.4	4543.2	21184	2281.5	305
3/13 13:38	2.17	1.5	4.56	16627.3	4542.3	21170	2280.0	305
3/13 13:39	2.21	1.5	4.56	16622.0	4541.9	21164	2279.4	305
3/13 13:40	2.20	1.5	4.55	16587.2	4549.1	21136	2276.3	303
3/13 13:41	2.22	1.5	4.55	16551.0	4540.8	21092	2271.5	303
3/13 13:42	2.22	1.5	4.55	16564.4	4541.4	21106	2273.1	303
3/13 13:43	2.22	1.5	4.55	16596.0	4546.9	21143	2277.1	304
3/13 13:44	2.21	1.5	4.57	16652.5	4542.1	21195	2282.7	305
3/13 13:45	2.26	1.5	4.78	16601.1	4551.4	21153	2278.1	304
3/13 13:46	2.30	1.6	4.77	16538.8	4552.9	21092	2271.5	303
3/13 13:47	2.26	1.5	4.78	16562.7	4547.8	21111	2273.6	303
3/13 13:48	2.21	1.5	4.55	16576.1	4548.5	21125	2275.1	303

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
Average (all)	2.21	1.5	4.58	16595.9	4541.7	21138	2276.5	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.14	1.4	4.55	16538.8	4531.5	21092	2271.5	303
Maximum (all)	2.30	1.6	4.78	16652.5	4552.9	21195	2282.7	305
Average (valid values only)	2.21	1.5	4.58	16595.9	4541.7	21138	2276.5	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 1:59 PM thru 3/13/2019 2:28 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 13:59	2.35	1.6	5.00	16565.1	4540.5	21106	2273.1	304
3/13 14:00	2.31	1.6	4.78	16564.2	4550.7	21115	2274.1	304
3/13 14:01	2.28	1.5	4.79	16623.4	4542.5	21166	2279.5	305
3/13 14:02	2.34	1.6	4.78	16599.3	4550.0	21149	2277.7	305
3/13 14:03	2.35	1.6	4.79	16635.1	4550.5	21186	2281.7	305
3/13 14:04	2.40	1.6	5.01	16598.4	4545.8	21144	2277.2	304
3/13 14:05	2.41	1.6	5.00	16564.9	4547.6	21113	2273.8	304
3/13 14:06	2.38	1.6	5.00	16556.9	4549.1	21106	2273.1	304
3/13 14:07	2.33	1.6	4.79	16625.4	4546.7	21172	2280.3	305
3/13 14:08	2.33	1.6	4.79	16613.2	4544.1	21157	2278.6	305
3/13 14:09	2.38	1.6	5.00	16563.5	4549.1	21113	2273.8	304
3/13 14:10	2.34	1.6	4.78	16594.5	4549.8	21144	2277.2	305
3/13 14:11	2.35	1.6	5.01	16606.2	4544.3	21151	2277.9	305
3/13 14:12	2.31	1.6	4.79	16618.7	4549.4	21168	2279.8	305
3/13 14:13	2.35	1.6	5.02	16618.5	4555.1	21174	2280.4	305
3/13 14:14	2.35	1.6	5.02	16612.6	4544.1	21157	2278.6	305
3/13 14:15	2.36	1.6	5.01	16605.9	4550.5	21156	2278.6	305
3/13 14:16	2.35	1.6	5.02	16613.2	4554.7	21168	2279.7	305
3/13 14:17	2.36	1.6	5.02	16613.4	4559.3	21173	2280.3	305
3/13 14:18	2.35	1.6	5.02	16620.7	4546.9	21168	2279.7	305
3/13 14:19	2.32	1.6	4.79	16605.9	4550.7	21157	2278.6	305
3/13 14:20	2.32	1.6	4.79	16609.9	4548.0	21158	2278.7	305
3/13 14:21	2.35	1.6	5.01	16594.7	4551.8	21147	2277.4	305
3/13 14:22	2.37	1.6	5.01	16569.7	4554.7	21124	2275.1	304
3/13 14:23	2.37	1.6	5.00	16564.4	4555.1	21120	2274.6	304
3/13 14:24	2.34	1.6	5.01	16600.2	4549.8	21150	2277.8	304
3/13 14:25	2.34	1.6	5.02	16617.9	4546.3	21164	2279.3	305
3/13 14:26	2.35	1.6	5.02	16629.3	4550.7	21180	2281.1	305
3/13 14:27	2.37	1.6	5.01	16603.1	4547.4	21151	2278.0	305
3/13 14:28	2.38	1.6	5.01	16579.4	4548.9	21128	2275.5	304

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
Average (all)	2.35	1.6	4.94	16599.6	4549.1	21149	2277.7	305
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.28	1.5	4.78	16556.9	4540.5	21106	2273.1	304
Maximum (all)	2.41	1.6	5.02	16635.1	4559.3	21186	2281.7	305
Average (valid values only)	2.35	1.6	4.94	16599.6	4549.1	21149	2277.7	305
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 2:38 PM thru 3/13/2019 3:07 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 14:38	2.37	1.6	5.01	16592.5	4554.9	21147	2277.6	304
3/13 14:39	2.39	1.6	5.01	16578.3	4550.5	21129	2275.6	304
3/13 14:40	2.38	1.6	5.02	16614.1	4546.1	21160	2278.9	305
3/13 14:41	2.36	1.6	5.02	16608.8	4551.6	21160	2279.0	305
3/13 14:42	2.36	1.6	5.02	16613.4	4540.1	21154	2278.3	305
3/13 14:43	2.37	1.6	5.01	16579.7	4554.2	21134	2276.1	304
3/13 14:44	2.37	1.6	5.01	16581.4	4552.9	21134	2276.1	304
3/13 14:45	2.36	1.6	5.02	16642.6	4554.4	21197	2282.9	304
3/13 14:46	2.39	1.6	5.03	16657.8	4548.3	21206	2283.9	305
3/13 14:47	2.40	1.6	5.02	16639.9	4552.5	21192	2282.4	305
3/13 14:48	2.33	1.6	4.79	16617.9	4552.5	21170	2280.0	305
3/13 14:49	2.37	1.6	5.01	16595.1	4558.2	21153	2278.2	305
3/13 14:50	2.37	1.6	5.02	16624.0	4547.2	21171	2280.1	305
3/13 14:51	2.38	1.6	5.02	16620.3	4542.1	21162	2279.2	305
3/13 14:52	2.35	1.6	5.02	16613.2	4551.6	21165	2279.4	305
3/13 14:53	2.34	1.6	4.79	16624.5	4553.8	21178	2280.9	305
3/13 14:54	2.33	1.6	4.79	16620.9	4550.0	21171	2280.1	305
3/13 14:55	2.35	1.6	5.02	16631.1	4554.4	21186	2281.7	305
3/13 14:56	2.38	1.6	5.02	16629.3	4553.6	21183	2281.4	305
3/13 14:57	2.38	1.6	5.02	16630.0	4565.0	21195	2282.8	305
3/13 14:58	2.41	1.6	5.02	16609.0	4554.0	21163	2279.3	305
3/13 14:59	2.38	1.6	5.02	16614.3	4559.7	21174	2280.5	305
3/13 15:00	2.35	1.6	5.01	16573.3	4551.1	21124	2275.1	304
3/13 15:01	2.34	1.6	5.01	16576.3	4553.1	21129	2275.7	304
3/13 15:02	2.35	1.6	5.01	16588.5	4554.2	21143	2277.1	304
3/13 15:03	2.38	1.6	5.01	16585.0	4559.1	21144	2277.2	304
3/13 15:04	2.38	1.6	5.01	16594.5	4549.8	21144	2277.2	304
3/13 15:05	2.40	1.6	5.02	16638.8	4550.5	21189	2282.1	305
3/13 15:06	2.35	1.6	5.01	16603.5	4556.2	21160	2278.9	305
3/13 15:07	2.38	1.6	5.00	16560.9	4557.3	21118	2274.4	304

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
Average (all)	2.37	1.6	4.99	16608.6	4552.6	21161	2279.1	305
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.33	1.6	4.79	16560.9	4540.1	21118	2274.4	304
Maximum (all)	2.41	1.6	5.03	16657.8	4565.0	21206	2283.9	305
Average (valid values only)	2.37	1.6	4.99	16608.6	4552.6	21161	2279.1	305
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 3:14 PM thru 3/13/2019 3:45 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 15:14	2.37	1.6	5.01	16566.4	4554.9	21121	2274.8	304
3/13 15:15	2.35	1.6	5.01	16578.3	4554.4	21133	2276.0	304
3/13 15:16	2.35	1.6	5.00	16557.1	4553.6	21111	2273.6	304
3/13 15:17	2.37	1.6	5.00	16563.8	4558.2	21122	2274.8	304
3/13 15:18	2.33	1.6	4.78	16588.7	4560.4	21149	2277.8	303
3/13 15:19	2.32	1.6	4.78	16591.4	4548.7	21140	2276.8	303
3/13 15:20	2.33	1.6	4.80	16650.8	4546.5	21197	2283.0	304
3/13 15:21	2.36	1.6	5.02	16610.3	4544.5	21155	2278.3	304
3/13 15:22	2.40	1.6	5.01	16605.9	4554.4	21160	2279.0	305
3/13 15:23	2.35	1.6	5.01	16591.6	4565.5	21157	2278.6	304
3/13 15:24	2.33	1.6	4.78	16598.6	4554.7	21153	2278.2	303
3/13 15:25	2.31	1.6	4.79	16603.7	4556.6	21160	2278.9	304
3/13 15:26	2.32	1.6	4.78	16584.1	4557.5	21142	2276.9	304
3/13 15:27	2.34	1.6	5.02	16617.2	4558.6	21176	2280.7	303
3/13 15:28	2.34	1.6	5.01	16591.1	4560.2	21151	2278.0	304
3/13 15:29	2.35	1.6	5.00	16558.5	4556.2	21115	2274.1	304
3/13 15:30	2.33	1.6	4.78	16600.2	4552.0	21152	2278.1	303
3/13 15:31	2.30	1.6	4.79	16630.2	4558.2	21188	2282.0	304
3/13 15:32	2.31	1.6	4.80	16650.5	4560.8	21211	2284.5	305
3/13 15:33	2.36	1.6	5.01	16586.3	4547.8	21134	2276.1	303
3/13 15:34	2.36	1.6	5.02	16616.1	4557.8	21174	2280.5	304
3/13 15:35	2.36	1.6	5.01	16584.5	4558.6	21143	2277.2	303
3/13 15:36	2.34	1.6	5.02	16610.6	4551.8	21162	2279.2	303
3/13 15:37	2.32	1.6	4.79	16628.9	4560.8	21190	2282.1	305
3/13 15:38	2.34	1.6	4.79	16635.5	4558.4	21194	2282.5	305
3/13 15:39	2.37	1.6	5.01	16602.4	4559.3	21162	2279.1	305
3/13 15:40	2.36	1.6	5.01	16584.7	4561.5	21146	2277.5	304
3/13 15:41	2.37	1.6	5.01	16586.5	4557.5	21144	2277.2	303
3/13 15:42	2.37	1.6	5.01	16602.8	4562.4	21165	2279.5	304
3/13 15:43	2.39	1.6	5.01	16572.1	4554.2	21126	2275.3	303

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 15:44	2.37	1.6	5.02	16607.9	4552.5	21160	2279.0	304
3/13 15:45	2.33	1.6	4.79	16623.6	4559.3	21183	2281.4	305
Average (all)	2.35	1.6	4.93	16599.4	4556.2	21156	2278.5	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.30	1.6	4.78	16557.1	4544.5	21111	2273.6	303
Maximum (all)	2.40	1.6	5.02	16650.8	4565.5	21211	2284.5	305
Average (valid values only)	2.35	1.6	4.93	16599.4	4556.2	21156	2278.5	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	32	32	32	32	32	32	32	32

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 3:52 PM thru 3/13/2019 4:23 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 15:52	2.37	1.6	5.02	16619.8	4561.1	21181	2281.2	304
3/13 15:53	2.37	1.6	5.01	16592.7	4558.2	21151	2277.9	303
3/13 15:54	2.35	1.6	5.01	16600.6	4556.0	21157	2278.6	303
3/13 15:55	2.32	1.6	4.79	16609.0	4557.1	21166	2279.6	304
3/13 15:56	2.31	1.6	4.79	16612.1	4560.0	21172	2280.2	305
3/13 15:57	2.35	1.6	5.01	16602.2	4556.0	21158	2278.8	304
3/13 15:58	2.38	1.6	5.02	16636.8	4560.2	21197	2282.9	304
3/13 15:59	2.39	1.6	5.03	16655.4	4557.8	21213	2284.7	305
3/13 16:00	2.40	1.6	5.01	16594.2	4560.0	21154	2278.3	304
3/13 16:01	2.39	1.6	5.03	16679.9	4558.0	21238	2287.3	305
3/13 16:02	2.36	1.6	5.02	16641.5	4556.4	21198	2283.0	305
3/13 16:03	2.37	1.6	5.02	16630.9	4559.3	21190	2282.1	304
3/13 16:04	2.37	1.6	5.01	16581.6	4564.2	21146	2277.4	304
3/13 16:05	2.37	1.6	5.02	16619.2	4561.7	21181	2281.2	304
3/13 16:06	2.40	1.6	5.02	16639.9	4557.5	21197	2282.9	305
3/13 16:07	2.34	1.6	4.79	16642.6	4561.1	21204	2283.6	305
3/13 16:08	2.39	1.6	5.01	16573.3	4562.6	21136	2276.3	304
3/13 16:09	2.38	1.6	5.01	16579.0	4560.0	21139	2276.7	304
3/13 16:10	2.39	1.6	5.02	16624.0	4559.7	21184	2281.5	305
3/13 16:11	2.41	1.6	5.02	16640.6	4555.8	21196	2282.9	305
3/13 16:12	2.42	1.6	5.02	16638.2	4560.8	21199	2283.1	305
3/13 16:13	2.45	1.7	5.24	16605.7	4567.5	21173	2280.3	304
3/13 16:14	2.42	1.6	5.01	16602.0	4561.9	21164	2279.3	304
3/13 16:15	2.41	1.6	5.01	16589.2	4562.6	21152	2278.1	303
3/13 16:16	2.42	1.6	5.01	16585.0	4556.4	21141	2276.9	303
3/13 16:17	2.43	1.6	5.02	16608.6	4564.4	21173	2280.3	304
3/13 16:18	2.40	1.6	5.02	16630.9	4553.6	21185	2281.5	305
3/13 16:19	2.37	1.6	5.02	16637.9	4559.3	21197	2282.9	305
3/13 16:20	2.37	1.6	5.03	16680.6	4558.0	21239	2287.4	305
3/13 16:21	2.38	1.6	5.02	16644.8	4562.4	21207	2284.0	305

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 16:22	2.39	1.6	5.03	16650.3	4557.5	21208	2284.0	305
3/13 16:23	2.44	1.7	5.01	16591.4	4556.9	21148	2277.7	304
Average (all)	2.38	1.6	5.00	16620.0	4559.5	21180	2281.0	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.31	1.6	4.79	16573.3	4553.6	21136	2276.3	303
Maximum (all)	2.45	1.7	5.24	16680.6	4567.5	21239	2287.4	305
Average (valid values only)	2.38	1.6	5.00	16620.0	4559.5	21180	2281.0	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	32	32	32	32	32	32	32	32

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/13/2019 4:30 PM thru 3/13/2019 4:59 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 16:30	2.40	1.6	5.02	16613.4	4554.0	21167	2279.8	304
3/13 16:31	2.41	1.6	5.02	16615.6	4563.3	21179	2281.0	305
3/13 16:32	2.44	1.7	5.02	16615.6	4556.0	21172	2280.2	304
3/13 16:33	2.42	1.6	5.02	16629.1	4565.5	21195	2282.7	305
3/13 16:34	2.42	1.6	5.02	16630.7	4557.8	21189	2282.0	305
3/13 16:35	2.42	1.6	5.02	16647.9	4564.6	21213	2284.6	305
3/13 16:36	2.45	1.7	5.25	16637.1	4561.3	21198	2283.1	305
3/13 16:37	2.45	1.7	5.26	16663.3	4562.4	21226	2286.0	305
3/13 16:38	2.45	1.7	5.26	16667.3	4562.2	21230	2286.4	305
3/13 16:39	2.42	1.6	5.03	16659.8	4553.1	21213	2284.7	305
3/13 16:40	2.39	1.6	5.02	16646.3	4566.8	21213	2284.6	305
3/13 16:41	2.44	1.7	5.02	16622.0	4559.5	21182	2281.3	304
3/13 16:42	2.42	1.6	5.02	16629.6	4558.2	21188	2281.9	304
3/13 16:43	2.43	1.6	5.01	16605.3	4558.2	21164	2279.3	304
3/13 16:44	2.39	1.6	5.01	16592.9	4565.7	21159	2278.8	303
3/13 16:45	2.39	1.6	5.01	16586.3	4570.1	21156	2278.5	304
3/13 16:46	2.38	1.6	5.01	16602.6	4554.9	21158	2278.7	304
3/13 16:47	2.40	1.6	5.02	16636.2	4572.1	21208	2284.1	305
3/13 16:48	2.43	1.6	5.02	16634.4	4573.4	21208	2284.1	305
3/13 16:49	2.43	1.6	5.02	16636.6	4567.5	21204	2283.7	305
3/13 16:50	2.46	1.7	5.25	16636.0	4568.6	21205	2283.7	305
3/13 16:51	2.40	1.6	5.02	16639.1	4574.3	21213	2284.7	305
3/13 16:52	2.38	1.6	5.03	16614.8	4581.2	21196	2282.8	305
3/13 16:53	2.39	1.6	5.01	16597.3	4569.2	21167	2279.6	304
3/13 16:54	2.43	1.6	5.01	16597.5	4566.6	21164	2279.4	305
3/13 16:55	2.39	1.6	5.03	16665.5	4562.8	21228	2286.3	304
3/13 16:56	2.42	1.6	5.02	16620.1	4571.0	21191	2282.3	304
3/13 16:57	2.45	1.7	5.25	16620.3	4566.8	21187	2281.8	303
3/13 16:58	2.43	1.6	5.01	16580.5	4578.5	21159	2278.8	303
3/13 16:59	2.41	1.6	5.02	16613.9	4562.4	21176	2280.7	303

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
Average (all)	2.42	1.6	5.06	16625.2	4564.9	21190	2282.2	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.38	1.6	5.01	16580.5	4553.1	21156	2278.5	303
Maximum (all)	2.46	1.7	5.26	16667.3	4581.2	21230	2286.4	305
Average (valid values only)	2.42	1.6	5.06	16625.2	4564.9	21190	2282.2	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/13/2019 5:14 PM thru 3/13/2019 5:43 PM

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
3/13 17:14	2.44	1.7	5.24	16590.7	4569.0	21160	2278.9	303
3/13 17:15	2.43	1.6	5.03	16650.8	4564.8	21216	2284.9	304
3/13 17:16	2.39	1.6	5.03	16673.5	4569.9	21243	2287.9	304
3/13 17:17	2.41	1.6	5.03	16668.0	4570.3	21238	2287.3	304
3/13 17:18	2.43	1.6	5.02	16646.3	4569.7	21216	2285.0	304
3/13 17:19	2.44	1.7	5.03	16655.4	4575.2	21231	2286.5	304
3/13 17:20	2.42	1.6	5.02	16648.5	4573.7	21222	2285.6	305
3/13 17:21	2.44	1.7	5.02	16643.2	4578.7	21222	2285.6	304
3/13 17:22	2.38	1.6	5.03	16642.1	4579.8	21222	2285.6	304
3/13 17:23	2.36	1.6	5.02	16627.1	4565.5	21193	2282.4	304
3/13 17:24	2.38	1.6	5.02	16633.1	4561.9	21195	2282.7	304
3/13 17:25	2.39	1.6	5.02	16618.5	4578.1	21197	2282.9	304
3/13 17:26	2.42	1.6	5.03	16626.2	4579.6	21206	2283.8	305
3/13 17:27	2.40	1.6	5.03	16611.2	4585.6	21197	2282.9	303
3/13 17:28	2.41	1.6	5.01	16583.2	4570.3	21154	2278.2	303
3/13 17:29	2.37	1.6	5.01	16585.0	4565.7	21151	2277.9	303
3/13 17:30	2.39	1.6	5.02	16626.7	4562.6	21189	2282.1	304
3/13 17:31	2.38	1.6	5.03	16673.3	4577.4	21251	2288.7	304
3/13 17:32	2.40	1.6	5.03	16660.2	4575.6	21236	2287.1	304
3/13 17:33	2.41	1.6	5.02	16640.2	4570.8	21211	2284.4	304
3/13 17:34	2.38	1.6	5.01	16575.5	4577.6	21153	2278.2	303
3/13 17:35	2.34	1.6	5.01	16598.2	4570.3	21169	2279.8	303
3/13 17:36	2.31	1.6	4.80	16656.7	4574.1	21231	2286.5	304
3/13 17:37	2.35	1.6	5.03	16655.2	4570.8	21226	2286.1	304
3/13 17:38	2.37	1.6	5.01	16589.4	4573.0	21162	2279.2	303
3/13 17:39	2.39	1.6	5.02	16645.2	4565.7	21211	2284.4	304
3/13 17:40	2.35	1.6	5.03	16682.1	4574.3	21256	2289.4	304
3/13 17:41	2.36	1.6	5.02	16623.2	4579.2	21202	2283.5	304
3/13 17:42	2.38	1.6	5.01	16601.1	4565.5	21167	2279.6	303
3/13 17:43	2.36	1.6	5.01	16584.7	4578.7	21163	2279.3	303

