Source Test Report for
2022 Compliance Emissions Testing

Boiler No. 6 (EUB0260-06)
Turbine No. 10 (EUT0260-10)
Cogeneration System (EUFGBT0260-CO)

University of Michigan
Central Power Plant
Ann Arbor, Michigan

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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: John Nestor **Date:** Febuary 13, 2023

Name: John Nestor **Title:** District Manager

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1.0 Introduction

1.1 Summary of Test Program

The University of Michigan contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance test program on the Boiler No. 6 (EUB0260-06), Turbine No. 10 (EUT0260-10), and Cogeneration System (FGBT0260-CO) at the University of Michigan-Central Power Plant facility (State Registration No.: M0675) located in Ann Arbor, Michigan. Testing was performed on December 13-16, 2022, for the purpose of satisfying the emission testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operation Permit No. MI-ROP-M0675-2021b.

The specific objectives were to:

- Verify the emissions of carbon monoxide (CO) and volatile organic compounds (VOC) from the exhaust duct serving EUB0260-06 while burning natural gas (NG) and fuel oil (FO)
- Verify the emissions of CO from the exhaust duct serving EUT0260-10 while burning NG and FO
- Verify the emissions of nitrogen oxides (NO_x) (as NO_2) and CO and the concentration of NO_x (ppmvd corrected to 15% oxygen (O_2)) from the exhaust duct serving FGBT0260-CO while burning NG and FO
- Conduct the test program with a focus on safety

Montrose performed tests to measure the emission parameters listed in Tables 1-1 and 1-2.

Table 1-1
Summary of Test Program – NG as Fuel

Test Date(s)	Unit ID/ Source Name	Activity/Parameters	Test Methods	No. of Runs	Duration (Minutes)
12/15/2022	EUB0260-06	O_2, CO_2	EPA 3A	3	60
12/15/2022	EUB0260-06	Moisture	EPA 4	3	60
12/15/2022	EUB0260-06	CO	EPA 10	3	60
12/15/2022	EUB0260-06	VOC	EPA 25A	3	60
12/13/2022	EUT0260-10	O_2, CO_2	EPA 3A	3	60
12/13/2022	EUT0260-10	CO	EPA 10	3	60
12/14/2022	FGBT0260-CO	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	60
12/14/2022	FGBT0260-CO	O_2, CO_2	EPA 3A	3	60
12/14/2022	FGBT0260-CO	Moisture	EPA 4	3	60
12/14/2022	FGBT0260-CO	NO_x	EPA 7E	3	60
12/14/2022	FGBT0260-CO	CO	EPA 10	3	60

Table 1-2
Summary of Test Program – FO as Fuel

Test Date(s)	Unit ID/ Source Name	Activity/Parameters	Test Methods	No. of Runs	Duration (Minutes)
12/16/2022	EUB0260-06	O_2, CO_2	EPA 3A	3	60
12/16/2022	EUB0260-06	Moisture	EPA 4	3	60
12/16/2022	EUB0260-06	CO	EPA 10	3	60
12/16/2022	EUB0260-06	VOC	EPA 25A	3	60
12/13/2022	EUT0260-10	O_2, CO_2	EPA 3A	3	60
12/13/2022	EUT0260-10	CO	EPA 10	3	60
12/14/2022	FGBT0260-CO	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	60
12/14/2022	FGBT0260-CO	O_2, CO_2	EPA 3A	3	60
12/14/2022	FGBT0260-CO	Moisture	EPA 4	3	60
12/14/2022	FGBT0260-CO	NO_x	EPA 7E	3	60
12/14/2022	FGBT0260-CO	CO	EPA 10	3	60

To simplify this report, a list of Units and Abbreviations is included in Appendix C.1. Throughout this report, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

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 permit limits in Tables 1-3 through 1-8. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

The testing was conducted by the Montrose personnel listed in Table 1-9. The tests were conducted according to the test plan (protocol) dated November 3, 2022, that was submitted to and approved by the EGLE. Boiler No. 2 (EUBO260-02)was unable to fire on fuel oil and was not completed during this test program as described in protocol. EUBO260-02 testing was completed on January 25, 2023 after successfully firing on both fuels.

Table 1-3
Summary of Average Compliance Results – EUB0260-06 (NG as Fuel)

December 14, 2022

Parameter/Units	Average Results	Emission Limits
Carbon Monoxide (CO)		
ppmvd	0.033	--
lb/hr	0.0064	37.6
lb/MMBtu	0.000027	0.10
Volatile Organic Compounds (VOC), as propane		
ppmvd	1.53	--
lb/hr	0.47	9.4
lb/MMBtu	0.0019	0.025

Table 1-4
Summary of Average Compliance Results – EUB0260-06 (FO as Fuel)

December 16, 2022

Parameter/Units	Average Results	Emission Limits
Carbon Monoxide (CO)		
ppmvd	0.098	--
lb/hr	0.019	54.0
lb/MMBtu	0.000086	0.15
Volatile Organic Compounds (VOC), as propane		
ppmvd	1.05	--
lb/hr	0.32	9.4
lb/MMBtu	0.0015	0.025

Table 1-5
Summary of Average Compliance Results – EUT0260-10 (NG as Fuel)

