

COMPLIANCE TEST REPORT

for

CARBON MONOXIDE EMISSIONS

EU-BOILER1-BR (UNIT 1)

**Belle River Power Plant
China Township, Michigan**

September 14-15, 2022

Prepared By
Environmental Management & Safety
Environmental Field Services Group
DTE Corporate Services, LLC
7940 Livernois G4-S
Detroit, MI 48210





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EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Safety (EM&S) Field Services Group performed carbon monoxide emissions testing on the exhaust of Unit 1 at the DTE Electric, Belle River Power Plant, located in China Township, Michigan. The fieldwork, performed on September 14-15, 2022, satisfies requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit (ROP) No. ROP-MI-B2796-2015b. Testing was performed for carbon monoxide (CO) at two loads (high & intermediate loads) as required by permit conditions.

The results of the emissions testing are highlighted below:

CO Emissions Test Results Belle River Power Plant – EU-BOILER1-BR (Unit 1) September 14-15, 2022

Boiler Operating Condition	Average CO Concentration (ppm)	Average CO Concentration (lb/MMBtu)
High Load (9/14)	1.9	0.0025
Mid Load (9/15)	-0.1	0.0000



1.0 INTRODUCTION

DTE Energy's Environmental Management and Safety (EM&S) Field Services Group performed carbon monoxide emissions testing on the exhaust of Unit 1 at the DTE Electric, Belle River Power Plant, located in China Township, Michigan. The fieldwork, performed on September 14-15, 2022, satisfies requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit (ROP) No. ROP-MI-B2796-2015b. Testing was performed for carbon monoxide (CO) at two loads (high & intermediate loads) as required by permit conditions.

The testing was performed pursuant to Title 40, *Code of Federal Regulations*, Part 60, Appendix A (40 CFR §60 App. A), Method 3A and 10.

The fieldwork was performed in accordance with EPA Reference Methods and EM&S's Intent to Test¹, submitted August 2, 2022, which was approved in a letter by Ms. Regina Angellotti from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), dated August 31, 2022². The following EM&S personnel participated in the testing program: Mr. Mark D. Westerberg, Sr. Environmental Specialist, and Mr. Fred Meinecke, Environmental Specialist. Mr. Westerberg was the project leader. Mr. Jason Roggenbuck, Senior Environmental Engineer at the plant provided process coordination for the testing program.

2.0 SOURCE DESCRIPTION

The Belle River Power Plant (BRPP) located at 4505 King Road in China Township, Michigan, employs the use of two (2) Babcock and Wilcox coal-fired boilers (Units 1 & 2) each capable of producing 4,550,000 pounds per hour of steam. Each Unit has a Siemens Power Corporation turbine generator with a nominally rated capability of 635 (Unit 1) and 645 (Unit 2) megawatts (MW).

A schematic representation of the Boiler exhaust and sampling locations is presented in Figure 1.

¹ EGLE, Test Plan, Submitted August 2, 2022 (Attached-Appendix A)

² EGLE, Approval Letter, (Attached-Appendix A)

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3.0 SAMPLING AND ANALYTICAL PROCEDURES

DTE Energy's EM&R Field Services Group obtained emissions measurements in accordance with procedures specified in the USEPA *Standards of Performance for New Stationary Sources* and the approved Intent to Test Plan. 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 10	Carbon Monoxide	NDIR Instrumental Analyzer Method

3.1 OXYGEN AND CARBON MONOXIDE (USEPA METHODS 3A AND 10)

3.1.1 Sampling Method

Oxygen (O₂) emissions were evaluated using USEPA Method 3A, "Gas Analysis for Oxygen, Oxygen, Excess Air, and Dry Molecular Weight (Instrumental Analyzer Method)".

Carbon monoxide (CO) emissions were evaluated using USEPA Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources". The CO analyzer utilizes a NDIR detector.

3.1.2 O₂ and CO Sampling Train

DTE Energy Corporate Services' EPA Methods 3A and 10 sampling system consisted of the following components:

- (1) A heated stainless steel sampling probe with heated filter.
- (2) A heated PTFE sampling line.
- (3) A Universal[®] gas conditioner with particulate filter.
- (4) A flexible unheated PTFE sampling line.

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- (5)A Servomax 1400 O₂ gas analyzer and TECO 48i NDIR CO gas analyzer.
- (6)USEPA Protocol 1 calibration gases.
- (7)Data Acquisition System.

Refer to Figure 2 for a schematic of the O₂ and CO sampling train.