Timestamp	(Turbine 1) NH3 Slip ppm 1-Min	(Turbine 1) NH3 ppm @15% O2 1-Min	(Turbine 1) NH3 lb/hr 1-Min Avg	(Turbine 1) CT Gas Flow hscf/hr 1-Min	(Turbine 1) DB Gas Flow hscf/hr 1-Min	(Turbine 1) Total Gas Flow hscf/hr 1-Min	(Turbine 1) Total Heat Input mmBtu/hr 1-Min	(Turbine 1) 40CFR75 Megawatts 1-Min
Average (all)	2.39	1.6	5.02	16630.5	4572.4	21203	2283.5	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.31	1.6	4.80	16575.5	4561.9	21151	2277.9	303
Maximum (all)	2.44	1.7	5.24	16682.1	4585.6	21256	2289.4	305
Average (valid values only)	2.39	1.6	5.02	16630.5	4572.4	21203	2283.5	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 10:58 AM thru 3/14/2019 11:18 AM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 10:58	2.55	1.72	0.0063	14.12	0.00	0.00	0.0000	0.00	12.14
3/14 10:59	2.57	1.73	0.0064	14.34	0.00	0.00	0.0000	0.00	12.13
3/14 11:00	2.55	1.72	0.0063	14.10	0.00	0.00	0.0000	0.00	12.13
3/14 11:01	2.53	1.70	0.0063	14.11	0.00	0.00	0.0000	0.00	12.14
3/14 11:02	2.53	1.71	0.0063	14.11	0.11	0.07	0.0002	0.44	12.15
3/14 11:03	2.51	1.69	0.0062	13.88	0.07	0.05	0.0001	0.22	12.14
3/14 11:04	2.52	1.70	0.0062	13.87	0.09	0.06	0.0001	0.22	12.13
3/14 11:05	2.50	1.68	0.0062	13.89	0.00	0.00	0.0000	0.00	12.14
3/14 11:06	2.54	1.71	0.0063	14.11	0.00	0.00	0.0000	0.00	12.14
3/14 11:07	2.52	1.70	0.0063	13.88	0.00	0.00	0.0000	0.00	12.14
3/14 11:08	2.51	1.69	0.0062	13.90	0.00	0.00	0.0000	0.00	12.15
3/14 11:09	2.53	1.71	0.0063	14.09	0.00	0.00	0.0000	0.00	12.15
3/14 11:10	2.52	1.70	0.0063	13.89	0.00	0.00	0.0000	0.00	12.14
3/14 11:11	2.50	1.69	0.0062	13.87	0.00	0.00	0.0000	0.00	12.15
3/14 11:12	2.53	1.70	0.0063	14.10	0.00	0.00	0.0000	0.00	12.14
3/14 11:13	2.52	1.70	0.0063	13.89	0.00	0.00	0.0000	0.00	12.14
3/14 11:14	2.53	1.71	0.0063	14.09	0.00	0.00	0.0000	0.00	12.15
3/14 11:15	2.52	1.70	0.0063	13.88	0.00	0.00	0.0000	0.00	12.14
3/14 11:16	2.50	1.69	0.0062	13.86	0.00	0.00	0.0000	0.00	12.15
3/14 11:17	2.50	1.69	0.0062	13.90	0.00	0.00	0.0000	0.00	12.15
3/14 11:18	2.49	1.68	0.0062	13.88	0.00	0.00	0.0000	0.00	12.15
Average (all)	2.52	1.70	0.0063	13.99	0.01	0.01	0.0000	0.04	12.14
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.49	1.68	0.0062	13.86	0.00	0.00	0.0000	0.00	12.13
Maximum (all)	2.57	1.73	0.0064	14.34	0.11	0.07	0.0002	0.44	12.15
Average (valid values only)	2.52	1.70	0.0063	13.99	0.01	0.01	0.0000	0.04	12.14
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 10:58 AM thru 3/14/2019 11:18 AM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 10:58	16956.6	3849.4	20806	2240.8	307
3/14 10:59	16965.0	3849.6	20815	2241.7	306
3/14 11:00	16940.4	3848.3	20789	2239.0	306
3/14 11:01	16948.8	3841.5	20790	2239.1	307
3/14 11:02	16944.2	3839.9	20784	2238.5	307
3/14 11:03	16944.6	3843.7	20788	2238.9	307
3/14 11:04	16929.2	3843.9	20773	2237.3	307
3/14 11:05	16945.7	3848.8	20795	2239.6	307
3/14 11:06	16951.5	3853.6	20805	2240.7	307
3/14 11:07	16942.2	3854.9	20797	2239.9	307
3/14 11:08	16966.7	3851.6	20818	2242.1	307
3/14 11:09	16925.0	3845.0	20770	2236.9	307
3/14 11:10	16948.8	3843.9	20793	2239.4	307
3/14 11:11	16925.9	3848.8	20775	2237.4	307
3/14 11:12	16940.4	3847.4	20788	2238.9	307
3/14 11:13	16957.0	3847.2	20804	2240.6	307
3/14 11:14	16922.1	3851.4	20774	2237.3	306
3/14 11:15	16933.4	3846.1	20780	2237.9	307
3/14 11:16	16911.1	3851.9	20763	2236.1	306
3/14 11:17	16965.4	3843.0	20808	2241.1	307
3/14 11:18	16935.1	3853.2	20788	2238.9	307
Average (all)	16942.8	3847.8	20791	2239.1	307
Total (all)	--	--	--	--	--
Minimum (all)	16911.1	3839.9	20763	2236.1	306
Maximum (all)	16966.7	3854.9	20818	2242.1	307
Average (valid values only)	16942.8	3847.8	20791	2239.1	307
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 11:38 AM thru 3/14/2019 11:58 AM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 11:38	2.55	1.72	0.0063	14.03	0.09	0.06	0.0001	0.22	12.13
3/14 11:39	2.52	1.70	0.0063	13.82	0.07	0.05	0.0001	0.22	12.15
3/14 11:40	2.47	1.67	0.0061	13.58	0.02	0.01	0.0000	0.00	12.15
3/14 11:41	2.49	1.68	0.0062	13.82	0.00	0.00	0.0000	0.00	12.15
3/14 11:42	2.49	1.68	0.0062	13.81	0.00	0.00	0.0000	0.00	12.15
3/14 11:43	2.49	1.68	0.0062	13.83	0.00	0.00	0.0000	0.00	12.15
3/14 11:44	2.51	1.69	0.0062	13.83	0.00	0.00	0.0000	0.00	12.15
3/14 11:45	2.51	1.69	0.0062	13.83	0.00	0.00	0.0000	0.00	12.15
3/14 11:46	2.48	1.67	0.0062	13.83	0.00	0.00	0.0000	0.00	12.16
3/14 11:47	2.48	1.67	0.0062	13.82	0.00	0.00	0.0000	0.00	12.16
3/14 11:48	2.48	1.67	0.0062	13.83	0.00	0.00	0.0000	0.00	12.16
3/14 11:49	2.48	1.67	0.0062	13.83	0.00	0.00	0.0000	0.00	12.16
3/14 11:50	2.50	1.68	0.0062	13.83	0.00	0.00	0.0000	0.00	12.14
3/14 11:51	2.50	1.69	0.0062	13.82	0.00	0.00	0.0000	0.00	12.16
3/14 11:52	2.53	1.71	0.0063	14.04	0.00	0.00	0.0000	0.00	12.15
3/14 11:53	2.52	1.70	0.0063	13.81	0.00	0.00	0.0000	0.00	12.15
3/14 11:54	2.54	1.71	0.0063	14.05	0.06	0.04	0.0001	0.22	12.15
3/14 11:55	2.49	1.68	0.0062	13.82	0.07	0.05	0.0001	0.22	12.15
3/14 11:56	2.48	1.67	0.0062	13.60	0.00	0.00	0.0000	0.00	12.15
3/14 11:57	2.49	1.68	0.0062	13.81	0.00	0.00	0.0000	0.00	12.15
3/14 11:58	2.47	1.67	0.0061	13.57	0.00	0.00	0.0000	0.00	12.16
Average (all)	2.50	1.68	0.0062	13.82	0.01	0.01	0.0000	0.04	12.15
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.47	1.67	0.0061	13.57	0.00	0.00	0.0000	0.00	12.13
Maximum (all)	2.55	1.72	0.0063	14.05	0.09	0.06	0.0001	0.22	12.16
Average (valid values only)	2.50	1.68	0.0062	13.82	0.01	0.01	0.0000	0.04	12.15
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 11:38 AM thru 3/14/2019 11:58 AM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 11:38	16830.5	3841.7	20672	2226.4	305
3/14 11:39	16845.7	3847.0	20693	2228.6	305
3/14 11:40	16825.4	3846.8	20672	2226.4	306
3/14 11:41	16851.2	3844.1	20695	2228.9	306
3/14 11:42	16834.2	3847.9	20682	2227.4	305
3/14 11:43	16868.0	3844.3	20712	2230.7	306
3/14 11:44	16863.2	3851.6	20715	2231.0	306
3/14 11:45	16867.6	3845.9	20714	2230.8	305
3/14 11:46	16857.0	3846.6	20704	2229.8	305
3/14 11:47	16849.7	3847.9	20698	2229.1	305
3/14 11:48	16856.1	3844.8	20701	2229.5	304
3/14 11:49	16857.2	3851.2	20708	2230.3	305
3/14 11:50	16857.0	3849.0	20706	2230.0	305
3/14 11:51	16851.2	3843.7	20695	2228.9	305
3/14 11:52	16849.9	3847.9	20698	2229.1	306
3/14 11:53	16828.7	3842.1	20671	2226.3	305
3/14 11:54	16853.7	3844.1	20698	2229.1	305
3/14 11:55	16841.1	3847.9	20689	2228.2	304
3/14 11:56	16855.2	3850.1	20705	2230.0	306
3/14 11:57	16852.1	3838.4	20691	2228.4	304
3/14 11:58	16823.0	3841.7	20665	2225.6	304
Average (all)	16848.5	3845.9	20694	2228.8	305
Total (all)	--	--	--	--	--
Minimum (all)	16823.0	3838.4	20665	2225.6	304
Maximum (all)	16868.0	3851.6	20715	2231.0	306
Average (valid values only)	16848.5	3845.9	20694	2228.8	305
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 12:13 PM thru 3/14/2019 12:33 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 12:13	2.52	1.70	0.0063	13.82	0.00	0.00	0.0000	0.00	12.15
3/14 12:14	2.55	1.72	0.0063	14.02	0.00	0.00	0.0000	0.00	12.15
3/14 12:15	2.54	1.71	0.0063	14.02	0.00	0.00	0.0000	0.00	12.16
3/14 12:16	2.50	1.69	0.0062	13.80	0.00	0.00	0.0000	0.00	12.16
3/14 12:17	2.49	1.68	0.0062	13.79	0.00	0.00	0.0000	0.00	12.16
3/14 12:18	2.49	1.68	0.0062	13.79	0.00	0.00	0.0000	0.00	12.16
3/14 12:19	2.51	1.69	0.0062	13.79	0.00	0.00	0.0000	0.00	12.16
3/14 12:20	2.50	1.69	0.0062	13.79	0.00	0.00	0.0000	0.00	12.16
3/14 12:21	2.53	1.71	0.0063	14.03	0.00	0.00	0.0000	0.00	12.16
3/14 12:22	2.50	1.69	0.0062	13.81	0.00	0.00	0.0000	0.00	12.16
3/14 12:23	2.53	1.71	0.0063	14.03	0.00	0.00	0.0000	0.00	12.16
3/14 12:24	2.53	1.71	0.0063	14.02	0.00	0.00	0.0000	0.00	12.15
3/14 12:25	2.51	1.69	0.0062	13.80	0.00	0.00	0.0000	0.00	12.16
3/14 12:26	2.53	1.71	0.0063	14.02	0.10	0.07	0.0002	0.44	12.16
3/14 12:27	2.51	1.69	0.0062	13.82	0.00	0.00	0.0000	0.00	12.16
3/14 12:28	2.52	1.70	0.0063	14.03	0.00	0.00	0.0000	0.00	12.17
3/14 12:29	2.54	1.71	0.0063	14.01	0.00	0.00	0.0000	0.00	12.16
3/14 12:30	2.55	1.72	0.0063	14.00	0.00	0.00	0.0000	0.00	12.16
3/14 12:31	2.51	1.70	0.0062	13.79	0.00	0.00	0.0000	0.00	12.17
3/14 12:32	2.54	1.71	0.0063	14.02	0.00	0.00	0.0000	0.00	12.16
3/14 12:33	2.56	1.73	0.0064	14.22	0.00	0.00	0.0000	0.00	12.16
Average (all)	2.52	1.70	0.0063	13.92	0.00	0.00	0.0000	0.02	12.16
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.49	1.68	0.0062	13.79	0.00	0.00	0.0000	0.00	12.15
Maximum (all)	2.56	1.73	0.0064	14.22	0.10	0.07	0.0002	0.44	12.17
Average (valid values only)	2.52	1.70	0.0063	13.92	0.00	0.00	0.0000	0.02	12.16
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/14/2019 12:13 PM thru 3/14/2019 12:33 PM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 12:13	16865.4	3830.0	20695	2228.9	306
3/14 12:14	16836.4	3834.0	20670	2226.2	304
3/14 12:15	16825.6	3836.6	20662	2225.3	304
3/14 12:16	16840.2	3827.6	20668	2225.9	305
3/14 12:17	16819.9	3830.9	20651	2224.1	305
3/14 12:18	16822.5	3839.7	20662	2225.3	305
3/14 12:19	16823.2	3831.8	20655	2224.6	304
3/14 12:20	16819.7	3829.1	20649	2223.9	304
3/14 12:21	16837.8	3839.5	20677	2226.9	304
3/14 12:22	16841.3	3828.5	20670	2226.1	305
3/14 12:23	16851.2	3833.3	20685	2227.7	306
3/14 12:24	16835.3	3826.9	20662	2225.4	304
3/14 12:25	16833.4	3828.0	20661	2225.3	305
3/14 12:26	16833.8	3830.2	20664	2225.5	304
3/14 12:27	16855.7	3834.9	20691	2228.4	305
3/14 12:28	16840.2	3828.9	20669	2226.1	304
3/14 12:29	16812.8	3832.2	20645	2223.4	304
3/14 12:30	16801.6	3833.3	20635	2222.3	304
3/14 12:31	16824.5	3831.3	20656	2224.6	304
3/14 12:32	16812.4	3841.0	20653	2224.4	304
3/14 12:33	16796.7	3826.5	20623	2221.1	304
Average (all)	16830.0	3832.1	20662	2225.3	304
Total (all)	--	--	--	--	--
Minimum (all)	16796.7	3826.5	20623	2221.1	304
Maximum (all)	16865.4	3841.0	20695	2228.9	306
Average (valid values only)	16830.0	3832.1	20662	2225.3	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 12:50 PM thru 3/14/2019 1:10 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 12:50	2.51	1.70	0.0062	13.78	0.11	0.07	0.0002	0.44	12.17
3/14 12:51	2.50	1.69	0.0062	13.79	0.02	0.01	0.0000	0.00	12.17
3/14 12:52	2.54	1.72	0.0063	14.00	0.00	0.00	0.0000	0.00	12.17
3/14 12:53	2.54	1.72	0.0063	14.01	0.00	0.00	0.0000	0.00	12.18
3/14 12:54	2.53	1.71	0.0063	14.01	0.00	0.00	0.0000	0.00	12.18
3/14 12:55	2.51	1.70	0.0063	13.76	0.00	0.00	0.0000	0.00	12.18
3/14 12:56	2.51	1.70	0.0063	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 12:57	2.55	1.72	0.0063	14.00	0.00	0.00	0.0000	0.00	12.17
3/14 12:58	2.49	1.68	0.0062	13.76	0.00	0.00	0.0000	0.00	12.17
3/14 12:59	2.48	1.68	0.0062	13.76	0.00	0.00	0.0000	0.00	12.18
3/14 13:00	2.49	1.68	0.0062	13.76	0.00	0.00	0.0000	0.00	12.18
3/14 13:01	2.49	1.68	0.0062	13.75	0.00	0.00	0.0000	0.00	12.17
3/14 13:02	2.48	1.68	0.0062	13.78	0.00	0.00	0.0000	0.00	12.18
3/14 13:03	2.49	1.68	0.0062	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 13:04	2.50	1.69	0.0062	13.76	0.04	0.03	0.0001	0.22	12.17
3/14 13:05	2.50	1.69	0.0062	13.75	0.09	0.06	0.0001	0.22	12.17
3/14 13:06	2.49	1.68	0.0062	13.76	0.00	0.00	0.0000	0.00	12.17
3/14 13:07	2.50	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.17
3/14 13:08	2.51	1.70	0.0062	13.75	0.00	0.00	0.0000	0.00	12.17
3/14 13:09	2.51	1.70	0.0062	13.76	0.00	0.00	0.0000	0.00	12.17
3/14 13:10	2.50	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.18
Average (all)	2.51	1.69	0.0062	13.81	0.01	0.01	0.0000	0.04	12.17
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.48	1.68	0.0062	13.75	0.00	0.00	0.0000	0.00	12.17
Maximum (all)	2.55	1.72	0.0063	14.01	0.11	0.07	0.0002	0.44	12.18
Average (valid values only)	2.51	1.69	0.0062	13.81	0.01	0.01	0.0000	0.04	12.17
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 12:50 PM thru 3/14/2019 1:10 PM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 12:50	16799.6	3837.3	20637	2222.6	304
3/14 12:51	16820.5	3832.9	20653	2224.4	304
3/14 12:52	16795.2	3830.2	20625	2221.3	304
3/14 12:53	16815.5	3833.3	20649	2223.8	304
3/14 12:54	16815.5	3826.9	20642	2223.2	305
3/14 12:55	16779.9	3832.0	20612	2219.9	305
3/14 12:56	16790.1	3837.9	20628	2221.6	305
3/14 12:57	16784.6	3842.1	20627	2221.5	305
3/14 12:58	16780.4	3832.4	20613	2219.9	303
3/14 12:59	16767.6	3833.8	20601	2218.8	303
3/14 13:00	16770.2	3838.2	20608	2219.6	303
3/14 13:01	16763.8	3827.8	20592	2217.8	303
3/14 13:02	16804.4	3834.9	20639	2222.8	304
3/14 13:03	16793.4	3835.1	20629	2221.6	304
3/14 13:04	16776.8	3832.2	20609	2219.6	304
3/14 13:05	16758.5	3836.0	20595	2218.0	304
3/14 13:06	16768.4	3828.5	20597	2218.3	304
3/14 13:07	16766.2	3835.3	20602	2218.8	304
3/14 13:08	16761.8	3833.3	20595	2218.0	303
3/14 13:09	16766.9	3836.4	20603	2219.0	304
3/14 13:10	16775.5	3836.2	20612	2219.9	305
Average (all)	16783.6	3833.9	20618	2220.5	304
Total (all)	--	--	--	--	--
Minimum (all)	16758.5	3826.9	20592	2217.8	303
Maximum (all)	16820.5	3842.1	20653	2224.4	305
Average (valid values only)	16783.6	3833.9	20618	2220.5	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 1:25 PM thru 3/14/2019 1:45 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 13:25	2.53	1.71	0.0063	14.00	0.00	0.00	0.0000	0.00	12.18
3/14 13:26	2.55	1.72	0.0063	14.01	0.00	0.00	0.0000	0.00	12.17
3/14 13:27	2.51	1.70	0.0063	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 13:28	2.51	1.70	0.0062	13.77	0.00	0.00	0.0000	0.00	12.17
3/14 13:29	2.52	1.70	0.0063	14.00	0.00	0.00	0.0000	0.00	12.17
3/14 13:30	2.50	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.18
3/14 13:31	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 13:32	2.52	1.70	0.0063	13.99	0.00	0.00	0.0000	0.00	12.17
3/14 13:33	2.49	1.68	0.0062	13.79	0.00	0.00	0.0000	0.00	12.17
3/14 13:34	2.51	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.16
3/14 13:35	2.49	1.68	0.0062	13.77	0.00	0.00	0.0000	0.00	12.17
3/14 13:36	2.50	1.69	0.0062	13.79	0.00	0.00	0.0000	0.00	12.18
3/14 13:37	2.51	1.70	0.0063	13.79	0.00	0.00	0.0000	0.00	12.18
3/14 13:38	2.52	1.71	0.0063	13.99	0.00	0.00	0.0000	0.00	12.19
3/14 13:39	2.48	1.68	0.0062	13.75	0.00	0.00	0.0000	0.00	12.18
3/14 13:40	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 13:41	2.47	1.67	0.0061	13.54	0.00	0.00	0.0000	0.00	12.17
3/14 13:42	2.45	1.66	0.0061	13.54	0.00	0.00	0.0000	0.00	12.18
3/14 13:43	2.48	1.68	0.0062	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 13:44	2.48	1.68	0.0062	13.78	0.00	0.00	0.0000	0.00	12.18
3/14 13:45	2.51	1.70	0.0063	13.75	0.00	0.00	0.0000	0.00	12.18
Average (all)	2.50	1.69	0.0062	13.80	0.00	0.00	0.0000	0.00	12.18
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.45	1.66	0.0061	13.54	0.00	0.00	0.0000	0.00	12.16
Maximum (all)	2.55	1.72	0.0063	14.01	0.00	0.00	0.0000	0.00	12.19
Average (valid values only)	2.50	1.69	0.0062	13.80	0.00	0.00	0.0000	0.00	12.18
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 1:25 PM thru 3/14/2019 1:45 PM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 13:25	16801.1	3835.7	20637	2222.6	305
3/14 13:26	16812.6	3837.5	20650	2224.0	305
3/14 13:27	16788.1	3832.0	20620	2220.8	304
3/14 13:28	16791.2	3832.9	20624	2221.2	305
3/14 13:29	16794.3	3827.3	20622	2220.9	304
3/14 13:30	16772.2	3837.3	20610	2219.7	305
3/14 13:31	16784.3	3840.6	20625	2221.3	305
3/14 13:32	16784.1	3826.7	20611	2219.7	305
3/14 13:33	16797.1	3842.8	20640	2222.9	305
3/14 13:34	16779.7	3840.6	20620	2220.8	305
3/14 13:35	16792.5	3837.3	20630	2221.9	305
3/14 13:36	16810.6	3831.1	20642	2223.1	304
3/14 13:37	16811.3	3826.7	20638	2222.7	304
3/14 13:38	16783.7	3827.3	20611	2219.8	304
3/14 13:39	16759.6	3841.0	20601	2218.7	303
3/14 13:40	16778.8	3846.8	20626	2221.4	305
3/14 13:41	16775.9	3839.5	20615	2220.3	305
3/14 13:42	16780.6	3836.2	20617	2220.5	304
3/14 13:43	16789.9	3833.3	20623	2221.1	304
3/14 13:44	16799.4	3831.3	20631	2221.9	304
3/14 13:45	16774.0	3826.0	20600	2218.7	304
Average (all)	16788.6	3834.8	20623	2221.1	304
Total (all)	--	--	--	--	--
Minimum (all)	16759.6	3826.0	20600	2218.7	303
Maximum (all)	16812.6	3846.8	20650	2224.0	305
Average (valid values only)	16788.6	3834.8	20623	2221.1	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 2:06 PM thru 3/14/2019 2:26 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 14:06	2.51	1.70	0.0062	13.77	0.02	0.01	0.0000	0.00	12.17
3/14 14:07	2.50	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.18
3/14 14:08	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.17
3/14 14:09	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 14:10	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 14:11	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.17
3/14 14:12	2.51	1.70	0.0063	13.76	0.00	0.00	0.0000	0.00	12.18
3/14 14:13	2.52	1.70	0.0063	13.99	0.00	0.00	0.0000	0.00	12.17
3/14 14:14	2.53	1.71	0.0063	13.99	0.00	0.00	0.0000	0.00	12.17
3/14 14:15	2.53	1.71	0.0063	14.00	0.00	0.00	0.0000	0.00	12.17
3/14 14:16	2.52	1.71	0.0063	13.99	0.00	0.00	0.0000	0.00	12.18
3/14 14:17	2.51	1.70	0.0062	13.76	0.00	0.00	0.0000	0.00	12.17
3/14 14:18	2.51	1.69	0.0062	13.75	0.00	0.00	0.0000	0.00	12.16
3/14 14:19	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.17
3/14 14:20	2.50	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.17
3/14 14:21	2.48	1.68	0.0062	13.76	0.00	0.00	0.0000	0.00	12.18
3/14 14:22	2.47	1.67	0.0062	13.53	0.05	0.03	0.0001	0.22	12.18
3/14 14:23	2.46	1.66	0.0061	13.52	0.00	0.00	0.0000	0.00	12.17
3/14 14:24	2.47	1.67	0.0061	13.53	0.00	0.00	0.0000	0.00	12.17
3/14 14:25	2.48	1.68	0.0062	13.75	0.00	0.00	0.0000	0.00	12.17
3/14 14:26	2.53	1.71	0.0063	13.97	0.00	0.00	0.0000	0.00	12.17
Average (all)	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.01	12.17
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.46	1.66	0.0061	13.52	0.00	0.00	0.0000	0.00	12.16
Maximum (all)	2.53	1.71	0.0063	14.00	0.05	0.03	0.0001	0.22	12.18
Average (valid values only)	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.01	12.17
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 2:06 PM thru 3/14/2019 2:26 PM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 14:06	16788.5	3830.9	20619	2220.7	304
3/14 14:07	16771.8	3828.9	20601	2218.7	304
3/14 14:08	16784.8	3830.9	20616	2220.3	305
3/14 14:09	16785.9	3837.5	20623	2221.1	305
3/14 14:10	16774.6	3844.3	20619	2220.6	304
3/14 14:11	16786.1	3834.2	20620	2220.8	305
3/14 14:12	16779.7	3837.1	20617	2220.5	305
3/14 14:13	16785.9	3832.4	20618	2220.5	304
3/14 14:14	16788.3	3838.6	20627	2221.5	304
3/14 14:15	16802.7	3836.0	20639	2222.8	305
3/14 14:16	16788.1	3836.4	20625	2221.3	305
3/14 14:17	16779.0	3838.6	20618	2220.5	305
3/14 14:18	16764.9	3828.5	20593	2217.9	305
3/14 14:19	16783.5	3840.6	20624	2221.2	304
3/14 14:20	16766.2	3836.8	20603	2218.9	304
3/14 14:21	16783.7	3817.6	20601	2218.8	304
3/14 14:22	16761.2	3830.2	20591	2217.7	303
3/14 14:23	16729.6	3846.1	20576	2216.0	303
3/14 14:24	16763.6	3841.0	20605	2219.1	304
3/14 14:25	16753.2	3841.0	20594	2218.0	303
3/14 14:26	16763.6	3830.2	20594	2217.9	304
Average (all)	16775.5	3835.1	20611	2219.8	304
Total (all)	--	--	--	--	--
Minimum (all)	16729.6	3817.6	20576	2216.0	303
Maximum (all)	16802.7	3846.1	20639	2222.8	305
Average (valid values only)	16775.5	3835.1	20611	2219.8	304
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 2:42 PM thru 3/14/2019 3:02 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 14:42	2.48	1.68	0.0062	13.79	0.00	0.00	0.0000	0.00	12.17
3/14 14:43	2.47	1.67	0.0062	13.56	0.00	0.00	0.0000	0.00	12.18
3/14 14:44	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.18
3/14 14:45	2.52	1.70	0.0063	14.00	0.00	0.00	0.0000	0.00	12.17
3/14 14:46	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.17
3/14 14:47	2.52	1.70	0.0063	13.98	0.00	0.00	0.0000	0.00	12.17
3/14 14:48	2.50	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.17
3/14 14:49	2.51	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.16
3/14 14:50	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.17
3/14 14:51	2.50	1.69	0.0062	13.77	0.00	0.00	0.0000	0.00	12.16
3/14 14:52	2.50	1.69	0.0062	13.76	0.00	0.00	0.0000	0.00	12.16
3/14 14:53	2.49	1.68	0.0062	13.76	0.00	0.00	0.0000	0.00	12.16
3/14 14:54	2.46	1.66	0.0061	13.55	0.03	0.02	0.0000	0.00	12.17
3/14 14:55	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.16
3/14 14:56	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.17
3/14 14:57	2.51	1.70	0.0062	13.78	0.00	0.00	0.0000	0.00	12.17
3/14 14:58	2.51	1.70	0.0062	13.78	0.00	0.00	0.0000	0.00	12.17
3/14 14:59	2.51	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.16
3/14 15:00	2.53	1.71	0.0063	13.99	0.00	0.00	0.0000	0.00	12.17
3/14 15:01	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.17
3/14 15:02	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.16
Average (all)	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.17
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.46	1.66	0.0061	13.55	0.00	0.00	0.0000	0.00	12.16
Maximum (all)	2.53	1.71	0.0063	14.00	0.03	0.02	0.0000	0.00	12.18
Average (valid values only)	2.50	1.69	0.0062	13.78	0.00	0.00	0.0000	0.00	12.17
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 2:42 PM thru 3/14/2019 3:02 PM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 14:42	16808.6	3842.8	20651	2224.2	305
3/14 14:43	16804.0	3832.2	20636	2222.5	305
3/14 14:44	16788.3	3841.3	20630	2221.8	305
3/14 14:45	16780.1	3841.9	20622	2221.0	305
3/14 14:46	16791.0	3834.2	20625	2221.3	305
3/14 14:47	16768.2	3831.8	20600	2218.6	304
3/14 14:48	16773.1	3832.6	20606	2219.3	304
3/14 14:49	16777.9	3846.3	20624	2221.2	304
3/14 14:50	16799.4	3833.8	20633	2222.2	304
3/14 14:51	16772.9	3847.9	20621	2220.8	305
3/14 14:52	16773.5	3837.7	20611	2219.8	304
3/14 14:53	16769.3	3836.8	20606	2219.3	305
3/14 14:54	16783.0	3836.4	20619	2220.7	304
3/14 14:55	16794.9	3842.1	20637	2222.6	304
3/14 14:56	16799.4	3841.3	20641	2223.0	304
3/14 14:57	16796.0	3838.6	20635	2222.3	304
3/14 14:58	16798.5	3834.6	20633	2222.2	304
3/14 14:59	16798.2	3840.4	20639	2222.8	305
3/14 15:00	16786.3	3837.7	20624	2221.2	305
3/14 15:01	16803.5	3838.8	20642	2223.1	305
3/14 15:02	16808.0	3841.0	20649	2223.9	305
Average (all)	16789.2	3838.6	20628	2221.6	305
Total (all)	--	--	--	--	--
Minimum (all)	16768.2	3831.8	20600	2218.6	304
Maximum (all)	16808.6	3847.9	20651	2224.2	305
Average (valid values only)	16789.2	3838.6	20628	2221.6	305
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 3:16 PM thru 3/14/2019 3:36 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 15:16	2.42	1.64	0.0060	13.26	0.00	0.00	0.0000	0.00	12.20
3/14 15:17	2.40	1.63	0.0060	13.27	0.00	0.00	0.0000	0.00	12.20
3/14 15:18	2.38	1.61	0.0059	13.03	0.00	0.00	0.0000	0.00	12.19
3/14 15:19	2.39	1.62	0.0060	13.31	0.00	0.00	0.0000	0.00	12.20
3/14 15:20	2.50	1.69	0.0062	13.73	0.00	0.00	0.0000	0.00	12.18
3/14 15:21	2.48	1.68	0.0062	13.73	0.01	0.01	0.0000	0.00	12.19
3/14 15:22	2.46	1.67	0.0061	13.49	0.00	0.00	0.0000	0.00	12.19
3/14 15:23	2.42	1.64	0.0060	13.30	0.02	0.01	0.0000	0.00	12.19
3/14 15:24	2.46	1.67	0.0061	13.50	0.03	0.02	0.0000	0.00	12.19
3/14 15:25	2.46	1.67	0.0061	13.51	0.00	0.00	0.0000	0.00	12.19
3/14 15:26	2.43	1.65	0.0061	13.48	0.00	0.00	0.0000	0.00	12.21
3/14 15:27	2.41	1.64	0.0060	13.27	0.00	0.00	0.0000	0.00	12.21
3/14 15:28	2.39	1.62	0.0060	13.26	0.00	0.00	0.0000	0.00	12.21
3/14 15:29	2.41	1.63	0.0060	13.27	0.00	0.00	0.0000	0.00	12.20
3/14 15:30	2.38	1.62	0.0060	13.06	0.00	0.00	0.0000	0.00	12.21
3/14 15:31	2.51	1.70	0.0063	13.74	0.00	0.00	0.0000	0.00	12.19
3/14 15:32	2.55	1.73	0.0064	13.98	0.00	0.00	0.0000	0.00	12.18
3/14 15:33	2.48	1.68	0.0062	13.75	0.00	0.00	0.0000	0.00	12.18
3/14 15:34	2.49	1.68	0.0062	13.73	0.00	0.00	0.0000	0.00	12.18
3/14 15:35	2.43	1.65	0.0061	13.48	0.00	0.00	0.0000	0.00	12.21
3/14 15:36	2.35	1.60	0.0059	13.03	0.01	0.01	0.0000	0.00	12.22
Average (all)	2.44	1.65	0.0061	13.44	0.00	0.00	0.0000	0.00	12.20
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.35	1.60	0.0059	13.03	0.00	0.00	0.0000	0.00	12.18
Maximum (all)	2.55	1.73	0.0064	13.98	0.03	0.02	0.0000	0.00	12.22
Average (valid values only)	2.44	1.65	0.0061	13.44	0.00	0.00	0.0000	0.00	12.20
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/14/2019 3:16 PM thru 3/14/2019 3:36 PM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 15:16	16677.0	3836.6	20514	2209.3	303
3/14 15:17	16690.3	3841.7	20532	2211.3	303
3/14 15:18	16673.1	3842.8	20516	2209.6	302
3/14 15:19	16763.1	3836.8	20600	2218.6	303
3/14 15:20	16733.6	3833.5	20567	2215.1	303
3/14 15:21	16724.9	3839.3	20564	2214.8	303
3/14 15:22	16692.3	3841.9	20534	2211.6	303
3/14 15:23	16736.9	3835.7	20573	2215.7	303
3/14 15:24	16706.0	3840.2	20546	2212.8	303
3/14 15:25	16722.5	3840.2	20563	2214.6	303
3/14 15:26	16685.4	3833.1	20519	2209.8	302
3/14 15:27	16685.0	3847.0	20532	2211.3	303
3/14 15:28	16688.3	3843.9	20532	2211.3	302
3/14 15:29	16698.0	3841.5	20540	2212.1	303
3/14 15:30	16723.2	3829.1	20552	2213.5	303
3/14 15:31	16748.1	3831.1	20579	2216.4	303
3/14 15:32	16757.0	3839.5	20597	2218.2	303
3/14 15:33	16746.6	3843.7	20590	2217.6	303
3/14 15:34	16727.8	3840.2	20568	2215.2	303
3/14 15:35	16678.6	3843.2	20522	2210.2	302
3/14 15:36	16668.2	3841.9	20510	2209.0	302
Average (all)	16710.8	3839.2	20550	2213.2	303
Total (all)	--	--	--	--	--
Minimum (all)	16668.2	3829.1	20510	2209.0	302
Maximum (all)	16763.1	3847.0	20600	2218.6	303
Average (valid values only)	16710.8	3839.2	20550	2213.2	303
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/14/2019 4:06 PM thru 3/14/2019 4:26 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min	(Turbine 2) CO lb/mmBtu 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 75-O2% 1-Min
3/14 16:06	2.47	1.68	0.0062	13.72	0.00	0.00	0.0000	0.00	12.23
3/14 16:07	2.54	1.72	0.0064	13.97	0.00	0.00	0.0000	0.00	12.21
3/14 16:08	2.53	1.72	0.0063	13.93	0.00	0.00	0.0000	0.00	12.22
3/14 16:09	2.40	1.64	0.0060	13.26	0.00	0.00	0.0000	0.00	12.25
3/14 16:10	2.37	1.62	0.0060	13.04	0.00	0.00	0.0000	0.00	12.25
3/14 16:11	2.44	1.66	0.0061	13.51	0.00	0.00	0.0000	0.00	12.23
3/14 16:12	2.51	1.71	0.0063	13.93	0.00	0.00	0.0000	0.00	12.22
3/14 16:13	2.41	1.64	0.0060	13.25	0.00	0.00	0.0000	0.00	12.24
3/14 16:14	2.40	1.64	0.0060	13.26	0.00	0.00	0.0000	0.00	12.25
3/14 16:15	2.45	1.67	0.0061	13.50	0.00	0.00	0.0000	0.00	12.24
3/14 16:16	2.54	1.72	0.0064	13.95	0.00	0.00	0.0000	0.00	12.21
3/14 16:17	2.45	1.67	0.0061	13.48	0.00	0.00	0.0000	0.00	12.24
3/14 16:18	2.44	1.66	0.0061	13.48	0.00	0.00	0.0000	0.00	12.23
3/14 16:19	2.44	1.66	0.0061	13.49	0.02	0.01	0.0000	0.00	12.24
3/14 16:20	2.46	1.67	0.0062	13.73	0.00	0.00	0.0000	0.00	12.23
3/14 16:21	2.56	1.74	0.0064	14.18	0.00	0.00	0.0000	0.00	12.22
3/14 16:22	2.54	1.72	0.0064	13.97	0.00	0.00	0.0000	0.00	12.21
3/14 16:23	2.56	1.74	0.0064	14.13	0.00	0.00	0.0000	0.00	12.22
3/14 16:24	2.45	1.67	0.0061	13.52	0.00	0.00	0.0000	0.00	12.24
3/14 16:25	2.59	1.76	0.0065	14.37	0.00	0.00	0.0000	0.00	12.21
3/14 16:26	2.47	1.68	0.0062	13.69	0.00	0.00	0.0000	0.00	12.25
Average (all)	2.48	1.69	0.0062	13.68	0.00	0.00	0.0000	0.00	12.23
Total (all)	--	--	--	--	--	--	--	--	--
Minimum (all)	2.37	1.62	0.0060	13.04	0.00	0.00	0.0000	0.00	12.21
Maximum (all)	2.59	1.76	0.0065	14.37	0.02	0.01	0.0000	0.00	12.25
Average (valid values only)	2.48	1.69	0.0062	13.68	0.00	0.00	0.0000	0.00	12.23
Total (valid values only)	--	--	--	--	--	--	--	--	--
Count (valid values only)	21	21	21	21	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 4:06 PM thru 3/14/2019 4:26 PM