December 13, 2022

Parameter/Units	Average Results	Emission Limits
Carbon Monoxide (CO)		
ppmvd	17.8	--
lb/hr	2.34	7.54
lb/MMBtu	0.042	--

Table 1-6
Summary of Average Compliance Results – EUT0260-10 (FO as Fuel)

December 13, 2022

Parameter/Units	Average Results	Emission Limits
Carbon Monoxide (CO)		
ppmvd	19.8	--
lb/hr	2.78	37.87
lb/MMBtu	0.050	--

Table 1-7
Summary of Average Compliance Results – FGBT0260-CO (NG as Fuel)

December 14, 2022

Parameter/Units	Average Results	Emission Limits
Nitrogen Oxides (NO_x)		
ppmvd	49.7	--
ppmvd @ 15% O_2	29.2	53.3
lb/hr	23.0	30.4
Carbon Monoxide (CO)		
ppmvd	80.5	--
lb/hr	22.6	29.0

Table 1-8
Summary of Average Compliance Results – FGBT0260-CO (FO as Fuel)

December 14, 2022

Parameter/Units	Average Results	Emission Limits
Nitrogen Oxides (NO_x)		
ppmvd	79.4	--
ppmvd @ 15% O_2	51.8	114.8
lb/hr	36.5	47.3
Carbon Monoxide (CO)		
ppmvd	72.0	--
lb/hr	20.1	72.0

1.2 Key Personnel

A list of project participants is included below:

Facility Information

Source Location:	University of Michigan Central Power Plant 1239 Kipke Drive Ann Arbor, MI 48109	
Project Contact:	Brandi Campbell	Stephen O'Reilly
Role:	Sr. Environmental Specialist	Manager Environmental Protection & Permitting Program
Company:	University of Michigan- EHS	University of Michigan-EHS
Telephone:	734-647-9017	734-763-4642
Email:	campbelb@umich.edu	sorielly@umich.edu

Agency Information

Regulatory Agency:	EGLE
Agency Contact:	Andrew Riley
Telephone:	586-565-7379
Email:	RileyA8@michigan.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC	
Contact:	John Nestor	Robert J. Lisy, Jr.
Title:	District Manager	Reporting Hub Manager
Telephone:	248-548-8070	440-262-3760
Email:	jonestor@montrose-env.com	rlisy@montrose-env.com

Test personnel and observers are summarized in Table 1-9.

Table 1-9
Test Personnel and Observers

Name	Affiliation	Role/Responsibility
John Nestor	Montrose	District Manager, QI
Scott Dater	Montrose	Field Project Manager, QI
Shane Rabideau	Montrose	Field Technician
Brandi Campbell	University of Michigan	Test Coordinator
Andrew Riley	EGLE	Observer

2.0 Plant and Sampling Location Descriptions

2.1 Process Description, Operation, and Control Equipment

The University of Michigan-Central Power Plant operates six boilers, two turbines, and a co-generation system utilized to generate steam and electricity for use by various campus buildings.

2.1.1 Boiler No. 6 (EUB0260-06)

Boiler No. 6 (EUB0260-06) is rated at 376 MMBtu/hr heat input. The unit is fueled by natural gas (NG) or No. 2 fuel oil. A low NO_x burner system and flue gas recirculation are used for emission control.

2.1.2 Turbine No. 10 (EUT0260-10)

Gas Turbine No. 10 (EUT0260-10) is rated at 3.8 MW. The unit is fueled by NG or No. 2 fuel oil. A water injection system, regulating the water-to-fuel ratio, is used for emission control.

2.1.3 Gas Turbine Cogeneration System (FGBT0260-CO)

The gas turbine cogeneration system (FGBT0260-CO) consists of two gas turbines, Turbine No. 9 (EUT0260-09) and Turbine No. 10 (EUT0260-10), and two heat recovery boilers, Boiler No. 7 (EUB0260-07) and Boiler No. 8 (EUB0260-08). The turbines and boilers are capable of firing natural gas (NG) or fuel oil. The boilers are rated at 55 MMBtu/hr of heat input when firing NG, and the turbines are rated at 3.8 MG when firing NG.

EUB0260-07 is connected to EUT0260-09, and EUB0260-08 is connected to EUT0260-10. Both boilers have supplemental duct burners. The turbines have water injection systems, regulating the water-to-fuel ratio, for emission control.

2.2 Flue Gas Sampling Locations

Information regarding the sampling locations is presented in Table 2-1.

Table 2-1
Sampling Locations

Sampling Location	Duct Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
EUB0260-06 Exhaust Duct	--	--	--	Gaseous: 3
EUT0260-10 Exhaust Duct	--	--	--	Gaseous: 3
FGBT0260-CO Exhaust Duct	93.0 X 47.0	216"/ 3.46 Dia.	57"/.91 Dia	Flow: 24 (3/port) Gaseous: 3

Testing for EUB0260-06 and EUT0260-10 was performed at historical sampling locations during this test event. The FGBT0260-CO sampling location was verified in the field to conform to EPA Method 1. Acceptable cyclonic flow conditions were confirmed prior to testing using EPA Method 1, Section 11.4. Only the FGBT0260-CO Exhaust Duct had ports available for flow measurements.

See Appendix A.1 for more information.

