

COMPLIANCE TEST REPORT

for

QUARTERLY HYDROGEN CHLORIDE (HCL) EMISSIONS

EU-BOILER7-SC (Unit 7)

SRN: B2796

2nd Quarter 2021

**St. Clair Power Plant
East China, Michigan**

May 20, 2021

**Prepared By:
Environmental Management & Safety
Ecology, Monitoring, & Remediation
DTE Corporate Services, LLC
7940 Livernois G4-S
Detroit, MI 48210**

The logo for DTE Energy Services Corporation, consisting of the letters 'DTE' in a bold, black, sans-serif font. The 'D' and 'T' are connected, and the 'E' is separate.



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EXECUTIVE SUMMARY

DTE Energy’s Environmental Management and Safety (EM&S) Ecology, Monitoring, & Remediation group performed the 2nd Quarter – 2021 Hydrogen Chloride (HCl) emissions test on the exhaust of EU-BOILER7-SC at the St. Clair Power Plant, located in East China, 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. Testing was conducted on May 20, 2021.

A summary of the emission test results is shown below:

**Emissions Testing Summary
St. Clair Power Plant
EU-BOILER7-SC**

Source	Date	Load (GMW)	HCl (lbs/MmBtu) ⁽¹⁾
EU-BOILER7-SC	5-20-21	274.9	0.0004

(1) MATS Limit 0.002 lbs/MMBtu



1.0 INTRODUCTION

DTE Energy's Environmental Management and Safety (EM&S) Ecology, Monitoring, & Remediation performed the 2nd Quarter – 2020 Hydrogen Chloride (HCl) emissions test on the exhaust of EU-BOILER7-SC at the St. Clair Power Plant, located in East China, 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. Testing was conducted on May 20, 2021.

Testing was performed pursuant to USEPA Method 26A (Modified).

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 Gasloli from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), dated January 13, 2017². Emissions testing was performed utilizing Method 26A (modified as a single point sample) due equipment availability limitations which did not allow for FTIR analysis. The following DTE Energy personnel participated in the testing program: Mr. Thomas Snyder, Sr. Environmental Specialist, and Mr. Fred Meinecke, Senior Environmental Technician. Mr. Snyder was the project leader. Mr. Dominic Vendittelli, Environmental Engineer at the plant provided process coordination for the testing program.

2.0 SOURCE DESCRIPTION

The St Clair Power Plant (SCPP) located at 4901 Pointe Drive in East China, Michigan, employs the use of four (4) coal-fired boilers (Units 2-3, 6, and 7). Units 2 and 3 each have Babcock and Wilcox boilers capable of producing 1,070,000 pounds per hour of steam. Units 2 and 3 have Allis Chalmers turbine generators each with a nominally rated capability of 170 MW. Full load capability for Units 2-3, while firing coal only, are 135 MW and 150 MW while over-firing with oil.

Units 6 and 7 have Combustion Engineering boilers capable of producing 2,100,000 and 3,580,000 pounds of steam per hour respectively. The turbine generators on each unit were manufactured by Westinghouse and have a nominally rated capability of 325 and 500 megawatts respectively. Full load capability for Units 6 and 7 while firing coal only is approximately 315 MW and 470 MW respectively.

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

² EGLE, Approval Letter, dated January 13, 2017. (Attached-Appendix A)

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The air pollution control equipment on Units 2 and 3 consists of Wheelabrator Frye electrostatic precipitators on each unit that have design collection efficiencies of 99.6%. Each exhaust stack is 599 feet tall with an internal diameter of 13.3 feet. The air pollution control equipment on Unit 6 consists of Research Corporation electrostatic precipitators that have design collection efficiencies of 99.6%. The exhaust stack is 425 feet tall with an internal diameter of 19.0 feet. The air pollution control equipment on EU-BOILER7-SC consists of an American Standard electrostatic precipitator that has design collection efficiency of 99.6%. The exhaust stack is 600 feet tall with an internal diameter of 16.0 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, PM_{2.5}, and NO_x emissions from each unit. Trona is received at the plant where inline mills further refine the Trona. The ACI system is used to control Mercury emissions from each unit.

