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Renewable Operating Permit Continuous Compliance Demonstration Test Report

EUTURBINEC1-2

Consumers Energy Company
St. Clair Compressor Station
10021 Marine City Highway
Ira, Michigan 48023
SRN: B6637

May 18, 2021

Test Date: March 30, 2021

Test Performed by the Consumers Energy Company
Regulatory Compliance Testing Section
Air Emissions Testing Body
Laboratory Services Section
Work Order No. 35786601
Version No.: 0

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EXECUTIVE SUMMARY

Consumers Energy Regulatory Compliance Testing Section (RCTS) conducted nitrogen oxides (NO_x) and carbon monoxide (CO) testing at the exhaust location of one (1) natural gas-fired combustion turbine identified as EUTURBINEC1-2, installed and operating at the St. Clair Compressor Station, in Ira, Michigan. EUTURBINEC1-2 is a simple cycle turbine used to provide mechanical shaft power to a compressor for maintaining natural gas pipeline pressure for movement in and out of storage reservoirs and along the pipeline system. The turbine is listed within Michigan Department of Environment, Great Lakes and Energy (EGLE) Renewable Operating Permit (ROP) No. MI-ROP-B6637-2015a within the FGTURBINES flexible group and is subject to state and federal air emission regulations. FGTURBINES includes emission units EUTURBINEC1-1 and EUTURBINEC1-2.

The test program was conducted on March 30, 2021 to evaluate compliance with emission limits in 40 CFR Part 60, Subpart GG, *Standards of Performance for Stationary Gas Turbines*, (NSPS) and in the ROP for the EUTURBINEC1-2 source across the range of gas producer speeds where the turbine can operate and comply with the applicable emission limits. A test protocol was submitted to EGLE on February 28, 2020 and subsequently approved by Mr. Matt Karl, Environmental Quality Analyst, in his letter dated March 9, 2020.

There were no deviations from the approved stack test protocol or associated United States Environmental Protection Agency (USEPA) Reference Methods. However, the test protocol proposed testing EUTURBINEC1-1 and EUTURBINEC1-2 during the same test program mobilization; but, due to availability, EUTURBINEC1-1 was tested on December 16, 2020.

Three, 21-minute test runs were conducted at the turbine exhaust at the lower and upper operating range of 90% and 100% gas producer speeds (GPS) following the procedures in USEPA Reference Methods (RM) 1, 3A, 7E, 10, and 19 in 40 CFR 60, Appendix A. The test results are summarized in Table E-1.

Table E-1
Summary of EUTURBINEC1-2 Average Test Results

Parameter	Units	90% GPS Result	100% GPS Result	Emission Limit	Applicability
NO_x	lb/hr	3.2	3.7	**12.6**	Both turbines combined†
	tpy	9.9	11.4	**39.0**‡	Both turbines combined†
	ppmvd at 15% O_2	27.6	24.6	**150**	Each turbine
CO	lb/hr	0.4	0.3	**20.7**	Both turbines combined†
	tpy	1.2	1.1	**90.6**‡	Both turbines combined†
	g/HP-hr corrected to 15% O_2 on a dry basis	0.11	0.05	**1.09**	Each turbine

NO_x nitrogen oxides
CO carbon monoxide
lb/hr pound per hour
tpy ton per year
g/HP-hr grams per horsepower hour
† Both turbines combined includes the emissions from EUTURBINEC1-1 and EUTURBINEC1-2
‡ 12 month rolling time period, as determined at the end of each calendar month; result based on 8760 hours

The EUTURBINEC1-2 NO_x and CO test results indicate compliance with the applicable emission limits. Detailed results are presented in Appendix Tables 1 and 2. Sample calculations and field data sheets are presented in Appendices A and B. Turbine operating data and supporting documentation are provided in Appendices C and D.