Timestamp	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 16:06	16712.4	3832.4	20545	2212.6	302
3/14 16:07	16758.7	3837.3	20596	2218.2	304
3/14 16:08	16690.3	3846.8	20537	2211.8	302
3/14 16:09	16676.4	3845.0	20521	2210.1	301
3/14 16:10	16680.6	3841.9	20523	2210.3	301
3/14 16:11	16733.1	3843.2	20576	2216.1	303
3/14 16:12	16676.8	3842.1	20519	2209.9	302
3/14 16:13	16664.7	3843.5	20508	2208.7	301
3/14 16:14	16679.0	3844.6	20524	2210.4	302
3/14 16:15	16713.2	3839.7	20553	2213.5	302
3/14 16:16	16710.4	3849.2	20560	2214.3	302
3/14 16:17	16679.5	3840.6	20520	2210.0	302
3/14 16:18	16677.7	3840.6	20518	2209.8	302
3/14 16:19	16698.9	3841.9	20541	2212.3	302
3/14 16:20	16726.0	3841.3	20567	2215.1	302
3/14 16:21	16726.0	3843.7	20570	2215.4	302
3/14 16:22	16736.4	3841.5	20578	2216.2	302
3/14 16:23	16649.9	3842.1	20492	2207.0	301
3/14 16:24	16724.9	3845.0	20570	2215.4	302
3/14 16:25	16689.0	3842.1	20531	2211.2	302
3/14 16:26	16659.6	3850.8	20510	2208.9	301
Average (all)	16698.3	3842.6	20541	2212.2	302
Total (all)	--	--	--	--	--
Minimum (all)	16649.9	3832.4	20492	2207.0	301
Maximum (all)	16758.7	3850.8	20596	2218.2	304
Average (valid values only)	16698.3	3842.6	20541	2212.2	302
Total (valid values only)	--	--	--	--	--
Count (valid values only)	21	21	21	21	21

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 10:58 AM thru 3/14/2019 11:27 AM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 10:58	2.75	1.9	5.61	16956.6	3849.4	20806	2240.8	307
3/14 10:59	2.74	1.8	5.61	16965.0	3849.6	20815	2241.7	306
3/14 11:00	2.78	1.9	5.60	16940.4	3848.3	20789	2239.0	306
3/14 11:01	2.75	1.9	5.59	16948.8	3841.5	20790	2239.1	307
3/14 11:02	2.71	1.8	5.59	16944.2	3839.9	20784	2238.5	307
3/14 11:03	2.72	1.8	5.59	16944.6	3843.7	20788	2238.9	307
3/14 11:04	2.73	1.8	5.59	16929.2	3843.9	20773	2237.3	307
3/14 11:05	2.78	1.9	5.60	16945.7	3848.8	20795	2239.6	307
3/14 11:06	2.79	1.9	5.83	16951.5	3853.6	20805	2240.7	307
3/14 11:07	2.80	1.9	5.82	16942.2	3854.9	20797	2239.9	307
3/14 11:08	2.78	1.9	5.61	16966.7	3851.6	20818	2242.1	307
3/14 11:09	2.75	1.9	5.60	16925.0	3845.0	20770	2236.9	307
3/14 11:10	2.71	1.8	5.59	16948.8	3843.9	20793	2239.4	307
3/14 11:11	2.77	1.9	5.60	16925.9	3848.8	20775	2237.4	307
3/14 11:12	2.75	1.9	5.60	16940.4	3847.4	20788	2238.9	307
3/14 11:13	2.75	1.9	5.61	16957.0	3847.2	20804	2240.6	307
3/14 11:14	2.76	1.9	5.60	16922.1	3851.4	20774	2237.3	306
3/14 11:15	2.77	1.9	5.60	16933.4	3846.1	20780	2237.9	307
3/14 11:16	2.81	1.9	5.82	16911.1	3851.9	20763	2236.1	306
3/14 11:17	2.78	1.9	5.60	16965.4	3843.0	20808	2241.1	307
3/14 11:18	2.78	1.9	5.60	16935.1	3853.2	20788	2238.9	307
3/14 11:19	2.77	1.9	5.60	16939.1	3847.9	20787	2238.7	307
3/14 11:20	2.77	1.9	5.60	16922.1	3848.1	20770	2236.9	306
3/14 11:21	2.76	1.9	5.60	16924.3	3846.3	20771	2236.9	306
3/14 11:22	2.78	1.9	5.60	16938.9	3846.8	20786	2238.6	306
3/14 11:23	2.82	1.9	5.82	16919.9	3848.3	20768	2236.8	306
3/14 11:24	2.80	1.9	5.81	16906.0	3847.4	20753	2235.2	306
3/14 11:25	2.81	1.9	5.82	16931.4	3845.5	20777	2237.7	306
3/14 11:26	2.80	1.9	5.81	16903.1	3848.1	20751	2234.9	306
3/14 11:27	2.84	1.9	5.81	16901.6	3848.8	20750	2234.8	306

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.77	1.9	5.66	16936.2	3847.7	20784	2238.4	307
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.71	1.8	5.59	16901.6	3839.9	20750	2234.8	306
Maximum (all)	2.84	1.9	5.83	16966.7	3854.9	20818	2242.1	307
Average (valid values only)	2.77	1.9	5.66	16936.2	3847.7	20784	2238.4	307
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 11:38 AM thru 3/14/2019 12:07 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 11:38	2.81	1.9	5.79	16830.5	3841.7	20672	2226.4	305
3/14 11:39	2.83	1.9	5.80	16845.7	3847.0	20693	2228.6	305
3/14 11:40	2.77	1.9	5.57	16825.4	3846.8	20672	2226.4	306
3/14 11:41	2.80	1.9	5.80	16851.2	3844.1	20695	2228.9	306
3/14 11:42	2.84	1.9	5.79	16834.2	3847.9	20682	2227.4	305
3/14 11:43	2.84	1.9	5.80	16868.0	3844.3	20712	2230.7	306
3/14 11:44	2.84	1.9	5.80	16863.2	3851.6	20715	2231.0	306
3/14 11:45	2.84	1.9	5.80	16867.6	3845.9	20714	2230.8	305
3/14 11:46	2.82	1.9	5.80	16857.0	3846.6	20704	2229.8	305
3/14 11:47	2.81	1.9	5.80	16849.7	3847.9	20698	2229.1	305
3/14 11:48	2.78	1.9	5.58	16856.1	3844.8	20701	2229.5	304
3/14 11:49	2.77	1.9	5.58	16857.2	3851.2	20708	2230.3	305
3/14 11:50	2.79	1.9	5.80	16857.0	3849.0	20706	2230.0	305
3/14 11:51	2.80	1.9	5.80	16851.2	3843.7	20695	2228.9	305
3/14 11:52	2.85	1.9	5.80	16849.9	3847.9	20698	2229.1	306
3/14 11:53	2.86	1.9	5.79	16828.7	3842.1	20671	2226.3	305
3/14 11:54	2.85	1.9	5.80	16853.7	3844.1	20698	2229.1	305
3/14 11:55	2.84	1.9	5.80	16841.1	3847.9	20689	2228.2	304
3/14 11:56	2.82	1.9	5.80	16855.2	3850.1	20705	2230.0	306
3/14 11:57	2.81	1.9	5.79	16852.1	3838.4	20691	2228.4	304
3/14 11:58	2.82	1.9	5.79	16823.0	3841.7	20665	2225.6	304
3/14 11:59	2.82	1.9	5.79	16825.6	3848.3	20674	2226.6	304
3/14 12:00	2.85	1.9	5.79	16826.3	3846.1	20672	2226.4	304
3/14 12:01	2.87	1.9	5.80	16853.7	3846.1	20700	2229.3	305
3/14 12:02	2.86	1.9	5.80	16841.3	3850.1	20691	2228.5	305
3/14 12:03	2.85	1.9	5.80	16874.2	3838.4	20713	2230.8	306
3/14 12:04	2.86	1.9	5.80	16850.6	3847.4	20698	2229.2	306
3/14 12:05	2.84	1.9	5.79	16871.6	3819.2	20691	2228.4	306
3/14 12:06	2.79	1.9	5.80	16875.3	3823.4	20699	2229.3	306
3/14 12:07	2.81	1.9	5.80	16879.7	3828.9	20709	2230.3	306

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.82	1.9	5.78	16850.5	3843.8	20694	2228.8	305
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.77	1.9	5.57	16823.0	3819.2	20665	2225.6	304
Maximum (all)	2.87	1.9	5.80	16879.7	3851.6	20715	2231.0	306
Average (valid values only)	2.82	1.9	5.78	16850.5	3843.8	20694	2228.8	305
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 12:14 PM thru 3/14/2019 12:43 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 12:14	2.80	1.9	5.78	16836.4	3834.0	20670	2226.2	304
3/14 12:15	2.78	1.9	5.56	16825.6	3836.6	20662	2225.3	304
3/14 12:16	2.79	1.9	5.79	16840.2	3827.6	20668	2225.9	305
3/14 12:17	2.86	1.9	5.78	16819.9	3830.9	20651	2224.1	305
3/14 12:18	2.87	1.9	5.79	16822.5	3839.7	20662	2225.3	305
3/14 12:19	2.84	1.9	5.78	16823.2	3831.8	20655	2224.6	304
3/14 12:20	2.84	1.9	5.78	16819.7	3829.1	20649	2223.9	304
3/14 12:21	2.80	1.9	5.79	16837.8	3839.5	20677	2226.9	304
3/14 12:22	2.82	1.9	5.79	16841.3	3828.5	20670	2226.1	305
3/14 12:23	2.85	1.9	5.79	16851.2	3833.3	20685	2227.7	306
3/14 12:24	2.89	1.9	5.78	16835.3	3826.9	20662	2225.4	304
3/14 12:25	2.85	1.9	5.78	16833.4	3828.0	20661	2225.3	305
3/14 12:26	2.87	1.9	5.78	16833.8	3830.2	20664	2225.5	304
3/14 12:27	2.85	1.9	5.79	16855.7	3834.9	20691	2228.4	305
3/14 12:28	2.81	1.9	5.79	16840.2	3828.9	20669	2226.1	304
3/14 12:29	2.82	1.9	5.78	16812.8	3832.2	20645	2223.4	304
3/14 12:30	2.82	1.9	5.77	16801.6	3833.3	20635	2222.3	304
3/14 12:31	2.82	1.9	5.78	16824.5	3831.3	20656	2224.6	304
3/14 12:32	2.79	1.9	5.79	16812.4	3841.0	20653	2224.4	304
3/14 12:33	2.82	1.9	5.77	16796.7	3826.5	20623	2221.1	304
3/14 12:34	2.81	1.9	5.78	16806.4	3834.0	20640	2222.9	304
3/14 12:35	2.80	1.9	5.77	16800.0	3832.4	20632	2222.1	304
3/14 12:36	2.79	1.9	5.77	16775.7	3826.2	20602	2218.8	304
3/14 12:37	2.78	1.9	5.56	16820.5	3835.1	20656	2224.6	304
3/14 12:38	2.78	1.9	5.56	16820.5	3823.4	20644	2223.4	304
3/14 12:39	2.76	1.9	5.56	16820.8	3837.1	20658	2224.9	304
3/14 12:40	2.77	1.9	5.56	16818.8	3826.2	20645	2223.5	304
3/14 12:41	2.78	1.9	5.55	16799.8	3832.2	20632	2222.0	304
3/14 12:42	2.76	1.9	5.56	16828.1	3835.7	20664	2225.5	304
3/14 12:43	2.82	1.9	5.79	16804.7	3841.0	20646	2223.6	304

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.81	1.9	5.73	16822.0	3832.3	20654	2224.5	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.76	1.9	5.55	16775.7	3823.4	20602	2218.8	304
Maximum (all)	2.89	1.9	5.79	16855.7	3841.0	20691	2228.4	306
Average (valid values only)	2.81	1.9	5.73	16822.0	3832.3	20654	2224.5	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 12:50 PM thru 3/14/2019 1:19 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 12:50	2.85	1.9	5.77	16799.6	3837.3	20637	2222.6	304
3/14 12:51	2.82	1.9	5.78	16820.5	3832.9	20653	2224.4	304
3/14 12:52	2.78	1.9	5.77	16795.2	3830.2	20625	2221.3	304
3/14 12:53	2.84	1.9	5.78	16815.5	3833.3	20649	2223.8	304
3/14 12:54	2.87	1.9	5.78	16815.5	3826.9	20642	2223.2	305
3/14 12:55	2.84	1.9	5.77	16779.9	3832.0	20612	2219.9	305
3/14 12:56	2.90	2.0	6.00	16790.1	3837.9	20628	2221.6	305
3/14 12:57	2.91	2.0	6.00	16784.6	3842.1	20627	2221.5	305
3/14 12:58	2.89	2.0	5.99	16780.4	3832.4	20613	2219.9	303
3/14 12:59	2.87	1.9	5.77	16767.6	3833.8	20601	2218.8	303
3/14 13:00	2.84	1.9	5.77	16770.2	3838.2	20608	2219.6	303
3/14 13:01	2.87	1.9	5.76	16763.8	3827.8	20592	2217.8	303
3/14 13:02	2.87	1.9	5.78	16804.4	3834.9	20639	2222.8	304
3/14 13:03	2.84	1.9	5.77	16793.4	3835.1	20629	2221.6	304
3/14 13:04	2.83	1.9	5.77	16776.8	3832.2	20609	2219.6	304
3/14 13:05	2.85	1.9	5.76	16758.5	3836.0	20595	2218.0	304
3/14 13:06	2.83	1.9	5.77	16768.4	3828.5	20597	2218.3	304
3/14 13:07	2.90	2.0	6.00	16766.2	3835.3	20602	2218.8	304
3/14 13:08	2.91	2.0	5.98	16761.8	3833.3	20595	2218.0	303
3/14 13:09	2.89	2.0	6.00	16766.9	3836.4	20603	2219.0	304
3/14 13:10	2.87	1.9	5.77	16775.5	3836.2	20612	2219.9	305
3/14 13:11	2.84	1.9	5.77	16774.2	3833.8	20608	2219.5	305
3/14 13:12	2.88	1.9	5.77	16795.6	3828.5	20624	2221.2	305
3/14 13:13	2.85	1.9	5.77	16786.8	3828.0	20615	2220.2	304
3/14 13:14	2.89	2.0	6.00	16785.2	3840.2	20625	2221.4	304
3/14 13:15	2.88	1.9	5.78	16785.9	3841.5	20627	2221.5	304
3/14 13:16	2.88	1.9	5.77	16792.3	3835.7	20628	2221.6	304
3/14 13:17	2.88	1.9	5.77	16797.6	3829.1	20627	2221.5	304
3/14 13:18	2.85	1.9	5.78	16781.2	3839.1	20620	2220.8	303
3/14 13:19	2.84	1.9	5.76	16757.8	3827.8	20586	2217.1	303

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.86	1.9	5.82	16783.7	3833.9	20618	2220.5	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.78	1.9	5.76	16757.8	3826.9	20586	2217.1	303
Maximum (all)	2.91	2.0	6.00	16820.5	3842.1	20653	2224.4	305
Average (valid values only)	2.86	1.9	5.82	16783.7	3833.9	20618	2220.5	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 1:25 PM thru 3/14/2019 1:54 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 13:25	2.88	1.9	5.77	16801.1	3835.7	20637	2222.6	305
3/14 13:26	2.86	1.9	5.78	16812.6	3837.5	20650	2224.0	305
3/14 13:27	2.90	2.0	5.99	16788.1	3832.0	20620	2220.8	304
3/14 13:28	2.91	2.0	5.99	16791.2	3832.9	20624	2221.2	305
3/14 13:29	2.92	2.0	5.99	16794.3	3827.3	20622	2220.9	304
3/14 13:30	2.95	2.0	6.00	16772.2	3837.3	20610	2219.7	305
3/14 13:31	2.94	2.0	6.00	16784.3	3840.6	20625	2221.3	305
3/14 13:32	2.93	2.0	5.99	16784.1	3826.7	20611	2219.7	305
3/14 13:33	2.91	2.0	6.00	16797.1	3842.8	20640	2222.9	305
3/14 13:34	2.91	2.0	6.00	16779.7	3840.6	20620	2220.8	305
3/14 13:35	2.92	2.0	6.00	16792.5	3837.3	20630	2221.9	305
3/14 13:36	2.88	1.9	5.78	16810.6	3831.1	20642	2223.1	304
3/14 13:37	2.90	2.0	6.00	16811.3	3826.7	20638	2222.7	304
3/14 13:38	2.89	2.0	5.99	16783.7	3827.3	20611	2219.8	304
3/14 13:39	2.89	2.0	5.99	16759.6	3841.0	20601	2218.7	303
3/14 13:40	2.92	2.0	6.00	16778.8	3846.8	20626	2221.4	305
3/14 13:41	2.94	2.0	6.00	16775.9	3839.5	20615	2220.3	305
3/14 13:42	2.94	2.0	6.00	16780.6	3836.2	20617	2220.5	304
3/14 13:43	2.86	1.9	5.77	16789.9	3833.3	20623	2221.1	304
3/14 13:44	2.88	1.9	5.77	16799.4	3831.3	20631	2221.9	304
3/14 13:45	2.83	1.9	5.77	16774.0	3826.0	20600	2218.7	304
3/14 13:46	2.82	1.9	5.77	16770.9	3835.5	20606	2219.3	304
3/14 13:47	2.86	1.9	5.77	16791.6	3836.4	20628	2221.7	304
3/14 13:48	2.86	1.9	5.77	16785.4	3835.5	20621	2220.9	304
3/14 13:49	2.87	1.9	5.77	16796.9	3838.2	20635	2222.4	304
3/14 13:50	2.87	1.9	5.77	16787.0	3836.4	20623	2221.2	305
3/14 13:51	2.87	1.9	5.77	16777.7	3834.2	20612	2219.9	305
3/14 13:52	2.85	1.9	5.76	16741.7	3835.3	20577	2216.2	303
3/14 13:53	2.87	1.9	5.77	16768.4	3837.3	20606	2219.3	303
3/14 13:54	2.86	1.9	5.76	16758.7	3835.7	20594	2218.0	304

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.89	2.0	5.88	16784.6	3835.1	20620	2220.8	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.82	1.9	5.76	16741.7	3826.0	20577	2216.2	303
Maximum (all)	2.95	2.0	6.00	16812.6	3846.8	20650	2224.0	305
Average (valid values only)	2.89	2.0	5.88	16784.6	3835.1	20620	2220.8	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/14/2019 2:06 PM thru 3/14/2019 2:35 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 14:06	2.91	2.0	5.99	16788.5	3830.9	20619	2220.7	304
3/14 14:07	2.92	2.0	5.99	16771.8	3828.9	20601	2218.7	304
3/14 14:08	2.96	2.0	5.99	16784.8	3830.9	20616	2220.3	305
3/14 14:09	2.97	2.0	6.00	16785.9	3837.5	20623	2221.1	305
3/14 14:10	2.92	2.0	6.00	16774.6	3844.3	20619	2220.6	304
3/14 14:11	2.93	2.0	5.99	16786.1	3834.2	20620	2220.8	305
3/14 14:12	2.92	2.0	6.00	16779.7	3837.1	20617	2220.5	305
3/14 14:13	2.93	2.0	5.99	16785.9	3832.4	20618	2220.5	304
3/14 14:14	2.91	2.0	6.00	16788.3	3838.6	20627	2221.5	304
3/14 14:15	2.91	2.0	6.01	16802.7	3836.0	20639	2222.8	305
3/14 14:16	2.92	2.0	6.00	16788.1	3836.4	20625	2221.3	305
3/14 14:17	2.94	2.0	6.00	16779.0	3838.6	20618	2220.5	305
3/14 14:18	2.94	2.0	5.99	16764.9	3828.5	20593	2217.9	305
3/14 14:19	2.91	2.0	6.00	16783.5	3840.6	20624	2221.2	304
3/14 14:20	2.94	2.0	6.00	16766.2	3836.8	20603	2218.9	304
3/14 14:21	2.95	2.0	5.99	16783.7	3817.6	20601	2218.8	304
3/14 14:22	2.94	2.0	5.98	16761.2	3830.2	20591	2217.7	303
3/14 14:23	2.90	2.0	5.98	16729.6	3846.1	20576	2216.0	303
3/14 14:24	2.94	2.0	5.99	16763.6	3841.0	20605	2219.1	304
3/14 14:25	2.93	2.0	5.99	16753.2	3841.0	20594	2218.0	303
3/14 14:26	2.88	1.9	5.76	16763.6	3830.2	20594	2217.9	304
3/14 14:27	2.95	2.0	6.00	16772.9	3834.4	20607	2219.4	304
3/14 14:28	2.94	2.0	6.00	16788.3	3839.5	20628	2221.6	305
3/14 14:29	2.95	2.0	6.00	16769.1	3841.3	20610	2219.7	304
3/14 14:30	2.92	2.0	5.99	16759.6	3839.3	20599	2218.5	304
3/14 14:31	2.91	2.0	5.98	16755.9	3827.3	20583	2216.8	304
3/14 14:32	2.95	2.0	6.00	16768.9	3835.5	20604	2219.1	305
3/14 14:33	2.89	2.0	5.99	16778.6	3833.5	20612	2220.0	305
3/14 14:34	2.87	1.9	5.78	16771.5	3840.6	20612	2219.9	305
3/14 14:35	2.89	2.0	6.00	16779.0	3836.6	20616	2220.3	304

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.92	2.0	5.98	16774.3	3835.5	20610	2219.7	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.87	1.9	5.76	16729.6	3817.6	20576	2216.0	303
Maximum (all)	2.97	2.0	6.01	16802.7	3846.1	20639	2222.8	305
Average (valid values only)	2.92	2.0	5.98	16774.3	3835.5	20610	2219.7	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center

