Source Test Report for 2023 Compliance Emissions Testing

Turbine (EUTURBINE) and Natural Gas-Fired Duct Burner (EUDUCTBURNER)

TransAlta Corporation
Ada, Michigan

Prepared For:

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For Submission To:

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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: Scott Dater **Date:** 12 / 07 / 2023

Name: Scott Dater **Title:** Field 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: John Nestor **Date:** 12 / 07 / 2023

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

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1.0 Introduction

1.1 Summary of Test Program

TransAlta Corporation contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance test program on the EUTURBINE and EUDUCTBURNER (FGENERGY) at the TransAlta Corporation/Ada Cogeneration LLC facility (State Registration No.: N1784) located in Ada, Michigan. Testing was performed on October 3-4, 2023, 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-N1784-2020.

The specific objectives were to:

- Measure emissions of NO_x and CO at the outlet of the turbine at low load (16.2 MW) with duct burner off (EUTURBINE)
- Measure emissions of NO_x and CO at the outlet of the turbine at high load (27.5 MW) with duct burner off (EUTURBINE)
- Measure emissions of NO_x and CO at the outlet of the turbine at low load (16.2 MW) with duct burner on (FGENERGY)
- Measure emissions of NO_x, CO, PM, and NMOC at the outlet of the turbine at high load (29.4 MW) with duct burner on (FGENERGY)
- Conduct the test program with a focus on safety

Montrose performed the tests to measure the emission parameters listed in Table 1-1.

Table 1-1
Summary of Test Program

Test Date(s)	Unit ID/ Source Name	Activity/Parameters	Test Methods	No. of Runs	Duration (Minutes)
10/3/2023	EUTURBINE (Low Load)	O_2	EPA 3A	3	60
10/3/2023	EUTURBINE (Low Load)	NO_x	EPA 7E	3	60
10/3/2023	EUTURBINE (Low Load)	CO	EPA 10	3	60
10/3/2023	EUTURBINE (High Load)	O_2	EPA 3A	3	60
10/3/2023	EUTURBINE (High Load)	NO_x	EPA 7E	3	60
10/3/2023	EUTURBINE (High Load)	CO	EPA 10	3	60
10/4/2023	FGENERGY (Low Load)	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	60
10/4/2023	FGENERGY (Low Load)	O_2, CO_2	EPA 3A	3	60
10/4/2023	FGENERGY (Low Load)	Moisture	EPA 4	3	60

Test Date(s)	Unit ID/ Source Name	Activity/Parameters	Test Methods	No. of Runs	Duration (Minutes)
10/4/2023	FGENERGY (Low Load)	NO_x	EPA 7E	3	60
10/4/2023	FGENERGY (Low Load)	CO	EPA 10	3	60
10/4/2023	FGENERGY (High Load	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	60
10/4/2023	FGENERGY (High Load	O_2, CO_2	EPA 3A	3	60
10/4/2023	FGENERGY (High Load	Moisture	EPA 4	3	60
10/4/2023	FGENERGY (High Load	FPM	EPA 5	3	60
10/4/2023	FGENERGY (High Load	NO_x	EPA 7E	3	60
10/4/2023	FGENERGY (High Load	CO	EPA 10	3	60
10/4/2023	FGENERGY (High Load	VOC	EPA 25A/18	3	60

To simplify this report, a list of Units and Abbreviations is included in Appendix D.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 1-2 through 1-5. 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 1-6. The tests were conducted according to the test plan (protocol) dated August 23, 2023 that was submitted to the EGLE.

Table 1-2
Summary of Average Compliance Results – EUTURBINE (Low Load)

October 3, 2023

Parameter/Units	Average Results	Emission Limits
Nitrogen Oxides (NO_x)		
ppmvd @ 15% O_2	31.5	42
Carbon Monoxide (CO)		
lb/MMBtu	0.091	0.13

Table 1-3
Summary of Average Compliance Results – EUTURBINE (High Load)

October 3, 2023

Parameter/Units	Average Results	Emission Limits
Nitrogen Oxides (NO_x)		
ppmvd @ 15% O_2	33.4	42
Carbon Monoxide (CO)		
lb/MMBtu	0.028	0.13

Table 1-4
Summary of Average Compliance Results – FGENERGY (Low Load)

October 4, 2023

Parameter/Units	Average Results	Emission Limits
Nitrogen Oxides (NO_x)		
lb/hr	26.6	47.9
Carbon Monoxide (CO)		
lb/hr	13.1	91.5

