



Consumers Energy

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40 CFR Part 60, 63, and 75 CEMS Relative Accuracy Test Audit Report

EUBOILER

Genesee Power Station Limited Partnership
G-5310 North Dort Highway
Flint, Michigan 48505
SRN: N3570
FRS: 110001842356
ORIS: 54751

October 14, 2024

Test Dates: September 3 and 4, 2024

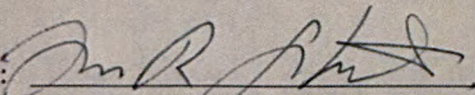
Test Performed by the Consumers Energy Company
Regulatory Compliance Testing Section
Air Emissions Testing Body
Laboratory Services Section
PCS Project No. 2400700

CERTIFICATION FOR 40 CFR PART 75 TEST REPORT

(To be completed by authorized AETB firm representative and included in source test report)

Facility ID:	ORIS: 54751, SRN: N5370	Date(s) Tested:	September 3 and 4, 2024
Facility Name:	Genesee Power Station Limited Partnership		
Facility Address:	G-5310 North Dort Highway, Flint, MI 48505		
Equipment Tested:	EUBOILER SO ₂ , NO _x , CO ₂ , CO and Volumetric Flow CEMS		
AETB Firm:	CECo/RCTS AETB		
Business Address:	135 W. Trail St., Jackson MI 49201		
Phone:	(616) 738-3234	Email:	thomas.schmelter@cmsenergy.com

As the legally authorized representative of the RCTS AETB, I certify that I have reviewed this test report in conjunction with the relevant Quality Manual Appendix D checklist. Having checked each item, the information provided in this test report is true, accurate, and complete.

Signature:		Date:	October 14, 2024
Name:	Thomas R. Schmelter	Title:	AETB Technical Director
Phone:	(616) 738-3234	Email:	thomas.schmelter@cmsenergy.com

RELATIVE ACCURACY TEST REPORT CHECKLIST

	Description (Typical location(s) in report) [ASTM D 7036-04 Section Reference]
☐	Title (Title Page) [15.3.1]
☐	AETB name & address (QM App. D pg. D-2) [15.3.2]
☐	Unique identification number on each page and a clear identification of the end of the report (Headers & Footers; "End of Report" page) [15.3.3]
☐	Name and address of the customer (Title Page; QM App. D pg. D-2) [15.3.4]
☐	Date(s) the testing was performed (Title page; Introduction; QM App. D pg. D-2) [15.3.10]
☐	Identification of the units tested (Title page; Introduction) [15.3.9]
☐	Identification of regulatory personnel that observed testing (Introduction; Appendix D1) [Note 13]
☐	Clear identification of the pollutants/parameters tested (Summary & Discussion) [15.3.5]
☐	Identification of the test methods used (Sampling and Analytical Procedures) [15.3.8]
☐	Identification of the sampling location, including diagrams, sketches, or photographs (Figures) [15.3.6]
☐	Detailed process description and process operations for each test run (Source and Monitor Description; Appendix B CEMS data sheets) [15.3.7]
☐	Reference to the test protocol and procedures used by the AETB (Introduction) [15.3.11]
☐	Test results and units of measure (Summary and Discussion) [15.3.12]
☐	Information on specific test conditions, including text description of process operations for each test run and description of any operational issues with the unit or the control device (Discussion of Test Results) [15.3.14]
☐	Discussion of the test results including the uncertainty associated with the test and discussion of possible errors or limiting conditions (Quality Assurance Procedures) [15.3.15]
☐	Reference Method analyzer calibrations for each RM gas RATA run. (Appendix B) [15.3.16]
☐	Raw plant CEMS data for each RATA run and each CEMS component (i.e., all gas analyzers, flow monitors). (Appendix B) [15.3.17]
☐	Raw Reference Method DAS data for each RM gas RATA run. (Appendix B) [15.3.17]
☐	CEMS "Operating Load Analysis" report. (Appendix C) [15.3.11]
☐	Meter box post-test calibration results (Appendix C) [15.3.16]
☐	NO _x converter check results (Appendix C) [15.3.16]
☐	Pitot calibrations and inspections (Appendix C) [15.3.16]
☐	FRRS/manometer/Magnehelic gage calibration results (Appendix C) [15.3.16]
☐	Reference Method calibration gas certificates of analysis (Appendix C) [15.3.16]
☐	RATA field data sheets verified against spreadsheet data (Field data sheets in project file) [15.3.17]
☐	RCTS AETB Letter of Certification (Appendix D1) [15.3.19]
☐	Completed QM Appendix F – "AETB Field Test Signature Form" (Appendix D1) [3.1.3; 3.1.9; 3.1.14; 8.3; Note 14; 12.2; 12.3; 12.4; 14.1.1]
☐	Deviations from, additions to, or exclusions from the test protocol, test methods, or AETB Quality Manual entered on QM App. F pg. F-2 (Appendix D2) [15.3.13]
☐	Names, titles, and signatures of persons authorizing the test report – "QM App. D pg. D-2" (After Title Page) [15.3.18]
☐	QSTI certificates for Qualified Individuals overseeing/performing the test (Appendix D2)
☐	Table of Contents is correct (Report Body) [Neatness & professionalism]
☐	Report Headers & Footers are correct (Report Body) [Neatness & professionalism]
☐	RM and CEMS run data in correct order (Appendix B) [Neatness & professionalism]

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1.0 INTRODUCTION

Consumers Energy Company (CECo), Regulatory Compliance Testing Section (RCTS) conducted continuous emission monitoring systems (CEMS) quality assurance (QA) audits associated with emission unit EUBOILER operating at the Genesee Power Station (GPS) located in Flint, Michigan.