Data for 3/14/2019 2:42 PM thru 3/14/2019 3:11 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 14:42	2.87	1.9	5.79	16808.6	3842.8	20651	2224.2	305
3/14 14:43	2.84	1.9	5.78	16804.0	3832.2	20636	2222.5	305
3/14 14:44	2.89	2.0	6.00	16788.3	3841.3	20630	2221.8	305
3/14 14:45	2.93	2.0	6.00	16780.1	3841.9	20622	2221.0	305
3/14 14:46	2.96	2.0	5.99	16791.0	3834.2	20625	2221.3	305
3/14 14:47	2.95	2.0	5.99	16768.2	3831.8	20600	2218.6	304
3/14 14:48	2.94	2.0	5.99	16773.1	3832.6	20606	2219.3	304
3/14 14:49	2.90	2.0	6.00	16777.9	3846.3	20624	2221.2	304
3/14 14:50	2.92	2.0	6.00	16799.4	3833.8	20633	2222.2	304
3/14 14:51	2.91	2.0	6.00	16772.9	3847.9	20621	2220.8	305
3/14 14:52	2.90	2.0	6.00	16773.5	3837.7	20611	2219.8	304
3/14 14:53	2.90	2.0	6.00	16769.3	3836.8	20606	2219.3	305
3/14 14:54	2.90	2.0	6.00	16783.0	3836.4	20619	2220.7	304
3/14 14:55	2.89	2.0	6.00	16794.9	3842.1	20637	2222.6	304
3/14 14:56	2.92	2.0	6.01	16799.4	3841.3	20641	2223.0	304
3/14 14:57	2.90	2.0	6.00	16796.0	3838.6	20635	2222.3	304
3/14 14:58	2.90	2.0	6.00	16798.5	3834.6	20633	2222.2	304
3/14 14:59	2.91	2.0	6.00	16798.2	3840.4	20639	2222.8	305
3/14 15:00	2.90	2.0	6.00	16786.3	3837.7	20624	2221.2	305
3/14 15:01	2.91	2.0	6.01	16803.5	3838.8	20642	2223.1	305
3/14 15:02	2.91	2.0	6.01	16808.0	3841.0	20649	2223.9	305
3/14 15:03	2.92	2.0	6.00	16800.0	3833.8	20634	2222.3	305
3/14 15:04	2.93	2.0	6.01	16815.9	3836.0	20652	2224.2	305
3/14 15:05	2.89	2.0	6.01	16807.3	3837.1	20644	2223.4	305
3/14 15:06	2.88	1.9	5.77	16797.6	3838.4	20636	2222.5	305
3/14 15:07	2.89	2.0	6.00	16812.6	3833.5	20646	2223.6	304
3/14 15:08	2.86	1.9	5.77	16799.8	3838.2	20638	2222.7	304
3/14 15:09	2.86	1.9	5.79	16805.5	3839.5	20645	2223.5	304
3/14 15:10	2.86	1.9	5.75	16696.5	3838.6	20535	2211.6	303
3/14 15:11	2.92	2.0	5.98	16701.1	3842.4	20544	2212.5	302

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.90	2.0	5.96	16787.0	3838.3	20625	2221.3	304
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.84	1.9	5.75	16696.5	3831.8	20535	2211.6	302
Maximum (all)	2.96	2.0	6.01	16815.9	3847.9	20652	2224.2	305
Average (valid values only)	2.90	2.0	5.96	16787.0	3838.3	20625	2221.3	304
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/14/2019 3:16 PM thru 3/14/2019 3:45 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 15:16	2.95	2.0	5.97	16677.0	3836.6	20514	2209.3	303
3/14 15:17	2.91	2.0	5.97	16690.3	3841.7	20532	2211.3	303
3/14 15:18	2.91	2.0	5.97	16673.1	3842.8	20516	2209.6	302
3/14 15:19	2.85	1.9	5.76	16763.1	3836.8	20600	2218.6	303
3/14 15:20	2.86	1.9	5.76	16733.6	3833.5	20567	2215.1	303
3/14 15:21	2.86	1.9	5.76	16724.9	3839.3	20564	2214.8	303
3/14 15:22	2.86	1.9	5.75	16692.3	3841.9	20534	2211.6	303
3/14 15:23	2.88	2.0	5.99	16736.9	3835.7	20573	2215.7	303
3/14 15:24	2.87	1.9	5.76	16706.0	3840.2	20546	2212.8	303
3/14 15:25	2.87	1.9	5.76	16722.5	3840.2	20563	2214.6	303
3/14 15:26	2.86	1.9	5.74	16685.4	3833.1	20519	2209.8	302
3/14 15:27	2.82	1.9	5.75	16685.0	3847.0	20532	2211.3	303
3/14 15:28	2.82	1.9	5.75	16688.3	3843.9	20532	2211.3	302
3/14 15:29	2.82	1.9	5.76	16698.0	3841.5	20540	2212.1	303
3/14 15:30	2.84	1.9	5.75	16723.2	3829.1	20552	2213.5	303
3/14 15:31	2.85	1.9	5.76	16748.1	3831.1	20579	2216.4	303
3/14 15:32	2.84	1.9	5.77	16757.0	3839.5	20597	2218.2	303
3/14 15:33	2.89	2.0	5.99	16746.6	3843.7	20590	2217.6	303
3/14 15:34	2.89	2.0	5.98	16727.8	3840.2	20568	2215.2	303
3/14 15:35	2.86	1.9	5.75	16678.6	3843.2	20522	2210.2	302
3/14 15:36	2.81	1.9	5.75	16668.2	3841.9	20510	2209.0	302
3/14 15:37	2.77	1.9	5.75	16728.3	3834.6	20563	2214.6	303
3/14 15:38	2.83	1.9	5.75	16724.3	3833.5	20558	2214.1	303
3/14 15:39	2.79	1.9	5.74	16673.7	3835.3	20509	2208.9	302
3/14 15:40	2.84	1.9	5.75	16669.3	3839.5	20509	2208.8	302
3/14 15:41	2.77	1.9	5.75	16676.4	3847.4	20524	2210.4	303
3/14 15:42	2.81	1.9	5.75	16715.7	3833.8	20550	2213.2	303
3/14 15:43	2.81	1.9	5.74	16687.2	3837.9	20525	2210.5	303
3/14 15:44	2.80	1.9	5.75	16682.5	3843.5	20526	2210.6	302
3/14 15:45	2.79	1.9	5.76	16703.1	3843.5	20547	2212.8	303

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
Average (all)	2.84	1.9	5.80	16706.2	3839.1	20545	2212.7	303
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.77	1.9	5.74	16668.2	3829.1	20509	2208.8	302
Maximum (all)	2.95	2.0	5.99	16763.1	3847.4	20600	2218.6	303
Average (valid values only)	2.84	1.9	5.80	16706.2	3839.1	20545	2212.7	303
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	30	30	30	30	30	30	30	30

CeDAR 1-Minute Data

Grays Harbor Energy Center
Data for 3/14/2019 4:05 PM thru 3/14/2019 4:35 PM

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 16:05	2.64	1.8	5.31	16708.6	3843.9	20553	2213.5	302
3/14 16:06	2.71	1.8	5.53	16712.4	3832.4	20545	2212.6	302
3/14 16:07	2.66	1.8	5.54	16758.7	3837.3	20596	2218.2	304
3/14 16:08	2.71	1.8	5.53	16690.3	3846.8	20537	2211.8	302
3/14 16:09	2.71	1.8	5.53	16676.4	3845.0	20521	2210.1	301
3/14 16:10	2.66	1.8	5.52	16680.6	3841.9	20523	2210.3	301
3/14 16:11	2.66	1.8	5.54	16733.1	3843.2	20576	2216.1	303
3/14 16:12	2.71	1.8	5.52	16676.8	3842.1	20519	2209.9	302
3/14 16:13	2.70	1.8	5.52	16664.7	3843.5	20508	2208.7	301
3/14 16:14	2.69	1.8	5.53	16679.0	3844.6	20524	2210.4	302
3/14 16:15	2.67	1.8	5.53	16713.2	3839.7	20553	2213.5	302
3/14 16:16	2.66	1.8	5.54	16710.4	3849.2	20560	2214.3	302
3/14 16:17	2.69	1.8	5.52	16679.5	3840.6	20520	2210.0	302
3/14 16:18	2.68	1.8	5.52	16677.7	3840.6	20518	2209.8	302
3/14 16:19	2.68	1.8	5.53	16698.9	3841.9	20541	2212.3	302
3/14 16:20	2.69	1.8	5.53	16726.0	3841.3	20567	2215.1	302
3/14 16:21	2.72	1.8	5.53	16726.0	3843.7	20570	2215.4	302
3/14 16:22	2.71	1.8	5.54	16736.4	3841.5	20578	2216.2	302
3/14 16:23	2.72	1.8	5.51	16649.9	3842.1	20492	2207.0	301
3/14 16:24	2.62	1.8	5.31	16724.9	3845.0	20570	2215.4	302
3/14 16:25	2.67	1.8	5.52	16689.0	3842.1	20531	2211.2	302
3/14 16:26	2.62	1.8	5.31	16659.6	3850.8	20510	2208.9	301
3/14 16:27	2.64	1.8	5.30	16673.3	3846.6	20520	2210.0	301
3/14 16:28	2.64	1.8	5.31	16698.7	3839.9	20539	2212.1	302
3/14 16:29	2.63	1.8	5.32	16740.6	3843.2	20584	2216.9	303
3/14 16:30	2.66	1.8	5.55	16750.3	3846.3	20597	2218.2	303
3/14 16:31	2.67	1.8	5.53	16670.6	3846.3	20517	2209.6	302
3/14 16:32	2.66	1.8	5.52	16655.4	3845.9	20501	2208.0	301
3/14 16:33	2.64	1.8	5.31	16724.5	3840.2	20565	2214.8	302
3/14 16:34	2.62	1.8	5.31	16659.6	3855.2	20515	2209.4	302

Timestamp	(Turbine 2) NH3 Slip ppm 1-Min	(Turbine 2) NH3 ppm @15% O2 1-Min	(Turbine 2) NH3 lb/hr 1-Min Avg	(Turbine 2) CT Gas Flow hscf/hr 1-Min	(Turbine 2) DB Gas Flow hscf/hr 1-Min	(Turbine 2) Total Gas Flow hscf/hr 1-Min	(Turbine 2) Total Heat Input mmBtu/hr 1-Min	(Turbine 2) 40CFR75 Megawatts 1-Min
3/14 16:35	2.63	1.8	5.30	16676.4	3843.5	20520	2209.9	302
Average (all)	2.67	1.8	5.46	16697.5	3843.4	20541	2212.2	302
Total (all)	--	--	--	--	--	--	--	--
Minimum (all)	2.62	1.8	5.30	16649.9	3832.4	20492	2207.0	301
Maximum (all)	2.72	1.8	5.55	16758.7	3855.2	20597	2218.2	304
Average (valid values only)	2.67	1.8	5.46	16697.5	3843.4	20541	2212.2	302
Total (valid values only)	--	--	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31	31	31

APPENDIX E
QUALITY ASSURANCE/QUALITY CONTROL

Appendix E.1
Quality Assurance Program Summary and Equipment Calibration Schedule

QUALITY ASSURANCE PROGRAM SUMMARY AND CERTIFICATIONS

Montrose Air Quality Services, LLC (Montrose) ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by internal QA personnel and encompasses seven major areas:

1. Development and use of an internal QA manual
2. QA reviews of reports, laboratory work, and field testing
3. Equipment calibration and maintenance
4. Chain of custody
5. Continuous training
6. Knowledge of current test methods
7. Audit program

Each of these areas is discussed individually below.

Quality Assurance Manual. Montrose has prepared a QA Manual according to EPA guidelines and ASTM D-7036. The manual serves to document and formalize all of Montrose's QA efforts. The manual is constantly updated, and each employee involved in technical services for emission measurements is required to read, understand its contents, and sign a statement that all work they perform will conform to its practices. The manual includes details on the other seven QA areas discussed below.

QA Reviews. Montrose 's review procedure includes review of each source test report by the QA Manager or equivalent position including data input, calculations and averages, and report text. The laboratory manager or equivalent reviews all laboratory work, and the qualified individual on-site reviews all field work and data sheets.

The most important review is the one that takes place before a test program begins. The QA Manager works with testing personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of any interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance. The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined below. The schedules for maintenance and calibrations are given in Tables A-1 and A-2.

Quality control checks are also conducted in the field for each test program. A partial list of checks made as part of each continuous analyzer system test series is included below as an example of the field QA procedures.

- Sample acquisition and conditioning system leak check
- 3-point analyzer calibrations (all analyzers)
- Complete system calibration check ("dynamic calibration" through entire sample system)

- Periodic analyzer calibration checks are conducted at the start and end of each test run. Any change between pre- and post-test readings are recorded.
- All calibrations are conducted using EPA Protocol gases certified by the manufacturer
- Calibration and continuous analyzer performance data are fully documented, and are included in each source test report

Chain of Custody. Montrose maintains full chain of custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Montrose documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.).

Samples are stored in a locked area to which only laboratory personnel have access. Neither other Montrose employees nor cleaning crews have keys to this area.

Training. Personnel training is essential to ensure quality testing. Montrose has formal and informal training programs which may include some or all of the following:

1. Attendance at EPA-sponsored training courses
2. A requirement for all technicians to read, understand, and sign Montrose 's QA Manual
3. In-house training and Montrose meetings on a regular basis
4. Maintenance of training records
5. Administration of internal qualified individual (QI) tests for all methods performed
6. Participation in the Qualified Source Testing Individual (QSTI) program administered by the Source Evaluation Society (SES)

Knowledge of Current Test Methods. With the constant updating of standard test methods and the wide variety of emerging test methods, it is essential that any qualified source tester keep abreast of new developments. Montrose subscribes to services which provide updates on EPA reference methods, and on EPA and local agency rules and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences.

Audit Program. Montrose participates in the TNI Stationary Source Audit Sample (SSAS) audit program for all methods for which audit samples are available.

TABLE A-1
SAMPLING INSTRUMENTS AND
EQUIPMENT CALIBRATION SCHEDULE

Instrument Type	Frequency of Calibration[1]	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter(large)	12 months	Calibrated dry test meter	± 2% of volume measured
Dry Gas Meter	6 months or when repaired	Calibrated dry test meter	± 2% of volume measured
Critical Orifice	6 months	Calibrated dry test meter	± 0.5% of average K’
S-Type Pitot (for use with EPA-type sampling train)	6 months	EPA Method 2	Geometric measurements within method-specified ranges
Vacuum Gauges	12 months	NIST-traceable gauge	≤ 1.0 in Hg difference
Temperature Measurement (thermocouples)	12 months	NBS mercury thermometer or NBS calibrated platinum RTD	±4 °F for <400 °F ± 1.5% for >400 °F
Temperature Readout Devices	6 months	Thermocouple simulator	± 2% full scale reading
Analytical Balance	12 months (check prior to each use)	NIST-traceable weights	± 0.5 mg of stated weight
Probe Nozzles	12 months	Nozzle diameter check	Range <± 0.10 mm for micrometer three measurements
Continuous Analyzers	Every field day, Depends upon use, frequency and performance	As specified by manufacturers’ operating manuals, EPA NBS gases and/or reference methods	Satisfy all limits specified in operating specifications

[1] The tabulated calibration frequencies are minimum standards. In certain instances, calibrations are performed more frequently.

TABLE A-2
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications and Montrose's Experience

Equipment	Performance Requirement	Maintenance Interval[2]	Corrective Action
Pumps	1. Absence of leaks 2. Ability to draw manufacturer required vacuum and flow	6 months	1. Visual inspection 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	6 months	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by the manufacturer	As recommended by manufacturer
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Leak check 3. Check for system contamination
Sampling Lines	Sample degradation less than 2%	After each test or test series	Blow filtered air through line until dry

[2] The tabulated maintenance intervals are minimum standards. In certain instances, maintenance is performed more frequently.

Appendix E.2
ASTM D-7036 Accreditation and QI Certificates

American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

MONTROSE AIR QUALITY SERVICES

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 5th day of March 2018.

President and CEO
For the Accreditation Council
Certificate Number 3925.01
Valid to February 29, 2020

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION CORPORATE SEAL 1978 DISTRICT OF COLUMBIA A2LA

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

CERTIFICATE OF COMPLETION

Allon Kienitz

This document certifies that this individual has passed a comprehensive examination and is now a Qualified Individual (QI) as defined in Section 8.3 of ASTM D7036-04 for the following method(s):

Source Evaluation Society Group 1: *EPA Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*

Certificate Number: 021-2018-4

Tate Strickler, Accreditation Director

DATE OF ISSUE: 7/16/18

DATE OF EXPIRATION: 7/16/23

MONTROSE ENVIRONMENTAL

CERTIFICATE OF COMPLETION

Allon Kienitz

This document certifies that this individual has passed a comprehensive examination and is now a Qualified Individual (QI) as defined in Section 8.3 of ASTM D7036-04 for the following method(s):

EPA Methods 3C, TO-8, TO-12, & TO-15

Certificate Number: 021-2018-3

Tate Strickler, Accreditation Director

DATE OF ISSUE: 2/12/18

DATE OF EXPIRATION: 2/12/23

MONTROSE ENVIRONMENTAL

Qualified Individual Conformance Statement

I Allan Kienitz, as a QI (Qualified Individual) sign this Conformance Statement to verify that each of the test projects that I perform, and each of the test projects performed under my supervision will conform with the Montrose Air Quality Services Management System, the test methods applicable to the testing, and ASTM D 7036-04.

I realize that as a Qualified Individual I have the proper knowledge to perform these tests correctly, and that I am held to a high standard of integrity.

QI Signature

7-19-2018

Date

Appendix E.3
Reference Method Analyzer Calibration Data

SPAN GAS RECORD AND CALIBRATION ERROR/LINEARITY

CLIENT/LOCATION: Grays Harbor Energy Center/ Unit 1 DATE: 3/12/19
TRUCK/CEM I.D.: CEMS-1 BY: RN

	Gas	Cylinder #	Value	Exp. Date	Vendor ID	% of Range
ZERO	Low	CC710020	0.000	11/6/26	B72018	
O_2	Mid	ALM057445	9.974	10/22/26	B72018	49.8%
O_2	High	SG9183206BAL	20.030	1/18/27	B72019	100.0%
CO_2	Mid	CC432613	4.993	3/16/21	B32017	53.5%
CO_2	High	SG9183206BAL	9.334	1/18/27	B72019	100.0%
NO_x	Mid	CC432613	4.769	3/16/21	B72018	52.5%
NO_x	High	CC300823	9.080	9/15/20	B32017	100.0%
NO_2	NO_2	CC500443	49.920	12/1/19	B72016	
NOx	CE Check	CC66067	51.050	11/7/24	B32016	
CO	Mid	CC432613	4.456	3/16/21	B72018	50.4%
CO	High	CC300823	8.834	9/15/20	B32017	100.0%

PRE-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Range	20.03	9.33	9.08	8.83		
Zero Gas Value	0.0	0.0	0.0	0.0		--
Analyzer Reads	0.00	0.00	-0.01	-0.01		--
Error (% of scale)	0.0%	0.0%	-0.1%	-0.2%		PASS
High Gas Value	20.030	9.334	9.080	8.834		--
Analyzer Reads	20.12	9.40	8.98	8.86		
Error (% of scale)	0.4%	0.7%	-1.1%	0.2%		PASS
Mid Gas Value	9.974	4.993	4.769	4.456		--
Analyzer Reads	9.97	5.04	4.83	4.64		--
Error (% of scale)	0.0%	0.5%	0.7%	2.0%		PASS

NO_2 to NO Converter Efficiency Test

Analyzer Manufacturer:	Thermo	NO Cal Gas Value:	51.05
Analyzer Model:	42C	NO_2 Cal Gas Value:	49.92
Analyzer Serial Number:	42C	Performed By:	#REF!
Date:	3/12/19	CEMS ID#:	CEMS-1

GAS	ANALYZER MODE	ANALYZER RESPONSE	CAL CORRECTED	LABEL
Zero	NO_x	-0.092	--	--
Zero	NO	-0.093	--	--
NO	NO_x	51.063	--	--
NO	NO	51.226	--	--
NO_2	NO	1.179	1.3	C_1
NO_2	NO_x	49.325	49.3	C_2

		Label	Requirement
Abs. Value C_o-C_1:	48.7	D_1	--
Abs. Value C_2-C_1:	48.1	D_2	--
C_1/C_2	3%	D_3	< 5%
CE = D_2/D_1 * 100%:	99%	--	> 90%

	Cylinder #	Exp. Date
NO bottle:	CC66067	11/7/2024
NO_2 bottle:	CC500443	12/1/2019

CEMS PERFORMANCE DATA SHEET

Client: Grays Harbor Energy Center
Location: Turbine Unit #1
CEMS ID#: CEMS-1

Date: 3/12/2019
Performed By: RN

Analyzer:	O_2	CO_2	NO_x	CO	SO_2
Manufacturer:	CAI	CAI	Thermo	Thermo	--
Model Number:	600	600	42C	48i	
Serial Number:	U02030-M	U02030-M	54897-302	718022704	

CEMS Probe:	Material:	Stainless Steel	Length:	12'	Gas Temp:	0 °F
Heated Line	Material:	Teflon	Length:	100'	Gas Temp:	0 °F
Sample Conditioner:			Type:	Universal	Gas Temp:	32 °F
CEMS Line:	Material:	Teflon	Length:	225'		
Bias Line:	Material:	Teflon	Length:	225'		

Upscale Response Time:	:56	Downscale Response Time:	:58	seconds
Sample Pressure (psi):	5.00	Sample Flow Rate:	6.50	LPM

RELATIVE ACCURACY TEST AUDIT DETERMINATION
GAS TURBINE #1
12-POINT STRATIFICATION CHECK

Point	Date	Time	O_2	CO_2	NO_x	O_2 Avg.	NO_x Avg.
	3/13/19	7:46 AM	12.20	5.22	2.57		
	3/13/19	7:47 AM	12.20	5.19	2.56		
NE-3	3/13/19	7:48 AM	12.20	5.17	2.47	12.20	2.53
	3/13/19	7:49 AM	12.20	5.15	2.27		
	3/13/19	7:50 AM	12.18	5.15	2.20		
NE-2	3/13/19	7:51 AM	12.19	5.14	2.27	12.19	2.25
	3/13/19	7:52 AM	12.17	5.14	2.30		
	3/13/19	7:53 AM	12.18	5.13	2.29		
NE-1	3/13/19	7:54 AM	12.20	5.12	2.29	12.18	2.29
	3/13/19	7:58 AM	12.30	5.03	2.28		
	3/13/19	7:59 AM	12.30	5.04	2.28		
NW-3	3/13/19	8:00 AM	12.30	5.04	2.31	12.30	2.29
	3/13/19	8:01 AM	12.24	5.07	2.43		
	3/13/19	8:02 AM	12.24	5.07	2.49		
NW-2	3/13/19	8:03 AM	12.22	5.09	2.47	12.23	2.46
	3/13/19	8:04 AM	12.24	5.08	2.54		
	3/13/19	8:05 AM	12.22	5.09	2.50		
NW-1	3/13/19	8:06 AM	12.21	5.09	2.51	12.22	2.52
	3/13/19	8:10 AM	12.27	5.05	2.46		
	3/13/19	8:11 AM	12.27	5.05	2.49		
SW-3	3/13/19	8:12 AM	12.27	5.05	2.49	12.27	2.48
	3/13/19	8:13 AM	12.32	5.03	2.44		
	3/13/19	8:14 AM	12.32	5.03	2.31		
SW-2	3/13/19	8:15 AM	12.33	5.03	2.32	12.32	2.36
	3/13/19	8:16 AM	12.34	5.02	2.34		
	3/13/19	8:17 AM	12.35	5.01	2.32		
SW-1	3/13/19	8:18 AM	12.34	5.02	2.33	12.35	2.33
	3/13/19	8:23 AM	12.18	5.07	2.74		
	3/13/19	8:24 AM	12.18	5.09	2.84		
SE-3	3/13/19	8:25 AM	12.19	5.09	2.80	12.18	2.79
	3/13/19	8:26 AM	12.20	5.09	2.65		
	3/13/19	8:27 AM	12.20	5.10	2.58		
SE-2	3/13/19	8:28 AM	12.20	5.10	2.58	12.20	2.60
	3/13/19	8:29 AM	12.22	5.09	2.58		
	3/13/19	8:30 AM	12.22	5.09	2.54		
SE-1	3/13/19	8:31 AM	12.22	5.09	2.54	12.22	2.55

	O_2	NO_x
Average	12.24	2.45
Maximum	12.35	2.79
Minimum	12.18	2.25
Maximum Difference from Average	0.11	0.34
Max Difference (% of average)	0.9%	13.8%
Status	Pass	Pass

Notes:
If max difference is < 10%, short-line may be used
If max difference is < 5 ppm for NOx and 0.5% for O_2, short line may be used.

In order to use single point, a 12-point traverse must be conducted and the results must be < 5% for NOx and O2 or (3 ppm for NOx and 0.3 % for O_2).