Table 1-5
Summary of Average Compliance Results – FGENERGY (High Load)

October 4, 2023

Parameter/Units	Average Results	Emission Limits
Filterable Particulate Matter (FPM)		
lb/hr*	<0.73	5.61
lb/MMBtu*	<0.003	0.02
Nitrogen Oxides (NO_x)		
lb/hr	36.7	47.9
Carbon Monoxide (CO)		
lb/hr	4.2	91.5
Nonmethane Organic Compounds (NMOC), as propane		
lb/hr*	0.0	1.0

* See Section 4.2 for details

1.2 Key Personnel

A list of project participants is included below:

Facility Information

Source Location:	TransAlta Corporation Ada Cogeneration LLC 7575 East Fulton Ada, Michigan 49501
Project Contact:	Steve Wonnacott
Role:	Plant Manager
Company:	TransAlta Corporation
Telephone:	616-825-6452
Email:	Steve_Wonnacott@transalta.com

Agency Information

Regulatory Agency:	Michigan Department of Environment, Great Lakes, and Energy	
Contact:	Dillon King	Trevor Drost
Telephone:	616-280-0292	517-245-5781
Email:	KingD36@Michigan.gov	DrostT@Michigan.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC	
Contact:	John Nestor	Scott Dater
Title:	District Manager	Field Project Manager
Telephone:	248-765-5032	630-860-4740
Email:	jonestor@montrose-env.com	sadater@montrose-env.com

Laboratory Information

Laboratory:	Montrose
City, State:	Royal Oak, Michigan
Method:	EPA Method 5
Laboratory:	Montrose
City, State:	Elk Grove Village, Illinois
Method:	EPA Method 18

Test personnel and observers are summarized in Table 1-6.

Table 1-6
Test Personnel and Observers

Name	Affiliation	Role/Responsibility
Scott Dater	Montrose	Filed Project Manager, QI
Shane Rabideau	Montrose	Field Technician
Roy Zimmer	Montrose	Field Technician
Trevor Bennet	Montrose	Field Technician
Sin Hoi Chiew	Montrose	Calculations and report preparation
Steve Wonnacott	TransAlta Corporation	Test Coordinator
Trevor Drost	EGLE	Observer

2.0 Plant and Sampling Location Descriptions

2.1 Process Description, Operation, and Control Equipment

The Ada facility is a 29 MW contracted cogeneration facility located in Ada, Michigan. The facility has been in operation since 1991, and comprises a single GE LM2500 natural gas-fired turbine and an ABB steam turbine that also generates electricity. Up to 50,000 pounds of steam per hour is extracted from the steam turbine for export.

The GE LM2500 gas turbine (EUTURBINE) is used to produce electricity. The hot exhaust gases from the turbine flow through a Heat Recovery Steam Generator (HRSG) which supplies steam to the steam turbine to generate additional electricity and steam for export." A 45 MMBTU/hr duct burner (EUDUCTBURNER) is installed in the gas stream ahead of the HRSG to provide additional heat to generate extra steam for electricity generation and export. EUDUCTBURNER is designed to only operate in tandem with EUTURBINE and therefore cannot be operated separately. FGENERGY is the designated Flexible Group ID for combined turbine and duct burner operations.

2.2 Flue Gas Sampling Location

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

Table 2-1
Sampling Location

Sampling Location*	Source/ Load	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
			Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
Turbine Exhaust (SVTURBINE/DUCT)	EUTURBINE Low Load	89.5	394.75 / 4.4	96 / 1.1	Gaseous: 3
Turbine Exhaust (SVTURBINE/DUCT)	EUTURBINE High Load	89.5	394.75 / 4.4	96 / 1.1	Gaseous: 3
Turbine Exhaust (SVTURBINE/DUCT)	FGENERGY Low Load	89.5	394.75 / 4.4	96 / 1.1	Flow: 16 (4/port) Moisture: 1 Gaseous: 3
Turbine Exhaust (SVTURBINE/DUCT)	FGENERGY High Load	89.5	394.75 / 4.4	96 / 1.1	Isokinetic: 24 (6/port) Gaseous: 3

* EUDUCTBURNER shares stack SVTURBINE/DUCT with EUTURBINE

The sample 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. See Appendix A.1 for more information.

