

## EXECUTIVE SUMMARY

Montrose Air Quality Services, LLC (Montrose) was retained by DTE (DTE) to evaluate nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO) emission rates from a single peaking unit while operating at four load conditions at the Delray Peaking facility located in Detroit, Michigan. The emissions test program was conducted on June 16, 2021.

Testing of Peaking Unit 12-1 consisted of triplicate approximate 30-minute test runs while each unit was operating at four load conditions. The emissions test program was required by 40 CFR 75, Appendix E. The results of the emission test program are summarized by Table I.

**Table I**  
**Peaking Overall Emission Summary**  
**Test Date: June 16, 2021**

| Unit 12-1 |                 |                        |                      |
|-----------|-----------------|------------------------|----------------------|
| Load      | Pollutant       | Average Emission Rate  | Emission Limit       |
| 65 MW     | NO <sub>x</sub> | 14.6 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |
|           | CO              | 5.61 lbs/hr            | 64 lbs/hr            |
| 60 MW     | NO <sub>x</sub> | 13.8 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |
|           | CO              | 7.06 lbs/hr            | 64 lbs/hr            |
| 55 MW     | NO <sub>x</sub> | 13.5 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |
| 55 MW     | NO <sub>x</sub> | 12.4 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |

1: Corrected to 15% O<sub>2</sub>

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- Figure 1 – USEPA Methods 3A, 7E, and 10 Sampling Diagram  
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## 1. Introduction

Montrose Air Quality Services (Montrose) was retained by DTE Energy (DTE) to evaluate nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO) emission rates from a single peaking unit while operating at four load conditions at the Delray Peaking facility located in Detroit, Michigan. The emissions test program was conducted on June 16, 2021.

AQD has published a guidance document entitled “Format for Submittal of Source Emission Test Plans and Reports” (December 2013). This document is provided as Appendix A. The following is a summary of the emissions test program and results in the format suggested by the aforementioned document.

### 1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on June 16<sup>th</sup>, 2021 at the Delray facility located in Detroit, Michigan. The test program included evaluation of NO<sub>x</sub> and CO emissions from peaking unit 12-1.

### 1.b Purpose of Testing

AQD issued Renewable Operating Permit No. MI-ROP-B2798-2017 to DTE. This permit limits emissions from each turbine as summarized by Table 1.

**Table 1**  
**CO and NO<sub>x</sub> Emission Limitations**  
**Delray Peaking Facility**

| Facility       | Permit No.        | NO <sub>x</sub> Emission Limit | CO Emission Limits |
|----------------|-------------------|--------------------------------|--------------------|
| Delray Peaking | MI-ROP-B2798-2017 | 15 ppmv @ 15% O <sub>2</sub>   | 64 lb/hr           |

### 1.c Source Description

The Delray Power Plant (Delray) located at 6603 West Jefferson Road in Detroit, Michigan, employs the use of two natural gas-fired peaking turbines for the purpose of energy production. Each peaking turbine is nominally rated at 80 MW.

## 1.d Test Program Contacts

The contact for the source and test report is:

Mark Grigereit, QSTI  
Principal Engineer - EMS  
DTE Energy Corporate Services, L.L.C.  
Detroit MI 48210

Names and affiliations for personnel who were present during the testing program are summarized by Table 2.

**Table 2**  
**Test Personnel**

| <b>Name and Title</b>                               | <b>Affiliation</b>   | <b>Telephone</b> |
|---|--|------------------|
| Mr. Mark Grigereit<br>Principal Engineer - EMS      | DTE Energy Corporate Services,<br>L.L.C.<br>Detroit MI 48210       | (313)-412-0305   |
| Mr. Chance Bradley<br>Combustion Turbine Specialist | Delray Energy Center<br>6911 W. Jefferson Ave<br>Detroit, MI 48209 | (734)-652-9982   |
| Mr. John Hamner<br>Project Manager                  | Montrose<br>1351 Brummel Avenue<br>Elk Grove Village, IL 60007     | (630) 715-3259   |
| Mr. Zachary Le Fever<br>Field Project Manager       | Montrose<br>1351 Brummel Avenue<br>Elk Grove Village, IL 6007      | (216) 990-1113   |

## 2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions compliance test program.

### 2.a Operating Data

Process data monitored during the emissions test program included generation (MW), gas flow, inlet guide vane angle, compressor discharge temperature, compressor discharge pressure, and exhaust temperature.

### 2.b Applicable Permit

The applicable permit for this emissions test program is Renewable Operating Permit (ROP) No. MI-ROP-B2798-2017.

