

1.0 PROJECT OVERVIEW

1.1 GENERAL

Montrose Air Quality Services, LLC (Montrose) located at 1371 Brummel Avenue, Elk Grove Village, Illinois was contracted by Bluewater Gas Storage, LLC to perform an air emission test program at the Omo Road Station located in Ray Township, Michigan. Testing was performed to satisfy the requirements of the Michigan Department of Environmental - Quality (MDEQ) PTI, the United States Environmental Protection Agency (U.S. EPA), 40 CFR 63.6640 (c), Subpart ZZZZ and KKKK as applicable.

The specific objective of the test program is as follows:

- Determine the nitrogen oxides (NO_x) and carbon monoxide (CO) emissions from one (1) natural gas fired, turbine at the Omo Road Station

Testing was performed on EUTUR01, on December 8, 2021. Coordinating the field aspects of the test program were:

James Jensen – WEC Energy Group - (414) 221-2530

Frank Rasmussen – Bluewater Gas Storage - (810) 305-3912

Brandon Check – Montrose Air Quality Services, LLC - (630) 860-4740

1.2 EXECUTIVE SUMMARY

The results of the test program are summarized in the following table.

**TABLE 1-1
 EXECUTIVE SUMMARY**

Location	SO ₂ (lb/MMBtu)		NO _x (ppmdv@15%O ₂)		NO _x (lb/hr)		CO (lb/hr)	
	Limit	Result	Limit	Result	Limit	Result	Limit	Result
EUTUR01	0.060	See Appendices G & H	25	8.56	5.18	0.934	5.25	0.174

1.3 ASTM D7036-04(2011)

All applicable Montrose field personnel used on-site for this test program were compliant with ASTM D7036-04(2011) “Standard Practice for Competence of Air Emissions Testing Bodies” for all tests performed. This includes having the appropriate QSTI directly supervise the testing.

The following table summarizes the key personnel that were involved with this project:

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**TABLE 1-2
PROJECT PERSONNEL**

Personnel	Position on Project	Date of QSTI Exam
Brandon Check, Q.S.T.I.	Client Project Manager	04/28/2021

1.4 METHODOLOGY

The concentrations of oxygen (O₂), NO_x, and CO at the exhaust of each engine was determined using EPA Methods 3A, 7E and 10. The sample gas was withdrawn from the outlet at a constant rate through a stainless steel probe, a glass fiber filter and a Teflon sample line. The probe, filter and sample line were operated at a minimum temperature of 250 °F to prevent the condensation of moisture. The sample gas passed through a gas cooler system. The gas cooler consists of two separate stages designed to lower the dew point of the sample gas to 35 °F, thus removing the moisture. Each stage of the gas cooler is designed to minimize contact of condensed moisture with the dry sample gas. The dry gas is then delivered to the O₂, NO_x and CO analyzers.

Three (3) thirty (30) minute test runs were performed at the outlet of each engine. Results from the analyzers were determined on a “dry” basis. Results are in parts per million dry volume (ppmdv), ppmdv at 15 percent (%) O₂ (ppmdv@15%) (NO_x only) and in pound per hour (lb/hr).

1.5 PARAMETERS

The following specific parameters were determined at each engine at the Bluewater Gas Storage Station test locations during each test run:

- oxygen concentration
- nitrogen oxides concentration
- carbon monoxide concentration

1.6 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 presented in the report appendices.

1.7 RESULTS

A complete summary of test results is presented in Tables 2-1 and 2-2.

Testing was performed according to Test Plan No. MW023AS-007099-PP-338. The procedures outlined in that document were followed.

Bluewater Gas Storage, LLC – Omo Road Station Ray Township, Michigan
2021 Compliance Demonstration EUTUR01

Sample measurements were conducted at three points on the line passing through the centroidal area at 16.7, 50.0, and 83.3 percent (%) of the measurement line. Each point was sampled for ten (10) minutes for each thirty (30) minute test run.