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 FGENERGY (EUTURBINE and EUDUCTBURNER) was tested at Low (16.2 MW ± 5%) and High (29.4 MW ± 10%) Loads. The EUTURBINES (EUDUCTBURNER-Off) was at tested at Low (16.2 MW ± 10%) and High (27.5 MW ± 10%) Loads.

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 for all four testing scenarios:

- Gross Gas Turbine Load. MW
- Gross Steam Turbine Load, MW
- Net Plant Load, MW
- GT Natural Gas Totalizer, 1000 ft3
- DB Natural Gas Totalizer, 100 ft3
- NOx Fuel Water Ratio
- GT Heat Input for the Hour HHV, MMBTU
- Duct Burner Heat Input for the Hour HHV, 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 samples or 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.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - None
- Method Exceptions:
  - When cyclonic flow patterns exist, one (or more) of the recommendations listed in EPA Guideline Document GD-008 are implemented (in sequential order)

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

3.1.2 EPA Method 2, Determination of 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 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.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - S-type pitot tube coefficient is 0.84

- Method Exceptions:
  - A flow traverse is conducted once during each test run to represent the flow rate for the entire test run (turbine at low load with duct burner on)
  - Stack gas temperatures thermocouples are checked using EPA Alternate Method 011 (ALT-011). A single-point calibration is performed using a NIST-traceable thermometer.

The typical sampling system is detailed in Figures 3-1 and 3-2.

3.1.3 EPA Methods 3A, 7E, and 10, Determination of Oxygen, Carbon Dioxide, Nitrogen Oxides, and Carbon Monoxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

Concentrations of O_2, CO_2, NO_x, and CO are measured simultaneously using EPA Methods 3A, 7E, and 10, which are instrumental test methods. Conditioned gas is sent to a series of analyzers to measure the gaseous emission concentrations. The performance requirements of the method must be met to validate the data.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - A dry extractive sampling system is used to report emissions on a dry basis
  - A paramagnetic analyzer is used to measure O_2
  - A nondispersive infrared analyzer is used to measure CO_2
  - Calibration span values are 10.22% O_2 and 9.69% CO_2
  - A chemiluminescent analyzer is used to measure NO_x
  - Calibration span value of 96.20 ppmv NO_x is used
  - A gas filter correlation nondispersive infrared analyzer is used to measure CO
  - Calibration span value of 95.91 ppmv CO is used
- Method Exceptions:
  - For gaseous emissions sampling, MDL are calculated for each analyzer. The ISDL is equal to the sensitivity of the instrumentation, which is 2% of the span value.
- Target and/or Minimum Required Sample Duration: 60 minutes
- Target Analytes: O_2, CO_2, NO_x, and CO

The typical sampling system is detailed in Figures 3-3 and 3-4.