MONTROSE AIR QUALITY SERVICES

SPAN GAS RECORD AND CALIBRATION ERROR/LINEARITY

CLIENT/LOCATION: Grays Harbor Energy Center/ Unit 2 DATE: 3/14/19
TRUCK/CEM I.D.: CEMS-1 BY: RN, SS

	Gas	Cylinder #	Value	Exp. Date	Vendor ID	% of Range
ZERO	Low	CC710020	0.000	11/6/26	B72018	
O_2	Mid	ALM057445	9.974	10/22/26	B72018	49.8%
O_2	High	SG9183206BAL	20.030	1/18/27	B72019	100.0%
CO_2	Mid	CC484915	5.017	5/29/21	B72018	53.7%
CO_2	High	SG9183206BAL	9.334	1/18/27	B27019	100.0%
NO_x	Mid	CC484915	4.289	5/29/21	B72018	47.2%
NO_x	High	CC300823	9.080	9/15/20	B32017	100.0%
NO_2	NO_2	CC50044	49.920	12/1/19	B72016	
NOx	CE Check	CC66067	51.050	11/7/24	B32016	
CO	Mid	CC484915	4.018	5/29/21	B72018	45.5%
CO	High	CC300823	8.834	9/15/20	B32017	100.0%

PRE-TEST INSTRUMENT CALIBRATION ERROR STRAT CHECK

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Range	20.03	9.33	9.08	8.83		
Zero Gas Value	0.0	0.0	0.0	0.0		--
Analyzer Reads	0.00	0.00	-0.01	0.01		--
Error (% of scale)	0.0%	0.0%	-0.1%	0.1%		PASS
High Gas Value	20.030	9.334	9.080	8.834		--
Analyzer Reads	20.12	9.39	9.05	8.84		
Error (% of scale)	0.4%	0.6%	-0.4%	0.1%		PASS
Mid Gas Value	9.974	5.017	4.289	4.018		--
Analyzer Reads	10.01	5.08	4.38	4.18		--
Error (% of scale)	0.2%	0.7%	0.9%	1.9%		PASS

PRE-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO	SO_2	
Analyzer Range	20.03	9.334	9.08	8.834	0	
Zero Gas Value	0.0	0.0	0.0	0.0		--
Analyzer Reads	0.00	0.01	-0.03	0.00		--
Error (% of scale)	0.0%	0.1%	-0.3%	0.0%		PASS
High Gas Value	20.03	9.33	9.08	8.83		--
Analyzer Reads	20.11	9.42	9.08	8.81		--
Error (% of scale)	0.4%	0.9%	-0.1%	-0.3%		PASS
Mid Gas Value	9.97	5.017	4.289	4.018		--
Analyzer Reads	9.92	5.04	4.36	3.98		--
Error (% of scale)	-0.3%	0.2%	0.7%	-0.4%		PASS

NO_2 to NO Converter Efficiency Test

Analyzer Manufacturer:	Thermo	NO Cal Gas Value:	51.05
Analyzer Model:	42C	NO_2 Cal Gas Value:	49.92
Analyzer Serial Number:	54897-302	Performed By:	#REF!
Date:	3/14/19	CEMS ID#:	CEMS-1

GAS	ANALYZER MODE	ANALYZER RESPONSE	CAL CORRECTED	LABEL
Zero	NO_x	-0.092	--	--
Zero	NO	-0.093	--	--
NO	NO_x	51.063	--	--
NO	NO	51.226	--	--
NO_2	NO	1.179	1.3	C_1
NO_2	NO_x	49.325	49.3	C_2

		Label	Requirement
Abs. Value C_o-C_1:	48.7	D_1	--
Abs. Value C_2-C_1:	48.1	D_2	--
C_1/C_2	3%	D_3	< 5%
CE = D_2/D_1 * 100%:	99%	--	> 90%

	Cylinder #	Exp. Date
NO bottle:	CC66067	11/7/2024
NO_2 bottle:	CC50044	12/1/2019

CEMS PERFORMANCE DATA SHEET

Client:	Grays Harbor Energy Center	Date:	3/14/2019
Location:	Turbine Unit #1	Performed By:	RN
CEMS ID#:	CEMS-1		

Analyzer:	O_2	CO_2	NO_x	CO	SO_2
Manufacturer:	CAI	CAI	Thermo	Thermo	--
Model Number:	600	600	42C	48i	
Serial Number:	U02030-M	U02030-M	54897-302	718022704	

CEMS Probe:	Material:	Stainless Stee	Length:	12'	Gas Temp:	0	°F
Heated Line	Material:	Teflon	Length:	100'	Gas Temp:	0	°F
Sample Conditioner:			Type:	Universal	Gas Temp:	32	°F
CEMS Line:	Material:	Teflon	Length:	225'			
Bias Line:	Material:	Teflon	Length:	225'			

Upscale Response Time:	:51	Downscale Response Time:	:54	seconds
Sample Pressure (psi):	5.00	Sample Flow Rate:	6.00	LPM

GRAYS HARBOR ENERGY CENTER
GAS TURBINE #2
12-POINT STRATIFICATION CHECK

Point	Date	Time	O_2	CO_2	NO_x	O_2 Avg.	NO_x Avg.
	3/14/19	9:28 AM	12.06	5.16	2.72		
	3/14/19	9:29 AM	12.02	5.19	2.77		
NE-3	3/14/19	9:30 AM	12.05	5.18	2.86	12.04	2.78
	3/14/19	9:31 AM	12.02	5.19	2.84		
	3/14/19	9:32 AM	12.02	5.19	2.91		
NE-2	3/14/19	9:33 AM	12.05	5.17	2.85	12.03	2.87
	3/14/19	9:34 AM	12.03	5.18	2.81		
	3/14/19	9:35 AM	12.02	5.19	2.89		
NE-1	3/14/19	9:36 AM	12.02	5.19	2.94	12.02	2.88
	3/14/19	9:39 AM	12.15	5.11	2.74		
	3/14/19	9:40 AM	12.17	5.10	2.64		
NW-3	3/14/19	9:41 AM	12.15	5.12	2.62	12.16	2.67
	3/14/19	9:42 AM	12.08	5.15	2.80		
	3/14/19	9:43 AM	12.07	5.16	2.99		
NW-2	3/14/19	9:44 AM	12.08	5.15	2.99	12.08	2.93
	3/14/19	9:45 AM	12.06	5.16	2.95		
	3/14/19	9:46 AM	12.06	5.17	3.03		
NW-1	3/14/19	9:47 AM	12.09	5.15	2.78	12.07	2.92
	3/14/19	9:50 AM	12.21	5.07	2.41		
	3/14/19	9:51 AM	12.19	5.09	2.44		
SW-3	3/14/19	9:52 AM	12.18	5.09	2.47	12.19	2.44
	3/14/19	9:53 AM	12.19	5.09	2.55		
	3/14/19	9:54 AM	12.22	5.07	2.40		
SW-2	3/14/19	9:55 AM	12.22	5.07	2.44	12.21	2.46
	3/14/19	9:56 AM	12.22	5.07	2.42		
	3/14/19	9:57 AM	12.21	5.08	2.44		
SW-1	3/14/19	9:58 AM	12.21	5.08	2.51	12.21	2.46
	3/14/19	10:02 AM	12.03	5.16	2.81		
	3/14/19	10:03 AM	12.03	5.17	2.89		
SE-3	3/14/19	10:04 AM	12.02	5.18	2.86	12.03	2.85
	3/14/19	10:05 AM	12.04	5.17	2.90		
	3/14/19	10:06 AM	12.05	5.16	2.70		
SE-2	3/14/19	10:07 AM	12.02	5.18	2.88	12.04	2.83
	3/14/19	10:08 AM	12.05	5.17	2.94		
	3/14/19	10:09 AM	12.04	5.17	2.71		
SE-1	3/14/19	10:10 AM	12.01	5.19	2.93	12.03	2.86

	O_2	NO_x
Average	12.09	2.75
Maximum	12.21	2.93
Minimum	12.02	2.44
Maximum Difference from Average	0.12	0.31
Max Difference (% of average)	1.0%	11.2%
Status	Pass	Pass

Notes:
If max difference is < 10%, short-line may be used
If max difference is < 5 ppm for NOx and 0.5% for $O_{2,}$ short line may be used.

In order to use single point, a 12-point traverse must be conducted and the results must be < 5% for NOx and O2 or (3 ppm for NOx and 0.3 % for O2).

Appendix E.4
Span Gas Certificates

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	NI CZ15A	Reference Number:	153-401348863-1
Cylinder Number:	CC710020	Cylinder Volume:	142.0 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2000 PSIG
Analysis Date:	Nov 06, 2018	Valve Outlet:	580
Lot Number:	153-401348863-1		

Expiration Date: Nov 06, 2026

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
NITROGEN	99.9995 %	99.9995 %
CARBON DIOXIDE	< 1.0 PPM	0.01 PPM
NOx	< 0.1 PPM	0.01 PPM
SO2	< 0.1 PPM	0.01 PPM
THC	< 0.1 PPM	0.01 PPM
CARBON MONOXIDE	< 0.5 PPM	0.01 PPM

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

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

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI70E15A0002	Reference Number:	153-401400086-1
Cylinder Number:	SG9183206BAL	Cylinder Volume:	151.7 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72019	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jan 18, 2019

Expiration Date: Jan 18, 2027

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
CARBON DIOXIDE	9.500 %	9.334 %	G1	+/- 0.5% NIST Traceable	01/18/2019
OXYGEN	20.00 %	20.03 %	G1	+/- 0.5% NIST Traceable	01/18/2019
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08010530	K021127	4.954 % CARBON DIOXIDE/NITROGEN	0.5%	Dec 14, 2023
NTRM	09061433	CC282486	22.53 % OXYGEN/NITROGEN	0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Dec 27, 2018
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Jan 10, 2019

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas.
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI71E15A3565	Reference Number:	153-401331305-1
Cylinder Number:	ALM057445	Cylinder Volume:	157.4 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Oct 22, 2018

Expiration Date: Oct 22, 2026

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
OXYGEN	10.00 %	9.974 %	G1	+/- 0.4% NIST Traceable	10/22/2018
CARBON DIOXIDE	19.00 %	18.97 %	G1	+/- 0.6% NIST Traceable	10/22/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	09060238	CC263127	9.961 % OXYGEN/NITROGEN	0.3%	Nov 08, 2018
NTRM	13060712	CC413623	16.939 % CARBON DIOXIDE/NITROGEN	0.6%	May 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Oct 04, 2018
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Oct 18, 2018

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI94E15AC098	Reference Number:	48-400992897-1
Cylinder Number:	CC300823	Cylinder Volume:	146.9 Cubic Feet
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32017	Valve Outlet:	660
Gas Code:	CO,NO,NOX,CO2,BALN	Certification Date:	Sep 15, 2017

Expiration Date: Sep 15, 2020

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	9.000 PPM	9.080 PPM	G1	+/- 1.4% NIST Traceable	09/08/2017, 09/15/2017
CARBON MONOXIDE	9.000 PPM	8.834 PPM	G1	+/- 0.4% NIST Traceable	09/12/2017
NITRIC OXIDE	9.000 PPM	8.878 PPM	G1	+/- 1.4% NIST Traceable	09/08/2017, 09/15/2017
CARBON DIOXIDE	5.000 %	5.002 %	G1	+/- 0.5% NIST Traceable	09/12/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062825	CC366934	9.766 PPM CARBON MONOXIDE/NITROGEN	+/- 0.3%	Sep 07, 2018
PRM	12367	APEX1099237	9.82 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Jun 02, 2017
NTRM	16060703	CC344931	10.08 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jun 28, 2018
GMIS	0224201602	CC500997	5.100 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 24, 2019
NTRM	10060105	CC281146	5.027 % CARBON DIOXIDE/NITROGEN	+/- 0.4%	Dec 02, 2021

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
SIEMENS 6E CO2	NDIR	Aug 18, 2017
Thermo 48i-TLE 1132250557 CO	NDIR	Aug 31, 2017
Nicolet 6700 AHR0801551 NO	FTIR	Aug 21, 2017
Nicolet 6700 AHR0801551 NO2	FTIR	Sep 05, 2017

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Airgas.
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI94E15A0057	Reference Number:	153-401145141-1
Cylinder Number:	CC432613	Cylinder Volume:	146.9 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	660
Gas Code:	CO,CO2,NO,NOX,BALN	Certification Date:	Mar 16, 2018

Expiration Date: Mar 16, 2021

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	5.000 PPM	4.769 PPM	G1	+/- 1.2% NIST Traceable	03/09/2018, 03/16/2018
CARBON MONOXIDE	5.000 PPM	4.456 PPM	G1	+/- 0.7% NIST Traceable	03/09/2018
NITRIC OXIDE	5.000 PPM	4.765 PPM	G1	+/- 1.1% NIST Traceable	03/09/2018, 03/16/2018
CARBON DIOXIDE	5.000 %	4.993 %	G1	+/- 0.5% NIST Traceable	03/09/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	1	CC401502	9.766 PPM CARBON MONOXIDE/NITROGEN	0.3	Sep 07, 2018
NTRM	08012121A	KAL004278	5.08 PPM NITRIC OXIDE/NITROGEN	1.0%	Jun 02, 2018
NTRM	08012121A	KAL004278-NOX	5.08 PPM NOx/NITROGEN	1.0%	Jun 02, 2018
NTRM	10060106	CC281264	5.027 % CARBON DIOXIDE/NITROGEN	0.4%	Dec 02, 2021

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Feb 21, 2018
Thermo 48i-TLE 1163640031 CO	CO NDIR (Mason)	Feb 13, 2018
Thermo 42i-LS 1123749327 NO	Chemiluminescence (Mason)	Feb 22, 2018
Thermo 42i-LS 1123749327 NOx	Chemiluminescence (Mason)	Feb 22, 2018

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Approved for Release

Airgas

Airgas Specialty Gases
525 North Industrial Loop Road
Tooele, UT 84074
435-241-5662 Fax: 435-241-5664
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0055	Reference Number:	153-124588332-1
Cylinder Number:	CC500443	Cylinder Volume:	CF
Laboratory:	124 - Tooele - UT	Cylinder Pressure:	
PGVP Number:	B72016	Valve Outlet:	660
Gas Code:	NO2,BALN	Certification Date:	Dec 01, 2016

Expiration Date: Dec 01, 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
NITROGEN DIOXIDE	50.00 PPM	49.92 PPM	G1	+/- 2%	11/23/2016, 12/01/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	0911201402	CC502379	30.64 PPM NITROGEN DIOXIDE/NITROGEN	1.6%	Sep 11, 2017
PRM	12329	726612	25.02 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.5%	Oct 15, 2014

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
MKS 18143349 NO2	FTIR	Nov 17, 2016

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PERMANENT NOTES: OXYGEN ADDED TO MAINTAIN STABILITY

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI94E15A0660	Reference Number:	48-124585297-1
Cylinder Number:	CC66067	Cylinder Volume:	146.9 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32016	Valve Outlet:	660
Gas Code:	CO,CO2,NO,NOX,BALN	Certification Date:	Nov 07, 2016

Expiration Date: Nov 07, 2024

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	50.00 PPM	51.05 PPM	G1	+/- 1.2% NIST Traceable	10/31/2016, 11/07/2016
CARBON MONOXIDE	50.00 PPM	50.03 PPM	G1	+/- 0.6% NIST Traceable	11/03/2016
NITRIC OXIDE	50.00 PPM	50.71 PPM	G1	+/- 1.1% NIST Traceable	10/31/2016, 11/07/2016
CARBON DIOXIDE	5.000 %	5.005 %	G1	+/- 0.5% NIST Traceable	11/02/2016
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060755	CC434464	49.88 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Feb 22, 2020
PRM	12328	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Oct 15, 2014
NTRM	13061204	CC403869	49.40 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Nov 19, 2019
GMIS	1211201301	CC501041	4.950 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Dec 11, 2016
NTRM	10060133	CC307775	5.027 % CARBON DIOXIDE/NITROGEN	+/- 0.4%	Dec 02, 2021

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
SIEMENS 6E CO2	NDIR	Oct 25, 2016
Thermo 48i-TLE 1132250557 CO	NDIR	Oct 03, 2016
Nicolet 6700 AHR0801551 NO	FTIR	Nov 07, 2016
Nicolet 6700 AHR0801551 NO2	FTIR	Oct 11, 2016

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E04NI94E15AC099	Reference Number:	153-401206558-1
Cylinder Number:	CC484915	Cylinder Volume:	146.9 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	660
Gas Code:	CO,NO,NOX,CO2,BALN	Certification Date:	May 29, 2018

Expiration Date: May 29, 2021

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	4.500 PPM	4.289 PPM	G1	+/- 1.1% NIST Traceable	05/22/2018, 05/29/2018
CARBON MONOXIDE	4.500 PPM	4.018 PPM	G1	+/- 0.7% NIST Traceable	05/22/2018
NITRIC OXIDE	4.500 PPM	4.276 PPM	G1	+/- 1.1% NIST Traceable	05/22/2018, 05/29/2018
CARBON DIOXIDE	5.000 %	5.017 %	G1	+/- 1.0%	05/23/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062855	CC401927	9.766 PPM CARBON MONOXIDE/NITROGEN	0.3%	Sep 07, 2018
NTRM	08012121A	KAL004278	5.08 PPM NITRIC OXIDE/NITROGEN	1.0%	Jun 02, 2018
NTRM	08012121A	KAL004278-NOX	5.08 PPM NOx/NITROGEN	1.0%	Jun 02, 2018
NTRM	10060106	CC281264	5.027 % CARBON DIOXIDE/NITROGEN	0.4%	Dec 02, 2021

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	May 18, 2018
Thermo 48i-TLE 1163640031 CO	CO NDIR (Mason)	May 10, 2018
Thermo 42i-LS 1123749327 NO	Chemiluminescence (Mason)	May 23, 2018
Thermo 42i-LS 1123749327 NOx	Chemiluminescence (Mason)	May 23, 2018

Triad Data Available Upon Request

Approved for Release

Appendix E.5
Equipment Calibration Data

MONTROSE AIR QUALITY SERVICES Electronic Manometer Calibration Data Sheet

QA/QC		Location	Auburn shop	Manometer	~~SR-21~~ 1586	EM 2/28

Pt. 60, App. A, Method 2, 6.2 (Differential Pressure Gauges)

Magnehelic ID		15 second Leak check	Scale Inches	Shortridge in H2O	Manometer in H2O	Difference in H2O	Difference %
SR	SR3		electronic	0	0	< Set to Zero	
Date	2/28/14	High	In/min	0.4910	0.50	0.009	1.83%
Personnel	EM	Low	In/min	1.0002	1.00	0.002	0.02%
				1.478	1.50	0.022	1.48%
				2.011	2.00	0.011	0.55%
SR			electronic	0	0	< Set to Zero	
Date		High	In/min				
Personnel		Low	In/min				
SR			electronic	0	0	< Set to Zero	
Date		High	In/min				
Personnel		Low	In/min				
SR			electronic	0	0	< Set to Zero	
Date		High	In/min				
Personnel		Low	In/min				
SR			electronic	0	0	< Set to Zero	
Date		High	In/min				
Personnel		Low	In/min				
SR			electronic	0	0	< Set to Zero	
Date		High	In/min				
Personnel		Low	In/min				
SR			electronic	0	0	< Set to Zero	
Date		High	In/min				
Personnel		Low	In/min				

SharedFiles\Field\DataSheets\Calibrations\Electronic Manometer_M_v1.pdf

MONTROSE

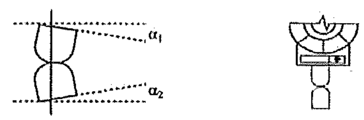
Pitot Tube Calibration Data Sheet

Calibration Date:	December 1, 2017	**Performed by:**	A Kienitz	**Expiration Date:**	June 1, 2018
		ID No.:	6-18	**No obstructions:**	YES
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	6-18	**No damage:**	YES
Probe Description:	Self Supporting Probe (SP)	**Effective Length (ft):**	6	**Level and Perpendicular:**	YES
Thermocouple calibration performed?		Yes	**Thermocouple passed calibration?**		YES

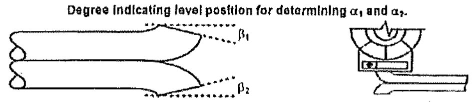
Protractor or Digital Angle Finder ID: BEF013
Measuring Tape ID: Shop
Caliper ID: SEA-CAL2

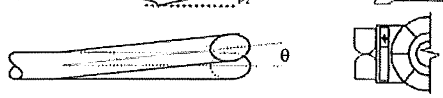
Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions



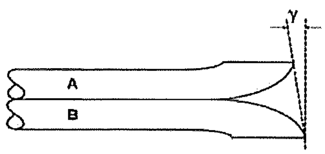
Degree indicating level position for determining α_1 and α_2.

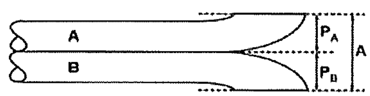




Degree indicating level position for determining θ.

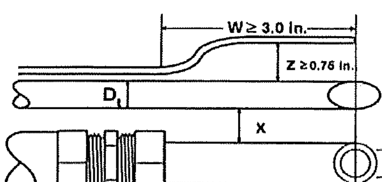
α_1 $(-10° < \alpha_1 < +10°)$	1.6	
α_2 $(-10° < \alpha_2 < +10°)$	2.0	
β_1 $(-5° < \beta_1 < +5°)$	1.9	
β_2 $(-5° < \beta_2 < +5°)$	0.7	
γ	2.5	
θ	0.0	
A	0.6910	
z= A tan γ (± 0.125")	0.0302	Pass
w= A tan θ (± 0.03125")	0.0000	Pass
D_t (0.1875" < D_t < 0.375")	0.2500	Pass
P_A ($1.05D_t$ < P_A < $1.5D_t$)	0.3400	Pass
P_B ($1.05D_t$ < P_B < $1.5D_t$)	0.3510	Pass
$\lvert P_A - P_B \rvert \leq 0.0625$	-0.0110	Pass



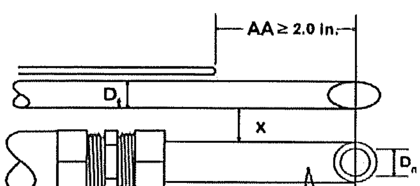


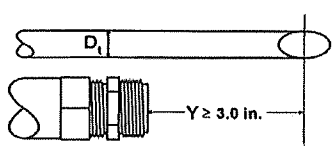
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")			Offset TC only
-or- AA (≥ 2.0")	2.250	Pass	Setback TC only
X	0.750		
D_n	0.250		
X / D_n (≥ 1.5)	3.000	Pass	
Y (≥ 3.0")	3.250	Pass	
Z ≥ 0.75"			Offset TC only





Performed By: AL [signature] Signature: Allan Kienitz Date: 12-1-17

Approved By: Allan Kienitz Signature: [signature] Date: 12-1-17

MONTROSE

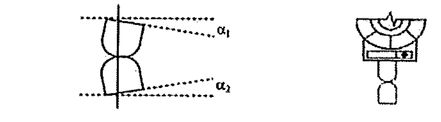
Pitot Tube Calibration Data Sheet

Calibration Date:	April 16, 2019	**Performed by:**	A.Kienitz	**Expiration Date:**	October 16, 2019
		ID No.:	6-18	**No obstructions:**	YES
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	6-18	**No damage:**	YES
Probe Description:	Self Supporting Probe (SP)	**Effective Length (ft):**	7	**Level and Perpendicular:**	YES
Thermocouple calibration performed?	Yes	**Thermocouple passed calibration?**			YES

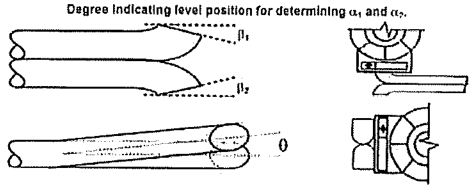
Protractor or Digital Angle Finder ID: BEF014
Measuring Tape ID: Shop
Caliper ID: SEA CAL2

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions

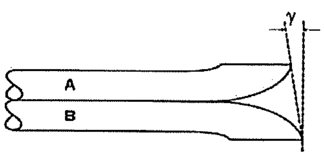


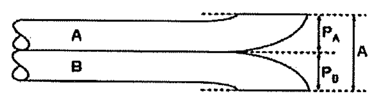
Degree indicating level position for determining α_1 and α_2.



Degree indicating level position for determining θ.

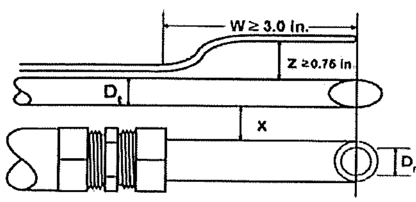
α_1 ($-10° < \alpha_1 < +10°$)	0.4	
α_2 ($-10° < \alpha_2 < +10°$)	1.5	
β_1 ($-5° < \beta_1 < +5°$)	4.2	
β_2 ($-5° < \beta_2 < +5°$)	1.9	
γ	3.0	
θ	0.0	
A	0.6870	
z= A tan γ (± 0.125")	0.0360	Pass
w= A tan θ (± 0.03125")	0.0000	Pass
D_t (0.1875" < D_t < 0.375")	0.2500	Pass
P_A ($1.05D_t < P_A < 1.5D_t$)	0.3400	Pass
P_B ($1.05D_t < P_B < 1.5D_t$)	0.3470	Pass
$\lvert P_A - P_B \rvert \le 0.0625$	-0.0070	Pass



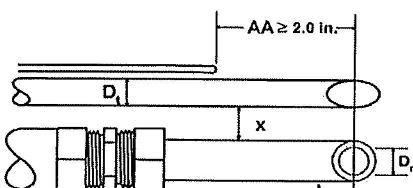


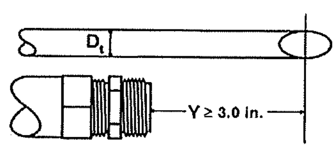
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")			Offset TC only
-or- AA (≥ 2.0")	2.125	Pass	Setback TC only
X	0.750		
D_n	0.250		
X / D_n (≥ 1.5)	3.000	Pass	
Y (≥ 3.0")	3.125	Pass	
Z ≥ 0.75"			Offset TC only





Performed By: A. Kienitz Signature: Allan Kienitz Date: 4-16-19

Approved By: Sean Hilley Signature: Sean Hilley Date: 4-16-19

Pitot Tube Measurement Calibration Sheet Revision: 2 Created: 3/16/15 by IE Last revised 5/17/17 by IE

MONTROSE

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice, Leak Check, and Thermocouple Calibration Check

English Meter Box Units, English K' Factor

Meter box ID:	MB-34
Meter ID (if applicable):	MB-34
Orifice set ID:	Shop YD
Calibrated by:	N. Woltkamp
Expires:	**7/22/19**

Date:	1/22/19
Location:	Auburn WA
No. of orifices used (min. 3)	4
Barometric pressure (in. Hg):	30.26 in. Hg
Theoretical critical vacuum	14.27 in. Hg

Yd:	**0.9904**
ΔH@:	**1.9853**

Meter Box Orifice Calibration

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

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min))

		Volume			Initial Temps.		Final Temps		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
2.10	11.00	660.930	669.418	8.488	65	67	66	67	63	0.5852	19.5	67	67	67.0
1.20	10.00	669.600	675.520	5.920	66	67	69	67	55	0.4508	21.5	67	69	68.0
0.69	13.00	675.700	681.510	5.810	69	67	73	69	48	0.3406	23.0	69	68	68.5
0.34	18.00	681.700	687.213	5.513	73	69	74	71	40	0.2335	24.0	68	67	67.5

— SAMPLE RATE — INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
2.10	0.771
1.20	0.594
0.69	0.448
0.34	0.308

— DRY GAS METER — VOLUME CORRECTED

Vm(std) (cu ft)
8.653
6.011
5.867
5.539

—— ORIFICE ——

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
8.485	8.377
5.937	5.873
5.828	5.770
5.538	5.473

— DRY GAS METER — CALIBRATION FACTOR Yd

Value (number)	Variation (number)
0.9805	-0.010
0.9877	-0.003
0.9934	0.003
1.000	0.009

—— ORIFICE —— CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
2.012	0.026
1.940	-0.045
1.953	-0.032
2.036	0.051

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 ΔH@, 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.

QA Criteria:	
Average Yd	0.9904
Average ΔH@	1.9853
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6	Should be 5-7 in. H_2O
Leak Rate, (in H_2O/min):	0	Must be zero (manometer level stable for 1 minute)

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	20	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Meter Box Thermocouple Readout Calibration Check

Input Temperature	Allowable Temp. Dev.*
0	7
100	8
200	10
300	11
400	13
500	14
700	17
900	20

Stack	Probe	Filter	Exit	Aux.	Meter In	Meter Out
5	5	5	5	5	5	5
105	105	105	105	105	105	105
207	207	207	207	207	207	207
305	305	305				
404	404	404				
504						
704						
903						

Thermocouple simulator	
Make/Model:	Altek Series 22
Serial No.	8510116
Cal Date:	1/3/2018

Meter Thermocouple Calibration

Ref. Temp	Allowable Temp. Dev.*	Meter In	Meter Out
41.2	8	42	41
139.6	9	142	140

Reference Thermometer	
Make/Model:	Traceable/ST-5
Serial No.	18101104
Cal Date:	10/9/2018

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Nicholas Woltkamp Signature: [signature] Date: 1/22/19

Approved by: Name: Kristina Schafer Signature: [signature] Date: 1/28/19

Meter box 6-month calibration form (orifices) R1

MONTROSE

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice: Post-Test, English Meter Box Units, English K' Factor

Meter box ID:	MB34
Meter ID (if applicable):	XXXX
Orifice set ID:	SHOP 3 (YD)
Calibrated by (initials):	EM
Current 6-month calibration Yd:	0.9904
Date of 6-month calibration:	7/22/19

Date:	3/28/19
Location:	OFFICE
No. of runs (default 3)	3
Barometric pressure (in. Hg):	31.50 in. Hg
Theoretical critical vacuum:	14.86 in. Hg

Current Cal. Yd:	**0.9904**
Post-test Yd:	**1.0050**
Post-test Result:	**PASS**

Meter Box Orifice Calibration

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

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
1.20	10.00	743.300	749.135	5.835	63	62	69	63	55	0.4508	20.5	65	67	66.0
1.20	10.00	749.135	754.930	5.795	69	63	72	64	55	0.4508	20.5	67	69	68.0
1.20	10.00	754.930	760.745	5.815	72	64	77	67	55	0.4508	20.5	69	73	71.0

— SAMPLE RATE — INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
1.20	0.62
1.20	0.62
1.20	0.62

— DRY GAS METER — VOLUME CORRECTED

Vm(std) (cu ft)
6.202
6.127
6.114

——— ORIFICE ———

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
6.192	5.861
6.180	5.873
6.163	5.889

— DRY GAS METER — CALIBRATION FACTOR Yd

Value (number)	Variation (number)
0.9984	-0.007
1.0086	0.004
1.0080	0.003

——— ORIFICE ——— CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
1.87	-0.004
1.88	0.000
1.88	0.003

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 ΔH@, 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.

