

## 1.0 INTRODUCTION

### 1.1 SUMMARY OF TEST PROGRAM

DTE Energy-Belle River Power Plant (BRPP) (State Registration Number: B2796) contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance test program on the Coal-Fired Boiler No. 1 (EU-BOILER1-BR) (part of FG-DSI/ACI-BR) at the DTE Energy-BRPP facility located in East China Township, Michigan. Testing was performed on August 30, 2021, for the purpose of satisfying the emission testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit No. MI-ROP-B2796-2015c and 40 CFR Part 63, Subpart UUUUU.

The specific objectives were to:

- Verify the emissions of hydrogen chloride (HCl) at the electrostatic precipitator (ESP) serving EU-BOILER1-BR
- Conduct the test program with a focus on safety

Montrose performed the tests to measure the emission parameters listed in Table 1-1.

**TABLE 1-1  
 SUMMARY OF TEST PROGRAM**

Test Date(s)	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
8/20/2021	EU-BOILER1-BR	O <sub>2</sub> , CO <sub>2</sub>	EPA 3A	3	60
8/20/2021	EU-BOILER1-BR	Moisture	EPA 4	3	60
8/20/2021	EU-BOILER1-BR	HCl	EPA 26	3	60

To simplify this report, a list of Units and Abbreviations is included in Appendix D.1. Throughout this report, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

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 in Table 1-2. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

DTE Energy-Belle River Power Plant  
2021 Compliance Source Test Report

**TABLE 1-2  
SUMMARY OF AVERAGE COMPLIANCE RESULTS -  
EU-BOILER1-BR  
AUGUST 30, 2021**

Parameter/Units	Average Results	Emission Limits
Hydrogen Chloride (HCl) lb/MMBtu	0.00027	0.002

## 1.2 KEY PERSONNEL

A list of project participants is included below:

### Facility Information

Source Location: DTE Energy - Belle River Power Plant  
4901 Pointe Drive  
East China Township, MI 48054

Project Contact: Mark Grigereit  
Role: Principal Engineer  
Company: DTE Energy  
Telephone: 313-412-0305  
Email: mark.grigereit@dteenergy.com

### Agency Information

Regulatory Agency: EGLE  
Agency Contact: Karen Kajiya-Mills  
Telephone: 517-335-3122  
Email: kajiya-millk@michigan.gov

### Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC

Contact: Matthew Young	Barry Boulianne
Title: District Manager	Midwest Sales Manager
Telephone: 248-548-8070	248-548-8070
Email: myoung@montrose-env.com	bboulianne@montrose-env.com

### Laboratory Information

Laboratory: Enthalpy Analytical, LLC  
City, State: Durham, NC 27713  
Method: EPA Method 26A

DTE Energy-Belle River Power Plant  
2021 Compliance Source Test Report

Test personnel and observers are summarized in Table 1-3.

**TABLE 1-3  
TEST PERSONNEL AND OBSERVERS**

<b>Name</b>	<b>Affiliation</b>	<b>Role/Responsibility</b>
Barry Boulianne	Montrose	Midwest Sales Manager
Jeff Peitzsch	Montrose	Field Technician
Mark Grigereit	DTE Energy-BRPP	Observer/Client Liaison/Test Coordinator

## 2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

### 2.1 PROCESS DESCRIPTION, OPERATING, AND CONTROL EQUIPMENT

The DTE Energy-BRPP employs the use of two coal-fired boilers (EU-BOILER1-BR and EU-BOILER2-BR) to produce power. Boilers No. 1 (EU-BOILER1-BR) and No. 2 (EU-BOILER2-BR) are Electric Generating Units (EGU) (FG-DSI/ACI-BR). EU-BOILER1-BR has a nominally rated capability of 697 MW, and its emissions are controlled by an ESP. EU-BOILER1-BR was in operation for this test event.