The facility is an approximate 43-megawatts (MW) gross electric generating facility consisting of a 523 MMBtu/hr spreader-stoker boiler, identified as EUBOILER within the air permit, steam turbine, and associated electrical equipment. The CEMS are installed in the EUBOILER exhaust to satisfy United States Environmental Protection Agency (USEPA) Code of Federal Regulations, Chapter 40, Part 75 (40 CFR Part 75) monitoring requirements, the Cross State Air Pollution Rule (CSAPR), and 40 CFR Part 60, Subparts A, Db, and 40 CFR Part 63 Subpart DDDDD, as specified in State of Michigan Renewable Operating Permit (ROP) MI-ROP-N3570-2023.

The relative accuracy test audits (RATA) were conducted on September 3 and 4, 2024. The purpose of the CEMS audits was to certify the CEMS after replacement of the NO_x, SO₂, and O₂ analyzers, and comply with the periodic QA required in 40 CFR Part 75, Appendices A and B, and 40 CFR Part 60, Appendix F, as incorporated in the ROP. The CO CEMS is used for compliance monitoring for the Industrial Boiler MACT under 40 CFR Part 63, Subpart DDDDD.

A test protocol describing the sampling, calibration, and QA procedures in USEPA Reference Methods (RM) 1, 2, 2H, 3, 3A, 4, 6C, 7E, 10, and 19, in conjunction with Performance Specifications (PS) 2 (for the SO₂ and NO_x RATA), 4 (for the CO RATA), and 40 CFR 75, Appendices A and B was submitted to the USEPA Region 5 and EGLE offices on July 25, 2024. The protocol was subsequently approved in a letter dated August 23, 2024, by EGLE representative Andrew Riley.

The CEMS audits were performed by RCTS representatives Thomas Schmelter, David Kawasaki, and Thomas Duchane. Kathryn Cunningham, Principal Environmental Engineer with CECo, and Derek Burk, Control Technician at the Genesee Power Station, coordinated the tests with applicable plant personnel and provided CEMS data. EGLE representatives Andrew Riley, Alexis Rolling, Michelle Rogers, and Amy Beaver witnessed portions of the testing on September 4, 2024.

RCTS operates as a self-accredited Air Emission Testing Body (AETB) as described in the AETB Letter of Certification contained in Appendix D of this report, and is accordingly qualified to conduct 40 CFR Part 75 test programs. RCTS' AETB program is developed in accordance with the American Society for Testing and Materials (ASTM) D 7036-04, *Standard Practice for Competence of Air Emissions Testing Bodies*, in which the AETB is required during test projects to provide at least one qualified individual (QI), qualified in the specific methods for that project, to be on-site at all times. RCTS representatives Thomas Schmelter and David Kawasaki met these requirements and assumed the on-site lead QI roles for the duration of the flow and gas CEMS audits, respectively.

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Table 1-1 presents the test program organization, major lines of communication, and names of responsible individuals.

Table 1-1
Contact Information

Program Role	Contact	Address
EPA Regional Contact	r5ardreporting@epa.gov	USEPA Region 5 77 W. Jackson Blvd. (AR-18J) Chicago, IL 60604
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Regulatory Agency Representative	Matthew Karl Senior Environmental Quality Analyst 517-284-6639 karlm@michigan.gov	EGLE Lansing District Office 525 West Allegan Street Lansing, Michigan 48909
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Alternate Designated Representative	Roxanna Woodard Environmental Health and Safety Coordinator 810-785-4144 x224 roxanna.woodard@nsce.com	NorthStar Clean Energy Genesee Power Station Limited Partnership G-5310 North Dort Highway Flint, Michigan 48505
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Test Team Representative	Thomas Schmelter, QSTI Principal Lab Technical Analyst 616-738-3234 thomas.schmelter@cmsenergy.com	Consumers Energy Company L&D Training Center 17010 Croswell Street West Olive, Michigan 49460
Test Team Representative	David Kawasaki, QSTI Sr. Engineering Technical Analyst 925-550-1632 david.kawasaki@cmsenergy.com	Consumers Energy Company Royal Oak Service Center 4600 Coolidge Hwy Royal Oak, Michigan 48073

2.0 SUMMARY AND DISCUSSION

The Genesee Power Station oxygen (O₂), oxides of nitrogen (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), and volumetric airflow CEMS relative accuracy (RA) results indicate the CEMS meet the annual RA frequency standards in 40 CFR 75, Appendix A. Further, where applicable, the CEMS meet the applicable RATA requirements of 40 CFR Part 60, Appendix F.

Results are presented in Tables 2-1 through 2-5 and Appendix B of this report. RA equations and other applicable sample calculations are presented in Appendix A.

2.1 WALL ADJUSTMENT FACTOR

The applicable default wall adjustment factor (WAF) of 0.9950 (dimensionless) was used to adjust the flue gas velocity and calculate volumetric flow rate. Accordingly, when reviewing the volumetric flow RATA results, note the volumetric flowrate corrected for WAF is used in relative accuracy calculations.

2.2 VOLUMETRIC FLOWRATE

The flow monitoring system consists of a Monitoring Solutions Model CEMFLOW FL2000 Pitot tube and differential pressure gauge installed in the EUBOILER exhaust stack. The flow monitor calculates stack gas velocity and is used in conjunction with the stack cross-sectional area and diluent measurements to calculate pollutant mass emission rates.