QA Criteria:	
Average Yd	1.0050
Average ΔH@	1.8765
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg).	3	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Performed by: Name: Evan Motz Signature: [signature] Date: 3-28-19

Approved by: Name: Sean Hillery Signature: [signature] Date: 3-28-19

Meter box post-test calibration form (orifices) R3

Certified Calibration Service, LLC
917 Industry Drive
Tukwila,WA 98188 USA
1-425-255-1485

Z540.3 Calibration

Certificate of Calibration

Report Date 10/11/2018

Certificate No 181011-02

ID **MAQS-ST1**

Manufacturer CONTROL COMPANY
Description Thermometer + Probe
Model No. 4039
Gage S/N ST1
Calibration Location C.C.S Metrology Lab

Customer

Montrose Environmental
4150B Place NW Suite 106
Auburn, WA 98001

PO No Credit Card
Order Date 05 Oct 2018

Certification Statement

Certified Calibration Service, LLC Quality Management Systems (QMS) is in accordance with the requirements of ISO/IEC 17025:2017/Option A/Testing/Calibration, ANSI/NCSL Z540.3-2006 and the technical requirements of the customer's order. The measurement standards used are traceable to the National Institute of Standards and Technology (NIST), and through NIST to the International system of units (SI), fundamental or natural physical constants with values assigned or accepted by NIST. The Test Uncertainty Ratio (TUR) for each calibration parameter is at least 4:1 or greater unless otherwise indicated. The results relate only to the item calibrated and are certified to user/client supplied maximum permissible error (MPE), original equipment manufacturer supplied MPE or the American Society for Testing and Materials (ASTM) standard MPE. The calibration due date and calibration interval are calculated as per user/client agreement. Presented in simplified format in accordance with client contract or quality agreement, the uncertainty of measurement associated with the measurement results reported in this certificate is available upon request. This certificate may not be reproduced, except in full, without the written approval of Certified Calibration Service, LLC. This calibration shall not be used to claim product endorsement. Calibration certificates without signature are not valid.

Statement

This calibration meets all user/client requirements

Calibration Date 10/9/2018
Due Due 10/9/2019
Calibration Interval 1.00 Years

As Found In
Approved Yes

Environmental Conditions
Temperature 21 Deg C
Humidity 52 %Rh

Procedure

CCS-0005-CALSOP TEMP INDICATING DEVICES-GENERAL

Standard Used

CCS-0537 Due 26 MAR 2020 CERT -180066-00
CCS-0406 Due-11 DEC 2018 CERT-171211-01

		Maximum Permissible Error			Unit Under Test						
Test Point Range	Units	Minimum	Nominal	Maximum	As Found	Difference	Fail	As Left	Difference	Fail	TUR
A) 0 °C	°C	-1.3	0.0	1.3	0.0	0.00	No	0.0	0.00	No	4:1
B) 50 °C	°C	48.7	50.0	51.3	51.0	1.00	No	51.0	1.00	No	4:1

Calibration By: Victor Wolff - Technical Sup Mgr.

Reviewed By: Ineke Wolff - QA Mgr

MONTROSE

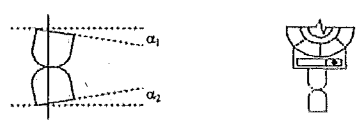
Pitot Tube Calibration Data Sheet

Calibration Date:	November 16, 2017	**Performed by:**	A.Kienitz	**Expiration Date:**	May 16, 2018
		ID No.:	P011	**No obstructions:**	YES
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	P011	**No damage:**	YES
Probe Description:	Self Supporting Probe (SP)	**Effective Length (ft):**	7	**Level and Perpendicular:**	YES
Thermocouple calibration performed?	Yes	**Thermocouple passed calibration?**			YES

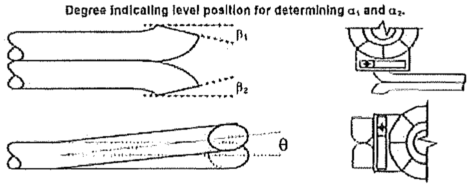
Protractor or Digital Angle Finder ID: BEF013
Measuring Tape ID: Shop
Caliper ID: SEA-CAL2

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions

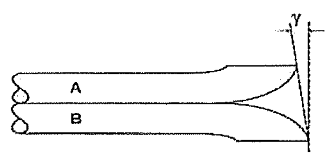


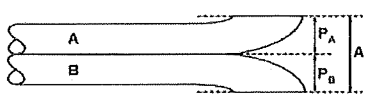
Degree indicating level position for determining α_1 and α_2.



Degree indicating level position for determining θ.

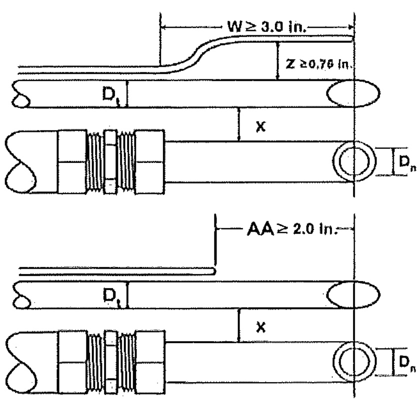
α_1 $(-10° < \alpha_1 < +10°)$	1.0	
α_2 $(-10° < \alpha_2 < +10°)$	1.0	
β_1 $(-5° < \beta_1 < +5°)$	2.0	
β_2 $(-5° < \beta_2 < +5°)$	2.5	
γ	0.0	
θ	0.0	
A	0.9940	
z= A tan γ (± 0.125")	0.0000	Pass
w= A tan θ (± 0.03125")	0.0000	Pass
D_t (0.1875" < D_t < 0.375")	0.3740	Pass
P_A (1.05D_t < P_A < 1.5D_t)	0.4840	Pass
P_B (1.05D_t < P_B < 1.5D_t)	0.5100	Pass
$\lvert P_A - P_B \rvert \le 0.0625$	-0.0260	Pass



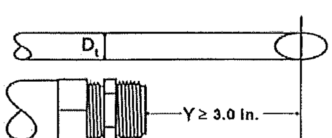


Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")	x		Offset TC only
-or- AA (≥ 2.0")	x		Setback TC only
X	x		
D_n	x		
X / D_n (≥ 1.5)	#######	#VALUE!	
Y (≥ 3.0")	x	Pass	
Z ≥ 0.75"	x	Pass	Offset TC only



Performed By: Allon Kienitz Signature: [signature] Date: 11-16-17
Approved By: Allon Kienitz Signature: [signature] Date: 11-16-17

Pitot Tube Measurement Calibration Sheet Revision: 2 Created: 3/10/15 by IE Last revised: 6/17/17 by IE

MONTROSE

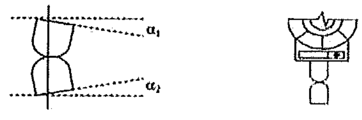
Pitot Tube Calibration Data Sheet

Calibration Date:	April 2, 2019	**Performed by:**	A. Kienitz	**Expiration Date:**	October 2, 2019
		ID No.:	P011	**No obstructions:**	Yes
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	P011	**No damage:**	Yes
Probe Description:	Self Supporting Probe (SP)	**Effective Length (ft):**	7	**Level and Perpendicular:**	Yes
Thermocouple calibration performed?	Yes	**Thermocouple passed calibration?**	Yes		

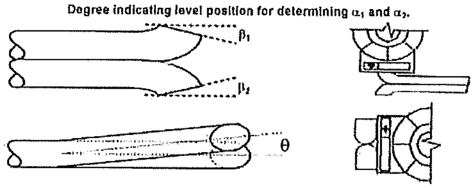
Protractor or Digital Angle Finder ID: BEF013
Measuring Tape ID: Shop
Caliper ID: SEA-CAL2

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions

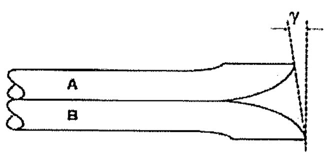


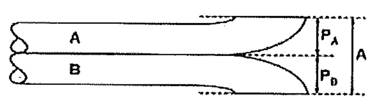
Degree indicating level position for determining α_1 and α_2.



Degree indicating level position for determining θ.

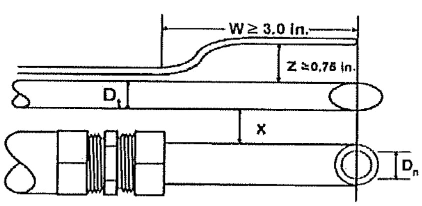
α_1 $(-10° < \alpha_1 < +10°)$	0.4	
α_2 $(-10° < \alpha_2 < +10°)$	1.7	
β_1 $(-5° < \beta_1 < +5°)$	3.0	
β_2 $(-5° < \beta_2 < +5°)$	1.6	
γ	2.5	
θ	0.2	
A	0.9970	
z= A tan γ (± 0.125")	0.0435	Pass
w= A tan θ (± 0.03125")	0.0035	Pass
D_t (0.1875" < D_t < 0.375")	0.3730	Pass
P_A $(1.05D_t < P_A < 1.5D_t)$	0.4980	Pass
P_B $(1.05D_t < P_B < 1.5D_t)$	0.4990	Pass
$\lvert P_A - P_B \rvert \leq 0.0625$	-0.0010	Pass



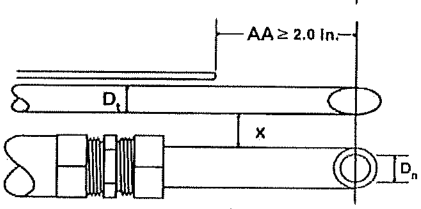


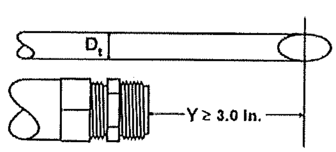
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")			Offset TC only
-or- AA (≥ 2.0")	2.125	Pass	Setback TC only
X			
D_n			
X / D_n (≥ 1.5)			
Y (≥ 3.0")			
Z ≥ 0.75"			Offset TC only





Performed By: Allan Kienitz Signature: [signature] Date: 4-16-19

Approved By: Sean Hilling Signature: [signature] Date: 4-16-19

Pitot Tube Measurement Calibration Sheet Revision: 2 Created: 3/16/15 by IE Last revised: 5/11/18 by AV

MONTROSE

PRESSURE GAUGE
CALIBRATION DATA FORM

Date.. 4-9-19
Calibrator.. NW
Ambient Temperature, °F.. 58
Test Gauge ID Number.. SR#3
Reference Gauge Serial Number.. 1586

Reference Level	Ref. Gauge Pressure, in H_2O	Test Gauge Pressure, in H_2O	Difference, in H_2O	Relative Difference, %	Pass/Fail
Low	0.55	0.5506	0.0006	0	PASS
Medium	1.1	1.123	0.023	2	PASS
High	2	2.022	0.022	1	PASS

Pressure difference must be ≤ 5% at each level

Performed By: N Wolttkamp Signature: Nick Wolttkamp Date: 4-9-19
Approved By: Allan Kienitz Signature: AL Kienitz Date: 4-9-19

APPENDIX F
MISCELLANEOUS INFORMATION

Appendix F.1
Agency Correspondence

SOURCE TEST PLAN
2019 COMPLIANCE AND RATA TESTING
GRAYS HARBOR ENERGY CENTER
GAS TURBINE #1 AND GAS TURBINE #2
ELMA, WASHINGTON

Prepared For:

Grays Harbor Energy, LLC
401 Keys Road
Elma, WA 98541

For Submittal To:

Olympic Region Clean Air Agency
2940 Limited Lane
Olympia, WA 98502

Prepared By:

Montrose Air Quality Services, LLC
4150 B Place NW, Suite 106
Auburn, WA 98001

Document Number:	**021AS-555757-PP-101**
Proposed Test Dates:	**March 13-14, 2019**
Original Test Plan Submittal Date:	**January 28, 2019**
Revised Test Plan Submittal Date:	**February 19, 2019**

STAC
ACCREDITED
TO ASTM D7036 ONLY
CERT #3925.01

MONTROSE
AIR QUALITY SERVICES

TABLE OF CONTENTS

LIST OF TABLES

1.0 OBJECTIVES AND SUMMARY OF TEST PROGRAM

1.1 PROGRAM OBJECTIVES

Montrose Air Quality Services, LLC (Montrose) has been contracted by Grays Harbor Energy, LLC. (Grays Harbor) to perform a series of air emission tests at the facility located in Elma, Washington. The tests will be conducted to determine compliance with the source testing limitations of the 40 CFR Parts 60 and 75 as specified in the Energy Facility Site Evaluation Council (EFSEC) Approval of the Prevention of Significant Deterioration (PSD) and Notice of Construction (NOC) No. EFSEC/22001-01, Amendment 4. Tests will be performed to audit the performance of the continuous emission monitoring systems (CEMS) and continuous emission rate monitoring systems (CERMS) in accordance with 40 CFR, Part 60, Appendix B and 40 CFR, Part 75, Appendix A. Tests are scheduled to be conducted on March 13-14, 2019. Montrose will perform the tests to measure the following emission parameters:

- Emission Compliance:
  - PM (total) as PM_{10} (lb/hr)
- O_2 and CO_2 (% volume dry) – for molecular weight
- Stack volumetric flow rate (dscfm) and moisture content (% by volume)
- Part 60 and Part 75 Relative Accuracy Test Audit (O_2, CO, NO_X, and NH_3)
  - CO, NO_X (ppmvd, ppm @ 15% O_2, lb/MMBtu, lb/hr)
  - O_2 (% volume dry)
  - NH_3 (ppmvd, ppm @ 15% O_2, lb/hr)

Montrose will provide the test personnel and the necessary equipment to measure emissions as outlined in this test plan. Facility personnel will provide the process and production data to be included in the final report. A summary of the test program and proposed schedule is presented below in Table 1-1.

TABLE 1-1
SUMMARY OF TEST PROGRAM AND PROPOSED SCHEDULE

Date	Unit ID/ Source Name	Activity/ Pollutants	Test Methods	No. Runs	Duration
March 12, 2019	--	Mobilize, site safety, setup	--	--	--
March 13, 2019	Gas Turbine #1	O_2, CO_2, CO, NO_X RATA NH_3 RATA PM	EPA 3A, 10, 7E BAAQMD ST-1B EPA 5/202	1-12 1-12 1, 2, 3	21 minutes 30 minutes 60 minutes
March 14, 2019	Gas Turbine #2	O_2, CO_2, CO, NO_X RATA NH_3 RATA PM	EPA 3A, 10, 7E BAAQMD ST-1B EPA 5/202	1-12 1-12 1, 2, 3	21 minutes 30 minutes 60 minutes
March 15, 2019	--	Demobilize	--	--	--
April 28, 2019	--	Permit report submittal deadline	--	--	--

1.2 APPLICABLE REGULATIONS AND PERMIT LIMITS

The results from this test program will be presented in units consistent with those listed in the permit or subpart. The limits are presented in Table 1-2:

TABLE 1-2
EMISSION LIMITS

Emission Parameter	Units of Measurement	Permit Limits	Emission Limit Reference
Total Particulate Matter	lb/hr	22.6	Permit 5.6
Oxides of Nitrogen (NO_X)	lb/hr, 1-hour average	21.7	Permit 5.1.1
	lb/hr, 24-hour moving average	17.4	Permit 5.1.2
	ppmvd @ 15% O_2, 1-hour average	2.5	Permit 5.1.3
	ppmvd @ 15% O_2, 24-hour moving average	2.0	Permit 5.1.4
Carbon Monoxide (CO)	ppmvd @ 15% O_2, 1-hour average	2.0	Permit 5.2.1
	lb/hr, 1-hour average	10.6	Permit 5.2.2
Ammonia (NH_3)	ppmvd @ 15% O_2, 24-hour average	5.0	Permit 5.7.1
	lb/hr, 24-hour average	16.1	Permit 5.7.2

The emission limits are also used as the "applicable standards" for alternate pass/fail criteria in reporting RATA results. The performance specifications for the RATA are presented in Table 1-3:

TABLE 1-3
SUMMARY OF PERFORMANCE SPECIFICATIONS

Parameter	Performance Specification 40 CFR, Part 60 Appendix B	Performance Specification 40 CFR, Part 75 Appendix A	Specification Limit
O_2 Analyzer			
% volume dry	3, Section 13.2	Section 3.3.3	a / g
NO_x Analyzer			
ppm volume dry	2, Section 13.2	Section 3.3.7	b or c / g or i
ppmvd @ 15% O_2	2, Section 13.2	Section 3.3.7	b or c / g or i
lb/hr as NO_2	2 / 6, Section 13.2	Section 3.3.7	b or c / g
lb/MMBtu as NO_2	2 / 6, Section 13.2	Section 3.3.2	b or c / g or h
CO Analyzer			
ppm volume dry	4A, Section 13.2	--	d, e, or f
ppmvd @ 15% O_2	4A, Section 13.2	--	d, e, or f
lb/hr	4A / 6, Section 13.2	--	b or c
lb/MMBtu	4A / 6, Section 13.2	--	b or c
NH_3 Analyzer			
ppm @ 15% O_2	4A, Section 13.2	--	d, e, or f
lb/hr	4A / 6, Section 13.2	--	b or c

40 CFR, Part 60
[a] No greater than 1% O_2 (based on actual analyzer readings)
[b] No greater than 20% of the RM value (if average emissions are above 50% of the emission standard)
[c] No greater than 10% of the applicable standard (if average emissions are less than 50% of the emission standard)
[d] No greater than 10% of the RM value
[e] No greater than 5% of the applicable standard
[f] Within 5 ppm absolute difference between the RM and CEMS, plus confidence coefficient
40 CFR, Part 75
[g] No greater than 10% of the RM
[h] No greater than 0.020 lb/MMBtu of the RM mean value if the 10% of RM criteria is not met (for use when analyzer emission rate is no greater than 0.200 lb/MMBtu)
[i] Within 15 ppm absolute difference between the RM and CEMS, plus confidence coefficient

1.3 PROJECT CONTACTS

A list of project participants is included below:

Facility Information

Source Location:	Grays Harbor Energy Center 401 Keys Road Elma, Washington 98541	
Project Contact:	Chris Sherin	Paul Hughes
Role:	Plant Manager	Operations Manager
Company:	Grays Harbor Energy Center	Grays Harbor Energy Center
Telephone:	360-482-4349	360-482-6291
Email:	csherin@invenergyllc.com	phughes@invernergyllc.com

Agency Information

Regulatory Agency:	Energy Facility Site Evaluation Council	Olympic Region Clean Air Agency
Agency Contact:	Sonia E. Bumpus	Robert Moody
Telephone:	360-664-1363	(360) 539-7610
Email:	Sonia.Bumpus@utc.wa.gov	Robert.Moody@orcaa.org

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC (Montrose)	
Contact:	Kristina Schafer	Treston Devers
Title:	District Manager	Client Project Manager
Telephone:	253-480-3801	979-799-6862
Email:	kschafer@montrose-env.com	tdevers@montrose-env.com

Laboratory Information

Laboratory:	Chester LabNet[1]
City, State:	Tigard, Oregon

1.3.1 Test Personnel and Responsibilities

The test team will consist of one Field Project Manager and two Field Technicians. The Field Project Manager is responsible for overseeing sample and data collection, while the Field Technician works at the sample location. It is anticipated that Treston Devers, QSTI (1, 3) will be assigned to the role of Client Project Manager. The staff assignment for the Field Technician positions have not been finalized as of the date of this test plan. The team will be fully qualified to perform all test methods listed in this test plan. At least one team member will hold current QSTI and/or QI certifications for all test methods included in this test program.

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D-7036 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose completed multiple functional assessments for ASTM D7036-04 which were conducted by the American Association for Laboratory Accreditation

1 Montrose reserves the right to select a different laboratory than the one stated here.

(A2LA). All testing is overseen and supervised on site by at least one Qualified Individual (QI), as defined in 40 CFR 72.2.

2.0 SOURCE DESCRIPTION

2.1 FACILITY AND SOURCE DESCRIPTION

The Grays Harbor facility is located at 401 Keys Road in Elma, Washington. The facility includes two General Electric Frame 7FA combined cycle units. Each turbine is equipped with dry low-NOx combustors and a selective catalytic reduction (SCR) system for NOx emissions control and an oxidation catalyst for CO emissions control.

2.1.1 CEMS and DAS Description

Each stack has a dry extractive continuous emissions monitoring system (CEMS) to measure O_2, CO and NO_X emissions. The steam generated from each block of two units supplies a single steam turbine-generator set. The two units are arranged in combined cycle mode with a single steam turbine generator.

TABLE 3-1
CEMS INFORMATION

Analyzer Type	Manufacturer / Model No	Serial No. Turbine 1	Serial No. Turbine 2
Low CO/O_2	Oxymat 6E	P6-0489	P6-0490
CO	Siemens / U23	P6-0444	P6-0445
NO_X	Thermo / 42i LS	1152020022	1162090003
NH_3	Thermo / 42i LS	1162090004	1152020023

2.2 SAMPLING LOCATIONS AND ACCESS

Information regarding the sampling locations is presented below and will be verified on site by Field personnel and documented in the final test report.

Sample location ID:	Turbine Units 1 and 2 exhaust stacks (locations are identical)
Configuration:	Cylindrical, vertical
Dimensions:	18 ft. in diameter
Port locations:	Appx. 45 ft. (~2.5 duct diameters) upstream from stack exit Appx. 100 ft. (~5.6 duct diameters) downstream from nearest stack disturbance
Port configuration:	Four ports located 90° apart from one another

Traverse point information is presented below:

- RATA testing will be conducted at 0.4, 1.2, and 2.0 meters from the stack wall

- Particulate tests - 24 points total, 12 from each of two ports located 90 degrees apart from one another
- Gaseous emission tests – sampling point selection to be performed per EPA Method 7E

2.3 OPERATING CONDITIONS AND PROCESS DATA

Emission tests will be performed while the source/units and air pollution control devices are operating at the conditions required by the permit. The units will be tested when operating normally and at least 50% of rated load.

Plant personnel will establish the test conditions and will collect all applicable unit-operating data. Montrose will monitor the collection of process data. Data collected will include the following parameters:

- Fuel flow rates
- Gross power output
- CEMS data
- Manufacturer, Model and SN of the CEMS

2.4 PLANT SAFETY

Safety is a priority at Montrose. A discussion of the field safety measures which will be employed on this project are detailed below. A detailed Site Safety Plan is attached to this test plan in Appendix S.

2.4.1 Safety Responsibilities

As per 40 CFR 60 Subpart A, Section 60.8, the facility should provide the following provisions at each sample location:

- Sampling ports, which meet EPA minimum requirements for testing. The caps should be removed or be hand-tight.
- Safe sampling platforms
- Safe access to the platforms and test ports, including any scaffolding or man lifts
- Sufficient utilities to perform all necessary testing

Montrose will comply with all safety requirements at the facility. The facility plant safety coordinator is responsible for ensuring routine compliance with plant entry, health, and safety requirements. The facility plant site safety coordinator has the authority to impose or waive facility restrictions. The Montrose test team leader has the authority to negotiate any deviations from the facility restrictions with the plant site safety coordinator. Any deviations must be documented.

2.4.2 Safety Program

Montrose has a comprehensive health and safety program that satisfies State and Federal OSHA requirements. The program includes an Illness and Injury Prevention Program, site-specific safety meetings, and training in safety awareness and procedures. The basic elements include:

- Written policies and procedures
- Routine training of employees and supervisors
- Medical monitoring as necessary, including Hearing Conservation
- Use of personal protection equipment (PPE)
- Hazard communication
- Pre-test and daily safety meetings
- Routine surveillance and inspection of on-going work
- Near-miss and accident reporting procedures
- Following Federal Motor Carrier Safety Administration (FMCSA) regulations, as applicable

Montrose will provide all PPE to its employees. The PPE will include, but is not limited to; hard hats, safety shoes, safety glasses with side shields (or goggles), hearing protection, and hand protection.

2.4.3 Safety Requirements

All on-site personnel will adhere to the following standard safety measures:

- All OSHA and facility mandated safety training and accreditation will be completed before arrival. This will include MSHA, OSHA 10-hr, TWIC, Aerial Work Platform, etc., as required.
- Complete any site-specific training as necessary
- Complete Site Safety Plan before work activities begin
- Daily Tool Box Meetings
- Confine themselves to the testing and administration areas only
- Wear all mandated PPE
- Know the location of first aid equipment and fire extinguishers
- Smoke only in designated areas

3.0 TEST METHOD DETAILS

3.1 LIST OF TEST METHODS

The test procedures for this test program are summarized in Table 3-1 below. Additional information regarding specific applications or modifications to standard procedures is presented in the following sub-sections.

TABLE 3-1
TEST PROCEDURES

Parameter	Measurement Principle	Reference Method
Volumetric flow rate	Pitot/temperature traverse	EPA 19
Volumetric flow rate	Pitot/temperature traverse	EPA 1, 2
O_2	Paramagnetism	EPA 3A
CO_2	Non-dispersive infrared	EPA 3A
NO_x	Chemiluminescence	EPA 7E
CO	Gas filter correlation NDIR	EPA 10
Moisture	Impinger weight gain	EPA 4[2]
Filterable & Condensable PM	Gravimetry with condensable analysis	EPA 5/202
NH_3	Ion chromatography	BAAQMD ST-1B

Note: Stack gas volumetric flow rates will be determined by stoichiometric calculations based on fuel flow rate (from the plant's certified fuel flow meters), fuel composition, and excess O_2 (%) from the flue gas (as measured by Montrose). Calculations will be performed using an "Fd" factor (8710 dscf/MMBtu @ 0% O_2) and a higher heating value for natural gas (based on the fuel analysis) using calculations described in EPA Method 19. The results will be used with the measured emission concentrations to calculate mass emission rates.

3.1.1 EPA Method 1 – Traverse Points

EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance. An EPA Method 1 diagram is included in the final report.

[2] It is anticipated that EPA Method 4 will be used to measure moisture levels along with BAAQMD ST-1B and EPA Method 5/202 but they will not be used in gaseous calculations.