2.3 Operating Conditions and Process Data

Emission tests were performed while the emission units were operating at normal maximum load.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The process data that was provided is presented in Appendix B. Data collected includes the following parameters:

- Heat input rate, MMBtu/hr
- Natural gas flow, kscfh
- Steam Flow, klb/hr
- Load, MW
- Water-Fuel ratio, %
- F-Factor (F_d), dscf/MMBtu

3.0 Sampling and Analytical Procedures

3.1 Test Methods

The test methods for this test program have been presented in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

3.1.1 EPA Method 1, Sample and Velocity Traverses for Stationary Sources

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.

The sample port and traverse point locations are detailed in Appendix A.

3.1.2 EPA Method 2, Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

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 typical sampling system is detailed in Figure 3-2.

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

EPA Method 3A is an instrumental test method used to measure the concentration of O_2 and CO_2 in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O_2 and CO_2. The performance requirements of the method must be met to validate data.

The typical sampling system is detailed in Figures 3-3 through 3-5.

3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

The typical EUB0260-06 sampling system is detailed in Figure 3-1, and the typical FGBT0260-CO sampling system is detailed in Figure 3-2.

Figure 3-1
EPA Method 4 (Detached) Sampling Train

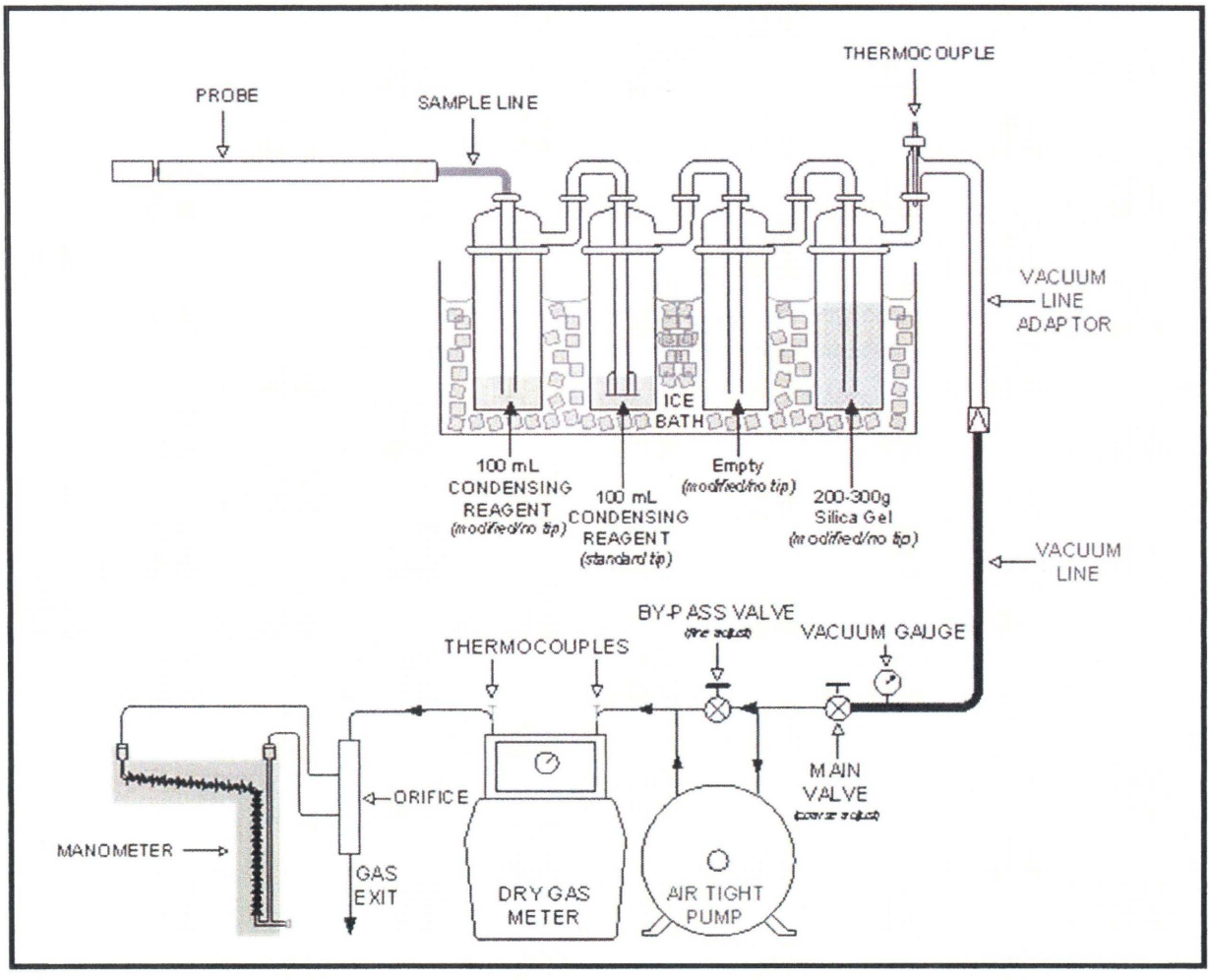
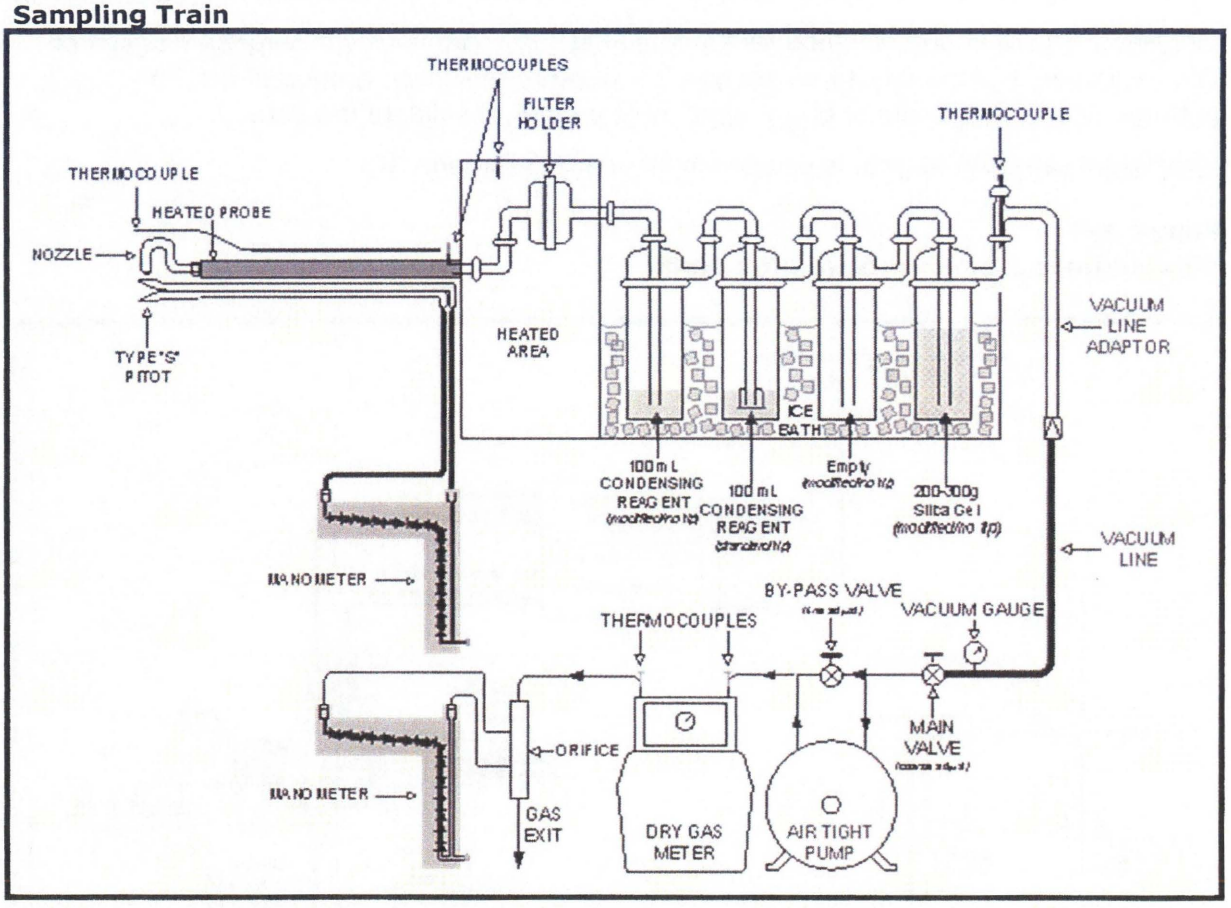