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

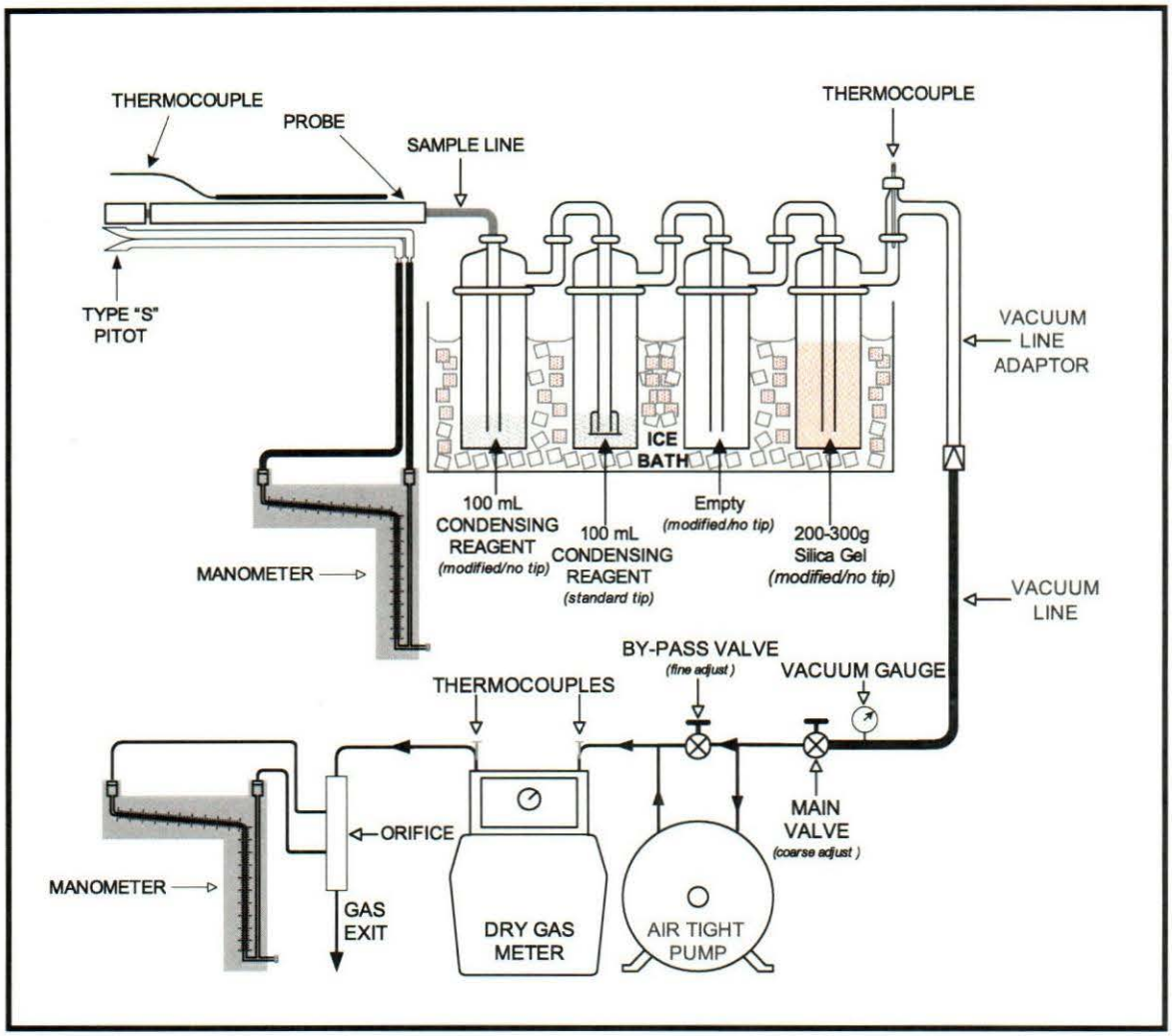
EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed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

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - The reference method is used to measure moisture
  - Moisture sampling is performed as part of the pollutant sample trains (turbine at high load with duct burner on)
  - Since it is theoretically impossible for measured moisture to be higher than psychrometric moisture, the psychrometric moisture is also calculated, and the lower moisture value is used in the calculations
- Method Exceptions:
  - Moisture sampling is performed as a stand-alone method at a single point in the centroid of the stack (turbine at low load with duct burner on)
- Target and/or Minimum Required Sample Duration: 60 minutes
- Target and/or Minimum Required Sample Volume: 21 scf

The typical sampling system is detailed in Figures 3-1 and 3-2.