## **2.c Results**

The overall results of the emission test program are summarized by Table 3 (see Section 5.a). NO<sub>x</sub> emissions from peaking UNIT 12-1 were below the corresponding limit of 15 ppmv, corrected to 15% O<sub>2</sub>. CO emissions were also below the limit of 64 lb/hr.

## **3. Source Description**

Sections 3.a through 3.e provide a detailed description of the process.

### **3.a Process Description**

The Delray Power Plant (Delray) employs the use of two natural gas-fired peaking turbines for the purpose of energy production. Each peaking turbine is nominally rated at 80 MW.

The turbines have no post-combustion air pollution control devices.

### **3.b Process Flow Diagram**

Due to the simplicity of the Peaking unit, a process flow diagram is not necessary.

### **3.c Raw and Finished Materials**

The raw material used by the process is natural gas.

### **3.d Process Capacity**

Peaking turbine UNIT 12-1 can operate up to 80MW, dependent upon ambient conditions.

### **3.e Process Instrumentation**

Process data monitored during the emissions test program included generation (MW), gas flow, inlet guide vane angle, compressor discharge temperature, compressor discharge pressure, and exhaust temperature.

## **4. Sampling and Analytical Procedures**

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used.

### **4.a Sampling Train and Field Procedures**

Turbine exhaust NO<sub>x</sub> content was measured using a Thermo Model 42I NO<sub>x</sub> gas analyzer, the CO content was measured using a Thermo Model 48I CO gas analyzer, and the O<sub>2</sub> content was measured using a Teledyne T803 O<sub>2</sub>/CO<sub>2</sub> gas analyzer. A sample of the gas stream was drawn through an insulated stainless-steel probe with an in-line glass fiber

filter to remove any particulate, a heated Teflon<sup>®</sup> sample line, and through an electronic sample conditioner to remove the moisture from the sample before it enters the analyzer. Data was recorded at 1-minute intervals on a PC equipped with data acquisition software.

Sampling and analysis procedures utilized the following test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- Method 3A, “*Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources*”, was used to measure the O<sub>2</sub> concentration of the exhaust gas.
- Method 7E, “*Determination of Nitrogen Oxide Emissions from Stationary Sources*”, was used to measure the NO<sub>x</sub> concentration of the exhaust gas.
- Method 10, “*Determination of Carbon Monoxide Emissions from Stationary Sources*”, was used to measure the CO concentration of the exhaust gas.
- Method 19, “*Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Dioxide Emission Rates*”
- Method 20, “*Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines*”, was used for gas turbine testing methodologies.