Figure 3-2
EPA Method 2 and Method 4
Sampling Train



3.1.5 EPA Method 7E, Determination of Nitrogen Oxides Emissions from Stationary Source (Instrumental Analyzer Procedure)

EPA Method 7E is an instrumental test method used to continuously measure emissions of NO_x as NO_2. Conditioned gas is sent to an analyzer to measure the concentration of NO_x. NO and NO_2 can be measured separately or simultaneously together but, for the purposes of this method, NO_x is the sum of NO and NO_2. The performance requirements of the method must be met to validate the data.

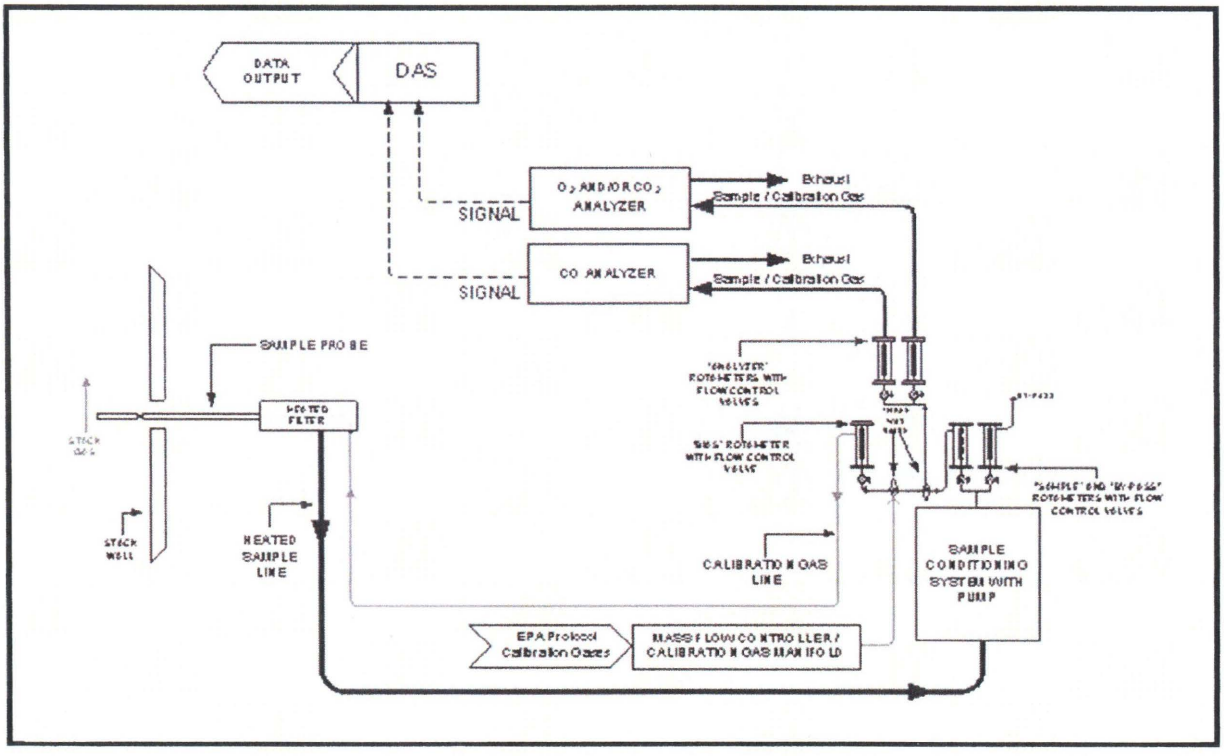
The typical sampling system is detailed in Figure 3-4.

3.1.6 EPA Method 10, Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 10 is an instrumental test method used to continuously measure emissions of CO. Conditioned gas is sent to an analyzer to measure the concentration of CO. The performance requirements of the method must be met to validate the data.

The typical sampling system is detailed in Figures 3-3 through 3-5.

Figure 3-3
EPA Methods 3A and 10 Sampling Train

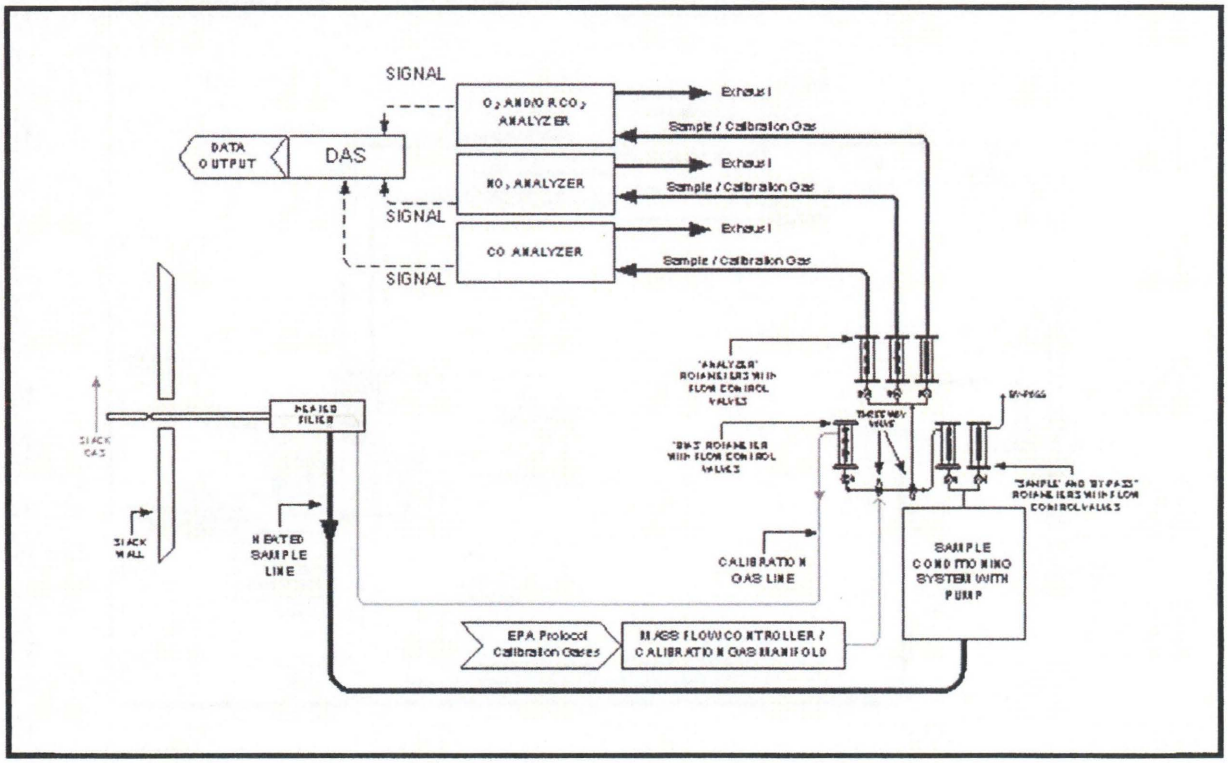


3.1.7 EPA Method 19, Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates

EPA Method 19 is a manual method used to determine (a) PM, SO_2, and NO_x emission rates; (b) sulfur removal efficiencies of fuel pretreatment and SO_2 control devices; and (c) overall reduction of potential SO_2 emissions. This method provides data reduction procedures, but does not include any sample collection or analysis procedures.