Figure 3-1
EPA Method 4 Detached with Pitots Sampling Train



3.1.5 EPA Method 5, Determination of Particulate Matter Emissions from Stationary Sources

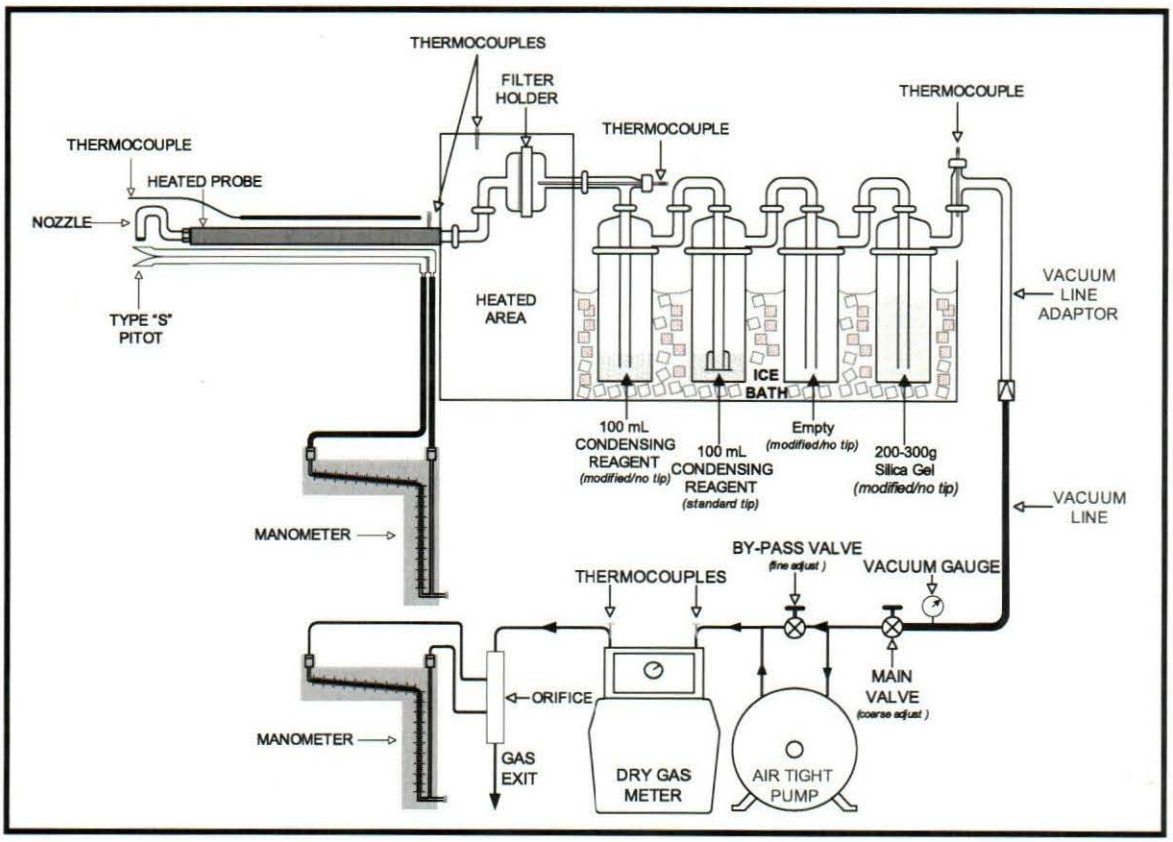
EPA Method 5 is a manual, isokinetic method used to measure FPM emissions. FPM is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 120 ± 14 °C (248 ± 25 °F) or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. The FPM mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after the removal of uncombined water.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Glass sample nozzles and probe liners are used
- Method Exceptions:
  - None
- Target and/or Minimum Required Sample Duration: 60 minutes
- Analytical Laboratory: Montrose, Royal Oak, Michigan

The typical sampling system is detailed in Figure 3-2.

Figure 3-2
EPA Method 5 Sampling Train



3.1.6 EPA Method 19, Measurement 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.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - F factor is the oxygen-based F factor, dry basis (F_d)
  - F factor is the published source-based F factor in EPA Method 19, Table 19-2 for natural gas, 8,710 dscf/MMBtu
- Method Exceptions:
  - None

3.1.7 EPA Methods 25A and 18, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer and Measurement of Gaseous Organic Compound Emissions by Gas Chromatography

EPA Method 25A is an instrumental test method used for the determination of total gaseous organic concentration of vapors in stack gas. A gas sample is extracted from the source through a heated sample line and glass fiber filter to an FIA. Results are reported as THC as volume concentration equivalents of the calibration gas, typically propane, or as carbon equivalents.

EPA Method 18 is used to measure gaseous organic compounds from stationary sources. The major organic components of a gas mixture are separated by GC and are individually quantified using a FID, PID, ECD, or other appropriate detection principles. The retention times of each separated component are compared with those of known compounds under identical conditions. The GC analyst confirms the identity and approximate concentrations of the organic emission components beforehand. With this information, the analyst then prepares or purchases commercially available standard mixtures to calibrate the GC under conditions identical to those of the samples. The analyst also determines the need for sample dilution to avoid detector saturation, gas stream filtration to eliminate particulate matter, and prevention of moisture condensation.

Total non-methane hydrocarbons concentrations are determined by subtracting methane from THC.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Results are measure and reported in terms of propane
  - Integrated bag sampling and analysis is performed for Method 18
- Method Exceptions:
  - For gaseous emissions sampling, MDL are calculated for each analyzer. The ISDL is equal to the sensitivity of the instrumentation, which is 2% of the span value (2.02 ppmv).
  - Span value for THC is 101.1 ppmv for EPA Method 25A
  - VOC emissions on a CH_4 basis are calculated by multiplying the concentrations as C_3H_8 by the response factor of the analyzer (2.38)
- Target Analytes: Total non-methane hydrocarbons excluding exempt compounds as defined by EGLE
- Target and/or Minimum Required Sample Duration: 60 minutes
- Analytical Laboratory: Montrose, Elk Grove Village, IL