2.0 SUMMARY OF RESULTS

**TABLE 2-1
 SUMMARY OF EUTUR01 RESULTS**

Test Parameters	Run 1	Run 2	Run 3	Average
Date	12/8/2021	12/8/2021	12/8/2021	
Start Time	12:20	13:45	14:25	
Stop Time	12:50	14:15	14:55	
Gas Conditions				
Oxygen (% dry)	15.8	15.3	15.3	15.5
Fuel Factor, Fd	8611	8611	8611	8611
Fuel Flow (MSCH)	28.1	28.1	28.1	28.1
Heating Value (BTU)	1066	1066	1066	1066
Heat Input (MMBTU/hr)	30.0	29.9	29.9	30.0
Nitrogen Oxides Results				
Concentration (ppmdv)	8.17	7.73	7.55	7.82
Concentration, C (ppmdv@15% O ₂)	9.53	8.19	41.4	8.56
Emission rate, E (lb/mmBTU)	0.0347	0.0298	0.151	0.0312
Emission rate (lb/hr)	1.04	0.893	0.868	0.934
Carbon Monoxide Results				
Concentration (ppmdv)	1.94	2.54	2.76	2.41
Concentration, C (ppmdv@15% O ₂)	2.26	2.69	2.91	2.62
Emission rate, E (lb/mmBTU)	0.00501	0.00596	0.00644	0.00580
Emission Rate (lb/hr)	0.150	0.178	0.193	0.174

**TABLE 2-2
 EUTUR01 PROCESS DATA**

Run	Temperature (°F)	Humidity (%)	Pressure (in)	Engine Temperature (°F)	Fuel Flow (MSCFH)	Fuel Consumed (MSCF)
1	28	60	29.97	1372	28.13	35.05
2	30	55	29.96	1372	28.08	34.63
3	30	58	29.97	1373	28.09	35.50

3.0 TEST PROCEDURES

3.1 METHOD LISTING

The following EPA test methods were referenced for the test program. These methods can be found in 40 CFR Part 60 Appendix A and 40 CFR Part 63, Appendix A.

- Method 3A Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- Method 7E Determination of nitrogen oxides emissions from stationary sources
- Method 10 Determination of carbon monoxide emissions from stationary sources
- Method 19 Determination of sulfur dioxide removal efficiency and particulate matter, sulfur dioxide, and nitrogen oxides emission rates

3.2 METHOD DESCRIPTIONS

3.2.1 Methods 3A, 7E and 10

The oxygen, nitrogen oxides and carbon monoxide concentrations at the test location were determined using EPA Methods 3A, 7E and 10. A schematic of the sample system is shown in Figure 1 in the Appendix.

The sample gas was withdrawn from the test location at a constant rate through an in-situ 0.3 micron stainless steel cindered frit, a stainless steel probe and Teflon sample line. The sample line was operated at a temperature of 250 °F to prevent the condensation of moisture. The sample gas passed through an M&C Type EC gas cooler system. The gas cooler is designed to unobtrusively lower the dewpoint of the sample gas to 35 °F, thus removing the moisture. The dry gas was then vented to the oxygen analyzer. Results from this analyzer were determined on a dry basis.

The analyzers that were used for this project are listed in the table below.

**TABLE 3-1
 ANALYZERS USED FOR PROJECT**

Parameter	Manufacturer	Model Number	Operating Principle	Units Reported	Ranges Used
Oxygen	Servo	1440	Paramagnetic	(%)	0-20.96
Nitrogen Oxides	Thermo	42i	Chemiluminescence	ppmd	0-45.03
Carbon Monoxide	Thermo	48i-TLE	Infrared, Gas Filter Correlation	ppmd	0-44.22

Prior to sampling, a calibration error test was performed on the analyzer using EPA Protocol 1 gases. The zero and high-range calibration gases for each constituent was introduced directly into each analyzer. Each analyzer was then adjusted to the appropriate values. The mid-range and low-range gases were introduced to each analyzer and the measured values were then recorded. The measured values for each calibration gas were compared to the calibration gas

values and the differences were less than the method requirement of two percent of the span value.

A sample system bias check was performed, by introducing the zero and mid-range calibration gases into the sampling system at the base of the probe. The gas was drawn through the entire sampling system. The measured responses were compared to the calibration error test values to determine the bias in response due to the sampling system. In all cases, the sampling system bias was less than the method requirement of five percent of the span value. In addition, the system response time was determined by measuring the time required for each analyzer to reach 95 percent of its' high-range calibration gas value.

After each test run the instrument drift for the analyzer was determined by introducing the zero and mid-range calibration gases into the sampling system at the base of the probe. The gas was drawn through the entire sampling system. The measured responses were compared to the values from the previous test run to determine the analyzer drift. For all test runs, the analyzer drift was less than the method requirement of three percent of the span value.

3.2.2 Method 19

EPA Method 19 was used to calculate pollutant emission rates in terms of pounds per million Btu (lb/mmBtu). The calculation was based on the oxygen content of the sample gas and an appropriate F factor, which is the ratio of combustion gas volumes to heat inputs. For this project the F factor used was 8,611 dscf/mmBtu for natural gas.

