



COMPLIANCE TEST REPORT

for

QUARTERLY HYDROGEN CHLORIDE (HCL) EMISSIONS

EU-BOILER2-BR

(SRN: B2796)

3rd Quarter 2019

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

September 4, 2019

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EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Resources (EM&R) Field Services Group performed 3rd Quarter – 2019 Hydrogen Chloride (HCl) emissions testing on the exhaust of EU-BOILER2-BR at the Belle River Power Plant, located in China Township, Michigan. The testing was required by 40 CFR Part 63, Subpart UUUUU (Mercury and Air Toxics Standards - MATS) to document quarterly HCl stack emissions. Testing was conducted on September 4, 2019.

A summary of the emission test results are shown below:

Emissions Testing Summary Belle River Power Plant EU-BOILER2-BR

Source	Date	Load (GMW)	HCl (lbs/MmBtu) ⁽¹⁾
EU-BOILER2-BR	9-4-19	638	0.0004

(1) MATS Limit 0.002 lbs/MMBtu

1.0 INTRODUCTION

DTE Energy's Environmental Management and Resources (EM&R) Field Services Group performed 3rd Quarter – 2019 Hydrogen Chloride (HCl) emissions testing on the exhaust of EU-BOILER2-BR at the Belle River Power Plant, located in China Township, Michigan. The testing was required by the 40 CFR Part 63, Subpart UUUUU (Mercury and Air Toxics Standards - MATS) to document quarterly HCl stack emissions. The testing was conducted on September 4, 2019.

The fieldwork was performed in accordance with EPA Reference Methods and DTE Energy Intent to Test¹, which was approved in a letter by Mr. Tom Maza from the Michigan Department of Environmental Quality (EGLE), dated January 20, 2017². The following DTE Energy personnel participated in the testing program: Mr. Jason Logan, Environmental Specialist, Mr. Mark Westerberg, Senior Environmental Specialist, and Mr. Fred Meineke, Senior Environmental Technician. Mr. Logan was the project leader. Mr. Jason Roggenbuck, Senior Environmental Engineer at the plant, provided process coordination for the testing program. Mr. Robert Elmouchi (EGLE) was on site to witness portions of the test event.

2.0 SOURCE DESCRIPTION

The Belle River Power Plant (BRPP) located at 4505 King Road in St Clair, Michigan, employs the use of two (2) Babcock and Wilcox coal-fired boilers (Unit 1 & 2) each capable of producing 4,550,000 pounds per hour of steam. Each Unit has a Siemens Power Corporation boiler generator with a nominally rated capability of 635 (EU-BOILER1-BR) and 645 (EU-BOILER2-BR) gross megawatts (GMW). See Figure 1 for a diagram of the units' sampling locations and stack dimensions.

The air pollution control equipment consists of Wheelabrator Frye cold gas electrostatic precipitators on each unit that have design collection efficiencies greater than 99%. Each exhaust Stack is 665 feet tall with an internal diameter of 25.5 feet.

Each boiler is equipped with a Dry Sorbent Injection (DSI) and Activated Carbon Injection (ACI) air quality control system. The DSI system is used to control acid gas, PM, PM10, PM2.5, and NOx emissions from each unit.

Testing was performed on EU-BOILER2-BR while operating at normal load conditions, per Subpart UUUUU.

¹ EGLE, Test Plan, Submitted October 23, 2017. (Attached-Appendix A)

² EGLE, Approval Letter, dated January 20, 2017. (Attached-Appendix A)

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* or listed as an approved “*Other Test Method*”. The sampling and analytical methods used in the testing program are indicated in the table below:

Sampling Method	Parameter	Analysis
USEPA Method 3A	Oxygen & CO ₂	Instrumental Analyzer Method
USEPA Method 4	Moisture Content	Field data analysis and reduction
USEPA Method 26a	Hydrogen Chloride	Ion Chromatography
USEPA Method 19	Emission Rate Calculations	Stoichiometric Calculations

3.1 OXYGEN AND CARBON DIOXIDE (USEPA Method 3A)

3.1.1 Sampling Method

Stack gas oxygen (O₂) and carbon dioxide (CO₂) emissions were evaluated using USEPA Method 3A, “Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)”. The O₂ / CO₂ analyzers utilize paramagnetic sensors.

3.1.2 O₂ / CO₂ Sampling Train

The Method 3A sampling system consisted of continuously collecting a gas sample from the exhaust of the dry gas meter sampling system. The samples were drawn through a PTFE line into a Servomex™ O₂/CO₂ gas analyzer.

