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COMPLIANCE TEST REPORT

for

QUARTERLY HYDROGEN CHLORIDE (HCL) EMISSIONS

EU-BOILER2-SC (Unit 2)

(SRN: B2796)

2nd Quarter 2020 (2nd Test)

St. Clair Power Plant
East China, Michigan

June 22, 2020

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CONTENTS

RESULTS TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Resources (EM&S) Field Services Group performed 4th Quarter – 2019 Hydrogen Chloride (HCl) emissions testing on the exhaust of EU-BOILER2-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. A second 2nd Quarter test was conducted as Unit 2 was not operated during the 1st Quarter – 2020. The testing was conducted on June 22, 2020.

A summary of the emissions test results are shown below:

Emissions Testing Summary
St. Clair Power Plant
EU-BOILER2-SC

Source	Date	Load (GMW)	HCl (lbs/MmBtu)(1)
EU-BOILER2-SC	6-22-20	105	<0.0003

(1) MATS Limit 0.002 lbs/MMBtu

3.2.2 *Sampling Train Calibration*

The CO_2 analyzer was calibrated according to procedures outlined in USEPA Methods 3A and 7E. Zero, span, and mid range calibration gases were introduced directly into the analyzer to verify the instruments linearity, prior to sampling, and again at the completion of each test run. The CO_2 emissions were corrected for bias according to USEPA Method 7E.

3.3 HYDROGEN CHLORIDE (ASTM D6348)

3.3.1 *Sampling Method*

Hydrogen chloride emissions were evaluated using ASTM D6348, "Measurement of Vapor Phase Organic Emissions by Extractive Fourier Transform Infrared (FTIR)". Single point sampling was performed. Triplicate 60-minute test runs were performed. HCl emissions reported were corrected to analyte spike recovery (%R), according to Table 5 of Part 63 Subpart UUUUU.

The ASTM D6348 sampling system (Figure 2) consisted of the following:

(1) Single-point sampling probe (located in the centroid of the exhaust stack)
(2) Flexible heated PTFE sampling line
(3) Air Dimensions Heated Head Diaphram Pump
(4) MKS MultiGas 2030 FTIR spectrometer
(5) Appropriate calibration gases
(6) Data Acquisition System

The FTIR was equipped with a temperature controlled, 5.11 meter multipass gas cell maintained at 191°C. Gas flows and sampling system pressures were monitored using a rotometer and pressure transducer. All data was collected at 0.5 cm^{-1} resolution.

3.3.2 *Sampling Train Calibration*

The FTIR was calibrated according to procedures outlined in ASTM D6348. Direct measurements of Nitrogen (N_2), Hydrogen Chloride (HCl), Carbon Dioxide (CO_2), and Ethylene (C_2H_4) gas standards were made at the test location to confirm concentrations.

A calibration transfer standard (CTS) was analyzed before and after testing at each location. The concentration determined for all CTS runs were within ±5% of the certified value of the standard. Ethylene was passed through the entire system to determine the sampling system response time and to ensure that the entire sampling system was leak-free.

Nitrogen was purged through the sampling system at each test location to confirm the system was free of contaminants.

HCl spiking was performed to verify the ability of the sampling system to quantitatively deliver a sample containing HCl from the base of the probe to the FTIR. Analyte spiking assures the ability of the FTIR to quantify HCl in the presence of effluent gas.

As part of the spiking procedure, samples of effluent stack gas were measured to determine HCl concentrations to be used in the spike recovery calculations. The determined sulfur hexafluoride (SF_6) concentration in the spiked and unspiked samples was used to calculate the dilution factor of the spike and thus used to calculate the concentration of the spiked HCl. The following equation illustrates the percent recovery calculation.

$$DF = \frac{SF_{6(spike)}}{SF_{6(direct)}}$$ (Sec. A5.6 ASTM D6348)

$$CS = DF * Spike_{dir} + Unspike\ (1 - DF)$$ (Sec. A5.7 ASTM D6348)

DF = Dilution factor of the spike gas
$SF_{6(direct)}$ = SF6 concentration measured directly in undiluted spike gas
$SF_{6(spike)}$ = Diluted SF_6 concentration measured in a spiked sample
$Spike_{dir}$ = Concentration of the analyte in the spike standard measured by the FTIR directly
CS = Expected concentration of the spiked samples
Unspike = Native concentration of analytes in unspiked samples

All analyte spikes were introduced using an instrument grade stainless steel rotometer. The spike target dilution ratio was 1:10 or less. All spike recoveries were within the ASTM D6348 allowance of ±30%. HCl emissions reported were corrected to analyte spike recovery (%R), according to Table 5 of Part 63 Subpart UUUUU.

3.3.3 Quality Control and Assurance

As part of the data validation procedure, reference spectra are manually fit to that of the sample spectra and a concentration is determined. The reference spectra are scaled to match the peak amplitude of the sample, thus providing a scale factor. The scale factor multiplied by the reference spectra concentration is used to determine the concentration value for the sample spectra. Sample pressure and temperature corrections are then applied to compute the final sample concentration. The manually calculated results are then compared with the software-generated results. The data is then validated if the two concentrations are within ± 5% agreement. If there is a difference greater than ± 5%, the spectra are reviewed for possible spectral interferences or any other possible causes that might lead to inaccurately quantified data. PRISM Analytical Technologies, Inc. validated the FTIR data. The data validation reports are located in Appendix C.

3.3.4 Data Reduction

Each spectrum was derived from the coaddition of 64 scans, with a new data point generated approximately every one minute. The emissions were recorded in parts per million (ppm) wet volume basis. The CO_2 emissions were recorded in percent (%) wet volume basis. The moisture content was recorded in percent (%).