EPA Method 19 is used to calculate mass emission rates in units of lb/MMBtu. EPA Method 19, Table 19-2 contains a list of assigned fuel factors for different types of fuels, which can be used for these calculations.

Figure 3-4
EPA Methods 3A, 7E, and 10 Sampling Train

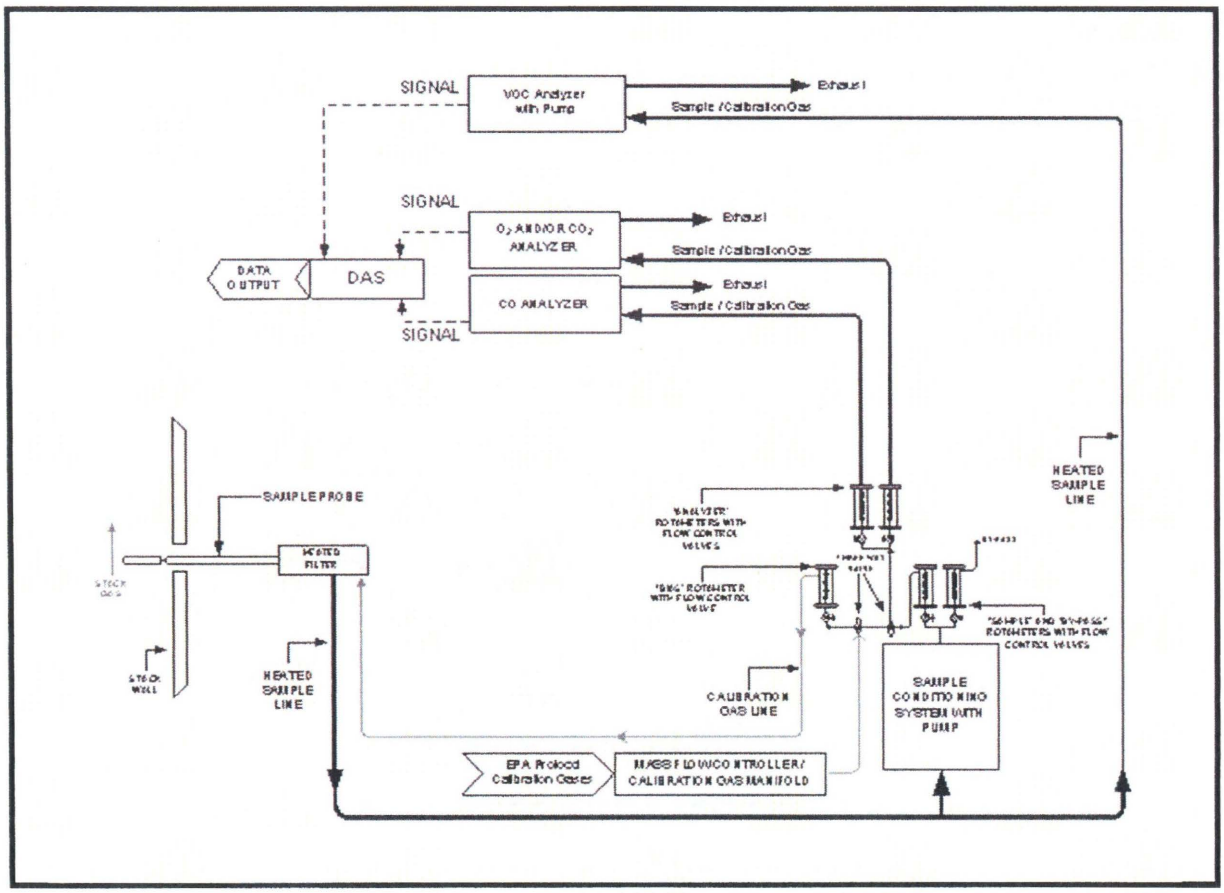


3.1.8 EPA Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

EPA Method 25A is an instrumental test method used to measure the concentration of THC in stack gas. A gas sample is extracted from the source through a heated sample line and glass fiber filter to a flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

The typical sampling system is detailed in Figure 3-5.

Figure 3-5
EPA Methods 3A, 10, and 25A Sampling Train



3.2 Process Test Methods

The test plan did not require that process samples be collected during this test program; therefore, no process sample data are presented in this test report.

4.0 Test Discussion and Results

4.1 Field Test Deviations and Exceptions

During FGBT0260-CO Exhaust Duct Run 1 (while firing fuel oil), a combustion turbine water injection pump went down. The unit was repaired, and testing resumed once FGT0260-CO was restored to normal operating conditions at full load. Run 1 was voided, and the test was restarted. The voided Run 1 data is included in the appendix for informational purposes only and was not used in any emissions calculations.

4.2 Presentation of Results

The average results are compared to the permit limits in Tables 1-3 through 1-8. The results of individual compliance test runs performed are presented in Tables 4-1 through 4-6. Emissions are reported in units consistent with those in the applicable regulations or requirements. Additional information is included in the appendices as presented in the Table of Contents.

The FGBT0260-CO Exhaust Duct was the only location where flow could be measured. As a result, heat input rates and fuel F-Factors were utilized to calculate lb/hr emissions at the EUB0260-06 Exhaust Duct and EUT0260-10 Exhaust Duct.