3.1.3 Sampling Train Calibration

The Sampling train was calibrated according to procedures outlined in USEPA Methods 3A & 10. Zero, span, and mid-range calibration gases were introduced directly into the CO and O₂ analyzers to determine the instruments linearity. A zero and mid-range span gas was then introduced through the entire sampling system to determine sampling system bias for each analyzer. Additional system calibrations were performed at the completion of each test.

3.1.4 Sampling Duration & Frequency

The emissions testing of the boiler at each load condition consisted of triplicate 60-minute samples. Historical Data has shown the stack to be non-stratified therefore testing was conducted at a single point. Sampling was performed simultaneously for O₂ and CO. Data was recorded as 1-minute averages. Field sampling and calibration data can be found in Appendix B.

3.1.5 Quality Control and Assurance (O₂ and CO)

All sampling and analytical equipment was calibrated according to the guidelines referenced in Methods 3A and 10. Calibration gases were EPA Protocol 1 gases. Due to spiking issues, the CO analyzer span was 0-25.62 ppm. The calibration gases utilized were (25.62, 13.83, and zero).

Calibration gas certification sheets are provided in Appendix C.

3.1.6 Data Reduction

There is not a CO emission limit stated in the State of Michigan ROP B2796-2015b. Testing was performed to establish emissions concentrations for future reporting. Emissions are reported in parts per million (ppm) and pounds per million BTU (lb/MMBtu).

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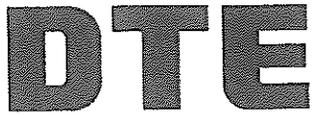
Emissions calculations (lb/MMBtu) are based on calculations located in USEPA Method 19. Coal samples were collected during the testing and analyzed to determine the F_c factor. Laboratory results from the coal analysis are presented in Appendix D.

4.0 OPERATING PARAMETERS

The test program included the collection of boiler emissions and operating data during each test run. Parameters recorded included CO₂, SO₂, and NO_x emissions, and opacity as well as boiler load. Operational data can be referred to in Appendix D.

5.0 RESULTS

The results from the CO testing on Unit 1 are displayed in Table No. 1. The results table presents the CO emissions in terms of parts per million (ppm) and pounds per million British thermal unit (lbs/MMBtu) for both the high and intermediate loads tested. The carbon dioxide (CO₂) in percent (%) is also presented. The CO₂ concentrations were corrected for analyzer drift per USEPA Method 7E procedures. Example calculations are presented in Appendix D.



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."

Mark D. Westerberg

Mark D. Westerberg, QSTI

This report prepared by: *Mark D. Westerberg*

Mr. Mark D. Westerberg, QSTI
Sr. Specialist, Environmental Field Services
Environmental Management and Safety
DTE Energy

This report reviewed by: _____

Thomas Snyder

Mr. Thomas Snyder, QSTI
Sr. Specialist, Environmental Field Services
Environmental Management and Safety
DTE Energy

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RESULTS TABLES



Carbon Monoxide Emissions Testing Results
 Unit 1
 September 14 & 15, 2022
 Belle River Power Plant

High Load	Run 3	Run 4	Run 5	Average
September 14, 2022				
Date				
Sampling Time (DAHS)	9:58-10:58	11:16-12:16	13:14-14:14	
Load (MW _{gross})	628.4	629.0	628.2	628.5
Average CO ₂ Content (% dry)	10.3	10.4	10.4	10.4
Average CO ₂ Content (% dry, corrected) ¹	10.5	10.5	10.5	10.5
Average CO Concentration (ppmv, dry)	1.8	1.9	2.1	2.0
Average CO Concentration (ppmv, dry, corrected) ¹	1.7	1.8	2.0	1.9
Average CO Concentration (lb/MMBtu)	0.0024	0.0026	0.0028	0.0026

Mid Load	Run 1	Run 2	Run 3	Average
September 15, 2022				
Date				
Sampling Time (DAHS)	06:41-07:41	08:05-09:05	09:24-10:24	
Load (MW _{gross})	340.4	342.2	342.1	341.6
Average CO ₂ Content (% dry)	8.1	8.0	8.0	8.0
Average CO ₂ Content (% dry, corrected) ¹	8.2	8.1	8.1	8.2
Average CO Concentration (ppmv, dry)	0.0	0.0	0.0	0.0
Average CO Concentration (ppmv, dry, corrected) ¹	-0.1	-0.1	-0.1	-0.1
Average CO Concentration (lb/MMBtu)	0.0000	-0.0001	0.0000	0.0000

