COMPLIANCE TEST REPORT

for

OXIDES OF NITROGEN (NO_X) AND CARBON MONOXIDE (CO) EMISSIONS

EU-CTG11-1-DP, EU-CTG11-2-DP, EU-CTG12-1-DP, EU-CTG12-2-DP

Dean Peakers
China Township, Michigan

March 8-11, 2022

Prepared By
Environmental Management & Safety
Ecology, Monitoring, and Remediation Group
DTE Corporate Services, LLC
7940 Livernois Ave. G4-S
Detroit, MI 48210

DTE

DTE

CONTENTS

RESULTS TABLES

DTE

FIGURES

APPENDICES

DTE

EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Safety (EMS) Ecology, Monitoring, and Remediation Group performed CO and NOx emissions testing at the DTE Energy, Dean Peaking Facility, located in China Twp., Michigan. The fieldwork, performed during the period of March 8-11, 2022, was conducted to satisfy testing requirements of Michigan Permit to Install (PTI) No. 116-01B. Emissions tests were performed on the exhaust of four natural gas-fired Combustion Turbine Generators (CTG's) (EU-CTG11-1-DP, 11-2, 12-1, and 12-2).

The average results of the emissions testing are highlighted below:

Emissions Testing Summary
CTG's 11-1, 11-2, 12-1, 12-2
Belle River Peaking Facility
March 8-11, 2022

Unit	Parameter	High Load[1,2]	Mid Load[1,2]
11-1	NO_x	7.4	8.1
	CO	7.5	4.9
	MW	87	60
11-2	NO_x	8.5	8.7
	CO	6.9	4.8
	MW	86	60
12-1	NO_x	6.9	7.3
	CO	9.0	5.5
	MW	89	62
12-2	NO_x	8.6	8.7
	CO	6.8	5.4
	MW	89	62

(1) Units in ppmvd @ 15% O2
(2) Permit Limits: NOx – 9.0 ppm @ 15% O2
CO – 25.0 ppm @15% O2

DTE

RECEIVED
APR 22 2022
AIR QUALITY DIVISION

1.0 INTRODUCTION

DTE Energy's Environmental Management and Safety (EMS) Ecology, Monitoring, and Remediation Group performed CO and NOx emissions testing at the DTE Energy, Dean Peaking Facility, located in China Twp., Michigan. The fieldwork, performed during the period of March 8-11, 2022, was conducted to satisfy testing requirements of Michigan Permit to Install (PTI) No. 116-01B. Emissions tests were performed on the exhaust of four natural gas-fired Combustion Turbine Generators (CTG's) (EU-CTG11-1-DP, 11-2, 12-1, and 12-2).

Testing was performed pursuant to Title 40, *Code of Federal Regulations*, Part 60, Appendix A (40 CFR §60 App. A), Methods 3A, 7E, and 10.

The fieldwork was performed in accordance with EPA Reference Methods and DTE Energy's Intent to Test[1], which was approved in a letter[2] by Ms. Lindsey Wells from the Michigan Department of Environment, Great Lakes, and Energy – Air Quality Division (EGLE-AQD). PM10 testing was conducted on a different date from the NOx/CO testing and will be submitted in a separate report. The following DTE Energy personnel participated in the testing program: Mr. Mark Westerberg, Senior Environmental Specialist, and Mr. Jason Logan, Senior Environmental Specialist. Mr. Logan was the project leader. Mr. Joseph Grave with the DTE Energy Peaker Group provided process coordination for the testing program.

2.0 SOURCE DESCRIPTION

The DTE Dean Peakers are located at 4990 North River Road, East China, Michigan. The facility produces electricity from four (4) simple cycle natural gas-fired turbines. The turbines are designated as EU-CTG12-1-DP, EU-CTG12-2-DP, EU-CTG11-1-DP, and EU-CTG11-2-DP (flexible group FG-CTG-DP) and are each rated at 82.4 Megawatts (MW) at ISO conditions. Flue gases from each unit exhaust through a separate rectangular stack (108" x 228") that has an exit height of 56.0 feet above ground level. See Figure 1 for a diagram of the units' sampling locations and stack dimensions.