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

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

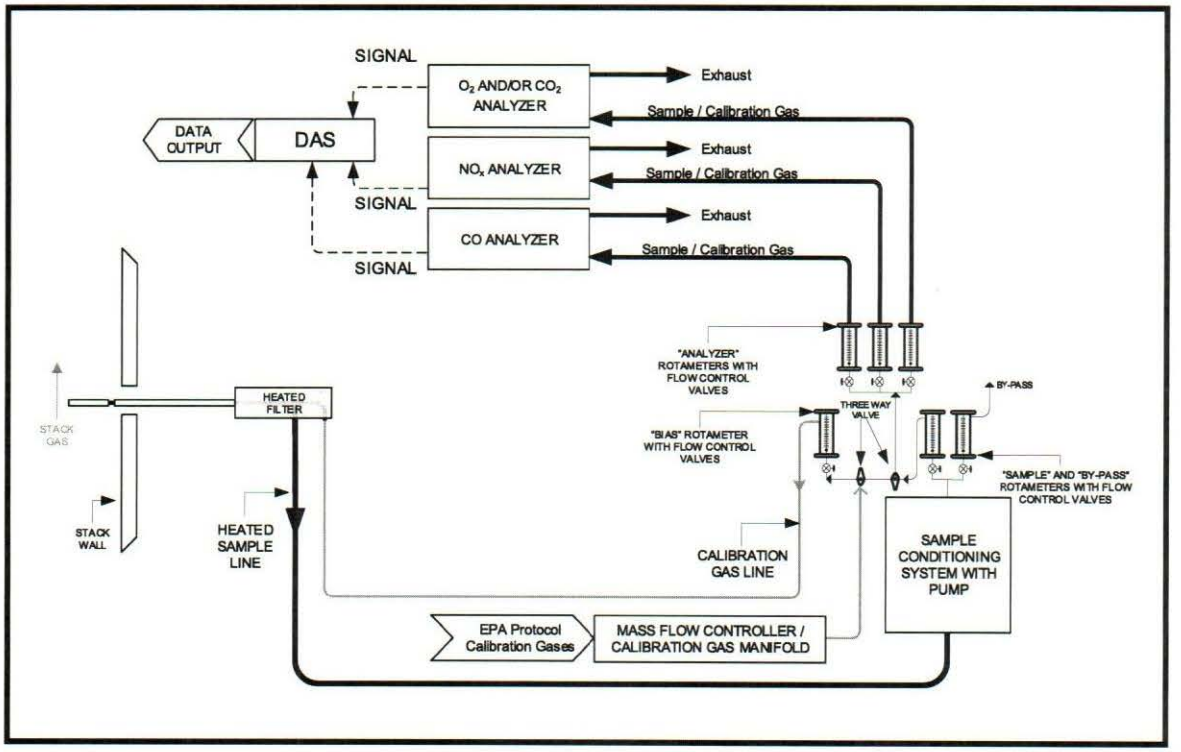
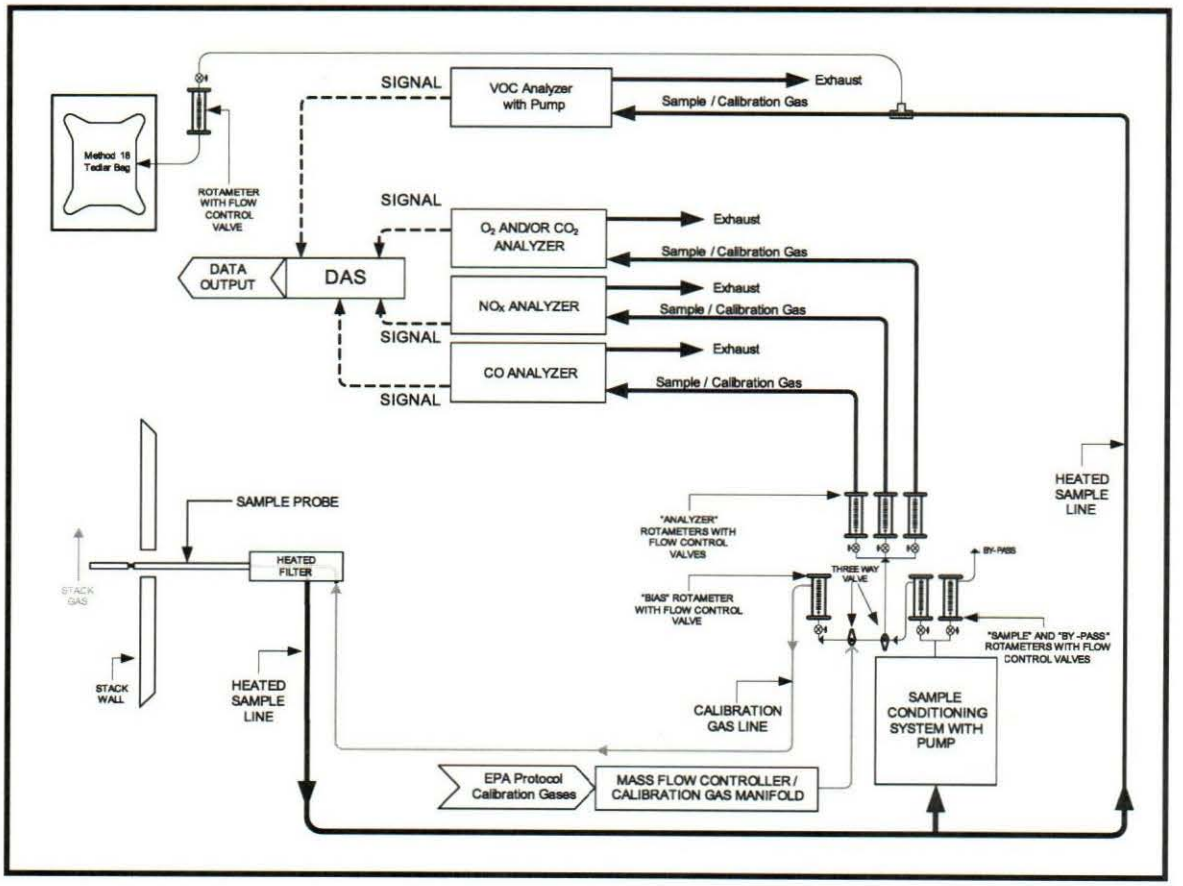