### 2.2 FLUE GAS SAMPLING LOCATION

Information regarding the sampling location is presented in Table 2-1.

**TABLE 2-1  
SAMPLING LOCATION**

Sampling Location	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
EU-BOILER1-BR ESP Exhaust Stack	306.0	4,800 / 15.7	1,800 / 5.9	Gaseous: 1

See Appendix A.1 for more information.

### 2.3 OPERATING CONDITIONS AND PROCESS DATA

Emission tests were performed while EU-BOILER1-BR and the ESP were operating at the conditions required by the permit.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The process data that was provided is presented in Appendix B.

### 3.0 SAMPLING AND ANALYTICAL PROCEDURES

#### 3.1 TEST METHODS

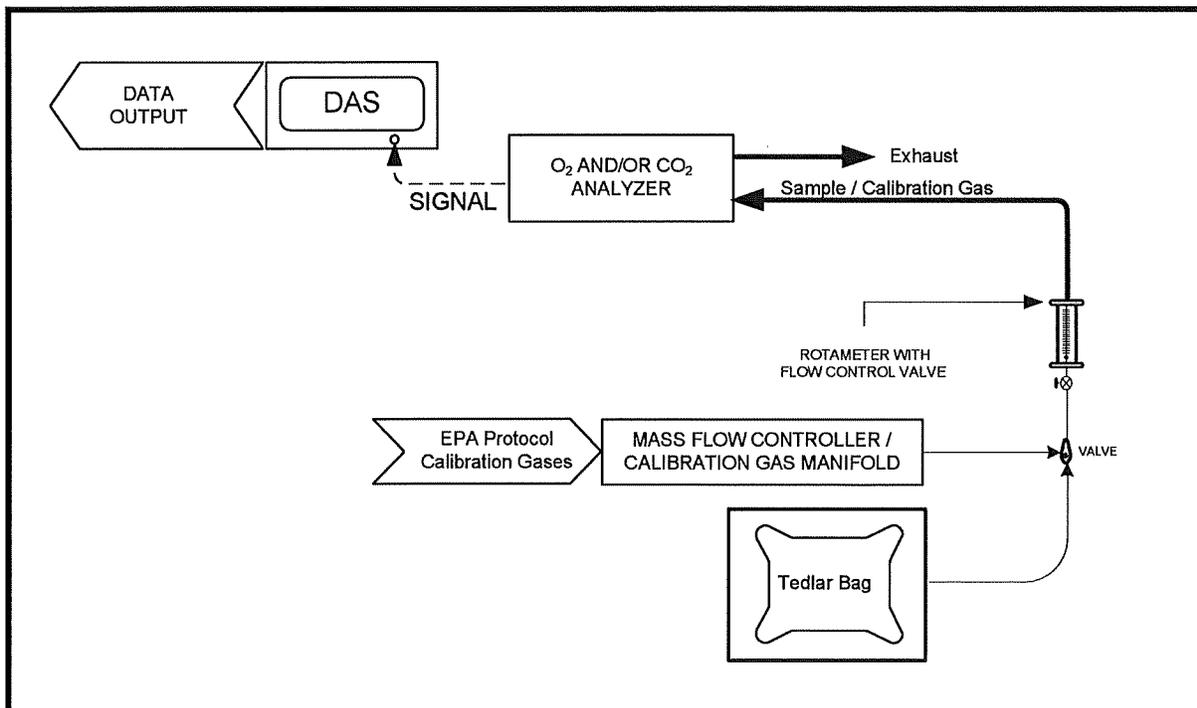
The test methods for this test program were presented previously in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

##### 3.1.1 EPA Method 3A, Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 3A is an instrumental test method used to measure the concentration of O<sub>2</sub> and CO<sub>2</sub> in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O<sub>2</sub> and CO<sub>2</sub>. The performance requirements of the method must be met to validate data.