As part of the RATA test program, trial flow RATA runs were performed on September 3, 2024, at the low operating load for the purpose of evaluating and optimizing the flow CEMS, if necessary, as allowed in 40 CFR 75, Appendix B §2.3.2(b)(2). The trial flow data was included in the 12-run flow RATA results, as the individual trial run results from the EUBOILER flow monitor were within the $\pm 10\%$ difference specification in 40 CFR 75.20(b)(3)(vii)(E). The flow RATA conducted on September 3, 2024 met the semi-annual test frequency criterion of $\leq 10\%$ RA. However, because the flow RATA exceeded the reduced (annual) relative accuracy test frequency criterion of $\leq 7.5\%$ RA, an additional RATA was conducted on September 4, 2024 at a marginally increased load condition (16 MW load versus 12 MW).

The additional 12-run flow RATA results at low load level met the annual reduced test frequency incentive standard of $\leq 7.5\%$ in 40 CFR 75, Appendix B §2.3.1.2(c). Table 2-1 summarizes the volumetric airflow RATA results.

Table 2-1
Summary of Volumetric Airflow RATA Results

CEMS Make/Model	CEMS Duct Location & Serial Number	RATA Criteria	Required RATA Performance	Actual RATA Performance
Monitoring Solutions Model CEMFLOW FL2000	EUBOILER SN: 060515-000-1081-UMCR	Low Load (Sept 3, 2024)	$\leq 10\%$ of mean RM	9.20%
		Low Load (Sept 4, 2024)		0.93%
		Bias	$ d \leq CC = \text{Pass}$	Pass

|d| average absolute difference between the RM and CEMS
|CC| confidence coefficient

2.3 SO₂ GAS RATA

The facility operates an SO₂ dilution out-of-stack pulsed fluorescence CEMS at the exhaust stack to report continuous emissions. The SO₂ concentrations (ppm) are used in conjunction with flow data to support 40 CFR Part 75 mass emissions reporting and assess compliance with a 24-hour rolling SO₂ mass emission limit.

The SO₂ ppm RATA results met the ± 15 ppm specification in 40 CFR 75, Appendix A §3.3.1(b) as well as the reduced RATA test frequency incentive standard of ± 12 ppm in 40 CFR 75, Appendix B §2.3.1.2(e). Table 2-2 summarizes the SO₂ RATA results.

Table 2-2
Summary of SO₂ RATA Results

CEMS Make and Model	CEMS Location & Serial Number	RATA Performance Criteria	Required RATA Performance	Actual RATA Performance
Thermo Model 43iQ-ABN	EUBOILER SN: 12412033798	ppm	$\leq 10\%$ of mean RM or ± 15.0 ppm RM-CEMS difference	641.01%
				-0.3 ppm
		Bias (ppm)	$ d \leq CC = \text{Pass}$	Pass

|d| average absolute difference between the RM and CEMS
|CC| confidence coefficient

2.4 NO_x GAS RATA

The facility operates an NO_x dilution out-of-stack chemiluminescence CEMS at the exhaust stack to report continuous emissions. The NO_x concentrations (ppmvd) are used in 40 CFR Part 75 Acid Rain Program reporting and to evaluate compliance with rolling NO_x emission limits.

The NO_x ppmvd RATA results met the $\leq 10\%$ RA specification in 40 CFR 75, Appendix A §3.3.1(a), as well as the reduced RATA test frequency incentive standard of $\leq 7.5\%$ RA in 40 CFR 75, Appendix B §2.3.1.2(a). Table 2-3 summarizes the NO_x RATA results.

Table 2-3
Summary of NO_x RATA Results

CEMS Make and Model	CEMS Location & Serial Number	RATA Performance Criteria	Required RATA Performance	Actual RATA Performance
Thermo Model 42iQLS-ANANN	EUBOILER SN: 12412033797	ppmvd	≤10% of mean RM	4.80%
		Bias	$ d \leq CC = \text{Pass}$	1.042

$|d|$ average absolute difference between the RM and CEMS
 $|CC|$ confidence coefficient

2.5 O₂ Gas RATA

The facility operates an O₂ dilution out-of-stack paramagnetic CEMS at the exhaust stack to report continuous emissions. The O₂ concentrations are used to calculate heat input and pollutant lb/MMBtu emission rates. The O₂ RATA results met the ≤10% RA requirement, the mean difference of no greater than ±1.0% O₂ specification in 40 CFR 75, Appendix A §3.3.3, and the reduced RATA test frequency incentive standard in 40 CFR 75, Appendix B §2.3.1.2(a) and (h) where the RA is ≤7.5% or the mean difference does not exceed ±0.7% O₂, respectively. Table 2-4 summarizes the O₂ RATA results.

Table 2-4
Summary of O₂ RATA Results

CEMS Make and Model	CEMS Location & Serial Number	RATA Performance Criteria	Required Performance Criteria	Actual RATA Performance
Brand-Gaus Model 4710	EUBOILER SN: 11927	%	≤10% of mean RM or	1.45% RA
		%	±1.0% O ₂ RM-CEMS difference	<0.1%

2.6 CO Gas RATA

The facility operates a CO dilution out-of-stack non-dispersive infrared gas filter correlation CEMS at the exhaust stack to report continuous emissions. The CO concentrations (ppmvd @ 3% O₂) and emission rates (lb/MMBtu) are used to assess compliance with 24-hour rolling CO mass emission limits. The CO ppm RATA results met the ≤10% RA specification in 40 CFR 60, Appendix B, Performance Specification 4, §13.2.

For purposes of RM CO lb/MMBtu calculations, the RM CO concentrations, O₂ concentrations, and CEMS flowrate data were utilized. Since the CO mass emission rate was less than 50% of the 0.35 lb/MMBtu 24-hour rolling average emission limit, the emission limit was used in calculation of relative accuracy. The CO lb/MMBtu RATA results met the ≤5% RA specification in 40 CFR 60, Appendix B, Performance Specification 4, §13.2. Table 2-5 summarizes the CO RATA results.

