

## 1.0 INTRODUCTION AND SUMMARY

### 1.1 PROGRAM OBJECTIVES

Montrose Air Quality Services, LLC (Montrose) was contracted by Detroit Edison Energy (DTE) to perform a series of air emission tests at the Belle River Power Plant (BRPP) facility located in Belle River, MI. The tests were conducted on one (1) coal-fired boiler EU-BOILER-BR (Unit1) to determine compliance with the source testing permit limitations.

The testing was conducted by Mr. Thomas Cassin and Mr. Scott Dater, of Montrose on the 20<sup>th</sup> of October, 2021. Mr. Mark Grigereit of DTE coordinated the testing program. The tests were conducted according to the test plan submitted to Michigan Department of Environment, Great Lakes and Energy (EGLE). Montrose performed the tests to measure the following emission parameters:

- Emission Parameters:
  - CO (ppmvd, lb/MMBtu)
  - O<sub>2</sub> (% volume dry) – for molecular weight calculations

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their respective permit limits and performance specifications in Table 1-1. Detailed results for individual test runs can be found in Section 5.0. All supporting data can be found in the appendices.

**TABLE 1-1  
 SUMMARY OF AVERAGE TEST RESULTS  
 BELLE RIVER POWER PLANT  
 UNIT 1  
 October 20<sup>th</sup>, 2021**

Condition	High Load	Mid Load	Permit Limit
<b>CO Emissions<sup>1</sup>:</b>			
lb/MMBtu	0.001	0.000	--
ppmvd	0.37	0.00	--

## 1.2 PROJECT CONTACTS

A list of project participants is included below:

### Facility Information

Source Location: DTE Energy Belle River Power Plant  
4505 King Road  
China Township, MI  
Project Contact: Mr. Mark Grigereit  
Company: DTE Energy  
Telephone: (313) 412-0305  
Email: mark.grigereit@dteenergy.com

### Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC (Montrose)  
Contact: John Hamner  
Title: Account Program Manager  
Telephone: (630) 715-3259  
Email: jhamner@montrose-env.com

## **2.0 SOURCE LOCATION INFORMATION**

### **2.1 FACILITY 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 (Unit2) megawatts (MW).

### **2.2 SAMPLING LOCATIONS**

Information regarding the sampling location is presented below:

- Sample location ID: Unit 1
- Stack exit height: 561 feet
- Configuration: Cylindrical
- Dimensions: 25 feet – 6 inches
- Port access: Elevator to permanent platform

## **3.0 TEST DESCRIPTION**

### **3.1 PROGRAM OBJECTIVES**

The objective of this test program was to determine compliance with the EGLE permit. The results are presented in units consistent with those listed in the Test Plan.

### **3.2 TEST CONDITIONS**

Emission tests were performed while the source unit, was operating at the conditions required by the permit. Tests were performed at the following condition:

- Condition 1 Base Load – 636.97 MW
- Condition 2 Mid Load – 364.70 MW

Plant personnel established the test conditions and collected all applicable unit-operating data. Montrose monitored the collection of process data and provided additional data collection as necessary to document operation.

### **3.3 TEST PROGRAM SCHEDULE**

The test program schedule is presented in Table 3-1.

**TABLE 3-1  
TEST MATRIX AND SCHEDULE**

Date	Source ID/ Activity	Sample Runs	Sample Duration
October 20 <sup>th</sup> 2021	<b>Unit 1</b>		
	O <sub>2</sub> & CO - Base	3	60 Minutes
	O <sub>2</sub> & CO - Mid	3	60 Minutes

### 3.4 MONTROSE TEST PROCEDURES

The test procedures used for this test program are summarized in Table 3-2 below. Additional information regarding specific applications or modifications to standard procedures is presented in the following sub-sections.