Table 4-1
CO and VOC Emissions Results -
EUB0260-06 (NG as Fuel)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	12/15/2022	12/15/2022	12/15/2022	--
Time	11:00-12:00	12:30-13:30	13:45-14:45	--
Process Data*				
Fuel Heat Input Rate, MMBtu/hr	240.54	240.55	240.52	240.54
F-Factor (F_d), dscf/MMBtu	8,635	8,635	8,635	8,635
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	4.64	4.65	4.66	4.65
CO_2, % volume dry	9.43	9.42	9.45	9.43
moisture content, % volume	12.76	11.80	11.59	12.05
Carbon Monoxide (CO)				
ppmvd	0.19	-0.048	-0.040	0.033
lb/MMBtu	0.00015	-0.000039	-0.000032	0.000027
lb/hr	0.036	-0.0094	-0.0078	0.0064
Volatile Organic Compounds (VOC), as propane				
ppmvd	1.45	1.55	1.58	1.53
lb/MMBtu	0.0018	0.0020	0.0020	0.0019
lb/hr	0.44	0.47	0.48	0.47

* Process data was provided by University of Michigan personnel.

Table 4-2
CO and VOC Emissions Results -
EUB0260-06 (FO as Fuel)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	12/16/2022	12/16/2022	12/16/2022	--
Time	7:50-8:50	9:05-10:05	10:20-11:20	--
Process Data*				
Fuel Heat Input Rate, MMBtu/hr	217.42	217.30	217.44	217.39
EPA Method 19 F-Factor (F_d), dscf/MMBtu	9,190	9,190	9,190	9,190
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	4.94	5.01	4.99	4.98
CO_2, % volume dry	12.17	11.94	11.99	12.03
moisture content, % volume	6.36	6.37	7.02	6.58
Carbon Monoxide (CO)				
ppmvd	-0.068	-0.012	0.37	0.098
lb/MMBtu	-0.000059	-0.000011	0.00033	0.000086
lb/hr	-0.013	-0.0023	0.071	0.019
Volatile Organic Compounds (VOC), as propane				
ppmvd	0.74	1.86	0.55	1.05
lb/MMBtu	0.0010	0.0026	0.00077	0.0015
lb/hr	0.22	0.56	0.17	0.32

* Process data was provided by University of Michigan personnel

Table 4-3
CO Emissions Results -
EUT0260-10 (NG as Fuel)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	12/13/2022	12/13/2022	12/13/2022	--
Time	9:10-10:10	10:25-11:25	11:50-12:50	--
Process Data				
Fuel Heat Input Rate, MMBtu/hr	56.37	56.01	55.89	56.09
F-Factor (F_d), dscf/MMBtu	8,635	8,635	8,635	8,635
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	15.25	15.32	15.32	15.30
CO_2, % volume dry	3.25	3.26	3.39	3.30
Carbon Monoxide (CO)				
ppmvd	17.9	17.8	17.7	17.8
lb/MMBtu	0.042	0.042	0.042	0.042
lb/hr	2.35	2.35	2.33	2.34

* Process data was provided by University of Michigan personnel.

Table 4-4
CO Emissions Results -
EUT0260-10 (FO as Fuel)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	12/13/2022	12/13/2022	12/13/2022	--
Time	13:50-14:50	15:05-16:05	16:15-17:15	--
Process Data				
Fuel Heat Input Rate, MMBtu/hr	55.78	55.73	55.61	55.71
EPA Method 19 F-Factor (F_d), dscf/MMBtu	9,190	9,190	9,190	9,190
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	15.37	15.34	15.40	15.37
CO_2, % volume dry	4.22	4.30	4.27	4.26
Carbon Monoxide (CO)				
ppmvd	17.7	19.0	22.6	19.8
lb/MMBtu	0.045	0.048	0.057	0.050
lb/hr	2.49	2.66	3.19	2.78

* Process data was provided by University of Michigan personnel.

Table 4-5
NO_x and CO Emissions Results -
FGBT0260-CO (NG as Fuel)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	12/14/2022	12/14/2022	12/14/2022	--
Time	9:15-10:15	10:30-11:30	11:45-12:45	--
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	11.23	10.52	10.81	10.85
CO_2, % volume dry	5.56	5.23	5.00	5.26
flue gas temperature, °F	357.7	357.3	357.8	357.6
moisture content, % volume	11.27	9.33	8.96	9.85
volumetric flow rate, dscfm	63,838	65,015	64,601	64,485
Nitrogen Oxides (NO_x)				
ppmvd	50.6	49.5	49.0	49.7
ppmvd @ 15% O_2	30.8	28.1	28.7	29.2
lb/hr, as NO_2	23.1	23.1	22.7	23.0
Carbon Monoxide (CO)				
ppmvd	81.8	79.6	80.0	80.5
lb/hr	22.8	22.6	22.5	22.6

Table 4-6
NO_x and CO Emissions Results -
FGBT0260-CO (NG as Fuel)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	12/14/2022	12/14/2022	12/14/2022	--
Time	17:05-18:05	18:30-19:30	19:50-20:50	--
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	11.71	11.73	12.15	11.86
CO_2, % volume dry	6.29	6.31	6.12	6.24
flue gas temperature, °F	356.2	357.6	359.3	357.7
moisture content, % volume	6.99	6.69	6.58	6.75
volumetric flow rate, dscfm	64,523	63,837	64,022	64,127
Nitrogen Oxides (NO_x)				
ppmvd	85.2	78.3	74.8	79.4
ppmvd @ 15% O_2	54.7	50.3	50.4	51.8
lb/hr, as NO_2	39.4	35.8	34.3	36.5
Carbon Monoxide (CO)				
ppmvd	68.6	69.2	78.3	72.0
lb/hr	19.3	19.3	21.9	20.1

5.0 Internal QA/QC Activities

5.1 QA/QC Audits

The meter box and sampling train used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes met the applicable QA/QC criteria.