Table 2-5
Summary of CO RATA Results

CEMS Make and Model	CEMS Location & Serial Number	RATA Performance Criteria	Required RATA Performance	Actual RATA Performance
Thermo Model 48iQ-ABN	EUBOILER SN: 12035010118	ppmvd @ 3% O ₂	≤10% of mean RM	8.70%
		lb/MMBtu	≤5% of emission standard [†]	2.63%

|d| average absolute difference between the RM and CEMS

|CC| confidence coefficient

[†] As the average RM CO lb/MMBtu emission rate was less than 50% of the CO emission limit (0.35 lb/MMBtu), the emission limit was used in the denominator of the percent RA calculation in lieu of the average RM value per §13.2 of 40 CFR Part 60, Appendix B, Performance Specification 4.

3.0 SOURCE AND MONITOR DESCRIPTION

The Genesee Power Station Limited Partnership is an electric utility facility located north of Flint, Michigan. The facility commenced commercial operation in 1995 and includes one 523 MMBtu/hr wood and tire-derived fuel (TDF) fired boiler equipped with natural gas auxiliary burners. The facility receives both chipped wood and TDF by truck and fires these fuels in the boiler to produce steam. However, GPS has removed TDF from the fuel mix as of February 2024. The steam is used to turn a turbine and generator to produce up to 43 MW gross of electricity at full capacity. The electricity is sold to Consumers Energy (the utility subsidiary of NorthStar Clean Energy) and routed through transmission and distribution systems to consumers.

Steam is generated with a single conventional ABB Combustion Engineering VU-40 hydra grate spreader-stoker design boiler. Emissions from the boiler are controlled by multiple air pollution control systems that include a selective non-catalytic reduction system, multi-cyclones, and electrostatic precipitator. Air emissions are continuously monitored by the CEMS systems.

O₂, SO₂, CO, NO_x, and a differential pressure air flow CEMS are installed in the EUBOILER exhaust stack. The CEMS interface with a data acquisition and handling system (DAHS), responsible for recording data that includes exhaust gas flow rate, pollutant and diluent concentrations, emission rates, and operating parameters. Figure 1 illustrates the EUBOILER Data Flow Diagram and Sampling Location.

The CEMS systems quality assured during this test program are summarized in Table 3-1.

Table 3-1
CEMS Information

Make and Model	System ID	Component ID	Span	Serial Number
Flow Monitoring Solutions Model CEMFLOW FL2000	115	A17	12,000,000 SCFM	060515-000-1081-UMCR
SO ₂ Thermo Model 43iQ-ABN	114	A14	100 ppm	12412033798
NO _x Thermo Model 42iQLS-ANANN	111	A15	300 ppm	12412033797
O ₂ Brand-Gaus Model 4710	113	A16	25%	11927
CO Thermo Model 48iQ-ABN	NA	NA	1,000 ppm	12035010118

In preparation for the testing, an Operating Load Analysis was obtained for EUBOILER encompassing a period of July 1, 2023 through June 30, 2024. Based on these four or more quarters of representative historical operating data, the first (i.e., normal) most frequently used load level was determined to ensure the appropriate load levels were selected during the RATAs. Based upon the Operating Load Analysis reviewed, Low was the most frequently used load level, with a usage rate $\geq 85\%$ of the time. Therefore, the gas and flow RATAs were conducted at a single load level: Low. Refer to Appendix C for the Operating Load Analysis Report.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Specific test procedures detailed in 40 CFR Part 60, Appendix A, Reference Methods 1, 2, 2H, 3, 3A, 4, 6C, 7E, 10, and 19 were followed in conjunction with Part 75 Appendices A and B to conduct the RATA and calculate CEMS RA. O₂, NO_x, CO, and SO₂ concentrations were measured for 25 minutes during each gas RATA run. Flue gas velocity and temperature were measured for a minimum of 5 minutes during each flow RATA test run. The following sections provide the sampling and analytical procedures employed.

4.1 TRAVERSE POINTS (USEPA METHOD 1)

The number and location of traverse points used for determining exhaust gas velocity and flow RA was determined in accordance with USEPA Method 1, *Sample and Velocity Traverses for Stationary Sources*. The exhaust stack area was calculated and the cross-section divided into traverse points of equal area based on the location of existing airflow disturbances. Sixteen traverse points, 8 traverse points in each of 2 test ports, were used to measure flue gas volumetric flowrate. Refer to Figure 2 for the EUBOILER Flow Traverse Points Dimensions and Detail.

Because the sampling location at the exhaust stack is at least 2 duct diameters downstream and 0.5 duct diameters upstream from a flow disturbance, gas concentrations were measured while traversing the duct approximately every 7-minutes at 16.7, 50.0, and 83.3 percent of the duct dimension parallel to the port (15.8, 47.2, and 78.7 inches from the stack wall). Refer to Figure 3 for the EUBOILER Gas Traverse Points Dimensions and Detail.

4.2 VELOCITY AND VOLUMETRIC FLOW (USEPA METHODS 2 AND 2H)

The exhaust gas velocity and temperature measurements were conducted in accordance with USEPA Method 2, *Determination of Stack Gas Velocity and Volumetric Flow Rate*. The pressure differential across the positive and negative openings of an S-type Pitot tube connected to a pressure transducer were used to calculate exhaust gas velocity and volumetric flowrate. Refer to Figure 4 for an illustration of the volumetric flow RM apparatus.