1.0 INTRODUCTION

This report summarizes the results of air emission tests on EUTURBINEC1-2, installed and operating at the Consumers Energy St. Clair Compressor Station (SCCS) in Ira, Michigan. This document follows the Michigan Department of Environment, Great Lakes and Energy (EGLE) format described in the November 2019, *Format for Submittal of Source Emission Test Plans and Reports*. Reproducing only a portion of this report may omit critical substantiating documentation or cause information to be taken out of context. If any portion of this report is reproduced, please exercise due care in this regard.

1.1 IDENTIFICATION, LOCATION, AND DATES OF TESTS

On March 30, 2021, Consumers Energy Regulatory Compliance Testing Section (RCTS) conducted nitrogen oxides (NO_x) and carbon monoxide (CO) testing at the exhaust location of one (1) natural gas-fired combustion turbine, identified as EUTURBINEC1-2, installed and operating at SCCS.

A test protocol was submitted to EGLE on February 28, 2020 and subsequently approved by Mr. Matt Karl, Environmental Quality Analyst, in his letter dated March 9, 2020. The protocol detailed the proposed test program for the two combustion turbines associated with flexible group (FG) FGTURBINES. EUTURBINEC1-1 was tested in December 16, 2020; however due to mechanical issues, EUTURBINEC1-2 was unavailable until March 30, 2021. A report presenting the results of EUTURBINEC1-1 emissions testing was submitted to EGLE on February 8, 2021.

1.2 PURPOSE OF TESTING

The purpose of the test program was to evaluate compliance with emission limits in 40 CFR Part 60, Subpart GG, *Standards of Performance for Stationary Gas Turbines*, (NSPS) and the facility's Renewable Operating Permit (ROP) for the EUTURBINEC1-2 across the range of gas producer speeds (GPS) where the turbine can operate and comply with the applicable emission limits. The applicable emission limits are presented in Table 1-1.

Table 1-1
FGTURBINES Applicable Emission Limits

Parameter	Emission Limit	Units	Equipment
NO_x	12.6	lb/hr	Both turbines combined†
	39.0‡	tpy	Both turbines combined†
	150	ppmvd at 15% O_2	Each turbine
CO	20.7	lb/hr	Both turbines combined†
	90.6‡	tpy	Both turbines combined†
	1.09	g/HP-hr corrected to 15% O_2 on a dry basis	Each turbine

NO_x nitrogen oxides
CO carbon monoxide
lb/hr pound per hour
tpy ton per year
g/HP-hr grams per horsepower hour

† Both turbines combined includes the emissions from EUTURBINEC1-1 and EUTURBINEC1-2
‡ 12 month rolling time period, as determined at the end of each calendar month

1.3 Brief Description of Source

EUTURBINEC1-2 is a 4,300 horsepower T4500 simple cycle combustion turbine manufactured by Solar Turbines that is located at an area source of hazardous air pollutant (HAP) emissions. The turbine operates as needed to provide mechanical shaft power to the compressor to maintain natural gas pipeline pressure for movement in and out of storage reservoirs and along the pipeline system.

1.4 Contact Information

Table 1-2 presents the names, addresses, and telephone numbers of the contacts for information regarding the test and the test report, and names and affiliation of personnel involved in conducting the testing.