¹corrected for analyzer drift as per USEPA Method 7E

CO₂ : Carbon dioxide

CO : carbon monoxide

ppmv : parts per million on a volume-to-volume basis

lb/MMBtu: pounds per million British Thermal Units

ND: Non-Detect

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FIGURES

Figure 1 – Sampling Location
Belle River Power Plant - Unit 1
September 14-15, 2022

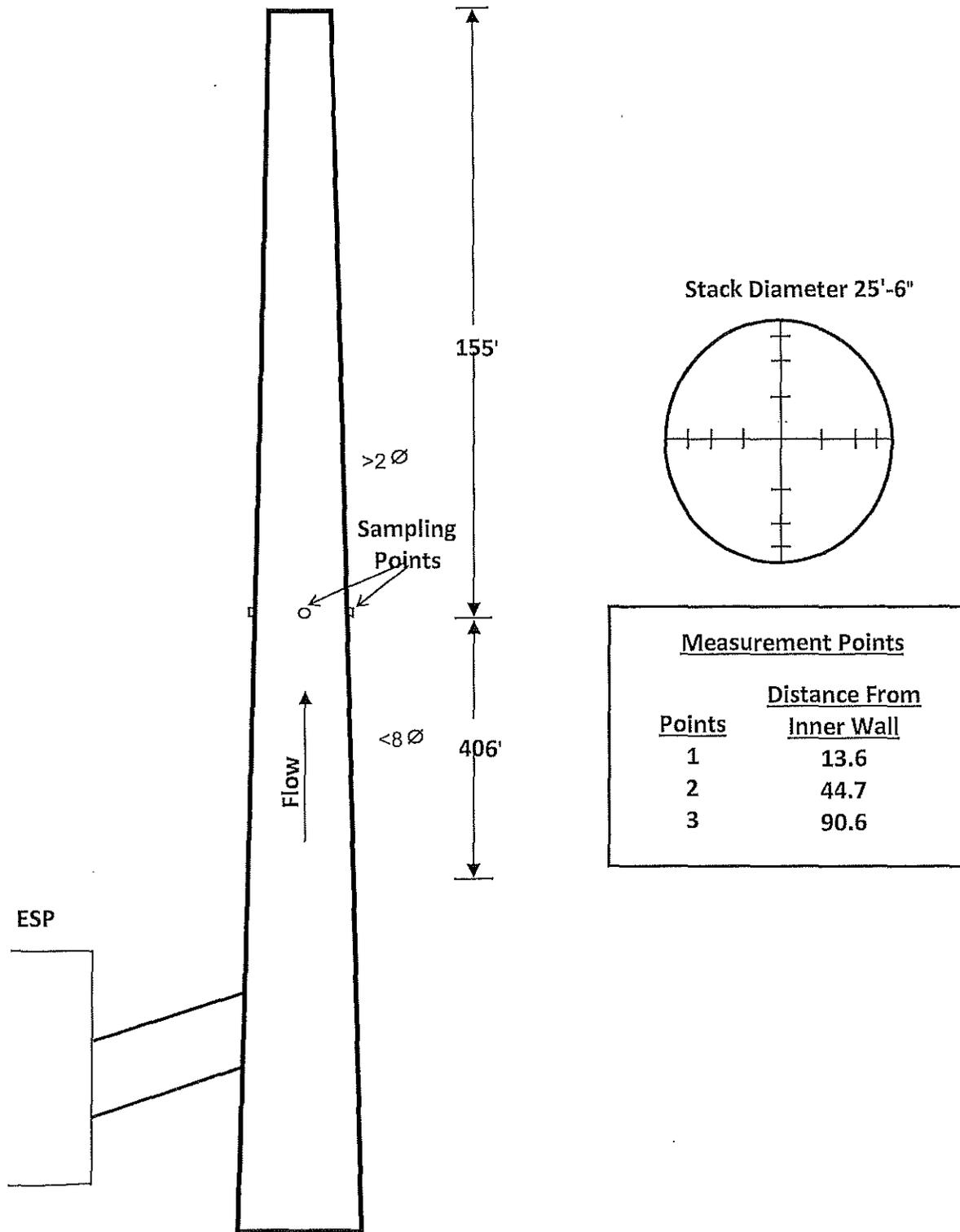


Figure 2 – EPA Method 3A/10
Belle River Power Plant – Unit 1
September 14-15, 2022