**TABLE 3-2  
TEST PROCEDURES**

Parameter	Measurement Principle	Reference Method
O <sub>2</sub>	Paramagnetism	EPA 3A
CO	Gas filter correlation NDIR	EPA 10

#### 3.4.1 Gaseous Emissions

Concentrations of the gaseous constituents of stack gas oxygen (O<sub>2</sub>) and carbon monoxide (CO) were measured using Montrose's dry extractive reference method (RM) monitor system in accordance with EPA Methods 3A and 10. This system meets the requirements of EPA methods for gaseous species. Pertinent information regarding the performance of the method is presented below:

- Method Deviations: None
- Method Options: N/A

The stack gas was sampled at a single point. Source gas was sampled for a period of 60 minutes for each of the three test runs. O<sub>2</sub> was measured concurrently with the gaseous test runs for molecular weight.

#### 3.4.4 Emission Rates

Emission rates will be calculated in units of lb/MMBtu from the measured coal analysis and using the standard published EPA Method 19 calculations.

### **3.4.5 Process Data**

The plant's unit operating data was used to document process conditions during the test runs. Unit operating data was provided by DTE personnel. Data presented in this report includes the following:

- Megawatts

## **4.0 QUALITY ASSURANCE AND REPORTING**

### **4.1 SAMPLING AND ANALYTICAL QA/QC**

Montrose has instituted a rigorous QA/QC program for all of its air pollution testing. Quality assurance audits are performed as part of the test program to ensure that the final results are calculated from the highest quality data. The program ensures that the emission data reported are as accurate as possible. The procedures included in the cited reference methods were followed for all steps of preparation, sampling, calibration, and analysis. Montrose was responsible for preparation, calibration and cleaning of the sampling apparatus. Montrose also conducted the sampling and sample recovery, storage, and shipping.

Contract laboratories conducted some of the preparation and sample analyses as needed. The laboratories that were used are established leaders in development and performance of the reference methods for which they have been selected. Their credentials for adherence to the required quality assurance procedures are well known.

### **4.2 QUALITY CONTROL PROCEDURES**

Our Quality Assurance documents located in Appendix A, provides our equipment calibration information. For additional quality control, Montrose followed the procedures outlined below and in the method write-ups in Section 3.4.

#### **4.2.1 Equipment Inspection and Maintenance**

- Each critical piece of field equipment was assigned a unique identification number to allow tracking of its calibration history
- All field equipment was visually inspected prior to testing and included pre-test calibration checks

#### **4.2.2 Equipment Calibrations**

Our equipment calibration documentation is located in Appendix A.

### **4.3 DATA ANALYSIS, VALIDATION, AND UNCERTAINTY**

The raw data collected during the sampling and analysis procedures were used to calculate the results of the testing program. The analysis or reduction of the data to the final results followed these steps, where appropriate to the test method:

- Check field-sampling data for accuracy and calculate appropriate data averages (e.g., temperatures, pressures, volumes, etc.).

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- Double check calculation of the data averages.
- Review all in-house and contract laboratory reports and ensure that appropriate and/or required QA/QC steps were followed.
- Enter field and laboratory data to established and verified computer spreadsheets for calculation of volumetric flow rates, mass emission rates or other appropriate results.
- Double-check all lab and field data inputs.
- Perform example calculations by hand using raw data on a single test run for each type of emission result reported.
- Compile summary tables of results and review all table inputs.

This report includes copies of spreadsheet printouts (data input and results output) and example calculation checks. The field data sheets with average data calculations are also included. Standard conditions used for data reduction are 29.92 inches of mercury and 68 °F. All values found to be below the detection limit of the analytical method are reported as “less than” (“<”) either the full detection limit value, one-half of the detection limit, or zero based on the applicable method.

