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COMPLIANCE TEST REPORT

for

QUARTERLY HYDROGEN CHLORIDE (HCL) EMISSIONS

UNIT 1

(SRN: B2796)

2nd Quarter 2016

St. Clair Power Plant
East China, Michigan

April 22, 2016 and May 2, 2016

Prepared By:
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EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Resources (EM&R) Field Services Group performed 2nd Quarter – 2016 Hydrogen Chloride (HCl) emissions testing on the exhaust of Unit 1 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. The testing was conducted on April 22, 2016 and May 2, 2016.

A summary of the emission test results are shown below:

Emissions Testing Summary
St. Clair Power Plant Unit 1

Source	Date	Load (GMW)	HCl (lbs/MmBtu)[1]
Unit 1	4-22-16	126	0.0005
Unit 1 (retest)	5-2-16	110	<0.0002

(1) MATS Limit 0.002 lbs/MMBtu

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Figure 2 – ASTM D6348
St.Clair Power Plant
April 22, 2016 & May 2, 2016

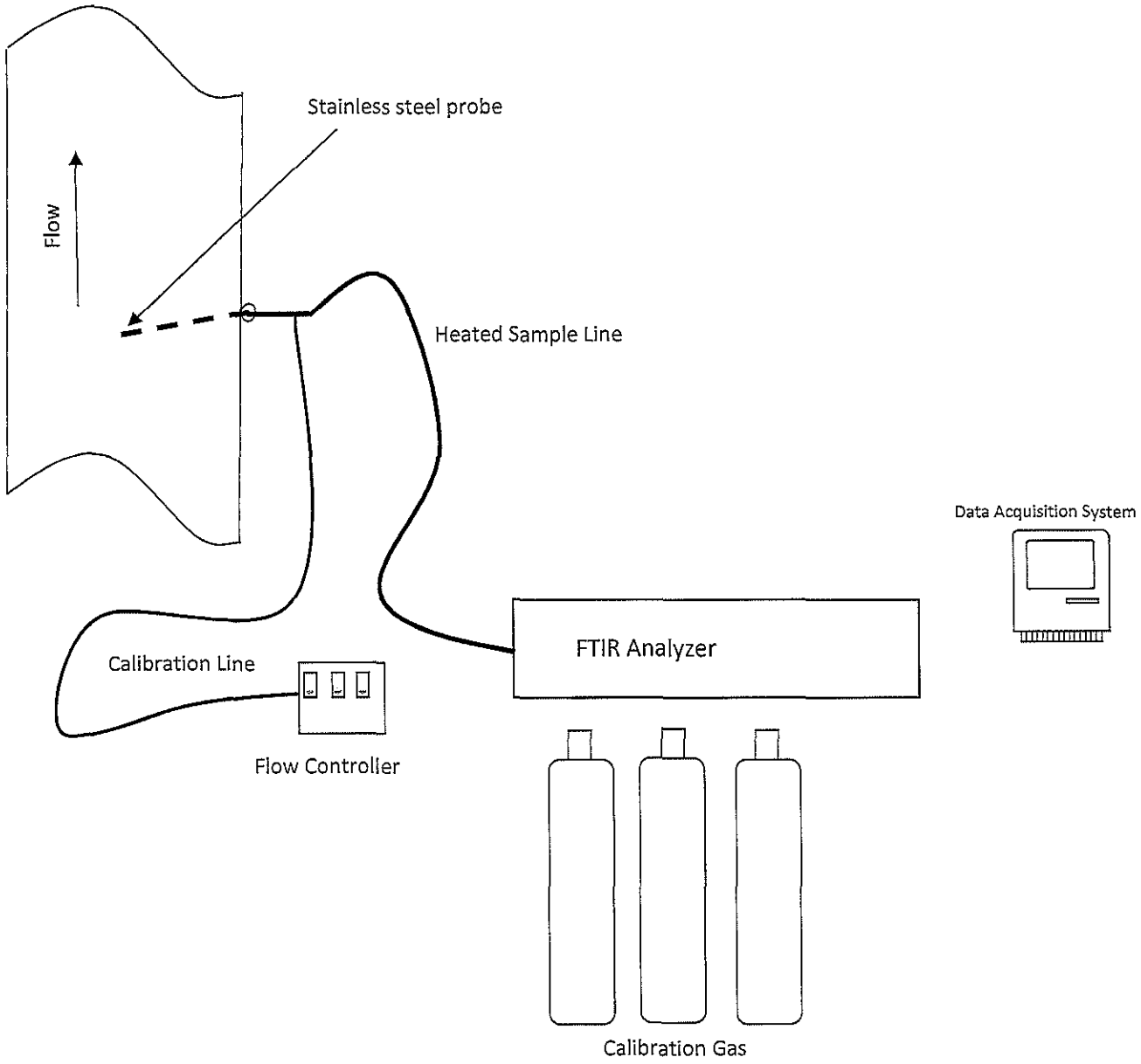

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Figure 1 – Sampling Location
St.Clair Power Plant – Unit 1
April 22, 2016 & May 2, 2016