As described in Section 2.1, the RM flow data incorporates the applicable default WAF of 0.9950 as referenced in USEPA Method 2H, *Determination of Stack Gas Velocity Taking into Account Velocity Decay near the Stack Wall*.

It should be noted that the most recent calibration for Pitot tube 2331 employed during sampling, resulted in an A-side C_p of 0.820 and a B side C_p of 0.826. Rather than use the average of the A and B-side C_p values, the A-side C_p of 0.820 was used in accordance with Section 10.1.5.1.1 of Method 2, as the A-side of the pitot consistently faced the flow direction throughout testing. The Pitot tube calibration certification is presented in Appendix C.

4.3 DILUENT AND MOLECULAR WEIGHT (USEPA METHOD 3 AND 3A)

During the gas RATAs, O_2 diluent concentrations were measured using a paramagnetic analyzer following guidelines in USEPA Method 3A, *Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from a Stationary Source (Instrumental Analyzer Procedure)*. Section 4.5 describes the sample apparatus configuration.

O_2 and carbon dioxide (CO_2) concentrations were also measured to calculate flue gas composition during the flow RATAs using USEPA Method 3, *Gas Analysis for the Determination of Dry Molecular Weight* using calibrated Fyrite gas analyzers. Triplicate grab samples were captured in absorbing fluid resulting in a proportional fluid rise to the gas concentration absorbed. Each sample concentration was read on the instrument scale, and the calculated dry molecular weight was verified to not differ from the triplicate sample mean by more than 0.3 g/g-mole (0.3 lb/lb-mole), with the average result reported to the nearest 0.1 g/g-mole (0.1 lb/lb-mole).

4.4 MOISTURE CONTENT (USEPA METHOD 4)

Flow RATA moisture content was determined using USEPA Method 4, *Determination of Moisture in Stack Gases*. Exhaust gas was drawn at a constant rate through a series of impingers immersed in an ice bath to remove moisture, which was subsequently measured gravimetrically to calculate moisture content. The Method 4 Moisture Sample Apparatus is shown in Figure 5.

4.5 O_2 , SO_2 , NO_x , AND CO CONCENTRATIONS (USEPA METHODS 3A, 6C, 7E AND 10)

Oxygen, sulfur dioxide, nitrogen oxides, and carbon monoxide concentrations were measured using the following sampling and analytical procedures:

- USEPA Method 3A, *Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)*,

- USEPA Method 6C, *Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)*,
- USEPA Method 7E, *Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)*, and
- USEPA Method 10, *Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)*

The sampling procedures of the methods are similar except for the analyzers and analytical technique used to quantify the parameters of interest. Components of the extractive gaseous RM system in contact with flue gas are constructed of Type 316 stainless steel and Teflon. Exhaust gas was extracted from the stack through a heated stainless-steel probe, heated Teflon® tubing, and a gas conditioning system to remove water and dry the sample before entering a pump, manifold, and the gas analyzers.

The output signal from each analyzer was connected to a data acquisition system (DAS). The RM analyzers were calibrated with USEPA Protocol calibration gases and operated to ensure that zero drift, calibration gas drift, bias, and calibration error met the specified method requirements. Refer to Figure 6 for a drawing of the reference method gaseous RATA sample apparatus.

Data collected from the RM analyzers were averaged for each run with CO, NO_x, and SO₂ concentrations measured in ppmvd, while O₂ concentrations were measured as percent by volume on a dry basis. Equation 19-1 from 40 CFR Part 60, Appendix A, Method 19 was used to calculate CO, NO_x and SO₂ lb/MMBtu emission rates.

4.6 EMISSION RATES (USEPA METHOD 19)

USEPA Method 19, *Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates*, was used to calculate lb/MMBtu emission rates. Measured O₂ and pollutant concentrations and F factors (ratios of combustion gas volume to heat input) were used to calculate emission rates using equation 19-1.

USEPA Method 19 Equation 19-1

$$E = C_d F_d \frac{20.9}{20.9 - \%O_{2d}}$$

Where:

E	=	Pollutant emission rate (lb/MMBtu)
C _d	=	Pollutant concentration, dry basis (lb/dscf)
F _d	=	Volume of combustion components per unit of heat content (dscf O ₂ /MMBtu)
%O _{2d}	=	Concentration of oxygen on a dry basis (% , dry)

The F_d factor reported by the facility was used to calculate RM lb/MMBtu emissions and calculate CEMS relative accuracy. Refer to Appendix A for RATA calculation summary presenting the calculations used in this report.

5.0 QUALITY ASSURANCE PROCEDURES

The objective of a Quality Assurance (QA) program is to produce data that are complete, representative, and of known precision and accuracy. Within the RATA test program, completeness can be defined as the percentage of the required field measurements and associated documentation achieved. Representativeness, defined as the "when," "how," and

“how many” measurements taken, is typically specified within the regulations governing the source to be tested as well as the Test Protocol submitted to the regulatory agency prior to the test event. Precision and accuracy are measures of data quality and exist by design within each of the USEPA reference test methods and procedures incorporated during the RATA.

RCTS addresses these QA goals by operating within a Quality System in compliance with ASTM D 7036-04, *Standard Practice for Competence of Air Emissions Testing Bodies*, a practice specifying the general competence requirements applicable to all AETB staff engaged in air emission testing at stationary sources, regardless of testing scope. By employing these requirements in conjunction with the precision and accuracy standards in each reference method, RCTS is better able to ensure consistently accurate data quality from an individual and AETB perspective. RCTS’ AETB Letter of Accreditation and individual QSTI Certificates are contained in Appendix D.