Method-specific options: N/A

Any project-specific exceptions are detailed below: NA

Quality control procedures for this method include:

- A check for cyclonic flow is made by measuring null angles using a protractor and pitot tube
- Pre- and post-test leak checks of the pitot tube lines

3.1.2 EPA Method 2 - Velocity

EPA Method 2 is used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. Typically, Type S (Stausscheibe) pitot tubes conforming to the geometric specifications in the test method are used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1. The molecular weight of the gas stream is determined from independent measurements of O_2, CO_2, and moisture. The stack gas volumetric flow rate is calculated using the measured average velocity head, the area of the duct at the measurement plane, the measured average temperature, the measured duct static pressure, the molecular weight of the gas stream, and the measured moisture.

Method-specific options are listed below:

- S-type pitot tube coefficient is 0.84
- Shortridge multimeter is used to measure velocity

Any project-specific exceptions are listed below: N/A

Velocity and volumetric flow rate are reported in the following units:

- feet per second (fps) or feet per minute (fpm)
- actual cubic feet per minute (acfm)
- dry standard cubic feet per minute (dscfm)

Quality control procedures for this method include:

- Pre- and post-test leak checks of the pitot tube lines
- Pitot tubes are examined before and after each use to confirm that they are in alignment
- Stack gas temperatures thermocouples are checked using EPA Alternate Method 011 (ALT-011). A single-point calibration is performed using a NIST-traceable thermometer. Temperatures must agree within ± 2° F.
- Thermocouples are checked at ambient temperature before heaters are turned on

3.1.3 Alternative EPA Method 2 Thermocouple Calibration Procedure (ALT-011)

Approved Alternative Method 011 (ALT-011) is used as an alternative to the EPA Method 2 two-point thermocouple calibration. This procedure involves a single-point in-field check using a reference thermometer to confirm that the thermocouple system is operating properly. The temperatures of the thermocouple and reference thermometers shall agree to within ±2 °F.

3.1.4 EPA Method 4 – Moisture Content

Stack gas moisture content will be determined using EPA Method 4 in conjunction with every particulate test run and wet chemical test run. The impingers are connected in series and contain reagents as listed in the applicable method descriptions. The impingers are contained in an ice bath to assure condensation of the flue gas stream moisture. Any moisture that is not condensed in the impingers is captured in the silica gel; therefore, all moisture is weighed and entered into moisture content calculations.

3.1.5 EPA Method 19 – Volumetric Flow Rate

Stack gas volumetric flow rates will be determined by the procedures outlined in EPA Method 19. Pertinent information regarding the performance of the method is presented below:

- F Factor: Oxygen based F-factor, dry basis (Fd)
- F Factor Source: Published in EPA Method 19
- Heat Input Data: Calculated based on fuel flow rate and higher heating value
- Higher Heating Value Source: Analysis of fuel samples by Grays Harbor

3.1.6 Determination of Sampling Traverse Points (Gaseous Sampling)

Sampling traverse points for gaseous methods are determined in accordance with EPA Method 7E. For RATA testing a 3-point probe traverse is performed along the measurement line of the inner diameter of the stack exhaust at 16.7%, 50%, and 83.3%. If the stack diameter is greater than 2.4 meters, and stratification is not expected, then sampling is performed 0.4, 1.2, and 2.0 meters from the stack wall. Source gas will be sampled for at least 21 minutes during each run.

3.1.7 Gaseous Emissions

Concentrations of the gaseous constituents of stack gas (O_2, CO_2, NO_X & CO) are measured using Montrose's dry extractive reference method (RM) monitor system in accordance with EPA Method 7E. This system meets the requirements of EPA methods for gaseous species. Pertinent information regarding the performance of the method is presented below:

- Method Deviations: None
- Method Options: N/A
- Detection Limits: 2% of calibration span

3.1.8 Particulate Matter Emissions

Emissions of total particulate matter (PM) are measured using a combination of EPA Methods 5 and 202. Pertinent information regarding the performance of the methods are presented below:

- Method Deviations: None
- Method Options: A field train proof blank may be collected on-site; if the glassware is not baked for six hours prior to use. Additionally, pressurized nitrogen will be used to purge all trains.
- Target and/or Minimum Required Sample Duration: 60 minutes
- Analytical Laboratory: Chester LabNet, Tigard, OR

3.1.9 Ammonia Slip

Concentrations of ammonia slip are determined using Bay Area Air Quality Management District (BAAQMD) Method ST-1B. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations: Ion chromatography will be used in place of ISE for analysis
- Method Options: N/A
- Target and/or Minimum Required Sample Duration: 30 minutes
- Analytical Laboratory: Chester LabNet

3.1.10 Relative Accuracy Test Audit

The relative accuracy of each CEMS will be audited per the procedures of 40 CFR, Part 60, Appendices B and F, and 40 CFR, Part 75, Appendix A. Pertinent information regarding the performance of the audit is presented below:

- Traverse Points: Three located along the measurement line
- Relevant Performance Specifications: 40 CFR 60, PS 2, 3, 4A and 6; 40 CFR Part 75 Sections 3.3.2, and 3.3.3.

4.0 QUALITY ASSURANCE AND REPORTING

4.1 SAMPLING AND ANALYTICAL QA/QC

Montrose has instituted a rigorous QA/QC program for its air quality testing. Quality assurance audits are performed as part of the test program to ensure that the results are calculated using the highest quality data available. This program ensures that the emissions data we report are as accurate as possible. The procedures included in the cited reference methods are followed during preparation, sampling, calibration, and analysis. Montrose will be responsible for preparation, calibration, and cleaning of the sampling apparatus. Montrose will also perform the sampling, sample recovery, storage, and shipping.

Approved contract laboratories may perform some of the preparation and sample analyses, as needed. The laboratories that will be used are established leaders in the development and performance of the reference methods for which they have been selected. Their credentials for adherence to the required quality assurance procedures are well known.

4.2 QUALITY CONTROL PROCEDURES

Montrose calibrates and maintains equipment as required by the methods performed and applicable regulatory guidance. Montrose follows internal procedures to prevent the use of malfunctioning or inoperable equipment in test programs. All equipment is operated by trained personnel. Any incidence of nonconforming work encountered during testing is reported and addressed through the corrective action system.

4.2.1 Equipment Inspection and Maintenance

- Each piece of field equipment that requires calibration is assigned a unique identification number to allow tracking of its calibration history
- All field equipment is visually inspected prior to testing and includes pre-test calibration checks as required by the test method or regulatory agency
- Glassware is visually inspected prior to testing
- Preliminary stack flow and temperature measurements are taken to assure correct isokinetic sampling
- Reagent blanks are collected and analyzed as required by the applicable test methods

4.2.2 Audit Samples

When required by the test method, Montrose obtains EPA TNI SSAS audit samples from an accredited provider for analysis along with the samples. The audit samples are stored, shipped, and analyzed along with the emissions samples collected during the test program. The audit sample results are reported along with the emissions sample results.

4.3 DATA ANALYSIS, VALIDATION, AND UNCERTAINTY

Montrose converts the raw field, laboratory, and process data to reporting units consistent with the permit or subpart. Calculations are made using proprietary computer spreadsheets or data acquisition systems. One run of each test method is also verified using a separate example calculation. The example calculations are checked against the spreadsheet results and are included in the final report. The "Standard Conditions" for this project are 29.92 inches of mercury and 68 °F.

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting test results. Whenever possible, Montrose Air Quality Services personnel reduce the impact of these uncertainty factors using approved and validated test methods. In addition, Montrose personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Management System and ASTM D 7036-04. The limitations of the various methods, instruments, equipment, and materials utilized during a test are reasonably considered, but the ultimate impact of the cumulative uncertainty for each project cannot be fully identified.

4.4 REPORTING

Montrose will prepare a final report to present the test data, calculations/equations, descriptions, and results. Prior to release by Montrose, each report will be reviewed and certified by the project manager and their supervisor, or a peer. Source test reports will be submitted to the facility or appropriate regulatory agency (upon client approval) within 45 days of the completion of the field work. The report will include a series of appendices to present copies of the intermediate calculations and example calculations, raw field data, laboratory analysis data, process data, and equipment calibration data.

4.4.1 Example Report Format

The report will be divided into various sections describing the different aspects of the source testing program. Table 4-1 presents a typical Table of Contents for the final report.

TABLE 4-1
TYPICAL REPORT FORMAT

Cover Page

Certification of Report

Table of Contents

Section

1.0 SUMMARY OF TEST PROGRAM AND RESULTS

2.0 SOURCE DESCRIPTION

3.0 TEST METHOD DETAILS

4.0 TEST RESULTS AND OVERVIEW

Appendices

APPENDIX A - CALCULATIONS

APPENDIX B - FIELD AND COMPUTER-GENERATED DATA

APPENDIX C - LABORATORY ANALYSIS DATA

APPENDIX D - CLIENT CEMS AND PROCESS DATA

APPENDIX E - QUALITY ASSURANCE/QUALITY CONTROL

APPENDIX F - MISCELLANEOUS INFORMATION

4.4.2 Example Data Presentation Format

Table 4-2 presents the typical tabular format that will be used to summarize the results in the final source test report. Separate tables will outline the results for each target analyte and compare them to their respective emissions limits.

TABLE 4-2
RESULTS SUMMARY TOTAL PARTICULATE EMISSIONS
CLIENT COMPANY – FACILITY
SOURCE

Run Number:	1	2	3	Average
Date:	X	X	X	--
Time:	X	X	X	--
Process Data:				
Parameter 1	X	X	X	X
Parameter 2	X	X	X	X
Flue Gas:				
O_2, % volume dry	X	X	X	X
CO_2, % volume dry	X	X	X	X
Flue gas temperature °F	X	X	X	X
Moisture content, % volume	X	X	X	X
Volumetric flow rate, dscfm	X	X	X	X
Total Particulate Emissions:				
ppm volume dry	X	X	X	X
ppm @ 3% O_2	X	X	X	X
lb/hr	X	X	X	X

Appendix F.2
Permit Excerpts

RECEIVED

JUN 28 2018

ENERGY FACILITY SITE EVALUATION COUNCIL

ENERGY FACILITY SITE EVALUATION COUNCIL
P.O. BOX 47250
OLYMPIA, WASHINGTON 98504-7250

IN THE MATTER OF:	**NO. EFSEC/2001-01, AMENDMENT 4**
Grays Harbor Energy Center **Grays Harbor Energy, LLC** **Electrical Generating Facility** **Elma, Washington**	**FINAL** **APPROVAL OF THE PREVENTION OF SIGNIFICANT DETERIORATION (PSD) AND NOTICE OF CONSTRUCTION**

This amendment supersedes air quality PSD and NOC approval EFSEC 2001-01, Amendment 3 dated April 3, 2006. Pursuant to the Energy Facility Site Evaluation Council (EFSEC) Permit Regulations for Air Pollution Sources, Chapter 463-78 Washington Administrative Code (WAC), regulation for air permit applications WAC 463-60-536, the Washington Department of Ecology (Ecology) regulations for new source review WAC 173-400-110 and Chapter 173-460 WAC; and based upon the Notices of Construction Application (NOC), submitted by Duke Energy Grays Harbor, LLC., and Energy Northwest; the Administrative Order on Consent, Docket No. CAA-10-2001-0097, between the Satsop Combustion Turbine (Satsop CT) Project and the U.S. Environmental Protection Agency, Region 10, dated March 30, 2001; the request for second extension submitted by Grays Harbor Energy LLC, dated August 31, 2005; the request for modifications to Amendment 3 from Grays Harbor Energy LLC, dated August 7, 2009, amended Dec. 30 2010, and March 25, 2010, and the technical analysis performed by Ecology for EFSEC, EFSEC now finds the following:

FINDINGS

1. Duke Energy Grays Harbor, LLC, and Energy Northwest (jointly "Duke Energy") applied to construct the Satsop Combustion Turbine Project located near Elma, Washington. EFSEC previously approved the construction of this project (a.k.a. Satsop Phase I), which is designed to produce a maximum of 650 megawatt (MW) of electrical power. This project received final approval on November 2, 2001 (No. EFSEC/2001-01).

2. Amendment 1 was approved on January 2, 2003. Amendment 1 modified the operating requirements and emission limitations in the original approval, added equipment as part of the project, and removed certain operational restrictions.

3. Amendment 2 was approved on October 19, 2004. Amendment 2 authorized a delay in continuous construction to not later than January 20, 2006, and modified the monitoring requirements and BACT emission limitations based on recently available information. Amendment 2 did not change or add any emission units that were either proposed for installation or already installed at the facility. In approving Amendment 2, EFSEC concluded that:

    3.1. The request for the second amendment was timely and complete (April 10, 2004).

3.2. Best Available Control Technologies (BACT) for all anticipated pollutants had not changed from the Amendment 1 permit determination.

3.3. Interim source growth did not affect conclusions from the original permit analysis regarding air quality impact of this project.

4. On February 23, 2005, EFSEC approved transfer of ownership of the Satsop CT Project from Duke Energy and Energy Northwest to Grays Harbor Energy, LLC.

5. On August 31, 2005, Grays Harbor Energy, LLC requested a third amendment. Amendment 3 authorized a second delay in continuous construction to not later than July 20, 2007, and makes several administrative corrections to errors in Amendment 2. After January 20, 2006, the sum of all delays in continuous construction may not exceed 18 months.

6. On August 7, 2009, Grays Harbor Energy, LLC requested a fourth amendment to the approval. Amendment 4 established emissions limits during start-up and shutdown and rectifies issues with the approval identified in both the development of the Air Operating Permit for the facility and as a result of the first year of operation of the facility.

7. The total project is proposed to consist of the following major components which is consistent with the original permit and amendments 1 through 3 unless noted:

   - Two General Electric combustion gas turbines (GE 7FA); each turbine having a maximum rating of 1,671 million British thermal units per hour (MMBtu/hr), and each turbine will have a supplementary duct burner with a maximum rating of 505 MMBtu/hr.
   - Two heat recovery steam generators (HRSG).
   - One steam turbine generator (STG) rated at 300 MW.
   - One auxiliary boiler rated at 29.3 MMBtu/hr.
   - One cooling tower system.
   - One emergency backup diesel generator (Manufactured in 2002, 400 KW).
   - One diesel engine-driven fire water pump (Manufactured on 10/25/2001, 300 BHP).

   Each gas turbine/duct burner/HRSG unit is defined as a combined cycle gas turbine (CGT). Each CGT has its own exhaust stack. These components are configured in a "power island" comprised of CGT 1 and CGT 2 and sharing one common steam turbine. Each CGT can operate independently with the steam turbine.

8. The project is subject to permitting requirements under WAC 173-400-700 as a fossil fuel fired steam electric generator, one of 28 listed industries that becomes a "major source," when emitting more than 100 tons per year (tpy) of any regulated pollutant. The Grays Harbor Energy Center CT Project has the potential to emit PSD significant quantities of nitrogen oxides (NO_X),

carbon monoxide (CO), sulfur dioxide (SO_2), sulfuric acid mist (H_2SO_4), particulate matter (PM), particulate matter less than 10 micrometers (PM_{10}), and volatile organic compounds (VOCs).

9. The project is subject to permitting under the requirements of WAC 463-78-005(1) and 005(4) (adopting by reference Chapters 173-400 and 173-460 WAC, respectively) for ammonia (NH_3). Emissions of NO_x are reduced by the addition of NH_3. NH3 emission are limited in the permit to protect the NOx catalyst and minimize NH_3 emissions (air toxic and visibility regulations).

10. The combustion turbines, duct burners, and auxiliary boilers will only use natural gas. The fuel for the diesel engines powering the emergency generator and emergency fire water pump is to be on-road specification diesel fuel.

11. The site is within an area that is in attainment with all National Ambient Air Quality Standards (NAAQS) and state air quality standards. The site is approximately 60 kilometers from the nearest Class I area, Olympic National Park.

12. The project is subject to new source review requirements under Chapter 463-78 WAC, which adopts by reference Chapter 173-400 WAC and Chapter 173-460 WAC. The facility is also subject to emission limitation, monitoring and reporting requirements in 40 CFR 60 Subpart Da (applicable to the duct burners), Dc (applicable to the auxiliary boiler), and GG (applicable to the combustion turbines). Chapter 173-400 WAC, 40 CFR 60 Appendices A, B, and F, 40 CFR 75; and gas fuel monitoring requirements under 40 CFR Part 75 Appendix D are applicable to both the turbines and associated HRSGs.

13. BACT as required under WAC 173-400-113(2), and toxic best available control technology (T-BACT) as required under WAC 173-460-040(4), will be used for the control of all air pollutants which will be emitted by the proposed project. The following table lists the plant-wide allowable emissions and BACT based on Amendment 4 requirements.

<table>
<tr><th rowspan="2">Pollutant</th><th rowspan="2">Plant-Wide Potential to Emit, tpy</th><th colspan="4">Best Available Control Technology</th></tr>
<tr><th>CGTs</th><th>Auxiliary Boiler</th><th>Diesel-Fired Emergency Equipment</th><th>Cooling Tower</th></tr>
<tr><td>NOx</td><td>246.5</td><td>Selective Catalytic Reduction plus low NOx burners (Turbine & HSRG)</td><td>Flue gas recirculation and low NOx burners</td><td rowspan="2">Limited to emergency uses as defined by 40 CFR 63 Subpart ZZZZ</td><td>Not applicable</td></tr>
<tr><td>CO</td><td>146.1</td><td>Good combustion practice</td><td>Good combustion practice</td><td>Not applicable</td></tr>
<tr><td>SO2</td><td>29.2*</td><td colspan="2">Natural gas fuel</td><td rowspan="2">Use only on-road specification diesel oil</td><td>Not applicable</td></tr>
<tr><td>H2SO4</td><td>19.0</td><td colspan="2">Natural gas fuel</td><td>Not applicable</td></tr>
</table>

Pollutant	Plant-Wide Potential to Emit, tpy	Best Available Control Technology			
		CGTs	Auxiliary Boiler	Diesel-Fired Emergency Equipment	Cooling Tower
VOCs	74.6	Natural gas fuel and good combustion practice		Limited to emergency uses as defined by 40 CFR 63 Subpart ZZZZ	Not applicable
PM and PM_{10}	203	Natural gas fuel and good combustion practice			Drift eliminator with less than 0.001% loss of the recirculating water
NH_3	141	5 ppm ammonia slip limitation	Not applicable		
* Based on an annual average natural gas total sulfur content of 0.5 grains/100 scf.					

14. Allowable emissions, from the new emissions units, will not cause or contribute to air pollution in violation of:

14.1. Any state or national ambient air quality standard.

14.2. Any applicable PSD increment.

The following table indicates the maximum Class I and Class II increment consumed by this project:

Pollutant		Maximum Ambient Class II Area Impact Concentration (μg/m³)	Class II Area Allowable Increment (μg/m³)	Maximum Ambient Class I Area Impact Concentration (μg/m³)	Class I Area Allowable Increment (μg/m³)
PM_{10}*	24-hr	4.86	17	0.23	8
	Annual	0.91	30	0.01	4
Nitrogen dioxide (NO_2)*	Annual	0.898	25	0.008	2.5
SO_2	3-hr	13.54	20	0.26	25
	24-hr	3.5	91	0.032	5
	Annual	0.29	512	0.001	2
* Evaluated at a higher emission rate than proposed to be permitted. See attached Fact Sheet for the Nov. 2001 approval and application materials for details.					

14.3. Ammonia is the significant toxic air pollutant emitted by this facility. The emissions of ammonia and all other toxic air pollutants from this facility will not exceed an acceptable source impact level established under WAC 173-460-150 and 160 (effective Feb. 14, 1994.

15. Ambient Impact Analysis indicates that there will be no significant impacts resulting from pollutant deposition on soils and vegetation in either of the closest Class I areas, Olympic and Mt. Rainier National Parks. The permitted turbine project will have deposition levels significantly below the National Park Service's level of concern.

16. Ambient air quality analysis indicates that there will be no adverse impacts resulting from pollutant deposition in the Class II areas surrounding the project site.

17. Ambient Impact Analysis indicates that degradation of regional visibility or vistas from Olympic National Park due to the Grays Harbor Energy Center project is acceptable to the National Park Service based on an emission limitation of 2.0 ppm NOx, 24-hr average on the CGTs.

18. No significant effect on industrial, commercial, or residential growth in the Elma area is anticipated due to the project.

19. As reflected in the Third Amendment Order, for the third amendment, EFSEC concluded that:

19.1. The request for the third amendment was timely and complete (September 30, 2005).

19.2. BACT:

19.2.1. Based on comparable permit actions since 2002, EFSEC concluded that BACT for VOC emissions from the auxiliary boiler using good combustion practice was 0.0055 lb/MMBtu (one-hour average). This determination is not changed in Amendment 4.

19.2.2. For all other anticipated pollutants from the gas combustion turbines, heat recovery steam generators, auxiliary boiler, and cooling tower system BACT was the same as determined in Amendment 2. This determination is not changed in Amendment 4.

19.3. Interim source growth did not affect conclusions from the original permit analysis regarding air quality impact of this project.

20. For the fourth amendment, EFSEC concludes that:

20.1. The request was deemed administratively complete on April 1, 2010.

20.2. No requested change results in an increase in an annual emission rate.

20.3. The sulfur monitoring is adjusted to match actual operating conditions and availability of fuel supplier information. The ability to determine compliance is not affected by the changes.

20.4. The allowable time for combustion turbine cold start-up is lengthened from four hours per turbine to 300 minutes per turbine in response to actual meteorological conditions at the Grays Harbor Energy Center site compared to the design meteorological conditions used by the prior owner/permittee, and in response to a review of the start-up procedures provided by the turbine manufacturer in its operation and maintenance manual. The climate for the site is colder than anticipated by the design conditions, so the turbines require a longer time to start up the gas and steam turbines compared to the design temperature. Both the actual start-up conditions and actual site design characteristics that affect start-up were unavailable during initial permitting.

20.5. For the CGTs, a Carbon monoxide BACT limit of 3.0 ppmdv @ 15 percent O_2, on a 1-hour average was established in the original PSD permit based on the application of good combustion practice. The CO limit applicable to the CGTs was revised to 2.0 ppmdv @ 15 percent O_2, on a 1-hour average to comply with EPA Region 10 Administrative Order on Consent, No.-CAA-10-2001-0097, dated March 2001.

20.6. EFSEC and Grays Harbor Energy agree that the CGTs are subject to emission limitation, monitoring and reporting requirements in 40 CFR 60 Subpart GG.

20.7. The requirement to comply with normal operation emissions limits during start-up and shutdown for NO_X CO and VOC is replaced with added start-up and shutdown emissions limits. Cold, warm, and hot start-ups and shutdown are defined.

20.8. For the emergency backup diesel generator and diesel engine-driven fire water pump, BACT constitutes the use of on-road diesel as 500 ppm sulfur defined in the Federal Code of Regulations (2007 to 2014) and limitation contained in 40 CFR 63, subpart ZZZZ.

21. EFSEC finds that all requirements for new source review (NSR) and PSD are satisfied and that as approved below, the emissions units comply with all applicable federal new source performance standards. Approval of the PSD and NOC application is granted subject to the following conditions:

APPROVAL CONDITIONS

1. This amendment supersedes air quality PSD approval EFSEC 2001-01, Amendment 3 dated April 3, 2006. The effective date of this permit is September 1, 2018.

2. The CGTs (each consisting of a GE 7FA combustion turbine and its associated duct burner and HRSG) and auxiliary boiler are limited to the use of natural gas.

3. The diesel emergency generator shall:

   3.1. Use only on-road specification diesel oil with 500 ppm or less sulfur content.

   3.2. Not exceed 500 hours per any 12 consecutive months of operating time.

4. The emergency fire water pump engine shall use only on-road specification diesel oil with 500 ppm or less sulfur content.

5. Emissions from CGT1 or CGT2 exhaust stack shall not exceed the following, except during start-up and shutdown (CGT over-speed protection testing), when they must meet the requirements in Condition 11:

   5.1. Nitrogen oxide (NO_X) emissions:

      5.1.1. 21.7 pounds/hour (lb/hr), 1-hour (1-hr) average.

      5.1.2. 17.4 lb/hr, 24-hr rolling average.

      5.1.3. 2.5 parts per million by volume, dry (ppm), 1-hr average, corrected to 15 percent oxygen (O_2).

      5.1.4. 2.0 ppm, 24-hr rolling average, corrected to 15 percent O_2.

      5.1.5. Initial compliance with the limits in Conditions 5.1.1 and 5.1.3 shall be determined in accordance with 40 CFR Subpart GG and EPA Reference Method 20, except that the instrument span shall be set between zero and 25 ppm.

      5.1.6. Ongoing compliance with all limits in Condition 5.1 shall be indicated by continuous emission monitors for NO_X and O_2. The continuous emission monitoring system (CEMS) and flow measurement to determine lb/hr emissions shall meet the requirements of Approval Conditions 18.1 and 18.6.

   5.2. Carbon monoxide (CO) emissions:

      5.2.1. 2.0 ppm, corrected to 15 percent O_2, 1-hr average.

5.2.2. 10.6 lb/hr, 1-hr average.

5.2.3. EPA Reference Method 10 shall determine initial compliance for each CGT, or an equivalent method agreed to in advance by EFSEC. The span and linearity calibration gas concentrations in Method 10 are to be modified as appropriate to the CO concentration limits specified in this condition.

5.2.4. Ongoing compliance shall be indicated through use of a continuous emission monitor meeting the requirements of Approval and flow measurement to determine lb/hr emissions shall meet the requirements of Approval Conditions 18.3 and 18.6.

5.3. Sulfur dioxide emissions:

5.3.1. 19.8 lb/hr, 1-hr average.

5.3.2. 3.3 lb/hr, rolling annual-average of emissions determined monthly when the CGTs operate.

5.3.3. Compliance with the limit in Condition 5.3.1 shall be determined based on stack testing using EPA Reference Method 6c, or an equivalent method approved in advance by EFSEC.

5.3.4. Compliance shall be determined for each CGT through stack testing once per calendar quarter for the first year of commercial operation, and thereafter at 5-year intervals.

5.3.5. Ongoing compliance with both limits in Condition 5.3 shall be determined monthly by calculating the hourly average SO_2 emission rates from each CGT in pounds per hour for all hours of operation during the previous month, and the average emission rate in lb/hr over the previous 12-consecutive month period.

5.3.6. The following emission rates shall be calculated based on the actual quantity of natural gas used by each CGT and sulfur content of natural gas consumed by each CGT:

5.3.6.1. SO_2 rates shall be determined per protocols and test methods described in Appendix D to 40 CFR Part 75, <u>Optional SO_2 Emissions Data Protocol for Gas-Fired and Oil-Fired Units</u>.

5.3.6.2. The quantity of SO_2 converted to H_2SO_4 shall be subtracted from SO_2 emissions rates for compliance determination purposes. The quantity of SO_2 converted to H_2SO_4 shall be based on the unit specific conversion rate of potential SO_2 to H_2SO_4 determined per Condition 5.4.2 below.

5.3.6.3. The hourly rate of natural gas burned shall be continuously monitored per the methods in 40 CFR Part 75, Appendix D, Section 2.1.

5.3.6.4. Sulfur content of natural gas shall be determined at least once per calendar month by sampling the natural gas burned and analyzing samples for total sulfur content per the method specified in 40 CFR Part 75, Appendix D for high variability, non-pipeline quality natural gas. Any other analysis method listed in 40 CFR Part 75, Appendix D may be used after the use is approved by EFSEC. Valid sulfur test results from the previous month, or an average of valid sulfur data approved by EFSEC may be used when monthly sampling and analysis of the natural gas is inconclusive or results in invalid data.