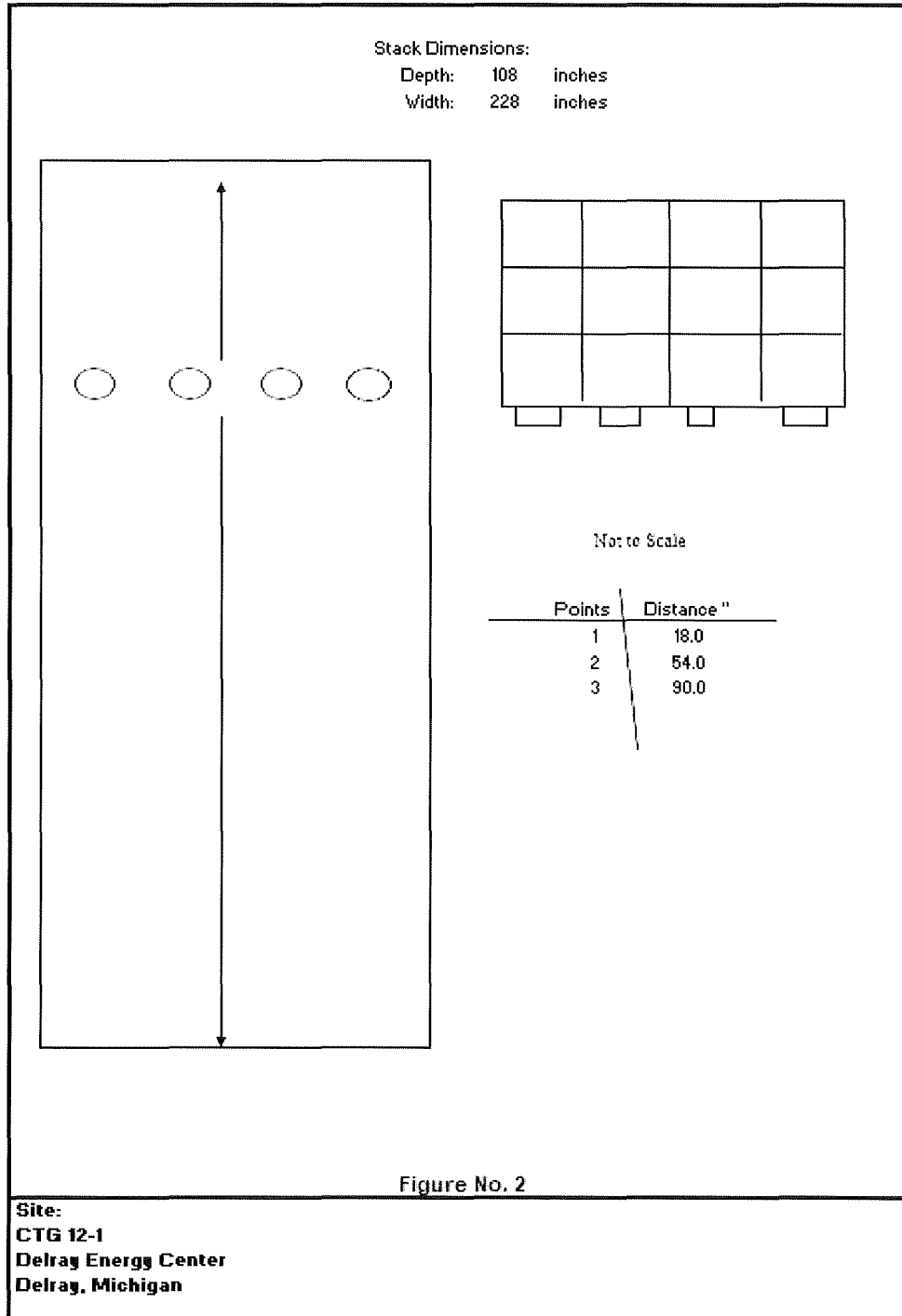
The NO<sub>x</sub> converter efficiency was verified as specified by Method 7E.

#### **4.b Recovery and Analytical Procedures**

This test program did not include laboratory samples, consequently, sample recovery and analysis are not applicable to this test program.

### 4.c Sampling Ports

Figure 2 shows relevant sampling port and traverse point locations.





#### 4.d Traverse Points

The sampling locations met the minimum criteria specified by Method 1. 12 points were sampled each test run.

#### 5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

#### 5.a Results Tabulation

The overall results of the emissions test program are summarized by Table 3. Detailed results for the emissions test program are summarized by Tables 4-7.

**Table 3**  
**Peaking Overall Emission Summary**  
**Test Date: June 16, 2021**

| Unit 12-1 |           |                        |                      |
|-----------|-----------|------------------------|----------------------|
| Load      | Pollutant | Average Emission Rate  | Emission Limit       |
| 65 MW     | NOx       | 14.6 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |
|           | CO        | 5.61 lbs/hr            | 64 lbs/hr            |
| 60 MW     | NOx       | 13.8 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |
|           | CO        | 7.06 lbs/hr            | 64 lbs/hr            |
| 55 MW     | NOx       | 13.5 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |
| 50 MW     | NOx       | 12.4 ppmv <sup>1</sup> | 15 ppmv <sup>1</sup> |

1: Corrected to 15% O<sub>2</sub>

#### 5.b Discussion of Results

The overall results of the emission test program are summarized by Table 3 (see Section 5.a). NOx emissions from peaking UNIT 12-1 were below the corresponding limit of 15 ppmv, corrected to 15% O<sub>2</sub>. CO emissions were also below the limit of 64 lb/hr.

#### 5.c Sampling Procedure Variations

There were no sampling variations used during the emission compliance test program.

#### 5.d Process or Control Device Upsets

No upset conditions occurred during testing.

#### **5.e Control Device Maintenance**

There was no control equipment maintenance performed during the emissions test program.

#### **5.f Re-Test**

The emissions test program was not a re-test.

#### **5.g Audit Sample Analyses**

No audit samples were collected as part of the test program.

#### **5.h Calibration Sheets**

Relevant equipment calibration documents are provided in Appendix C.

#### **5.i Sample Calculations**

Sample calculations are provided in Appendix D.

#### **5.j Field Data Sheets**

Field documents relevant to the emissions test program are presented in Appendix B

#### **5.k Laboratory Data**

There are no laboratory results for this test program. Raw CEMS data is provided electronically in Appendix B.