[1] DTE Test Plan, Submitted January 13, 2022. (Attached-Appendix A)

[2] EGLE Approval Letter received February 22, 2022 (Attached-Appendix A)

DTE

3.0 SAMPLING AND ANALYTICAL PROCEDURES

DTE Energy obtained emissions measurements in accordance with procedures specified in the USEPA *Standards of Performance for New Stationary Sources*. The sampling and analytical methods used in the testing program are indicated in the table below:

Sampling Method	Parameter	Analysis
USEPA Method 3A	Oxygen	Instrumental Analyzer Method
USEPA Method 7E	Oxides of Nitrogen	Chemiluminecent Instrumental Analyzer Method
USEPA Method 10	Carbon Monoxide	NDIR Instrumental Analyzer Method

3.1 OXYGEN AND CARBON DIOXIDE (USEPA METHOD 3A)

3.1.1 Sampling Method

Exhaust gas oxygen (O_2) concentrations were evaluated using USEPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)". The O_2 analyzer utilizes paramagnetic sensors.

3.1.2 O_2 / CO_2 Sampling Train

The EPA Method 3A sampling system (Figure 2) consisted of the following:

(1) Stainless Steel sampling probe
(2) Heated Teflon™ sampling line
(3) Gas conditioner with particulate filter
(4) Flexible unheated Teflon™ sampling line
(5) Servomex O_2/CO_2 gas analyzer
(6) Appropriate USEPA Protocol 1 calibration gases
(7) Data Acquisition System.

3.1.3 Sampling Train Calibration

The sampling train was calibrated per procedures outlined in USEPA Method 7E. Zero, span, and mid-range calibration gases were introduced directly into the analyzer to determine the instruments linearity. An upscale and downscale gas was introduced through the entire sampling system to determine sampling system bias and instrument drift at the completion of each test.

DTE

3.2 OXIDES OF NITROGEN AND CARBON MONOXIDE (USEPA METHODS 7E AND 10)

3.2.1 Sampling Method

Oxides of nitrogen (NO_x) emissions were evaluated using USEPA Method 7E, "Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)". The NO_x analyzer utilizes a Chemiluminescent detector. Carbon monoxide (CO) emissions were evaluated using USEPA Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)". The CO analyzer utilizes a non-dispersive infrared (NDIR) detector.

The EPA Methods 7E and 10 sampling system (Figure 2) consisted of the following:

(1) Stainless Steel sampling probe
(2) Heated Teflon™ sampling line
(3) Gas conditioner with particulate filter
(4) Flexible unheated Teflon™ sampling line
(5) Thermo 42i Chemiluminecent NO/NO_x gas analyzer and Thermo 48i NDIR CO gas analyzer
(6) Appropriate USEPA Protocol 1 calibration gases
(7) Data Acquisition System.

NOx and CO testing consisted of triplicate 1-hour runs at a high and mid load in accordance with PTI requirements.

3.2.2 Quality Control and Assurance

All sampling and analytical equipment were calibrated per the guidelines referenced in Methods 7E and 10. Calibration gases were EPA Protocol 1 gases and the concentrations were within the acceptable ranges specified in Method 7E. Calibration gas certification sheets are in Appendix C.

Zero, span, and mid-range calibration gases were introduced directly into the analyzer to determine the instruments linearity. An upscale and downscale gas for each pollutant was then introduced through the entire sampling system to determine sampling system bias for each analyzer at the completion of each test.

DTE performed NO_x converter efficiency testing by directly challenging the NO_x analyzer with a nitrogen dioxide (NO_2) calibration gas of 15.42 ppm. Results from the converter efficiency test demonstrated that the analyzer met the requirements of Method 7E (Eq-1).