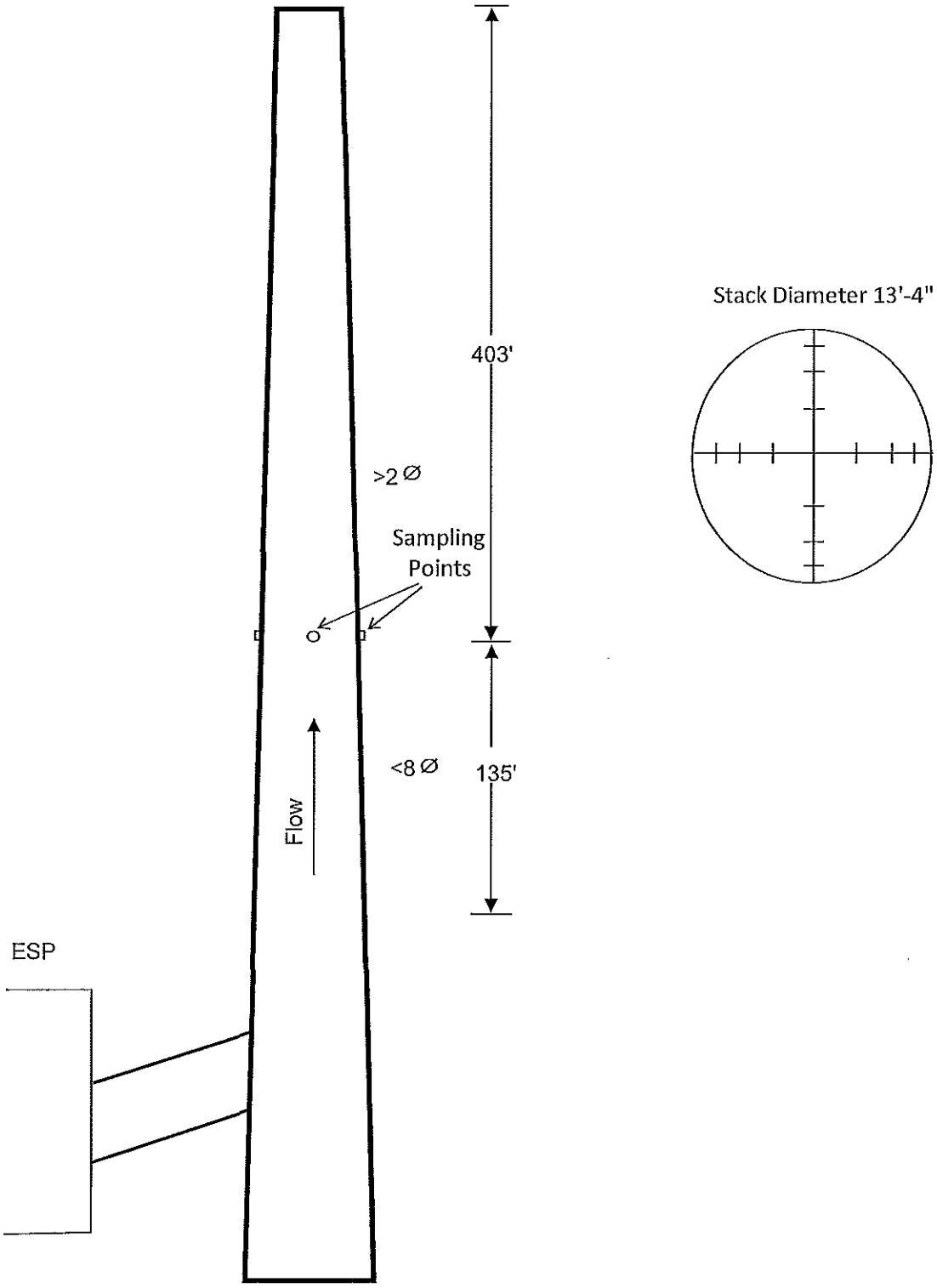

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TABLE NO. 2
HYDROGEN CHLORIDE EMISSIONS TESTING RESULTS
St.Clair Power Plant - Unit 1
May 2, 2016

Test	Test Date	Test Time	Unit Load (GMW)	DSI Injection Rate (lb/hr)	ACI Injection Rate (lb/hr)	CO_2 Concentration ($\%_{wet}$)	HCl Concentration ($ppmv_{wet}$)	HCl Emissions (lbs/MMBtu)[1][2]
HCl-1	**2-May-16**	11:47-12:47	110	286	43	8.2	<0.10	<0.0002
HCl-2		12:48-13:48	110	277	44	8.2	<0.10	<0.0002
HCl-3		13:50-14:50	110	290	42	8.2	<0.10	<0.0002
	Average:		***110***	***284***	***43***	***8.2***	***<0.10***	***<0.0002***