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 (SO_2, NO_x, CO_2, 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 D.

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

5.0 DISCUSSION OF RESULTS

Table 1 presents the HCl emission testing results from EU-BOILER2-SC. HCl emissions are presented in parts per million on a wet basis (ppm_W) and pounds per million BTU (lbs/MMBtu). The EU-BOILER2-SC HCl emissions during run 1 averaged 0.2ppm and less than the minimum detectable concentration of 0.08 for runs 2 and 3. EU-BOILER2-SC demonstrated average HCl emissions 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 CO_2 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

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RESULTS TABLES

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TABLE NO. 1
HYDROGEN CHLORIDE EMISSIONS TESTING RESULTS
St.Clair Power Plant - EU-BOILER2-SC (Unit 2)
June 22, 2020

Test	Test Date	Test Time	Unit Load (GMW)	DSI Injection Rate (lb/hr)	ACI Injection Rate (lb/hr)	CO_2 Concentration (% wet)	HCl Concentration (ppmv)	HCl Emissions (lbs/MMBtu)(1)
HCl-1	**22-Jun-20**	8:52-9:52	105	2796	110	7.2	0.20	0.0005
HCl-2		10:06-11:06	105	2908	104	7.2	<0.08	<0.0002
HCl-3		11:19-12:19	105	3013	112	7.2	<0.08	<0.0002
	Average:		***105***	***2906***	***109***	***7.2***	***<0.12***	***<0.0003***

(1) MATS Limit = 0.002 lb/MMBtu

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FIGURES

Figure 1 – Sampling Location
St.Clair Power Plant – EU-BOILER2-SC
June 22, 2020

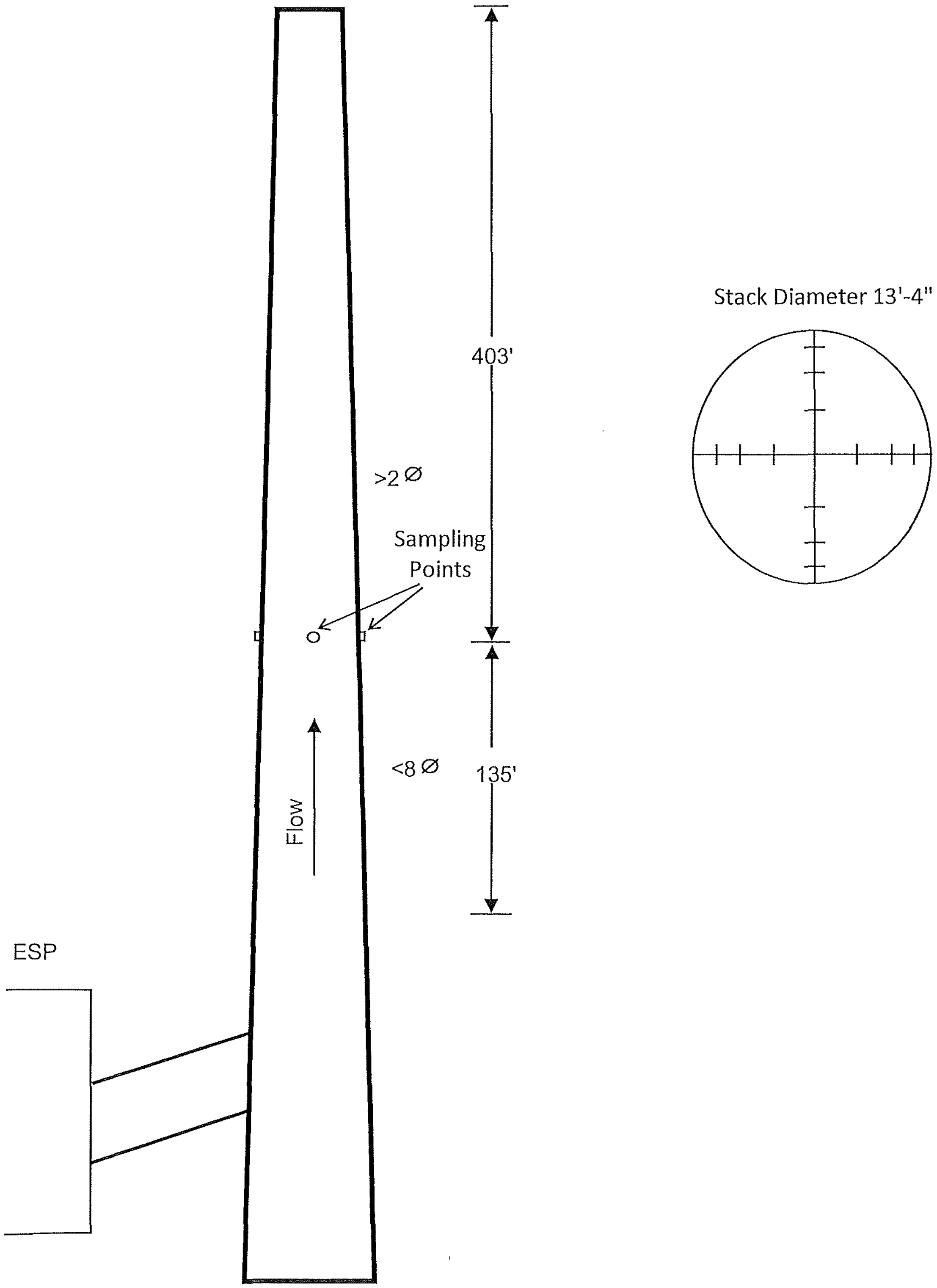

Figure 2 – ASTM D6348
St.Clair Power Plant – EU-BOILER2-SC
June 22, 2020