Table 1-2
Contact Information

Program Role	Contact	Address
Regulatory Agency Representative	Ms. Karen Kajiya-Mills Technical Programs Unit Manager 517-335-4874 kajiya-millsk@michigan.gov	EGLE - Technical Programs Unit 525 W. Allegan, Constitution Hall, 2nd Floor S Lansing, Michigan 48933
State Regulatory Inspector	Mr. Robert Elmouchi Environmental Quality Analyst 586-854-3244 elmouchir@michigan.gov	EGLE – Air Quality Division SE Michigan District 27700 Donald Court Warren, Michigan 48092
State Technical Programs Field Inspector	Mr. Matthew Karl Technical Programs Unit 517-282-2126 karlm@michigan.gov	EGLE – Air Quality Division Technical Programs Unit 525 W. Allegan, Constitution Hall, 2nd Floor S Lansing, Michigan 48933
Responsible Official	Mr. Avelock Robinson Director of Gas Compression Operations 586-716-3326 avelock.robinson@cmsenergy.com	Consumers Energy Company St. Clair Compressor Station 10021 Marine City Highway Ira, Michigan 48023
Corporate Air Quality Contact	Ms. Amy Kapuga Senior Engineer 517-788-2201 amy.kapuga@cmsenergy.com	Consumers Energy Company Environmental Services Department 1945 West Parnall Road Jackson, Michigan 49201
Field Environmental Coordinator	Mr. Thomas Fox Senior Engineer 989-667-5153 thomas.fox@cmsenergy.com	Consumers Energy Company Bay City Customer Service Center 4141 E. Wilder Road Bay City, MI 48706
Test Facility	Mr. Andre Tillman Workweek Field Leader 586-716-3336 andre.tillman@cmsenergy.com	Consumers Energy Company St. Clair Compressor Station 10021 Marine City Highway Ira, Michigan 48023
Test Team Representative	Mr. Thomas Schmelter Engineering Technical Analyst 616-738-3234 thomas.schmelter@cmsenergy.com	Consumers Energy Company L & D Training Center 17010 Croswell Street West Olive, Michigan 49460

2.0 SUMMARY OF RESULTS

2.1 OPERATING DATA

During the test program, the turbine was operated at the lower and upper range of operation, established as 90% and 100% gas producer speed. At these GPS, the average turbine horsepower was ≥55% and ≥92% of the maximum manufacturer's design capacity based on turbine and compressor site conditions. Refer to Attachment C for detailed operating data.

2.2 APPLICABLE PERMIT INFORMATION

SCCS is assigned State of Michigan Registration Number (SRN) B6637 and operates in accordance with MI-ROP-B6637-2021, with source EUTURBINEC1-1 collectively grouped with EUTURBINEC1-2 as FGTURBINES and associated with the applicable federal requirements of 40 CFR Part 60, Subpart GG.

2.3 RESULTS

The test results for EUTURBINEC1-2 indicate the measured NO_x and CO emissions comply with the applicable emission limits. Refer to Table 2-1 for a summary of test results.

Table 2-1
Summary of EUTURBINEC1-2 Average Test Results

Parameter	Units	90% GPS Result	100% GPS Result	Emission Limit	Applicability
NO_x	lb/hr	3.2	3.7	**12.6**	Both turbines combined†
	Tpy	9.9	11.4	**39.0‡**	Both turbines combined†
	ppmvd at 15% O_2	27.6	24.6	**150**	Each turbine
CO	lb/hr	0.4	0.3	**20.7**	Both turbines combined†
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NO_x nitrogen oxides
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† Both turbines combined includes the emissions from EUTURBINEC1-1 and EUTURBINEC1-2
‡ 12 month rolling time period, as determined at the end of each calendar month; result based on 8760 hours

Detailed results are presented in Appendix Tables 1 and 2. A discussion of the results are presented in Section 5.0. Sample calculations and field data sheets are presented in Appendices A and B. Turbine operating data and supporting information are provided in Appendices C and D.

3.0 SOURCE DESCRIPTION

EUTURBINEC1-2 provides mechanical shaft power to a compressor to maintain natural gas pipeline pressure for movement in and out of storage reservoirs and along the pipeline system. Solar Turbines provided maintenance support within three months of the test program. A summary of the turbine specifications is provided in Table 3-1.