5.3.7. Grays Harbor Energy, LLC shall record monthly and report to EFSEC on a quarterly basis the quantity and average sulfur content of the natural gas burned at the facility, and purchase records and vendor's reports of total sulfur content in the natural gas delivered.

5.4. Sulfuric acid mist emissions:

5.4.1. 2.17 lb H_2SO_4/hr, rolling annual average calculated monthly.

5.4.2. Hourly H_2SO_4 rates and the unit-specific ratios of H_2SO_4 to SO_2 shall be determined for each CGT based on stack testing using EPA Reference Method 8, or an equivalent method approved by EFSEC. Stack testing shall be performed once per calendar quarter for the first year of commercial operation at each exhaust stack, and thereafter at 5-year intervals.

5.4.3. Unit-specific ratios of H_2SO_4 to SO_2 shall be used as conversion factors to apportion the calculated potential SO_2 emissions into sulfuric acid mist emissions and SO_2 emissions.

5.4.4. Compliance with the limit in Condition 5.4.1 shall be determined monthly by calculating the average H_2SO_4 emission rate over all hours of operation during the previous month and 12 consecutive month periods based on the quantity and sulfur content of natural gas used by each CGT per Condition 5.3.6 above.

5.5. Volatile organic compound (VOC) emissions:

5.5.1. 6.3 lb/hr, 1-hr average, reported as carbon equivalent.

5.5.2. 2.8 ppm, 1-hr average, reported as carbon equivalent at 15 percent O_2.

5.5.3. Use of EPA Reference Method 19 and EPA Reference Method 25A, 25B, or South Coast Air Quality Management District Method 25.3, shall determine initial compliance for each CGT or an equivalent method agreed to in advance by EFSEC. After the initial three years of tests on each CGT stack have been completed, each CGT stack shall be tested at 5-year intervals.

5.5.4. Ongoing compliance shall be monitored by calculating hourly VOC emissions rates using:

5.5.4.1. Hours of operation.

5.5.4.2. Fuel flow to each CGT.

5.5.4.3. Application of an emission factor for VOCs derived from the most recent stack testing of the installed CGT.

5.5.4.4. Emission testing of each CGT using one of the methods listed in Approval Condition 5.5.3 is required.

5.6. Particulate matter and particulate matter less than or equal to 10 micrometers (aerodynamic diameter) (PM_{10}) emissions:

5.6.1. 22.6 lb/hr of filterable plus condensable PM_{10}.

5.6.2. Use of EPA Reference Method 19 and Methods 5, 201, or 201A, plus Reference Method 202, or an equivalent PM_{10} test method approved by EFSEC shall be used to determine initial compliance for each CGT exhaust stack with the limit in Condition 5.6.1. Use of EPA Reference Method 5 assumes all filterable particulate is PM_{10}. Use of EPA Reference Method 201 or 201A assumes that the mass of filterable PM is equal to the mass of filterable PM_{10}. If Method 201 or 201A is used, the mass of particulate retained in the cyclone shall be determined and reported.

5.6.3. The results of the filterable and condensable particulate analyses shall be reported as total particulate, filterable particulate, and condensable particulate.

5.6.4. After the initial three years of tests on each CGT stack have been completed, each CGT stack shall be tested at 5-year intervals.

5.7. Ammonia (free NH_3 and combined measured as NH_3) emissions:

5.7.1. 5.0 ppm, 24-hr average corrected to 15 percent O_2.

5.7.2. 16.1 lb/hr, 24-hr average.

5.7.3. Initial compliance for each CGT shall be indicated by Bay Area Air Quality Management District Source Test Procedure ST-1B, "Ammonia, Integrated

Sampling;" EPA Conditional Test Method 027; or an equivalent method approved in advance by EFSEC.

5.7.4. Compliance shall be determined through use of a CEMS, which meets the requirements of Approval Condition 18.2 or Grays Harbor Energy, LLC may propose alternative means for continuous assessment and reporting of NH_3 emissions for approval by EFSEC. Any proposed alternative NH_3 reporting shall be, at a minimum, equivalent to a CEMS meeting the requirements of Approval Condition 18.2 and 18.6.

5.7.5. The SCR catalyst system treating the exhaust from one CGT shall be repaired, replaced, or have additional catalyst bed installed at the next scheduled outage, following a calendar month when the average ammonia slip cannot be maintained at or below 4.5 ppm, corrected to 15% oxygen, based on the actual operating hours of the CGT. No month with less than 200 hours of actual operation (excluding start-up and shutdown hours) shall be used for this evaluation. The outage to repair, replace, or install additional catalyst to the SCR system shall be no later than 12 months after the month the ammonia slip exceeds the 4.5 ppm criteria given above in this condition.

5.8. Opacity at each CGT exhaust stack:

5.8.1. Is not allowed to exceed a 6-minute average opacity of five percent.

5.8.2. Shall be determined by use of EPA Reference Method 9 or an equivalent method approved in advanced by EFSEC.

5.8.3. Ongoing compliance with the opacity limit in Condition 5.8.1 shall be monitored once per day (or weekly if Condition 5.8.3.3 is satisfied) as follows:

5.8.3.1. A certified opacity reader shall read and record the opacity of each operating unit during daylight hours per 5.8.3 frequency, or

5.8.3.2. Opacity shall be monitored using a Continuous Opacity Monitoring system on each CGT as an alternative to EPA Reference Method 9 readings. If installed, the continuous opacity monitor must be installed in the exhaust stack at a location meeting the requirements of Approval Condition 18.4.

5.8.3.3. If readings from daily monitoring are less than the opacity limit in Condition 5.8.1 for the last calendar month, the manual opacity monitoring frequency is reduced to weekly. Readings above the opacity limit in Condition 5.8.1 will require daily manual opacity readings for at least 30 days.

6. The auxiliary boiler exhaust stack emissions are not to exceed the following:

 6.1. NO_X emissions:

  6.1.1. 1.03 lb/hr, 1-hr average.

  6.1.2. 30 ppm at three percent O_2, 1-hr average

  6.1.3. Initial compliance shall be determined in accordance with 40 CFR 60, Appendix A, Reference Method 7E and Method 19.

  6.1.4. Compliance shall be determined through periodic stack tests performed at 5-year intervals after the initial compliance test. Upon written request by EFSEC, GHE shall perform emissions testing using the method in Condition 6.1.3.

 6.2. CO emissions:

  6.2.1. 50.0 ppm, corrected to three percent O_2, 1-hr average.

  6.2.2. 1.07 lb/hr, 1-hr average.

  6.2.3. EPA Reference Method 10 and Method 19 or an equivalent method agreed to in advance by the EFSEC shall determine initial compliance. The span and linearity calibration gas concentrations in Method 10 shall be appropriate to the CO concentration limits specified in this condition.

  6.2.4. Compliance shall be determined through periodic stack tests performed at 5-year intervals after the initial compliance test. Upon written request by EFSEC, GHE shall perform emissions testing using the method in Condition 6.2.3.

 6.3. SO_2 emissions:

  6.3.1. 0.07 lb/hr annual average, calculated monthly.

  6.3.2. One ppm at three percent O_2, 1-hr average.

  6.3.3. EPA Reference Method 8 shall determine initial compliance with the limit in Condition 6.3.2 for the auxiliary boiler, or an equivalent method approved in advance by EFSEC.

  6.3.4. Ongoing compliance with the limit in Condition 6.3.1 shall be determined by mass-balance calculations utilizing the:

   6.3.4.1. Monthly Fuel consumption records for the auxiliary boiler, and

6.3.4.2. Sulfur content of the natural gas per Condition 5.3.6.4.

6.4. VOC emissions:

6.4.1. 0.16 lb/hr, 1-hr average, reported as carbon equivalent.

6.4.2. EPA Reference Method 19 and Method 25A or 25B or an equivalent method agreed to in advance by EFSEC shall determine initial compliance for the auxiliary boiler.

6.4.3. Ongoing compliance shall be determined through periodic stack tests, using one of the above referenced methods, at 5-year intervals after the initial compliance test. Upon written request by EFSEC, GHE shall perform emissions testing using methods in Condition 6.4.2.

6.5. PM_{10} emissions:

6.5.1. 0.292 lb/hr, hourly average.

6.5.2. 0.005 gr/dscf, 1-hr average, at three percent O_2.

6.5.3. Initial compliance with the limits in Condition 6.5 for the auxiliary boiler exhaust stack shall be determined by EPA Reference Method 19, Method 202 and either Reference Method 5, 201, or 201A, or an equivalent method agreed to in advance by EFSEC. Use of EPA Reference Method 5 assumes all particulate has an aerodynamic diameter less than 10 microns. Use of EPA Reference Method 201 or 201A assumes that the mass of filterable PM is equal to the mass of filterable PM_{10}.

6.5.4. The results of the filterable and condensable particulate analyses shall be reported as total particulate, filterable particulate, and condensable particulate.

6.5.5. Compliance shall be determined through periodic stack tests, using the above specified methods, taken at 5-year intervals after the initial compliance test. Upon written request by EFSEC, GHE shall perform emissions testing using the methods in Condition 6.5.3.

6.6. Opacity at the auxiliary boiler exhaust stack:

6.6.1. Is not allowed to exceed a 6-minute average opacity of five percent.

6.6.2. Shall be determined using EPA Reference Method 9 or an equivalent method approved in advance by EFSEC.

6.6.3. Ongoing compliance with the opacity limit in Condition 6.6.1 shall be monitored as follows:

6.6.3.1. An opacity reader shall survey the boiler stack daily to determine if any opacity is present. If opacity is not observed over the course of a week, the frequency for surveying the boiler stack may change to monthly. If the survey detects visible emissions, then the company must investigate the cause of the emissions and repair the problem or take EPA Method 9 observations for determining compliance.

7. The diesel generator engine shall meet the following requirements:

7.1. The engine shall comply with the requirements in 40 CFR Part 63, Subpart ZZZZ.

7.1.1. The facility shall maintain engine operation and maintenance records verifying the engine has been operated, maintained, and repaired in a manner consistent with the manufacturer's emission-related specifications. A copy of the manufacturer's recommendations for maintaining the engine shall be kept on-site and made available upon request.

7.2. The engine shall be operated only during routine maintenance, testing, and periods when electricity is not available from the power grid. Maintenance and testing shall not exceed 50 hours per any 12 consecutive month period.

7.3. The engine shall burn only diesel fuel, biodiesel, or a mixture of both. In any case, the fuel used shall have a maximum sulfur content that does not exceed 500 ppm by weight. A fuel certification from the fuel supplier may be used to demonstrate compliance with this requirement.

7.4. The engine shall be equipped with an operable, non-resetting hour meter.

7.5. Visible emissions from the engine shall not exceed an average of ten percent (10%) opacity during any 6-minute period except cold start-up, as determined in accordance with EPA Method 9 (Title 40 CFR, Part 60, Appendix A Method 9). Unless defined by the engine manufacturer, "cold start" as used in this condition shall be defined as the period beginning when the engine is started and ending when the temperature of the engine coolant reaches 150°F.

7.5.1. Initial compliance with the limit in Condition 7.5 shall be determined based on EPA Method 9 readings.

7.5.2. Weekly a qualified opacity reader shall survey and record if opacity is present from the engine whenever the engine is operated for testing and after the engine achieves normal operating temperature. If opacity is observed then Method 9 readings shall be performed during the next time the engine is started. The Survey frequency can be reduced to monthly once four readings without opacity are observed.

7.6. Visible emissions of ten percent (10%) opacity or more shall trigger prompt (within a week) action to initiate maintenance and/or repair the engine and eliminate opacity exceeding this standard. Maintenance and repair actions shall be documented and available for inspection.

8. The emergency fire water pump engine:

8.1. The engine must comply with requirements in 40 CFR 63 Subpart ZZZZ.

8.1.1. The facility shall maintain engine operation and maintenance records verifying the engine has been operated, maintained, and repaired in a manner consistent with the manufacturer's emission-related specifications. A copy of the manufacturer's recommendations for maintaining the engine shall be kept on-site and made available upon request.

8.2. The engine shall be operated only during routine maintenance, testing, and periods when electricity is not available from the power grid. Maintenance and testing shall not exceed 50 hours per any 12 consecutive month period.

8.3. The engine shall burn only diesel fuel, biodiesel, or a mixture of both. In any case, the fuel used shall have a maximum sulfur content that does not exceed 500 ppm by weight. A fuel certification from the fuel supplier may be used to demonstrate compliance with this requirement.

8.4. The engine shall be equipped with an operable, non-resetting hour meter.

9. The emissions from the cooling tower are not to exceed:

9.1. 24.5 lb/day PM_{10}, annual average.

9.2. 4.5 tpy PM_{10}, rolling total, calculated monthly.

9.3. Initial compliance shall be determined by:

9.3.1. An affirmative report by the cooling tower drift eliminator manufacturer, based on an on-site inspection of the completed installation, that its product has been installed in accordance with its specifications accompanied by the results of a test or analysis of the cooling tower drift eliminator material indicating that the material has a drift loss of less than 0.001% of the recirculating water flow rate. The required test could be performed on a full size mist eliminator module under laboratory conditions that match the worst case operations scenario of the actual cooling tower.

9.4. Compliance is determined by using the following formula:

$$Q \times C \times DL \times 60 \times 8.34 / 1000000 = D$$

Where: Q = Monthly average recirculation rate in gallons per minute
C = Monthly average total dissolved solids concentration in parts per million by weight (ppmw)
D = PM_{10} emission rate in lb/hr.
DL = the drift loss rate in gallon lost/gallon of recirculating cooling water

9.5. Calculate the PM_{10} emissions from the cooling tower once each month. The monthly calculations shall use the formula in Condition 9.4 above. The monthly average recirculating water flow rate for each month shall be used for "Q" in the formula. The monthly average recirculating water flow rate should be at or below the design recirculating water flow rate of 175,000 gpm. The monthly average total dissolved solids content measured or calculated during the month shall be used for "C" in the formula.

9.6. Prior to operation of the cooling tower, Grays Harbor Energy, LLC shall submit to EFSEC, a report describing the manufacturer's recommendations for installing, operating, and testing the drift eliminators.

10. Annual Emissions.

10.1. Annual emissions, calculated as a rolling 12-month average, shall not exceed the limits in the following table. These limits apply to total emissions over each 12 consecutive month period and include emissions from all units during start-up, shutdown and periods of malfunction.

Pollutant	CGT 1 and 2 Individually tpy	Auxiliary Boiler tpy	Cooling Tower tpy
NO_x	121.7*	1.3	---
CO	71.6*	1.3	---
SO_2	14.5	0.088	---
H_2SO_4	9.5	---	---
PM/PM_{10}	99.0†	0.4	4.5
VOC	37.5*	0.6	---
NH_3	70.5	---	---

* Includes the emissions from start-up and shutdown events of the CGTs and diesel generators. CGT start-up emissions are equally apportioned between the two turbines.

† PM and PM_{10} conservatively assumed to be equal.

10.2. Rolling 12-month total emissions shall be calculated monthly based on the total monthly emissions from each permitted unit summed for the preceding 12 months. The actual emissions shall be based on CEMS, where installed, mass balance and emission factor calculations for SO_2 and H_2SO_4, and emission factors for other pollutants and emission units where CEMs are not installed.

11. Start-up and shutdown of CGTs 1 and 2 (including CGT over-speed protection testing).

11.1. Each CGT is limited to two start-ups per calendar day. This limitation does not apply during the period between initial firing of a combustion turbine for testing purposes and the start-up condition specified in Approval Condition 13.

11.2. A start-up begins when fuel is first fired in the combustion turbine, and ends when the earlier of one of these events occurs:

11.2.1. The operating temperatures of the oxidation and SCR catalysts serving an operating CGT reach 500°F and 525°F, respectively and when the associated combustion turbine achieves operational Mode 6, or

11.2.2. One of the following time limits has been reached, as applicable:

11.2.2.1. Three hundred minutes have elapsed since fuel was first introduced to the applicable turbine on a cold start-up. A cold start-up is any start-up occurring after the applicable turbine has not operated for 48 hours or more.

11.2.2.2. One hundred eighty minutes have elapsed since fuel was first introduced to the applicable turbine on a warm start-up. A warm start-up is any start-up occurring after the applicable turbine has not operated between 8 and 48 hours.

11.2.2.3. One hundred twenty minutes have elapsed since fuel was first introduced to the applicable turbine on a hot start-up. A hot start-up is any start-up occurring after the applicable turbine has not operated for 8 hours or less.

11.2.2.4. Once per year it is estimated that each CGT will need to be tested to confirm that the over-speed protection is functioning properly (less than 90 minutes). Each test will account for one start-up.

11.3. The Shutdown is defined as the period beginning when the combustion turbine leaves operational Mode 6 and ends when fuel is no longer being introduced to any burner. The turbine manufacturer defines operational Mode 6 as the low emission mode during which all six of the burner nozzles are burning a lean premixed gas steady-state operation. Duration of a planned shutdown period shall not exceed 30 minutes per occurrence.

11.4. During start-up, ammonia injection shall begin no later than when the SCR reaches an operating temperature of 525°F.

11.5. During a start-up and associated shutdown of a CGT, the combined emissions shall not exceed the following:

Pollutant	Emission Limit Per Turbine Per Start-Up/Shutdown
NO_X	900 lb
CO	500 lb
VOCs	600 lb

11.5.1. Ongoing compliance with the NO_X limits in Condition 11.5 shall be indicated by continuous emission monitors for NO_X and O_2. The continuous emission monitoring system (CEMS) and flow measurement to determine NOx lb/hr emissions shall meet the requirements of Approval Conditions 18.1 and 18.6.

11.5.2. Ongoing compliance with the CO limits in condition 11.5 shall be indicated by continuous emission monitor for CO and O_2. The CEMS and flow measurement to determine CO lb/hr emissions shall meet the requirements of Approval Conditions 18.3 and 18.6.

11.6. To account for VOC emissions during start-up and shutdown when determining monthly or annual emissions, VOC emissions shall be calculated using a VOC emission factor of 177 lb/startup/shutdown/CGT. The emission factor accounts for combined VOC emissions during start-up and shutdown.

12. Within 180 days after formal, initial start-up of each combustion turbine, auxiliary boiler, and installation of the diesel generators, Grays Harbor Energy, LLC shall conduct the initial performance tests for NO_X, ammonia, SO_2, opacity, VOC, CO, PM_{10}, and H_2SO_4 noted above. An independent testing firm shall perform the initial performance testing. A test plan shall be submitted to EFSEC for approval at least 30 days prior to the testing.

13. The initial compliance testing, CEM system performance testing, and testing for other, non-acid rain program purposes must occur by the earlier of the following dates:

13.1. The earliest date that electrical power is offered for sale (not test generation) from a CGT and its associated steam turbine, or

13.2. One hundred eighty days after the first CGT in the power island has been synchronized to the electrical distribution grid.

14. Grays Harbor Energy, LLC shall notify EFSEC in writing at least 30 days prior to:

14.1. Initial start-up of any permitted emissions unit for operational testing and manufacturers certification purposes.

14.2. Formal, initial start-up defined in Approval Condition 13.

14.3. The date any emissions testing required by this permit shall be performed when the time between tests is specified to be longer than 30 days.

14.4. The date(s) CEMS performance testing or Relative Accuracy Test Audits will be performed.

15. Sampling ports and platforms shall be provided on each CGT stack, after the final pollution control device. The ports shall meet the requirements of 40 CFR, Part 60, Appendix A, Method 20. Upon request by EFSEC for emissions testing, sampling ports and platforms shall be installed on diesel engines as appropriate. Sampling ports and platforms shall meet the requirements of 40 CFR Part 60, Appendix A, Method 1.

16. Adequate permanent and safe access to the test ports shall be provided. Other arrangements may be acceptable if approved by EFSEC prior to installation.

17. Operating Records for Emissions Units:

17.1. Unless otherwise specified above, operating records shall contain information necessary to determine the operational status of the equipment.

17.2. Specific parameters and acceptable ranges of those parameters shall be specified in the Operation and Maintenance Manual.

17.2.1. Example operating record information includes, but is not limited to:

17.2.1.1. Fuel heat and sulfur content.

17.2.1.2. Fuel consumption during the period (hourly, monthly, etc.).

17.2.1.3. Unit operating parameters:

17.2.1.3.1. Exhaust temperature.

17.2.1.3.2. Percent oxygen.

17.2.1.3.3. Output rate (lb of steam/hr, kW output, etc.).

17.2.1.3.4. Operating hours during the reporting period and cumulative for the year.

17.2.1.3.5. For each combustion turbine, unit start-up and shutdown information.

17.2.1.3.5.1. Start-up day and time.

17.2.1.3.5.2. Time Mode 6 attained.

17.2.1.3.5.3. Error codes during start-up and their effect on start-up.

17.2.1.3.5.4. Ammonia flow as registered on an ammonia flow meter.

17.2.1.3.6. For the auxiliary boiler, start-up and shutdown information.

17.2.1.3.6.1. Start-up day and time.

17.2.1.3.6.2. Shutdown day and time.

18. Continuous Emission Monitoring Systems (CEMS):

18.1. CEMS for NO_X and O_2 compliance shall meet the requirements contained in 40 CFR 75, Emissions Monitoring.

18.2. CEMS for ammonia shall meet the requirements contained in 40 CFR, Part 63, Appendix A, Reference Method 301, Validation Protocol, and 40 CFR, Part 60, Appendix F, Quality Assurance Procedures, or other EFSEC-approved performance specifications and quality assurance procedures.

18.3. CEMS for CO shall meet the requirements contained in 40 CFR, Part 60, Appendix B, Performance Specification 4 or 4A, and in 40 CFR, Part 60, Appendix F, Quality Assurance Procedures.

18.4. Continuous Opacity Monitoring Systems shall meet the requirements contained in 40 CFR Part 60, Appendix B, Performance Specification 1 and in 40 CFR, Part 60, Appendix F, Quality Assurance Procedures.

18.5. Continuous emission and opacity monitors must meet the requirements of 40 CFR 60.13, except that the term "applicable subpart" as used in 40 CFR 60.13 means this permit. Monitors shall be capable of determining emissions during start-up, shutdown, and periods of malfunction.

18.6. Stack flows for calculating mass emissions must be determined in accordance with the following. Natural gas combusted in the CGT's and boiler must be sampled and analyzed based on the sampling and analysis frequencies established in the requirements of Approval Condition 5.3.6.4 for composition using Universal Oil Products (UOP) Laboratory Test Method 539-97 "Gas Analysis by Gas Chromatography" or equivalent. The gas composition must be used to determine the heat content of the gas in terms of British thermal unit, high heat value, per standard cubic foot (Btu/scf) and to determine the EPA Method 19 Fd factor for the gas. An alternative method to EPA Method 19 can be used to determine the Fd factor if pre-approved by EFSEC.

19. Relative Accuracy Test Audits (RATA) for NO_X and CO Continuous Emission Monitoring Systems:

    19.1. RATA testing is to be performed at the calendar year/calendar quarter frequency required by the quality assurance procedures referenced in Condition 18, except as provided for in Conditions 19.2 and 19.3.

    19.2. The testing shall be based on "QA operating quarters" as that term is defined in 40 CFR 72.2.

    19.3. A RATA is to be performed for all pollutants measured by CEMs as required by 40 CFR Part 75, Appendix B, Section 2.3, including the minimum frequency of once every eight calendar quarters.

    19.4. A test plan shall be prepared and submitted to EFSEC and Olympic Regional Clean Air Agency (ORCAA) for review at least 30 days prior to the RATA test. The test plan shall cover all pollutants required to be monitored during that RATA test. The test plan shall include the proposed dates of the testing. The permittee must revise the test plan to address comments provided by EFSEC or ORCAA.

    19.5. A report of the results of the RATA and other emission testing shall be submitted to EFSEC and ORCAA within 45 days of completing the test.

20. CEMS and process data shall be submitted quarterly, in written form (or electronic if permitted by the EFSEC) within 30 days of the end of each calendar quarter to EFSEC and ORCAA.

21. The format of the reporting described in Approval Condition 20 shall match that required by EPA for demonstrating compliance with the Title IV Acid Rain program reporting requirements. Pollutants not covered by that format shall be reported in a format approved by EFSEC that shall include at least the following:

    21.1. Process or control equipment operating parameters.

    21.2. The hourly maximum and average concentration, in the units of the standards, for each pollutant monitored.

    21.3. The duration and nature of any monitor downtime.

    21.4. Results of any monitor audits or accuracy checks.

    21.5. Results of any required stack tests.

    21.6. Results of any other stack tests performed after the initial performance test.

21.7. The above data shall be retained at the Grays Harbor Energy Center for a period of at least five years.

22. For each occurrence of monitored emissions in excess of the limits in this permit, the quarterly emissions report (per Approval Conditions 20 and 21) shall include the following:

22.1. For parameters subject to monitoring and reporting under the Title IV, Acid Rain program, the reporting requirements in that program shall govern excess emissions report content.

22.2. For all other pollutants:

22.2.1. The time of the occurrence.

22.2.2. Magnitude of the emission or process parameters excess.

22.2.3. The duration of the excess.

22.2.4. The probable cause.

22.2.5. Corrective actions taken or planned.

22.2.6. Any other agency contacted.

23. Grays Harbor Energy, LLC shall have on-site, and shall follow, an Operating and Maintenance manual, and an equipment Start-up, Shutdown, and Malfunction Procedures manual for all equipment that has the potential to affect emissions to the atmosphere. Copies of the manuals shall be available to EFSEC or ORCAA at the facility. Emissions that result from a failure to follow the requirements of the manuals may be considered evidence that emission violations have occurred. The above manuals must be reviewed annually and updated as needed. EFSEC and ORCAA shall be notified whenever the manual is updated.

23.1. The Operating and Maintenance manual should contain equipment-specific operating parameter and maintenance information.

23.2. The Start-up, Shutdown, and the Malfunction manual shall contain information on the proper procedures, and sequencing of actions for plant operations staff to follow in order to safely, efficiently start and stop the various equipment at the station under all reasonably ascertainable normal and abnormal start-up and shutdown situations.

24. Any activity, which is undertaken by Grays Harbor Energy, LLC, or others, in a manner, which is inconsistent with the application and this determination, shall be subject to enforcement under applicable regulations. Specific elements in the application to be followed are the structure locations and sizes depicted on site plans, emitting and process equipment specifications, and

emitting equipment stack height and diameters used for demonstrating compliance with ambient air quality impacts.

25. Nothing in this determination shall be construed so as to relieve Grays Harbor Energy, LLC of its obligations under any state, local, or federal laws or regulations.

26. At all times, Grays Harbor Energy, LLC must maintain and operate the emission units covered by this permit, including all associated emission control equipment and work practices, in a manner consistent with good air pollution control practices for minimizing emissions. Determination of whether acceptable operation and maintenance procedures are being used shall be based on information available to EFSEC or ORCAA. This information may include, but is not limited to, monitoring results, opacity observations, operating and maintenance procedures, all operation and maintenance records, and site inspections.

27. Access to the source by EFSEC or ORCAA, shall be permitted upon request for the purpose of compliance assurance inspections. Failure to allow access is grounds for action under the Washington Clean Air Act.

Prepared by:

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6/28/2018

Scott M. Inloes, P.E.
Air Quality Program
Washington Department of Ecology

Date

Approved by:

7/12/18

Kathleen Drew
Energy Facility Site Evaluation Council

Date

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