Eq. 1

$$Eff_{NO2} = \frac{C_{Dir}}{C_v} = \frac{14.24}{15.42} = 92\%$$

DTE

3.2.3 Data Reduction

Data was recorded in 1-minute averages. NO_x and CO emissions were reported in parts per million corrected to 15% oxygen (ppm @ 15% O_2). The 1-minute readings collected can be found in Appendix B.

4.0 OPERATING PARAMETERS

The test program included the collection of turbine fuel flowrate (scfm), power generation (MW), and CEMS data (NOx, CO, and O_2). In addition, a fuel analysis was conducted to determine gross fuel heat content. Unit operational data during each test can be found in Appendix E.

5.0 DISCUSSION OF RESULTS

Table Nos. 1-4 present the nitrogen oxides (NOx) and carbon monoxide (CO) emission testing results for CTGs 11-1, 11-2, 12-1, and 12-2. NOx and CO emissions are presented in parts per million, dry, corrected to fifteen percent oxygen (ppm @ 15% O_2). NOx and CO emissions for each unit at each load were below the permit limits of 9 ppm NOx @ 15% O_2 and 25 ppm CO at 15% O_2.

DTE

6.0 CERTIFICATION STATEMENT

"I certify that I believe the information provided in this document is true, accurate, and complete. Results of testing are based on the good faith application of sound professional judgment, using techniques, factors, or standards approved by the Local, State, or Federal Governing body, or generally accepted in the trade."

Jason Logan, QSTI, PMP

This report prepared by: _____

Mr. Jason Logan, QSTI, PMP
Sr Environmental Specialist, Ecology, Monitoring, and Remediation
Environmental Management and Safety
DTE Energy

This report reviewed by: _____

Mr. Mark Westerberg, QSTI
Sr Environmental Specialist, Ecology, Monitoring, and Remediation
Environmental Management and Safety
DTE Energy

DTE

RESULTS TABLES

DTE

TABLE NO. 1

NO_x & CO EMISSIONS TESTING RESULTS

EU-CTG11-1-DP

March 9, 2022

Test	Test Date	Unit Load (GMW)	Fuel Flow (scfm)	NOx Emissions ($ppm@15\%O_2$)	CO Emissions ($ppm@15\%O_2$)
High	**9-Mar-22**	87	21892	7.4	7.5
Mid	**9-Mar-22**	61	16928	8.1	4.9
	Permit Limit:			*9*	*25*

DTE

TABLE NO. 2

NO_x & CO EMISSIONS TESTING RESULTS

EU-CTG11-2-DP

March 8, 2022

Test	Test Date	Unit Load (GMW)	Fuel Flow (scfm)	NOx Emissions ($ppm@15\%O_2$)	CO Emissions ($ppm@15\%O_2$)
High	**8-Mar-22**	86	21401	8.5	6.9
Mid	**8-Mar-22**	60	16415	8.7	4.8
	Permit Limit:			*9*	*25*

DTE

TABLE NO. 3

NO_x & CO EMISSIONS TESTING RESULTS

EU-CTG12-1-DP

March 11, 2022

Test	Test Date	Unit Load (GMW)	Fuel Flow (scfm)	NOx Emissions (ppm@15%O_2)	CO Emissions (ppm@15%O_2)
High	**11-Mar-22**	89	22091	6.9	9.0
Mid	**11-Mar-22**	62	16845	7.3	5.5
	Permit Limit:			*9*	*25*