Table 3-1
Turbine Specifications

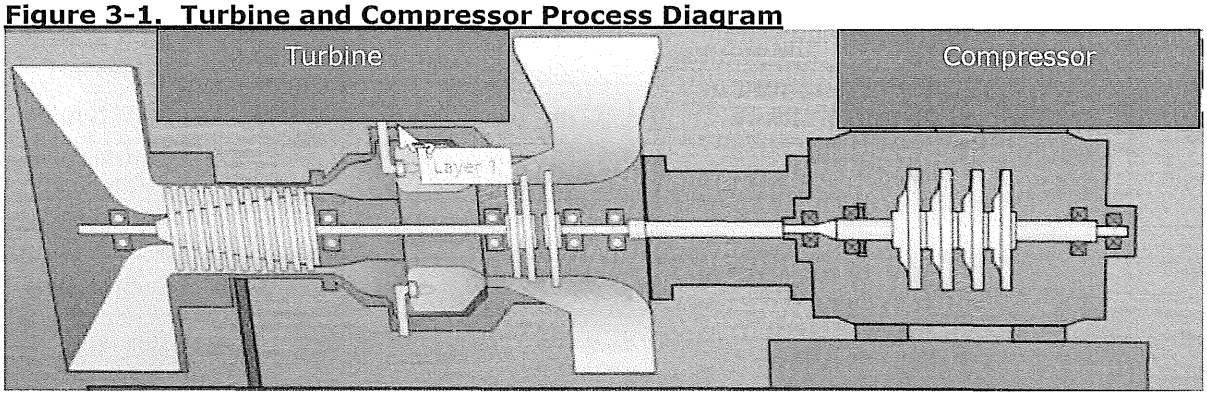
Turbine ID	Turbine Manufacturer	Site-Rated HP	Heat Input, LHV (mmBtu/hr)
EUTURBINEC1-2	Solar Turbines	4,300	45

3.1 PROCESS

The turbine is a type of internal combustion engine that converts fuel energy to rotational mechanical energy. Ambient air is drawn into the turbine where it is compressed, mixed with natural gas and ignited. The combusted air expands rapidly and directed through a series of airfoil-shaped blades connected to a mechanical drive shaft. The drive shaft and gearbox are connected at a compressor, which is used to maintain pressure within the natural gas pipeline system.

Refer to Figure 3-1 for the EUTURBINEC1-2 process diagram.

Figure 3-1. Turbine and Compressor Process Diagram



The flue gas generated by natural gas combustion is controlled through parametric controls (i.e., timing and air-to-fuel ratio), and lean burn combustion technology referred to as SoLoNO$_x$ mode. The turbine utilizes control and monitoring modules that are monitored by operators and adjusted for optimal performance within the established range of operation.

Detailed operating data recorded during testing are provided in Appendix D.

3.2 PROCESS FLOW

Located in southern St. Clair County, the St. Clair Compressor Station helps maintain natural gas pipeline pressures in southeast Michigan. The Hessen, Puttygut, Swan Creek, Four Corners, Ira, and Lenox gas storage fields within the Niagaran geologic formation are used to store approximately 45.6 billion cubic feet of natural gas. The station connects to

these six underground storage fields, which provide enough natural gas to serve up to 20 percent of Consumers Energy's 1.7 million gas customers in winter.

Equipment at the facility consists of natural gas reciprocating compressor engines, combustion turbines, and associated equipment for maintaining pressure and moving natural gas in and out of the storage reservoirs. The combustion turbines, specifically EUTURBINEC1-2 was the focus of this test program. Refer to Figure 3-2 for the turbine location.

Figure 3-2. St. Clair Compressor Station Plant 1 Turbine Location

3.3 Materials Processed

The fuel utilized in EUTURBINEC1-2 is exclusively natural gas, as defined in 40 CFR 72.2. During testing the natural gas combusted within the turbine was comprised of approximately 92% methane, 7% ethane, 0.5% nitrogen, and 0.3% carbon dioxide. The daily natural gas chromatograph analysis results are provided in Appendix C. The gas composition and heat content were used to calculate site-specific F factors in accordance with United States Environmental Protection Agency (USEPA) Method 19 and used in emission rate calculations.

3.4 Rated Capacity

The maximum turbine power output is approximately 4,300 horsepower with a rated heat input of 45 million British thermal units per hour (mmBtu/hour). The normal rated turbine capacities are governed by the connected compression equipment operated as a function of facility and gas transmission demand. The turbine operating parameters presented in Appendix C were recorded and averaged for each test run.