5.1 PITOT TUBE, THERMOCOUPLE, AND PRESSURE EQUIPMENT

The Pitot tube-thermocouple assembly for measuring exhaust gas volumetric flow was inspected and/or calibrated according to procedures in RCTS’ AETB Standard Operating Procedure 3-5 and Appendix O, USEPA RM 2, and Approved Alternative Method 011 (ALT-011).

A Pitot tube inspection occurred before the field test to confirm there is no gross damage or excess misalignment of the Pitot openings. A post-test Pitot tube inspection and certification was performed to evaluate if the Pitot face openings are still aligned within acceptable tolerances.

ALT-011 describes the inherent accuracy and precision of a thermocouple within $\pm 1.3^{\circ}\text{F}$ in the range of -32°F and $2,500^{\circ}\text{F}$ and states that a system performing accurately at one temperature is expected to behave similarly at other temperatures. Therefore, a single point thermocouple calibration procedure to verify accuracy within $\pm 1.0\%$ of absolute temperature, taking into account the presence of disconnected wire junctions or a potential miscalibrated temperature display, was performed. After the test event, the accuracy of the thermocouple system was checked at ambient temperature, or other temperature, within the range specified by the manufacturer, using a reference thermometer. The temperatures of the thermocouple and reference thermometer(s) shall agree within $\pm 2^{\circ}\text{F}$.

The differential pressure transmitters used with Method 2 were calibrated in accordance with §6.2.1 of the method and RCTS AETB Standard Operating Procedure Appendix J-4. Refer to Appendix C for Pitot tube, thermocouple, differential pressure and barometer calibration or inspection records.

5.2 DRY GAS METERING CONSOLE

The dry gas metering (DGM) console and pump for measuring exhaust gas moisture content was calibrated using critical orifices as described in Method 5, §16.0. A Post-Test Metering System Calibration check was performed pursuant to Method 5, §16.3 procedures. Refer to Appendix C for DGM console calibration data.

5.3 USEPA PROTOCOL GAS STANDARDS

In accordance with RCTS AETB Standard Operating Procedure 2-10, USEPA Protocol gas standards were purchased from an outside vendor participating in the USEPA Protocol Gas Verification Program (PGVP) calibration gas audit program described in 40 CFR Part 75 §75.21(g). The standards are certified to have a total relative uncertainty of no greater than $\pm 2.0\%$ according to the *USEPA Traceability Protocol for Assay & Certification of Gaseous*

Calibration Standards (EPA – 600/R-12/531; May 2012). Appendix C contains a summary of the PGVP calibration gas standards used during this test program.

5.4 ANALYZER CALIBRATIONS

The gaseous RM instruments were calibrated on-site and operated following manufacturer's specifications and the applicable reference method based in part on the quality assurance and quality control requirements contained in USEPA Methods 3A, 6C, 7E, and 10.

Before beginning the gas RATA, a three-point analyzer calibration error (ACE) check was conducted on each RM analyzer by injecting zero-, mid-, and high-level calibration gases directly into the instruments and measuring the responses. The instrument response must be within $\pm 2.0\%$ of the respective analyzer span or within ± 0.5 ppmv or $\pm 0.5\%$ for O_2 absolute difference to be acceptable. An initial system bias check was then performed by measuring the instrument response while introducing zero- and mid-level (upscale) calibration gases at the probe, upstream of all sample conditioning components, and drawing it through the various sample components in the same manner as flue gas. The initial system bias check is acceptable if the instrument response at the zero and upscale calibration is within $\pm 5.0\%$ of the calibration span or ± 0.5 ppmv or $\pm 0.5\%$ for O_2 absolute difference.

A NO_x analyzer nitrogen dioxide (NO_2) to nitric oxide (NO) conversion efficiency (CE) test was conducted to verify the analyzer's ability to convert NO_2 to NO and accurately measure NO_x by chemiluminescence.

After each gas RATA run, post-test zero and upscale system bias checks were performed to quantify and compensate for RM analyzer drift and bias. The RM system bias is acceptable if those values remain within $\pm 5.0\%$ of the calibration span or ± 0.5 ppmv or $\pm 0.5\%$ for O_2 absolute difference. The RM drift is acceptable if the zero and upscale values are within $\pm 3.0\%$ of the calibration span. System response times were documented during the initial system bias tests. Calibration gas flow rates were maintained at the target sample rate, with each subsequent run started after twice the system response time elapsed. Analyzer bias and drift data is presented in Appendix B, while calibration data is presented in Appendix C.

6.0 DISCUSSION OF TEST RESULTS

The CEMS RATA results presented in Tables 2-1 through 2-5 and Appendix B indicate the CEMS operating at the Genesee Power Station EUBOILER exhaust meet the performance specifications in 40 CFR 75, Appendix A, and the annual reduced RATA test frequency incentive standards in 40 CFR 75, Appendix B. Further, where applicable, the CEMS meet the applicable RATA requirements of 40 CFR Part 60, Appendix F. These data indicate compliance with the CEMS monitoring and recordkeeping requirements of the facility's air permit MI-ROP-N3570-2023.

During the test event, no deviations were observed by the QIs in attendance. The criteria specified in the applicable Reference Methods and the agency-approved Test Protocol were followed. Hard copy and/or electronic field data were completed in the field and upon return to the home office, verified for data precision and accuracy, further ensuring the appropriate AETB and Reference Method quality measures were met.

Quality Assurance data, such as protocol gas certificates of analysis, analyzer calibration error and system response time, NO_2 to NO CE check and instrument interference information are presented in Appendix C. Gas RATA instrument system bias/drift data is presented in Appendix B3. AETB certifications and signature forms are provided in Appendices D1 and D2.

6.1 CLOCK TIME SYNCHRONIZATION

The electronic timestamps recorded for RM RATA runs are on military time basis and synchronized to the CEMS DAHS, which is in Eastern Standard Time (EST).