Testing was performed on EU-BOILER7-SC while operating at maximum normal operating load and representative of site specific normal operating conditions per 40 CFR part 63.10007.

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, "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight (Instrumental Analyzer Method)". The O₂ / CO₂ analyzers utilize paramagnetic sensors.

3.1.2 *O₂ / CO₂ Sampling Train*

The EPA Method 3A sampling system consisted of the following components:

- (1) PTFE sampling line (collecting gas sample from the meter rig exhaust)
- (2) Servomex MiniMP 5200 O₂/CO₂ gas analyzer
- (3) Appropriate USEPA Protocol 1 calibration gases

3.1.3 *Sampling Train Calibration*

The O₂ / CO₂ analyzer was calibrated according to procedures outlined in USEPA Methods 3A. Zero, span, and mid-range calibration gases were introduced directly into the O₂ / CO₂ analyzer to determine the instruments linearity, prior to sampling. Mid and zero gases (upscale and downscale) were introduced again at the completion of each test run.

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 as a component of the Method 26A sampling train and the percentage of moisture was derived from calculations outlined in USEPA Method 4.

3.3 HYDROGEN CHLORIDE (USEPA Method 26A)

3.3.1 *HCl Sampling Method*

USEPA Method 26A, "Determination of Hydrogen Halide and Halogen Emissions" (Method 26A) 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)
- (2) Heated 3" glass filter holder with a PTFE filter (maintained at a temperature of >248 °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. Impingers 1, 2 and 3 were rinsed with water and their contents and associated rinses were collected in a pre-cleaned sample container. The containers were 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 DI water 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 Enthalpy Analytical, LLC. 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

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



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.

During each day of emissions sampling, a representative coal sample was collected from the unit and analyzed for ultimate and proximate analysis, including % Sulfur, % Ash, and heat content. The results of the coal analysis were 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.

5.0 DISCUSSION OF RESULTS

Table 1 presents the HCl emission testing results from EU-BOILER7-SC. HCl emissions are presented in parts per million on a wet basis (ppm_w) and pounds per million BTU (lbs/MMBtu). The EU-BOILER7-SC HCl emissions during testing demonstrated an average concentration of 0.22 ppm and emission rate of 0.0004 lb/MMbtu. This is below the Subpart UUUUU limit of 0.002 lb/MMBtu.

The auxiliary test data presented in the results table for each test includes the unit load in gross megawatts (GMW), DSI injection rate (lb/hr), ACI injection rate (lb/hr), and CO₂ concentration (%_{wet}).



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."



Mr. Thomas Snyder, QSTI

This report prepared by: 

Mr. Thomas Snyder, QSTI
Sr. Environmental Specialist, Ecology, Monitoring, & Remediation
Environmental Management and Safety
DTE Energy Corporate Services, LLC

This report reviewed by: 

Mr. Mark Grigereit, QSTI
Principal Engineer, Ecology, Monitoring, & Remediation
Environmental Management and Safety
DTE Energy Corporate Services, LLC

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AIR QUALITY DIVISION

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RESULTS TABLE





TABLE NO. 1
HYDROGEN CHLORIDE EMISSIONS TESTING RESULTS
St.Clair Power Plant - EU-BOILER7-SC (Unit 7)
May 20, 2021

Test	Test Date	Test Time (DAHS 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	20-May-21	7:49-8:49	275.0	0	70	10.5	0.23	0.0004
HCl-2		9:11-10:11	274.8	0	69	10.5	0.22	0.0004
HCl-3		10:32-11:32	<u>274.9</u>	<u>0</u>	<u>69</u>	<u>10.5</u>	<u>0.20</u>	<u>0.0003</u>
		Average:	274.9	0	69	10.5	0.22	0.0004

(1) MATS Limit = 0.002 lb/MMBtu

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FIGURES

Figure 1 – Sampling Location
 St.Clair Power Plant – EU-BOILER7-SC (Unit 7)
 5-20-21