3.1.3 Sampling Train Calibration

The O₂ / CO₂ analyzer was calibrated per procedures outlined in USEPA Method 7E. Zero, span, and mid-range calibration gases were introduced directly into the analyzer to verify the instruments linearity. The O₂/CO₂ concentrations are recorded on the field data sheets. Calibration data can be found in Appendix F.

3.2 MOISTURE DETERMINATION (USEPA Method 4)

3.2.1 *Sampling Method*

Determination of the moisture content of the exhaust gas was performed using the method described in USEPA Method 4, “Determination of Moisture Content in Stack Gases”. The exhaust gas condensate was collected in glass impingers and the percentage of moisture was derived from calculations outlined in USEPA Method 4 as a component of the HCl sampling train.

3.3 HYDROGEN CHLORIDE (USEPA Method 26A)

3.3.1 *HCl Sampling Method*

USEPA Method 26A, “Determination of Hydrogen Halide and Halogen Emissions” was used to measure the Hydrochloric Acid (HCl) emissions (see Figure 2 for a schematic of the sampling train). Method 26A uses impingers containing 0.1N H₂SO₄ to capture the HCl. Triplicate, 60-minute test runs were conducted. The Method 26A sampling was performed as a single point sample per Method 26 procedures.

The Method 26A stack sampling system (Figure 2) consisted of the following:

- (1) Heated glass-lined probe (Maintained 248 °F > T > 273 °F)
- (2) Heated 3” glass filter holder with a PTFE filter (maintained at a temperature of 248 °F > T > 273 °F)
- (3) Set of impingers for the collection HCl and condensate for moisture determination (Impingers containing 0.1N H₂SO₄)
- (4) Length of sample line
- (5) Environmental Supply® control case equipped with a pump, dry gas meter, and calibrated orifice.

All sampling was conducted at a single point per Method 26.

After completion of each run, a leak test was conducted. All the impingers were measured for moisture gain. The contents of impingers 1 and 2 were collected in a designated sample container. Impingers 1 and 2, the back half of the filter holder, the Z-fitting connecting the filter holder to the first impinger, and the U-tube between the first and second impingers were then rinsed with DI water and collected in the same sample container. Each container was labeled with the test number, test location, test date, and the level of liquid marked on the outside of the container. Immediately after recovery, the sample containers were placed in a cooler for storage.

Collected field blanks consisted of a 0.1N H₂SO₄ solution blank and a DI water rinse blank. 200ml of 0.1N H₂SO₄ was collected and diluted with DI water, from the same bottle used in sample recovery, to the liquid level of the three test runs. The blank was collected and analyzed following the same procedures used to recover and analyze the field samples.

Analysis of the Method 26A samples and blanks were conducted by Maxxaam Analytics. All analysis followed the procedures listed in USEPA Method 26A. A complete laboratory report is in Appendix E.

Field data sheets for the Method 26A sampling are in Appendix B.

3.3.2 Quality Control and Assurance

All sampling and analytical equipment was calibrated per the guidelines referenced in EPA Method 5 and 26A.

3.3.3 Data Reduction

HCl emissions data collected during the testing were calculated and reported as parts per million (ppm) and pounds per million Btu (lb/MMBtu).

Analysis of the Method 26A samples and blanks were conducted by Maxxaam Analytics. All analyses followed the procedures listed in USEPA Method 26A. A complete laboratory report is in Appendix E.

Field data sheets for the Method 26A sampling are in Appendix B.

4.0 OPERATING PARAMETERS

The test program included the collection of boiler load and stack emissions CEMs data during each test run. Parameters recorded included gross Megawatts (GMW) and CEMs data (SO₂, NO_x, CO₂, and opacity). Additionally, dry sorbent injection rates (DSI) and activated carbon injection rates (ACI), in pounds per hour (lb/hr), are reported. Operational Data collected during the testing is presented in Appendix C.

A representative coal sample was collected from the unit and analyzed for ultimate and proximate analysis, including % Sulfur, % Ash, and heat content. The coal analysis was used to calculate an Fc value for each day of testing and used in the lb/MMBtu calculations. Results of the fuel analysis can be referred to in Appendix E.

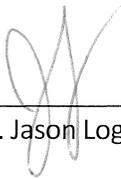
HCl emissions testing was performed at normal operating load and representative of site specific normal operating conditions according to 40 CFR part 63.10007.

5.0 DISCUSSION OF RESULTS

Table 1 presents the HCl emission testing results from EU-BOILER2-BR. HCl emissions are presented in parts per million on a dry basis (ppmvd) and pounds per million BTU (lbs/MMBtu). EU-BOILER2-BR demonstrated average HCl emissions below the Subpart UUUUU limit of 0.002 lb/MMBtu.