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose personnel reduce the impact of these uncertainty factors by using approved and validated test methods. In addition, Montrose personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Manual and ASTM D 7036-04. The limitations of the various methods, instruments, equipment, and materials utilized during this test have been reasonably considered, but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

## **5.0 DISCUSSION OF RESULTS**

### **5.1 DETAILED DISCUSSION OF RESULTS**

The average results are compared to the permit in Table 1-1. The results of individual test runs performed on the Unit 1 are presented in Table 5-1. The test results show that all of the emissions were within their respective permit limits. Emissions have been reported in units consistent with those in the permits.

All of the analyzers performed within their applicable performance specifications.

Additional information is included in the appendices. Appendix A presents the quality assurance information, including instrument calibration data. Raw field data sheets and RM data is included in Appendix B. Appendix C presents the general and specific equations used for the emissions calculations and computer spreadsheets. Laboratory reports and chain of custody sheets for the samples are located in Appendix D.

**5.2 PROBLEMS/DEVIATIONS/EXCEPTIONS**

There were no problems encountered during the testing.

**TABLE 5-1  
RESULTS SUMMARY GASEOUS EMISSIONS  
DTE BELLE RIVER POWER PLANT  
UNIT 1  
BASE & MID LOADS**

**Reference Method Test Run Data**

Client:	DTE	Test Start Date:	Wednesday, October 20, 2021
Facility:	Belle river	Operator:	Tom Cassin
Source:	GT 1	F Factor Information	
Test Location:	Stack	F <sub>1</sub>	-
Condition/Load:	Base & Mid	F <sub>2</sub>	9717
Project Number:	PROJ-010047	Reference Method Measurement Basis:	Dry - Extractive
		CEMS Analyzer Measurement Basis:	-

Uncorrected Reference Method Analyzer Results

Run Number	Test Date	Start Minute	End Minute	CO (ppmvd)	NO <sub>x</sub> (ppmvd)	SO <sub>2</sub> (ppmvd)	O <sub>2</sub> (% v/v Dry)	CO <sub>2</sub> (% v/v Dry)
1 Base	10/20/21	10:00	10:59	0.16	-	-	8.88	-
2 Base	10/20/21	11:15	12:14	0.20	-	-	8.94	-
3 Bae	10/20/21	12:33	13:32	0.76	-	-	8.89	-
1 Mid	10/20/21	16:42	17:41	-0.70	-	-	11.39	-
2 Mid	10/20/21	17:55	18:54	-0.85	-	-	11.41	-
3 Mid	10/20/21	19:08	20:07	-0.53	-	-	11.39	-

Calibration Corrected Reference Method Analyzer Results

Moisture Basis As Measured

Run Number	Test Date	Start Minute	End Minute	CO (ppmvd)	NO <sub>x</sub> (ppmvd)	SO <sub>2</sub> (ppmvd)	O <sub>2</sub> (% v/v Dry)	CO <sub>2</sub> (% v/v Dry)
1 Base	10/20/21	10:00	10:59	0.23	-	-	8.84	-
2 Base	10/20/21	11:15	12:14	0.14	-	-	8.89	-
3 Bae	10/20/21	12:33	13:32	0.74	-	-	8.84	-
1 Mid	10/20/21	16:42	17:41	-0.72	-	-	11.33	-
2 Mid	10/20/21	17:55	18:54	-0.82	-	-	11.35	-
3 Mid	10/20/21	19:08	20:07	-0.40	-	-	11.33	-

Reference Method Emission Rate Summary - lb/MMBtu

Run Number	Test Date	CO lb/MMBtu	NO <sub>x</sub> lb/MMBtu	SO <sub>2</sub> lb/MMBtu	F <sub>1</sub> Factor	F <sub>2</sub> Factor
1 Base	10/20/21	0.000	-	-	-	9717
2 Base	10/20/21	0.000	-	-	-	9717
3 Bae	10/20/21	0.001	-	-	-	9717
1 Mid	10/20/21	-0.001	-	-	-	9717
2 Mid	10/20/21	-0.001	-	-	-	9717
3 Mid	10/20/21	-0.001	-	-	-	9717