3.5 Process Instrumentation

Process instrumentation were continuously monitored by turbine controllers, data acquisition systems, and by Consumers Energy operations personnel during testing. Data were collected for the following parameters at 1-minute intervals during each test:

- Power turbine speed (%)
- Gas producer speed (%)
- Fuel gas flow (mscfh)
- Horsepower (hp)
- Fuel pressure (psig)
- Suction pressure (psig)
- Discharge pressure (psig)
- Fuel heat content (Btu)

Refer to Appendix C for operating data.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Consumers Energy RCTS tested for NO_x, CO, and oxygen (O_2) concentrations using the test methods presented in Table 4-1. The sampling and analytical procedures associated with each parameter are described in the following sections.

Table 4-1 Test Methods

Parameter	USEPA	
	Method	Title
Sample traverses	1	Sample and Velocity Traverses for Stationary Sources
Oxygen	3A	Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
Nitrogen oxides (NO_x)	7E	Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)
Carbon monoxide (CO)	10	Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)
Emission rates	19	Sulfur Dioxide Removal and Particulate, Sulfur Dioxide and Nitrogen Oxides from Electric Utility Steam Generators

4.1 Description of Sampling Train and Field Procedures

The Table 4-2 test matrix summarizes the sample parameters and analytical methods employed.

Table 4-2 Test Matrix

Date (2021)	Run	Sample Type	Start Time (EDT)	Stop Time (EDT)	Test Duration (min)	EPA Test Method	Comment
EUTURBINEC1-2							
March 30	1	O_2 NO_x CO	09:45	10:05	21	1, 3A, 7E, 10 19	90% GPS
	2		10:20	10:40	21		
	3		10:55	11:15	21		
	1	O_2 NO_x CO	11:30	11:50	21	1, 3A, 7E, 10 19	100% GPS
	2		12:02	12:22	21		
	3		12:35	12:55	21		

4.2 Sample Location and Traverse Points (USEPA Method 1)

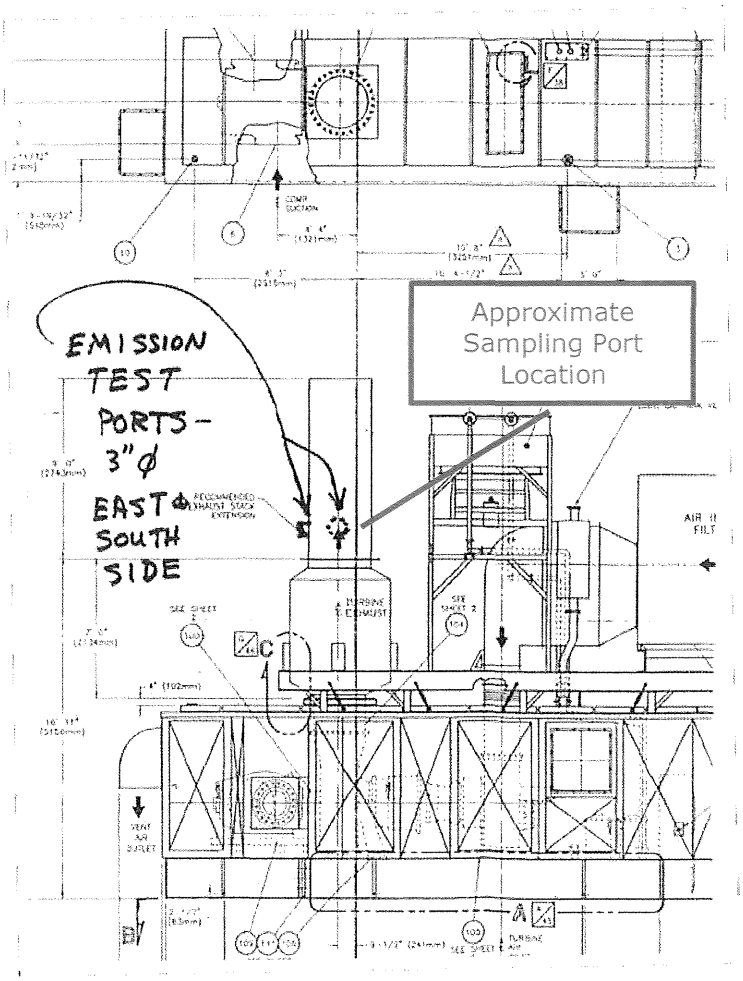
The number and location of traverse points was evaluated according to the requirements in USEPA Method 1, *Sample and Velocity Traverses for Stationary Sources.* Two 4-inch diameter test ports protrude approximately 3-inches beyond a 40-inch diameter vertical exhaust stack exiting the turbine. The exhaust stack is designated as SVTURBINEC1-2 within the ROP. The sampling ports are located:

- Approximately 84 inches or 2.1 duct diameters downstream from the turbine exhaust confluence to the vertical exhaust stack, and
- Approximately 96 inches or 2.4 duct diameters upstream of the stack exit to atmosphere approximately 26 feet above the ground surface.

Because the duct is >12 inches in diameter and the sampling port location meets the two and one-half diameter criterion of Section 11.1.1 of Method 1 of 40 CFR Part 60, Appendix A-1, the exhaust duct was sampled at 3 traverse points located at 16.7, 50.0, and 83.3% of the measurement line at approximately equal intervals during Run 1.

A three traverse point stratification test was performed using parameter concentrations from Run 1 in accordance with USEPA Method 7E, §8.1.2. The individual point and mean parameter concentrations were calculated, and the gas stream was considered unstratified; therefore, parameter concentrations were measured from a single point near the centroid of the stack for subsequent test runs. A representation of a turbine exhaust stack sampling location is presented as Figure 4-1.

Figure 4-1. Exhaust Stack Sampling Port Locations



4.3 O_2, NO_X, AND CO CONCENTRATIONS (USEPA METHODS 3A, 7E, AND 10)

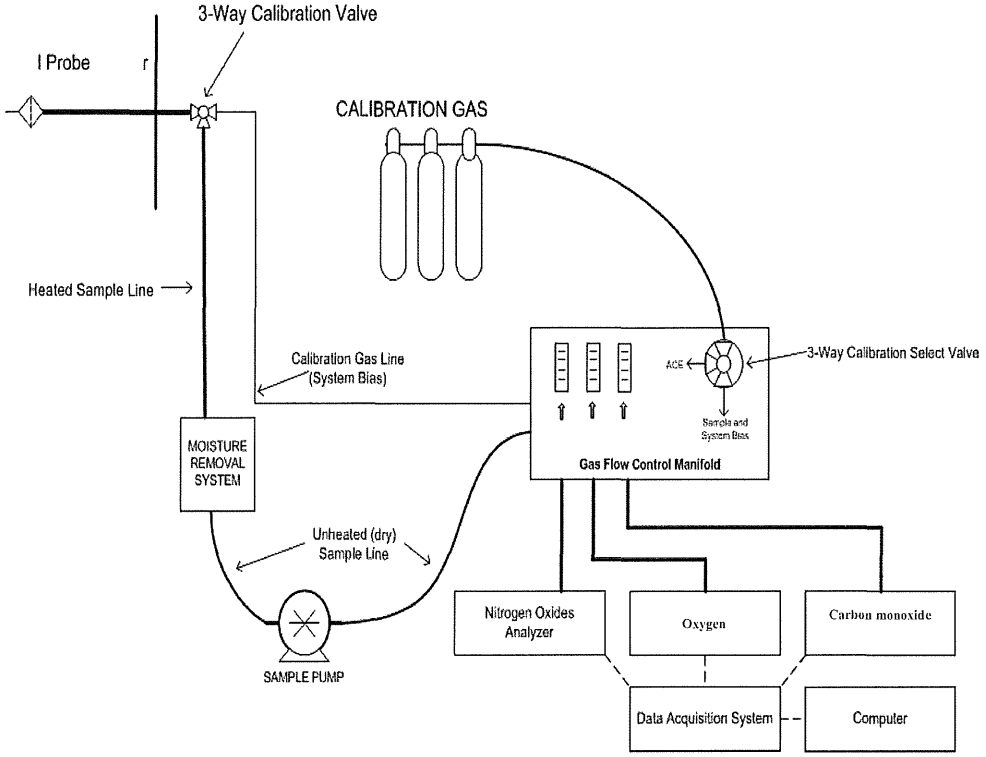
Oxygen, nitrogen oxides, and carbon monoxide concentrations were measured using the following sampling and analytical procedures:

- USEPA Method 3A, *Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure),*
- USEPA Method 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. The measured oxygen concentrations were used to adjust the pollutant concentrations to 15% O_2 and calculate pollutant emission rates.

Turbine exhaust gas was extracted from the stack through a stainless-steel probe, heated Teflon® sample line, and through a gas conditioning system to remove water and dry the sample before entering a sample pump, flow control manifold, and gas analyzers. Figure 4-2 depicts a drawing of the Methods 3A, 7E, and 10 sampling system.

Figure 4-2. Methods 3A, 7E, and 10 Sampling System



Prior to sampling turbine exhaust gas, the analyzers were calibrated by performing a calibration error test where zero-, mid-, and high-level calibration gases were introduced directly to the back of the analyzers. The calibration error check was performed to evaluate if the analyzers response was within ±2.0% of the calibration gas span or high calibration gas concentration. An initial system-bias test was performed where the zero- and mid- or high- calibration gases were introduced at the sample probe to measure the ability of the system to respond accurately to within ±5.0% of span.

A NO_2 to NO conversion efficiency test was performed on the NO_X analyzer prior to beginning the test program to evaluate the ability of the instrument to convert NO_2 to NO before analyzing for NO_x. The test verified the analyzer response as NO_x was ≥90% of the certified NO_2 calibration gas concentration.

Upon successful completion of the calibration error and initial system bias tests, sample flow rate and component temperatures were verified, and the probe was inserted into the duct at the appropriate traverse point. After confirming the turbine was operating at established conditions, the test run was initiated. Gas concentrations were recorded at 1-minute intervals throughout each 21-minute test run.

After the conclusion of each test run, a post-test system bias check was performed to evaluate analyzer bias and drift from the pre- and post-test system bias checks. The system-bias checks evaluated if analyzer bias was within ±5.0% and drift was within ±3.0% of span. The measured run concentrations were then corrected for any analyzer drift.

For the analyzer calibration error tests, bias tests and drift checks, these evaluations are also passed if the standard criteria are not achieved, but the absolute difference between the analyzer responses and calibration gas is less than or equal to 0.5 ppmv for NO_x and CO or 0.5% for O_2.

4.4 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 a fuel specific F_c factor and exhaust gas flowrate.

The natural gas processed by the St. Clair Compressor Station is the same gas used for firing EUTURBINEC1-2. The facility collects a daily sample of this gas and analyzes it via gas chromatography (GC) for hydrocarbons, non-hydrocarbons, heating value, and other parameters. The test day GC results were obtained to calculate F_w, F_d, and F_c factors (ratios of combustion gas volumes to heat inputs) using USEPA Method 19 Equations 19-13 (F_d), 19-14 (F_w), and 19-15 (F_c). The F_d factor was used to calculate the exhaust flow rate using *Equation 19-1* presented in Figure 4-3 and to calculate g/HP-hr emission rates.