For the purpose of this test event, Tedlar bags were utilized to collect exhaust gas from the ESP exhaust stack. Then, the Tedlar bags were analyzed using EPA Method 3A. The typical sampling system is detailed in Figure 3-1.

**FIGURE 3-1  
EPA METHOD 3A (O<sub>2</sub>/CO<sub>2</sub>) TEDLAR BAG SAMPLING TRAIN**



### **3.1.2 EPA Method 4, Determination of Moisture Content in Stack Gas**

EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

The typical sampling system is detailed in Figure 3-2.

### **3.1.3 EPA Method 19, Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates**

EPA Method 19 is a manual method used to determine (a) PM, SO<sub>2</sub>, and NO<sub>x</sub> emission rates; (b) sulfur removal efficiencies of fuel pretreatment and SO<sub>2</sub> control devices; and (c) overall reduction of potential SO<sub>2</sub> emissions. This method provides data reduction procedures, but does not include any sample collection or analysis procedures.

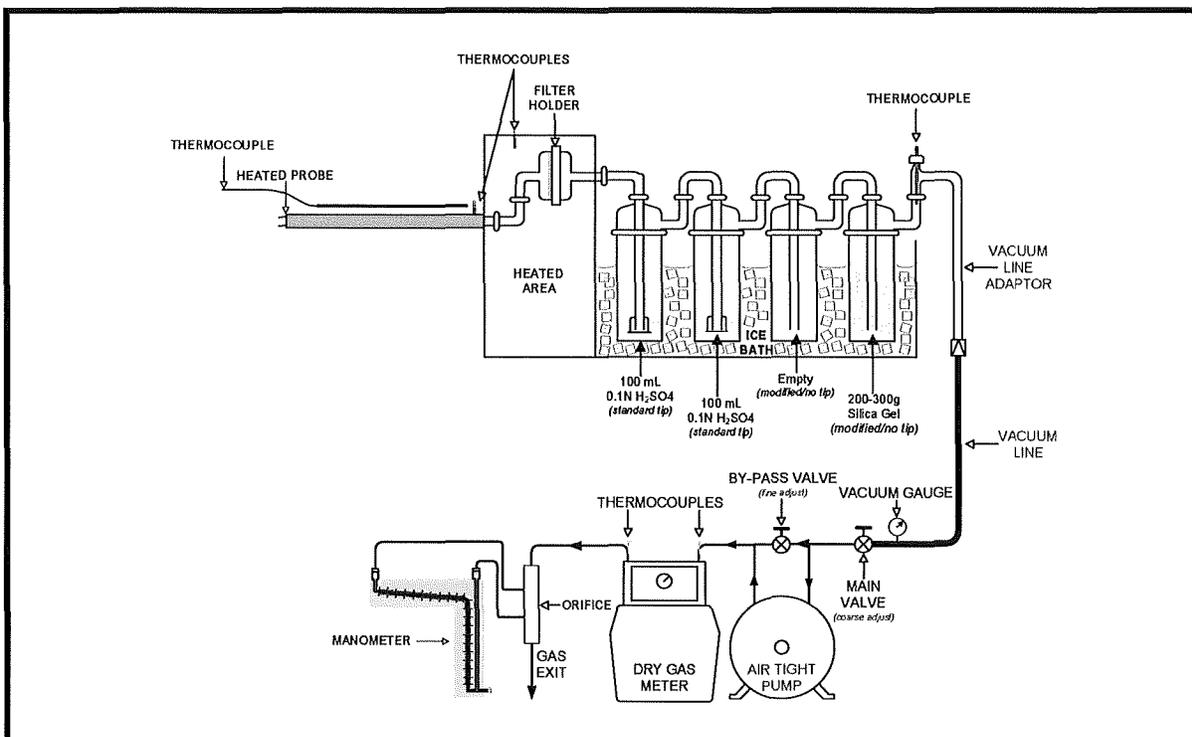
EPA Method 19 is used to calculate mass emission rates in units of lb/MMBtu. EPA Method 19, Table 19-2 contains a list of assigned fuel factors for different types of fuels, which can be used for these calculations.