EPA Method 3A, 7E, and 10 calibration audits were all within the measurement system performance specifications for the calibration drift checks, system calibration bias checks, and calibration error checks.

EPA Method 25A FIA calibration audits were within the measurement system performance specifications for the calibration drift checks and calibration error checks.

The NO_2 to NO converter efficiency check of the analyzer was conducted per the procedures in EPA Method 7E, Section 8.2.4. The conversion efficiency met the criteria.

5.2 QA/QC Discussion

All QA/QC criteria were met during this test program.

5.3 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. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).

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Appendix A
Field Data and Calculations

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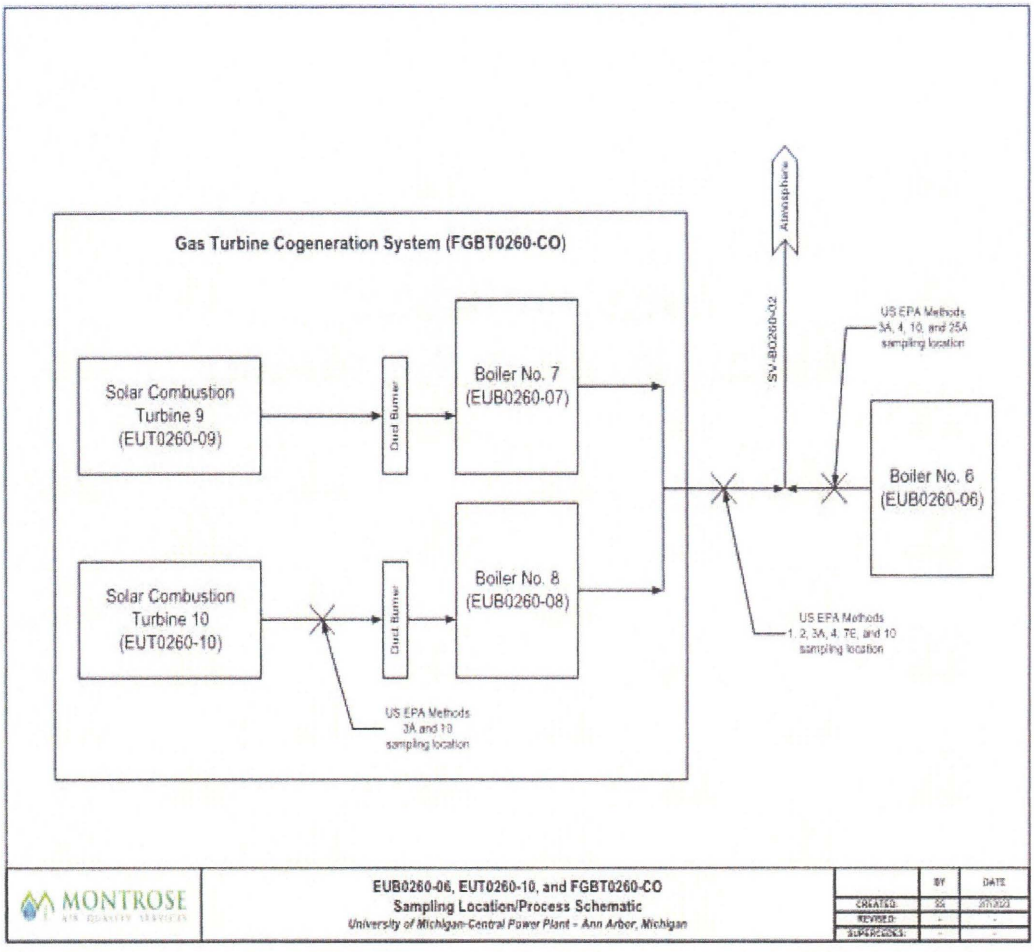
Appendix A.1
Sampling Locations


Gas Turbine Cogeneration System (FGBT0260-CO)
Solar Combustion Turbine 9 (EUT0260-09)
Duct Burner
Boiler No. 7 (EUB0260-07)
Solar Combustion Turbine 10 (EUT0260-10)
Duct Burner
Boiler No. 8 (EUB0260-08)
US EPA Methods 3A and 10 sampling location
SV-B0260-02
Atmosphere
US EPA Methods 3A, 4, 10, and 25A sampling location
Boiler No. 6 (EUB0260-06)
US EPA Methods 1, 2, 3A, 4, 7E, and 10 sampling location
MONTROSE
EUB0260-06, EUT0260-10, and FGBT0260-CO
Sampling Location/Process Schematic
University of Michigan-Central Power Plant - Ann Arbor, Michigan
BY
DATE
CREATED:
REVISED:
SUPERCEDES:

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Appendix A.2
EUB0260-06 Data Sheets