(1) Corrected to (%R)
(2) MATS Limit = 0.002 lb/MMBtu

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TABLE NO. 1
HYDROGEN CHLORIDE EMISSIONS TESTING RESULTS
St.Clair Power Plant - Unit 1
April 22, 2016

Test	Test Date	Test Time	Unit Load (GMW)	DSI Injection Rate (lb/hr)	ACI Injection Rate (lb/hr)	CO_2 Concentration ($\%_{wet}$)	HCl Concentration ($ppmv_{wet}$)	HCl Emissions (lbs/MMBtu)[1][2]
HCl-1	**22-Apr-16**	9:13-10:13	126	5054	75	8.3	0.33	0.0009
HCl-2		10:21-11:21	126	4991	67	8.4	0.10	0.0003
HCl-3		11:37-12:37	126	4981	67	8.4	0.10	0.0003
	Average:		***126***	***5009***	***70***	***8.4***	***0.18***	***0.0005***

(1) Corrected to (%R)
(2) MATS Limit = 0.002 lb/MMBtu

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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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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.

Coal samples were collected during each day of sampling and subject to proximate and ultimate analysis. Operational data can be referred to in Appendix D and results of the fuel analysis can be referred to in Appendix F.

5.0 DISCUSSION OF RESULTS

Table 1 presents the HCl Emission testing results from Unit 1. Emissions are presented in parts per million (ppm) and pounds per million BTU (lbs/MMBtu).

Unit 1 demonstrated HCl emissions below the Subpart UUUUU limit of 0.002 lb/MMBtu.

Testing on Unit 1 was completed on April 22, 2016. During testing it was determined that sorbent (Trona) was being injected into the exhaust of the boiler at a rate significantly higher than normal conditions. DTE Energy made the determination that a retest should be performed while the Unit was operating under a more representative condition. Both tests demonstrated compliance with Subpart UUUUU and results of both tests are included.

calculate the concentration of the spiked HCl. The following equation illustrates the percent recovery calculation.

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

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

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.

3.2.3 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.

3.2.4 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 (%).

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.

3.2.2 Sampling Train Calibration

The FTIR was calibrated according to procedures outlined in ASTM D6348. Direct measurements of Nitrogen (N_2), Hydrogen Chloride (HCl), 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

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 Unit 7 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, PM2.5, and NOx 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 Unit 1 while operating at normal load conditions, per Subpart UUUUU.

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
ASTM Method D6348	HCl, CO_2, and Moisture Content	FTIR
USEPA Method 19	Emission Rate Calculations	Stoichiometric Calculations

3.1 MOISTURE (ASTM D6348)

3.1.1 Sampling Method

Moisture content in the exhaust was evaluated using ASTM D6348, "Measurement of Vapor Phase Organic Emissions by Extractive Fourier Transform Infrared (FTIR)".

3.2 HYDROGEN CHLORIDE AND CARBON DIOXIDE (ASTM D6348)

3.2.1 Sampling Method

Hydrogen chloride and carbon dioxide emissions were evaluated using ASTM D6348, "Measurement of Vapor Phase Organic Emissions by Extractive Fourier Transform

1.0 INTRODUCTION

DTE Energy's Environmental Management and Resources (EM&R) Field Services Group performed 2nd Quarter – 2016 Hydrogen Chloride (HCl) emissions testing on the exhaust of Unit 1 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. The testing was conducted on April 22, 2016 and May 2, 2016.

Testing was performed pursuant to ASTM Method D6348.

The fieldwork was performed in accordance with EPA Reference Methods and DTE Energy Intent to Test[1], which was approved in a letter by Mr. Tom Gasloli from the Michigan Department of Environmental Quality (MDEQ), dated March 22, 2016[2]. The following DTE Energy personnel participated in the testing program: Mr. Mark Grigereit, Principal Engineer, Mr. Thom Snyder, Senior Environmental Technician, and Mr. Fred Meinecke, Senior Environmental Technician. Mr. Snyder was the project leader. Mr. Joe Neruda, Senior Environmental Specialist 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 six (6) coal-fired boilers (Units 1-4, 6, and 7). Units 1-4 each have Babcock and Wilcox boilers capable of producing 1,070,000 pounds per hour of steam. Units 1 and 4 are equipped with General Electric turbine generators each with a nominally rated capability of 167 megawatts (MW). Units 2 and 3 have Allis Chalmers turbine generators each with a nominally rated capability of 170 MW. Full load capability for Units 1-4, 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.

The air pollution control equipment on Units 1-4 consists of Wheelebrator 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

[1] MDEQ, Test Plan, Submitted March 14, 2016. (Attached-Appendix A)
[2] MDEQ, Approval Letter, dated March 22, 2016. (Attached-Appendix A)