Figure 3-4
EPA Method 3A, 7E, 10, 18 (Bag), and 25A Sampling Train



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

No field deviations or exceptions from the test plan or test methods occurred during this test program.

4.2 Presentation of Results

The average results are compared to the permit limits in Tables 1-2 through 1-5. The results of individual compliance test runs performed are presented in Tables 4-1 through 4-4. 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.

THC, as propane, concentrations displayed in Table 4-4 are below the minimum detection limit (MDL) for the analyzer (2.02 ppmv). Table 4-4 utilizes the as measured concentration values, as opposed to the MDL, in determining NMOC emissions.

NMOC concentration values for each run in Tables 4-4 were determined to be negative when methane, as propane, was subtracted from THC, as propane. As a result, the NMOC concentrations are a assigned a value of zero. NMOC emissions in Table 4-4 were then calculated utilizing the zero-concentration value instead of the negative concentration value.

The FPM concentration value for Run 3 displayed in Table 4-4 denoted with a '<' was measured to be below the minimum detection limit (MDL) of the applicable analytical method. FPM Emissions (lb/hr) denoted with a '<' in Run 3 of Table 4-4 were calculated utilizing the applicable MDL concentration value instead of the "as measured" concentration value.

Table 4-1
NO_x and CO Emissions Results -
EUTURBINE (Low Load)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	10/3/2023	10/3/2023	10/3/2023	--
Time	13:05-14:04	14:25-15:24	15:48-16:47	--
Process Data*				
Gross Gas Turbine Load, MW	14.54	14.59	14.59	14.57
Gross Steam Turbine Load, MW	2.62	2.60	2.58	2.60
Net Plant Load, MW	16.26	16.25	16.23	16.25
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	15.22	15.21	15.21	15.21
Nitrogen Oxides (NO_x)				
ppmvd	30.3	30.4	30.3	30.3
ppmvd @ 15% O_2	31.5	31.5	31.4	31.5
Carbon Monoxide (CO)				
ppmvd	42.1	37.6	37.5	39.0
lb/MMBtu	0.098	0.088	0.087	0.091

* Process data was provided by TransAlta Corporation / Ada Cogeneration LLC personnel.