4.0 DESCRIPTION OF INSTALLATION

Bluewater primarily provides seasonal storage needs throughout the Midwestern and Northeastern portions of the U.S. and the Southeastern portion of Canada. Bluewater's customers consist primarily of pipelines, utilities and marketers seeking seasonal storage services. Bluewater's 30mile, 20inch diameter pipeline header system connects with three interstate and three intrastate natural gas utility pipelines that provide access to the major market hubs of Chicago, Illinois and Dawn, Ontario, which supply natural gas to eastern Ontario and the northeastern United States. These interconnects also provide access to natural gas utilities that serve local markets in Michigan and Ontario.

APPENDIX A FIGURES

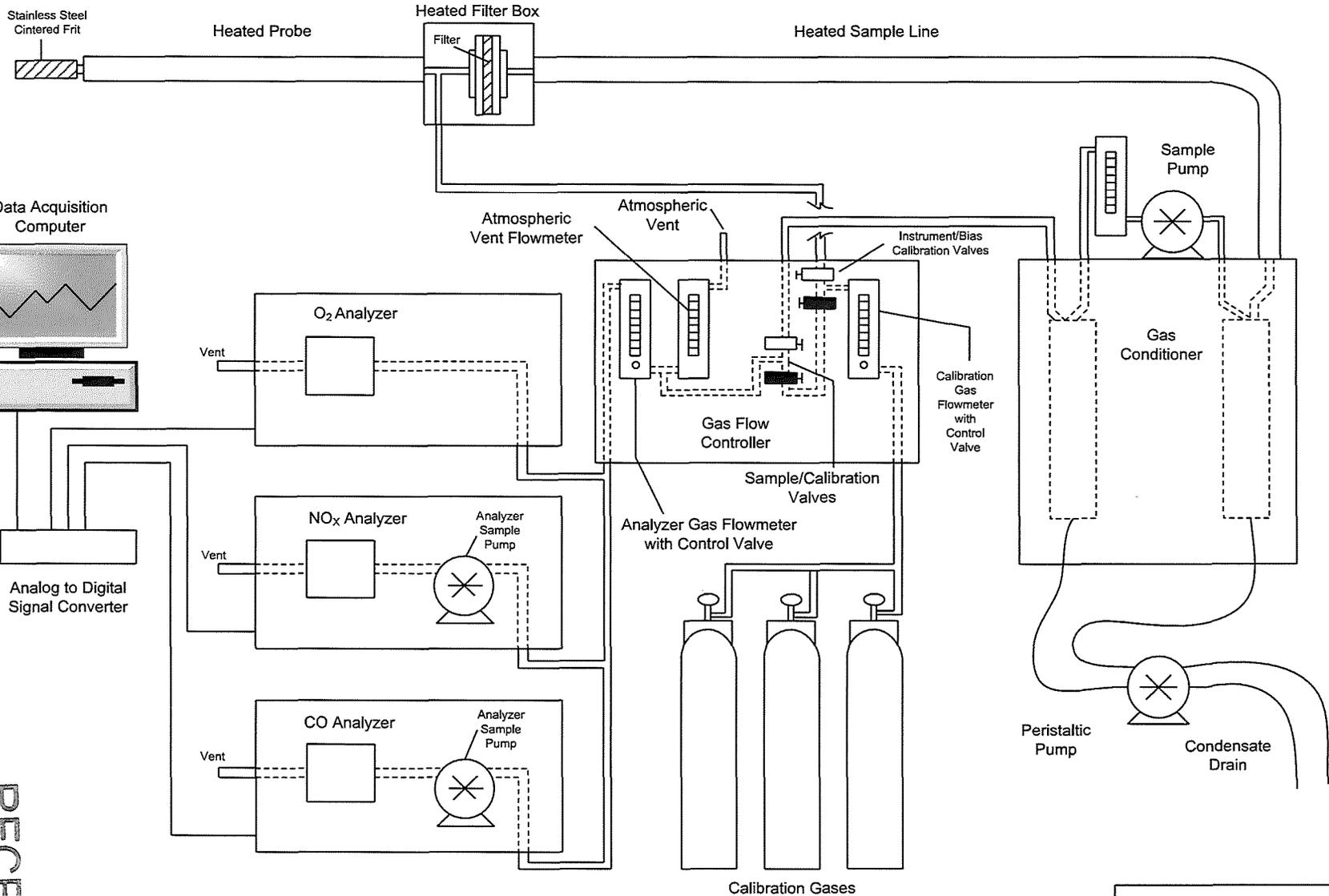
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EPA Methods 3A, 7E, and 10:
O₂, NO_x and CO Gas Sampling System

Figure 1