### **3.1.4 EPA Method 26, Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Non-Isokinetic Method**

An integrated sample is extracted from the source and passed through a pre-purged heated probe and filter into dilute sulfuric acid and dilute sodium hydroxide solutions which collect the gaseous hydrogen halides and halogens, respectively. The filter collects particulate matter including halide salts but is not routinely recovered and analyzed. The hydrogen halides are solubilized in the acidic solution and form chloride (Cl<sup>-</sup>), bromide (Br<sup>-</sup>), and fluoride (F<sup>-</sup>) ions. The halogens have a very low solubility in the acidic solution and pass through to the alkaline solution where they are hydrolyzed to form a proton (H<sup>+</sup>), the halide ion, and the hypohalous acid (HClO or HBrO). Sodium thiosulfate is added in excess to the alkaline solution to assure reaction with hypohalous acid to form a second halide ion such that 2 halide ions are formed for each molecule of halogen gas. The halide ions in the separate solutions are measured by ion chromatography (IC).

For the purpose of this test, non-isokinetic sampling was performed. The typical sampling system is detailed in Figure 3-2.

**FIGURE 3-2**  
**EPA METHOD 26 (HALIDES) SAMPLING TRAIN**



### 3.2 PROCESS TEST METHODS

Process samples of coal were taken by DTE Energy personnel and analyzed for Proximate and Ultimate fuel analysis.

#### 4.0 TEST DISCUSSION AND RESULTS

##### 4.1 FIELD TEST DEVIATIONS AND EXCEPTIONS

No field deviations or exceptions from the test plan or test methods occurred during this test program.

##### 4.2 PRESENTATION OF RESULTS

The average results are compared to the permit limits in Table 1-2. The results of individual compliance test runs performed are presented in Table 4-1. Emissions are reported in units consistent with those in the applicable regulations or requirements. Additional information is included in the appendices as presented in the Table of Contents.

**TABLE 4-1  
 HCl EMISSIONS RESULTS -  
 EU-BOILER1-BR**

Run Number	1	2	3	Average
<b>Date</b>	8/30/2021	8/30/2021	8/30/2021	--
<b>Time</b>	9:51-10:51	11:00-12:00	12:10-13:10	--
<b>Process Data</b>				
F-Factor, dscf/MMBtu	9781.0	9781.0	9781.0	9781.0
<b>Flue Gas Parameters</b>				
O <sub>2</sub> , % volume dry	10.78	10.97	10.94	10.90
CO <sub>2</sub> , % volume dry	8.95	8.64	8.89	8.83
flue gas temperature, °F	271.0	271.8	272.2	271.7
moisture content, % volume	10.68	10.76	11.10	10.85
<b>Hydrogen Chloride (HCl)</b>				
ppmvd	0.17	0.14	0.11	0.14
lb/MMBtu	0.00032	0.00027	0.00022	0.00027

## **5.0 INTERNAL QA/QC ACTIVITIES**

### **5.1 QA/QC AUDITS**

The meter box and sampling train used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes met the applicable QA/QC criteria.

EPA Method 3A calibration audits were all within the measurement system performance specifications for the calibration drift checks, system calibration bias checks, and calibration error checks.

EPA Method 26A analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met.

### **5.2 QA/QC DISCUSSION**

All QA/QC criteria were met during this test program.

### **5.3 QUALITY STATEMENT**

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is included in the report appendices. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).

DTE Energy-Belle River Power Plant  
2021 Compliance Source Test Report

**APPENDIX A  
FIELD DATA AND CALCULATIONS**

**RECEIVED**  
**OCT 01 2021**  
**AIR QUALITY DIVISION**

## Appendix A.1 Sampling Locations

### EU-BOILER1-BR SAMPLING LOCATION SCHEMATIC