Figures

Figure 1 – EUBOILER Flow Diagram and Sampling Location

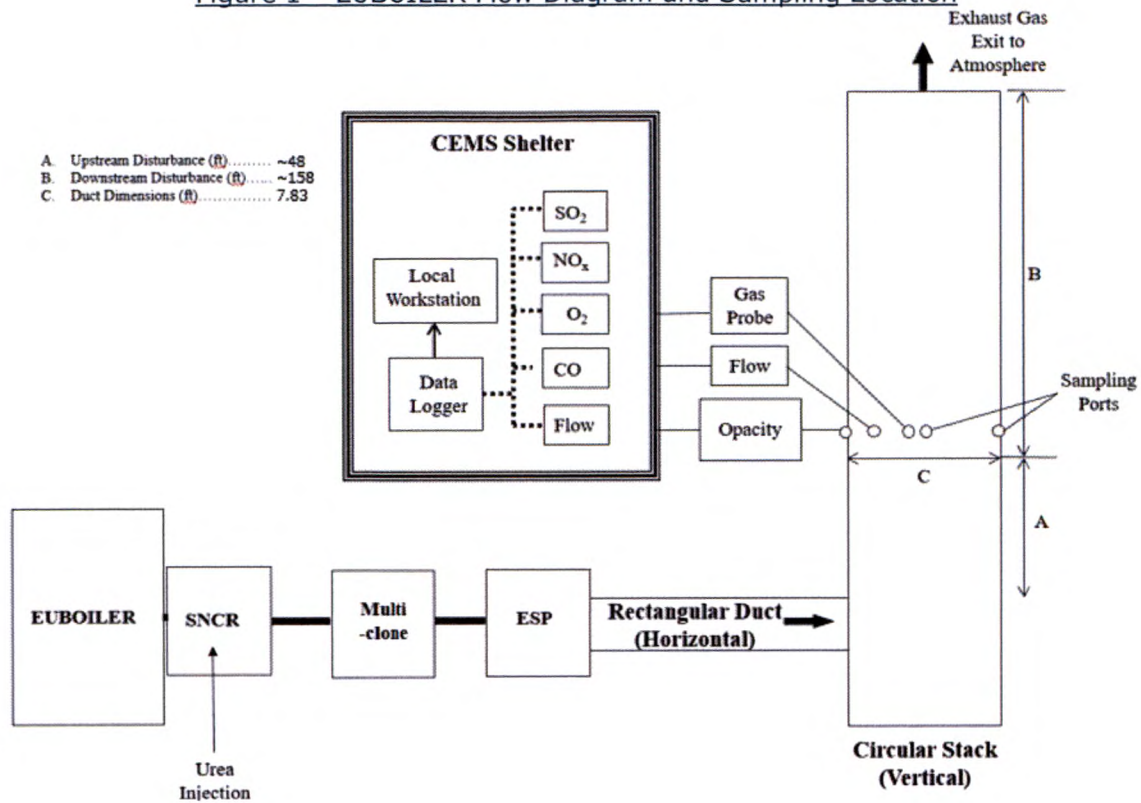
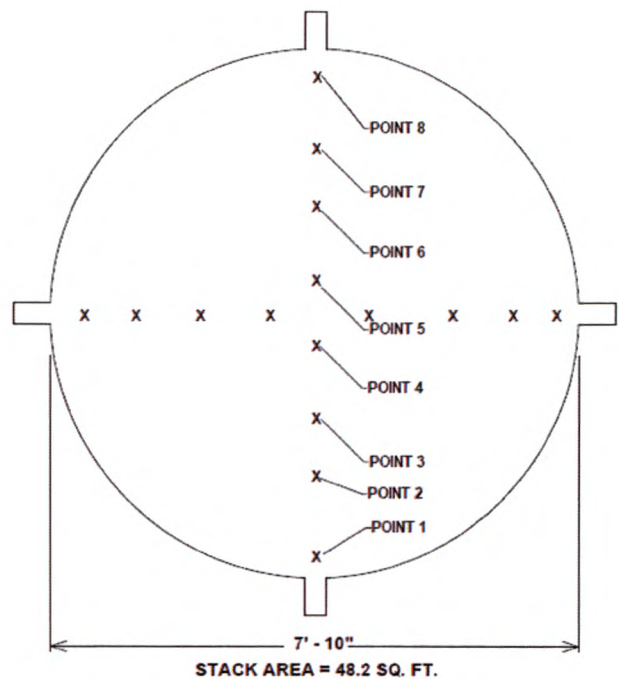


Figure 2 – EUBOILER Flow Traverse Points Dimensions and Detail



FLOW RATA TRAVERSE POINT LOCATIONS

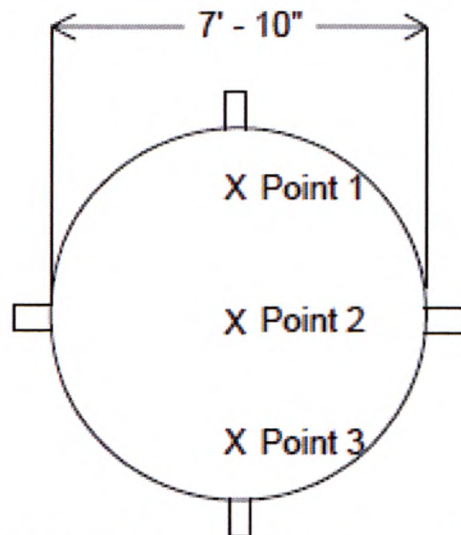
Note: Test Port Length = 12" from inside stack wall to outside flange.