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."



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RESULTS TABLES



TABLE NO. 1
HYDROGEN CHLORIDE EMISSIONS TESTING RESULTS
Belle River Power Plant - Unit 2
September 4, 2019

Test	Test Date	Test Time	Unit Load (GMW)	DSI Injection Rate (lb/hr)	ACI Injection Rate (lb/hr)	CO ₂ Concentration (%)	HCl Concentration (ppmv)	HCl Emissions (lbs/MMBtu) ⁽¹⁾
HCl-1	4-Sep-19	7:36-8:36	637	0	246	12.1	0.35	0.0005
HCl-2		8:46-10:08	638	3	218	12.3	0.21	0.0003
HCl-3		10:18-11:18	<u>638</u>	<u>0</u>	<u>201</u>	<u>12.1</u>	<u>0.28</u>	<u>0.0004</u>
Average:			638	1	222	12.2	0.28	0.0004

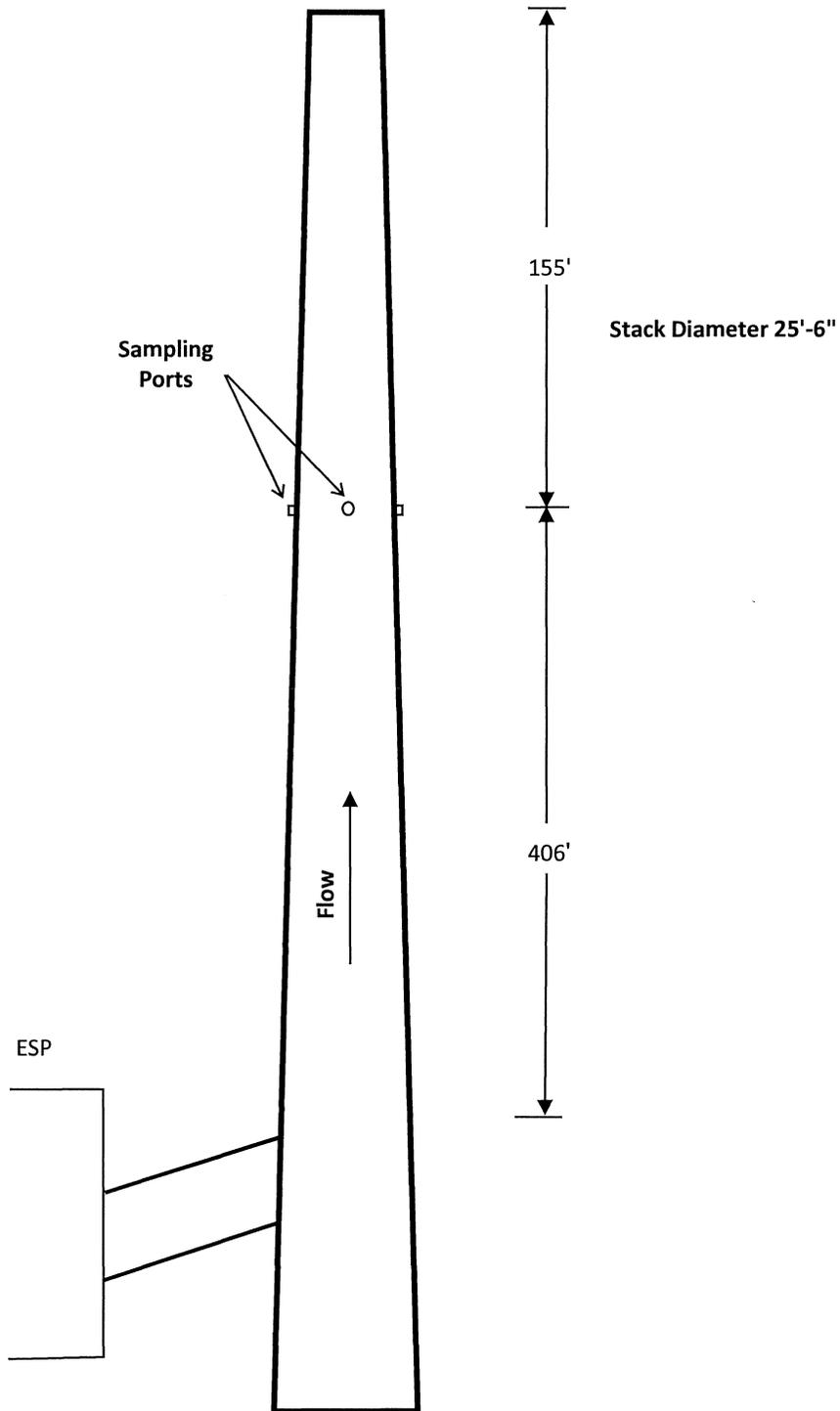
(1) MATS Limit = 0.002 lb/MMBtu

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FIGURES

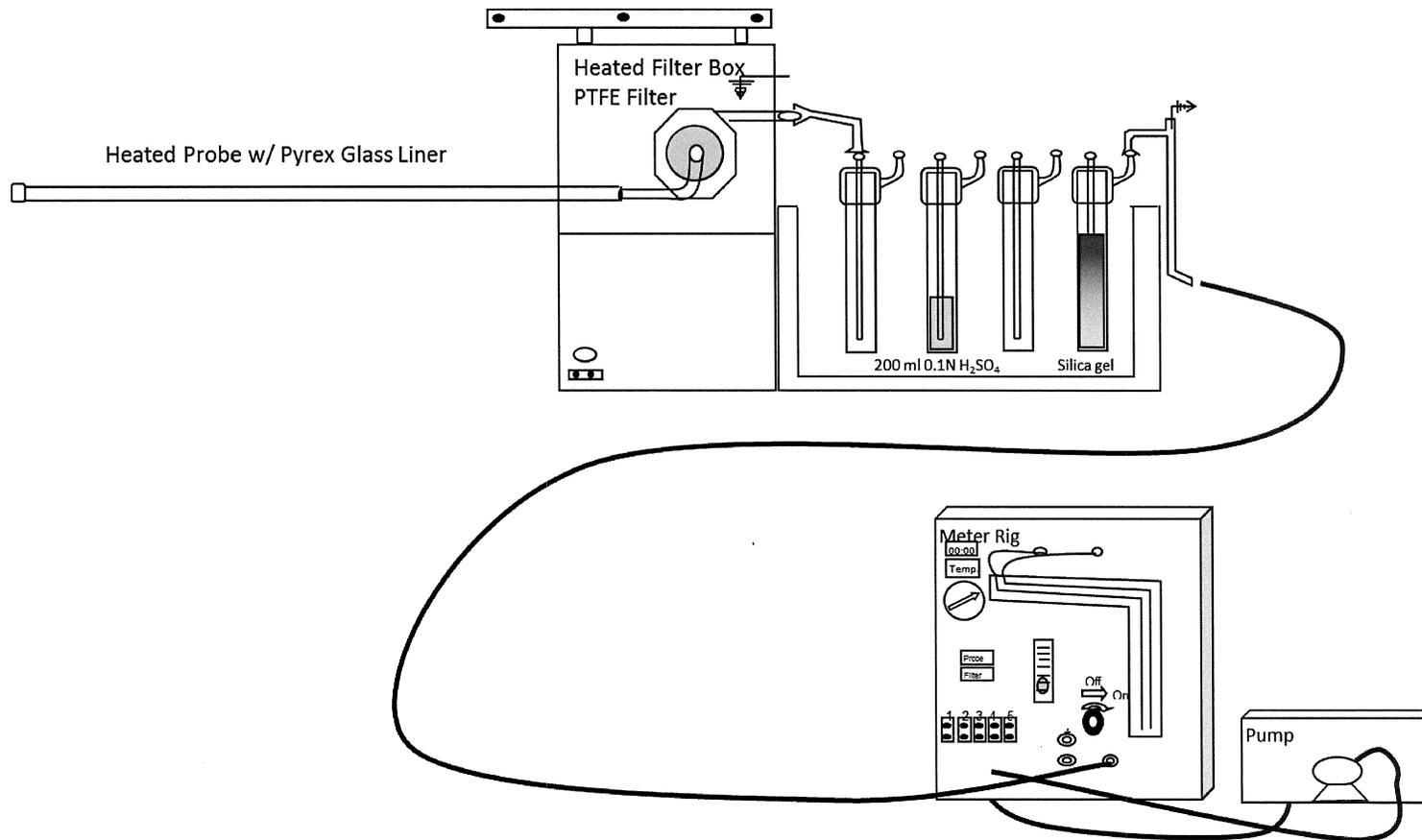
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Figure 1 – Sampling Location
Belle River Power Plant – EU-BOILER2-BR
September 4, 2019



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Figure 2 – USEPA Method 26A (Modified)
Belle River Power Plant
September 9, 2019



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APPENDIX A

**EPA TEST PLAN AND
EGLE APPROVAL LETTER**