Figure 4-3. USEPA Method 19 Exhaust Flow Rate Equation 19-1

$$Q_s = F_d H \frac{20.9}{20.9\text{-}O_2}$$

Where:

Q_s = stack flow rate (dscf/min)
F_d = fuel-specific oxygen-based F factor, dry basis, from Method 19 (dscf/mmBtu)
H = fuel heat input rate, (mmBtu/min), at the higher heating value (HHV) measured at turbine fuel feed line, calculated as (fuel feed rate in ft^3/min) x (fuel heat content in mmBtu/ft^3)
O_2 = stack oxygen concentration, dry basis (%)

5.0 TEST RESULTS AND DISCUSSION

5.1 Tabulation of Results

The EUTURBINEC1-2 test results indicate the NO_x and CO exhaust emissions comply with applicable emission limits as summarized in Table 2-1. Appendix Tables 1 and 2 contain detailed tabulation of results, process operating conditions, and exhaust gas conditions.

5.2 Significance of Results

The test results indicate compliance with applicable emission limits under the range of 90 to 100% gas producer speeds.

5.3 Variations from Sampling or Operating Conditions

There were no sampling or operating condition variations observed.

5.4 Process or Control Equipment Upset Conditions

The turbine and gas compressor/pump equipment were operating under maximum routine conditions and no upsets were encountered during testing.

5.5 Air Pollution Control Device Maintenance

Ongoing turbine optimization is performed to ensure lean-burn combustion and continuous regulatory emission limit compliance.

5.6 Re-Test Discussion

A re-test is not required based on these test program results. In accordance with the ROP, subsequent air emissions testing will be performed once every 5 years.

5.7 Results of Audit Samples

Audit samples for the reference methods utilized during this test program are not available from USEPA Stationary Source Audit Sample Program providers. The USEPA reference methods performed state reliable results are obtained by persons equipped with a thorough knowledge of the techniques associated with each method. Factors with the potential to cause measurement errors are minimized by implementing quality control (QC) and assurance (QA) programs into the applicable components of field-testing. QA/QC components included in this test program are summarized in Table 5-1. Refer to Appendix D for supporting documentation.

Table 5-1
QA/QC Procedures

QA/QC Activity	Purpose	Procedure	Frequency	Acceptance Criteria
M1: Sampling Location	Evaluates sampling location suitability for sampling	Measure distance from ports to downstream and upstream flow disturbances	Pre-test	≥2 diameters downstream; ≥0.5 diameter upstream.
M1: Duct diameter/ dimensions	Verifies area of stack is accurately measured	Review as-built drawings and field measurement	Pre-test	Field measurement agreement with as-built drawings
M3A, M7E, M10: Calibration gas standards	Ensures accurate calibration standards	Traceability protocol of calibration gases	Pre-test	Calibration gas uncertainty ≤2.0%
M3A, M7E, M10: Calibration Error	Evaluates analyzer operation	Calibration gases introduced directly into analyzers	Pre-test	±2.0% of calibration span or 0.5 ppmv or 0.5% O_2 abs. difference
M3A, M7E, M10: System Bias and Analyzer Drift	Evaluates analyzer/sample system integrity and accuracy over test duration	Calibration gas introduced at sample probe tip, HSL, and into analyzers	Pre-test and Post-test	Bias: ±5.0% of calibration span Drift: ±3.0% of calibration span or ≤ 0.5 ppmv or 0.5% O_2 abs. difference
M7E: NO_2-NO converter efficiency	Evaluates operation of NO_2-NO converter	NO_2 calibration gas introduced directly into analyzer	Pre-test or Post-test	NO_x response ≥90% of certified NO_2 calibration gas

5.8 Calibration Sheets

Calibration sheets, including gas protocol sheets and analyzer quality control and assurance checks are presented in Appendix D.

5.9 Sample Calculations

Sample calculations and formulas used to compute emissions data are presented in Appendix A.

5.10 Field Data Sheets

Field data sheets are presented in Appendix B.

5.11 Laboratory Quality Assurance / Quality Control Procedures

The method specific QA/QC procedures in each method employed during this test program were followed, without deviation. Laboratory analysis was not required to complete this test program.

5.12 QA/QC Blanks

Other than calibration gases used for zero calibrations, no other reagent or media blanks were used. Calibration gas certificates of analysis are included in Appendix D.