DTE

TABLE NO. 4

NO_x & CO EMISSIONS TESTING RESULTS

EU-CTG12-2-DP

March 10, 2022

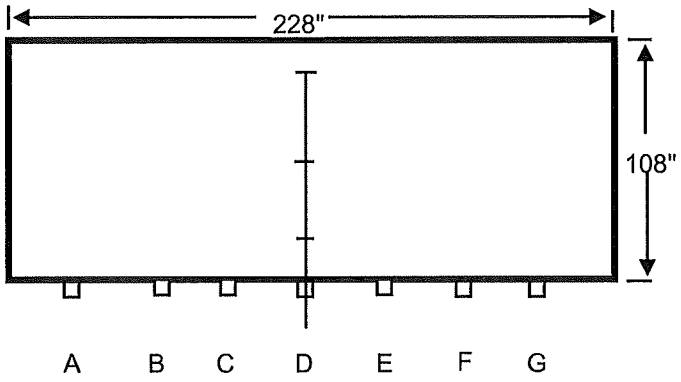
Test	Test Date	Unit Load (GMW)	Fuel Flow (scfm)	NOx Emissions ($ppm@15\%O_2$)	CO Emissions ($ppm@15\%O_2$)
High	**10-Mar-22**	89	22264	8.6	6.8
Mid	**10-Mar-22**	62	16921	8.7	5.4
	Permit Limit:			*9*	*25*