Table 4-2
NO_x and CO Emissions Results -
EUTURBINE (High Load)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	10/3/2023	10/3/2023	10/3/2023	--
Time	8:17-9:16	9:41-10:40	11:04-12:03	--
Process Data*				
Gross Gas Turbine Load, MW	22.48	22.16	21.85	22.16
Gross Steam Turbine Load, MW	6.29	6.33	6.31	6.31
Net Plant Load, MW	27.80	27.50	27.20	27.50
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	14.12	14.14	14.15	14.14
Nitrogen Oxides (NO_x)				
ppmvd	39.0	38.3	37.4	38.3
ppmvd @ 15% O_2	33.9	33.4	32.7	33.4
Carbon Monoxide (CO)				
ppmvd	16.2	12.3	14.5	14.4
lb/MMBtu	0.032	0.024	0.028	0.028

* Process data was provided by TransAlta Corporation / Ada Cogeneration LLC personnel.

Table 4-3
NO_x and CO Emissions Results -
FGENERGY (Low Load)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	10/4/2023	10/4/2023	10/4/2023	--
Time	15:54-16:54	17:19-18:19	18:42-19:42	--
Process Data*				
Gross Gas Turbine Load, MW	14.26	14.26	14.27	14.26
Gross Steam Turbine Load, MW	2.96	2.91	2.89	2.92
Net Plant Load, MW	16.26	16.34	16.20	16.27
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	15.06	15.06	14.91	15.01
CO_2, % volume dry	3.47	3.47	3.42	3.45
flue gas temperature, °F	335.9	308.1	317.7	320.6
moisture content, % volume	6.96	9.26	8.50	8.24
volumetric flow rate, dscfm	102,180	98,636	99,202	100,006
Nitrogen Oxides (NO_x)				
ppmvd	37.3	37.5	36.8	37.2
lb/hr	27.3	26.5	26.1	26.6
Carbon Monoxide (CO)				
ppmvd	30.1	32.0	28.3	30.1
lb/hr	13.4	13.8	12.2	13.1

* Process data was provided by TransAlta Corporation / Ada Cogeneration LLC personnel.

Table 4-4
FPM, NO_x, CO, and NMOC Emissions Results - FGENERGY (High Load)

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	10/4/2023	10/4/2023	10/4/2023	--
Time	8:40-10:12	10:48-12:15	12:51-14:38	--
Process Data*				
Gross Gas Turbine Load, MW	21.91	21.72	21.56	21.73
Gross Steam Turbine Load, MW	8.55	8.70	8.84	8.70
Net Plant Load, MW	29.50	29.47	29.44	29.47
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	13.24	13.24	13.11	13.20
CO_2, % volume dry	4.47	4.49	4.58	4.51
flue gas temperature, °F	361.5	358.5	360.0	360.0
moisture content, % volume	11.84	11.69	11.61	11.71
volumetric flow rate, dscfm	113,729	114,382	112,640	113,583
Filterable Particulate Matter (FPM)				
gr/dscf	0.0012	0.00068	<0.00040	<0.00075
lb/hr	1.13	0.67	<0.39	<0.73
lb/MMBtu	0.0039	0.0023	<0.0013	<0.0025
Nitrogen Oxides (NO_x)				
ppmvd	44.7	45.2	45.4	45.1
lb/hr	36.4	37.0	36.6	36.7
Carbon Monoxide (CO)				
ppmvd	8.7	8.0	8.8	8.5
lb/hr	4.3	4.0	4.3	4.2
Methane (CH_4), as propane				
ppmvd	0.57	0.49	0.56	0.54
Total Hydrocarbon (THC), as propane				
ppmvd §	0.25	0.20	0.22	0.22
Nonmethane Organic Compounds (NMOC), as propane				
ppmvd †	0	0	0	0
lb/hr †	0	0	0	0

* Process data was provided by TransAlta Corporation / Ada Cogeneration LLC personnel.
§ THC, as propane, is below the Minimum Detection Limit (MDL) of the analytical method. See Section 4.2 for details.
† See Section 4.2 for details.

5.0 Internal QA/QC Activities

5.1 QA/QC Audits

The meter box and sampling trains used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes, minimum sample durations, and percent isokinetics 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.

EPA Method 5 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met. An EPA Method 5 reagent blank was analyzed. The maximum allowable amount that can be subtracted is 0.001% of the weight of the acetone used. The blank did not exceed the maximum residue allowed.

EPA Method 18 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met.

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).