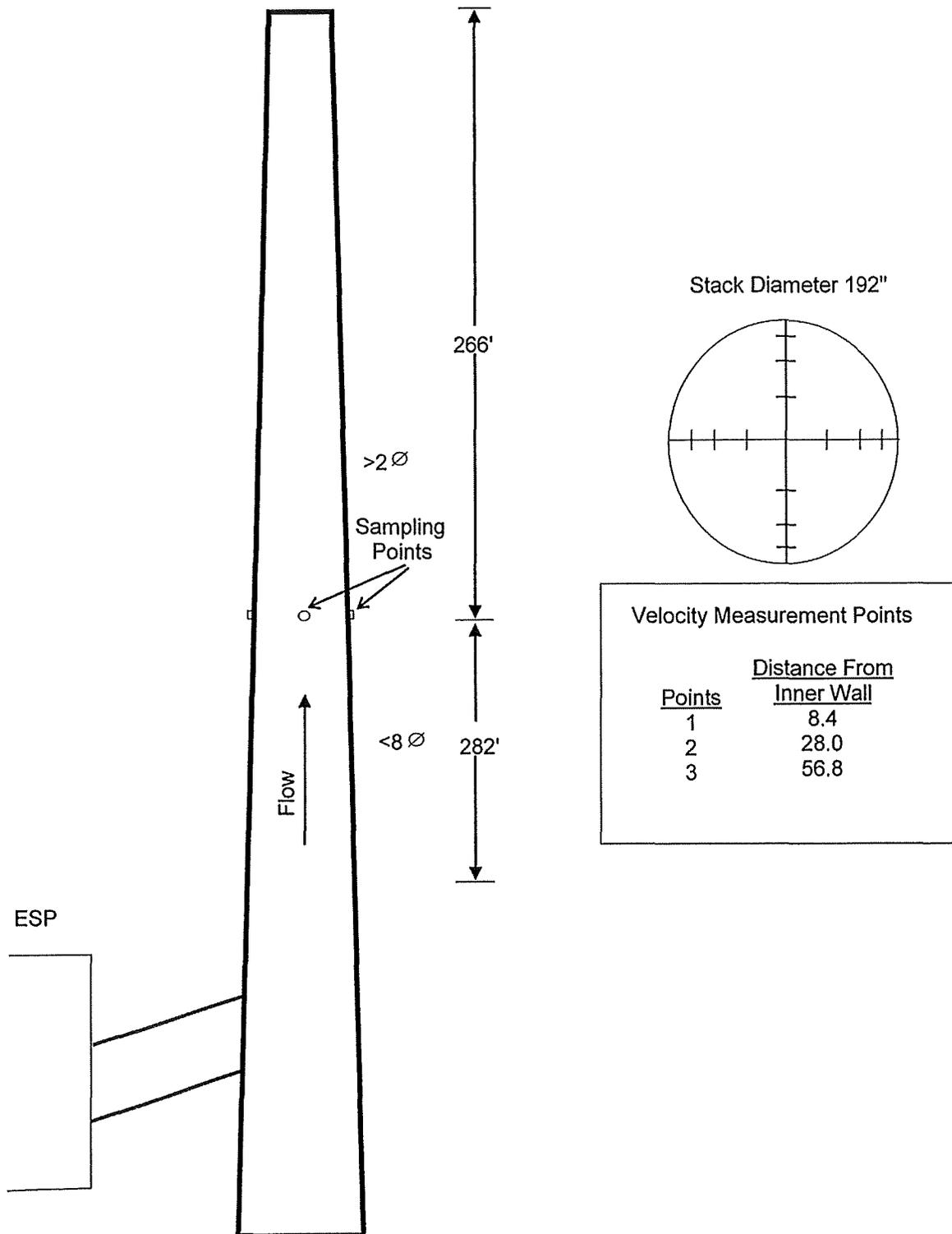


Figure 2 – USEPA Method 26A (Modified)
St.Clair Power Plant
5-20-21