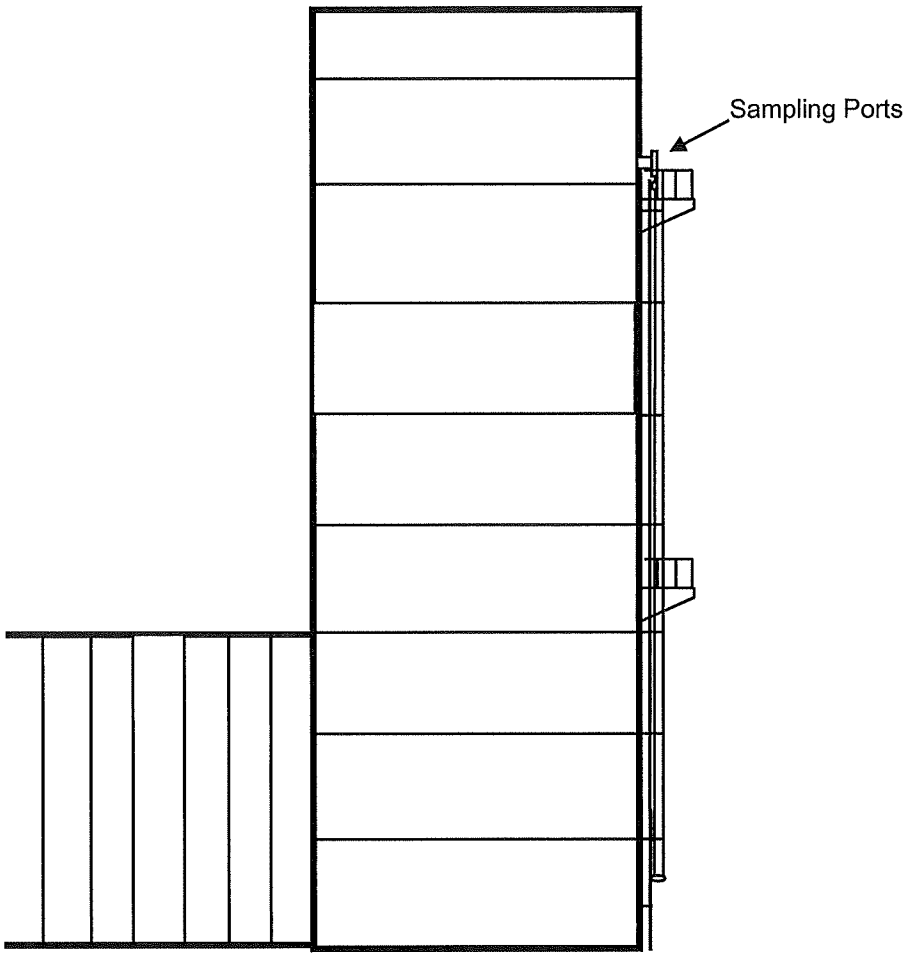
DTE

FIGURES

DTE

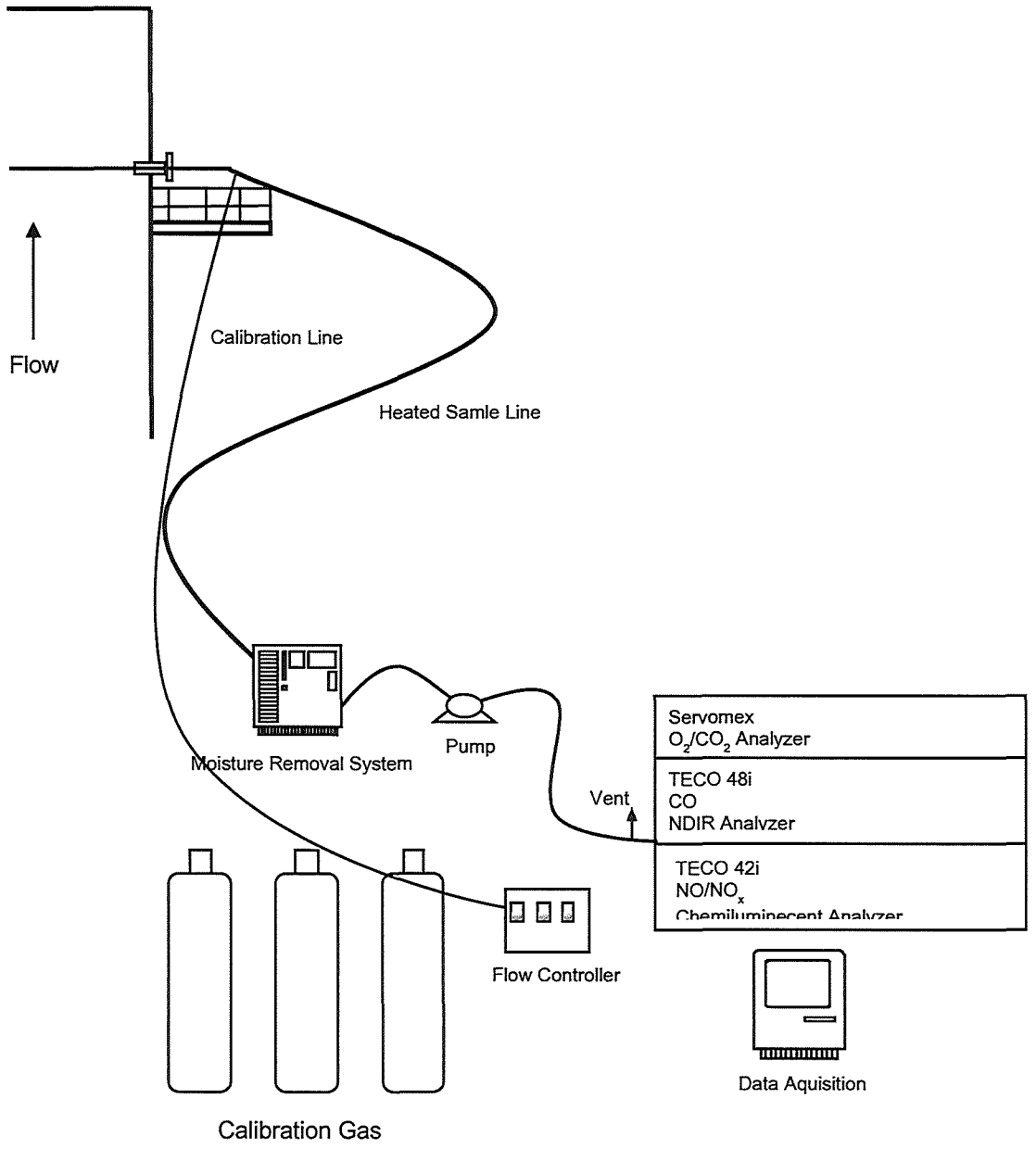
Figure 1 – Sampling Location
DTE – Dean CTGs





DTE

Figure 2 – EPA Method 3A/7E/10
DTE – Dean CTGs



DTE

APPENDIX A

EGLE TEST PLAN AND APPROVAL LETTER