DISTANCES FROM INSIDE STACK WALL

Point 1	91.0"
Point 2	84.1"
Point 3	75.8"
Point 4	63.6"
Point 5	30.4"
Point 6	18.2"
Point 7	9.9"
Point 8	3.0"

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Figure 3 – EUBOILER Gas Traverse Points Dimensions and Detail



In-Stack Sample Point Locations

Distances from inside stack wall:

Point 1 = 78.7"

Point 2 = 47.2"

Point 3 = 15.8"

Figure 4 – Volumetric Airflow RATA Sample Apparatus

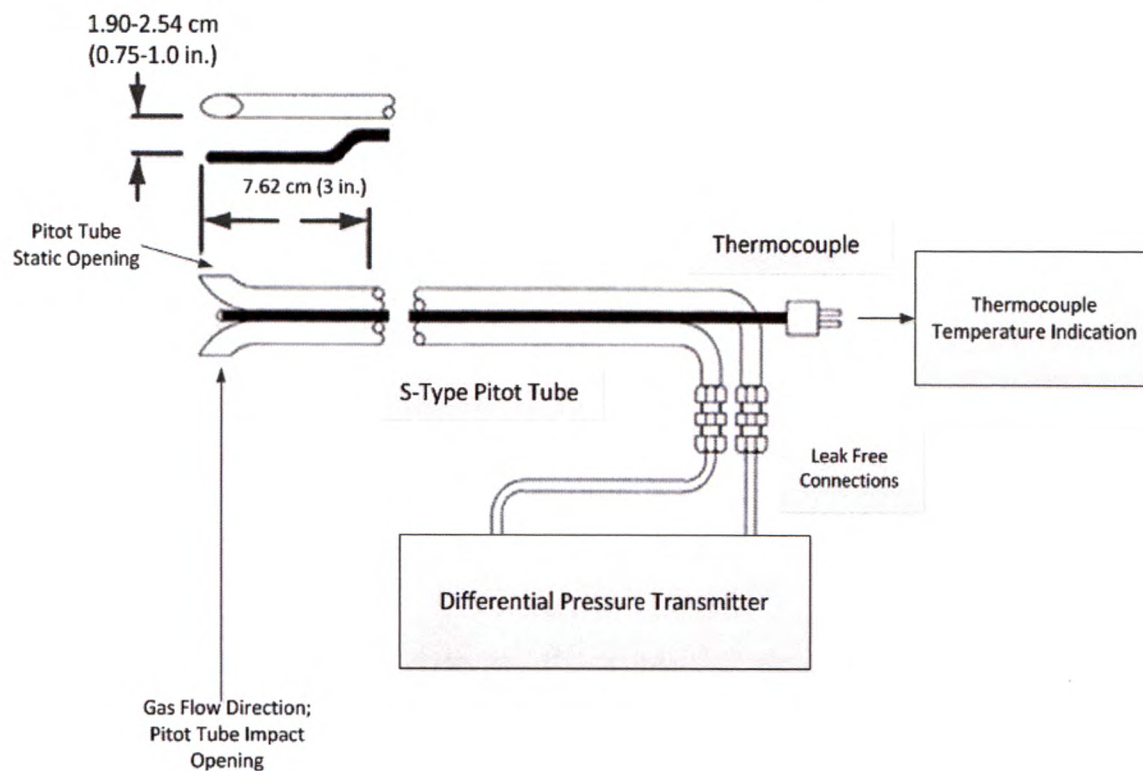


Figure 5 – Method 4 Moisture Sample Apparatus

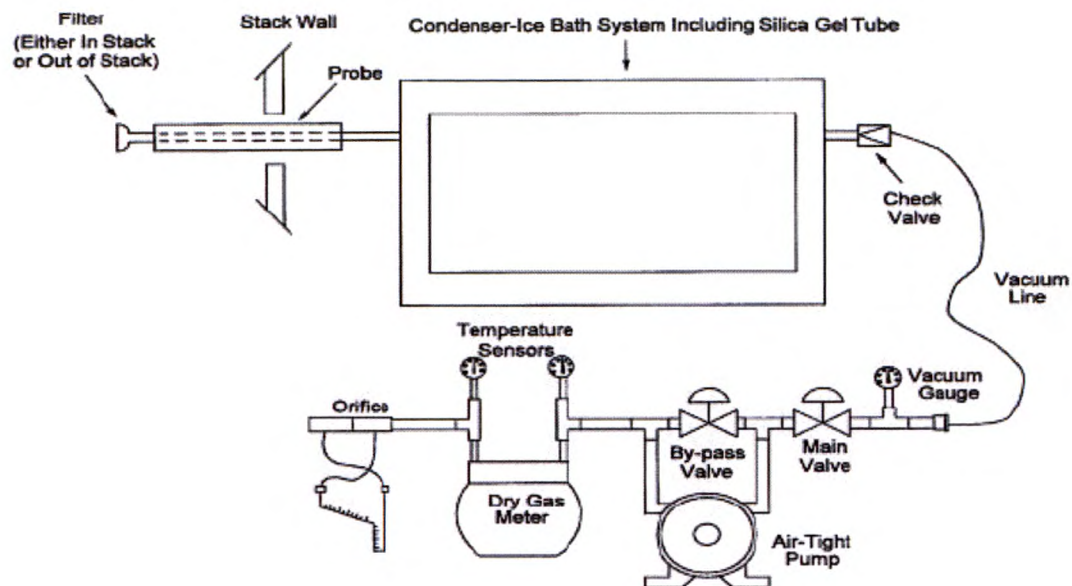


Figure 6 – Reference Method Gaseous RATA Sample Apparatus

