DTE

March 8, 2022

Ms. Joyce Zhu
Air Quality Division
Michigan Department of Environment, Great Lakes, and Energy
27700 Donald Court
Warren, MI 48092

Re: ***Quarterly Test Report for Hydrogen Chloride (HCl) on the exhaust of EU-BOILER6-SC (Unit 6) at DTE Electric St. Clair Power Plant (SRN: B2796) for compliance with MATS emission limits in 40 CFR part 63.***

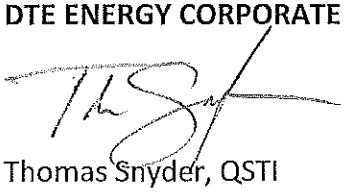
Dear Ms. Zhu:

Attached, please find one (1) copy of the compliance test report for the quarterly Hydrogen Chloride (HCl) emissions testing conducted on the exhaust of Unit 6 at St. Clair Power Plant on February 10, 2022 in East China, Michigan. The testing was required by the Mercury and Air Toxics Standard (MATS) (40 CFR Part 63, Subpart UUUUU).

HCl testing is required each quarter and this satisfies the obligation for the 1st Quarter of 2022.

If you have any questions concerning this test report, please contact me at (313) 897-0899, or via email at Thomas.Snyder@dteenergy.com.

Sincerely,
DTE ENERGY CORPORATE SERVICES, LLC



Thomas Snyder, QSTI
Senior Environmental Specialist
Ecology, Monitoring & Remediation
Environmental Management & Safety (EM&S)

Enc: Compliance Test Report – STCPP Unit 6 (1 copy)

Cc: Karen Kajiya-Mills, EGLE (with enclosure)

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environment, Great Lakes, and Energy, Air Quality Division upon request.

Source Name: DTE Electric Company - St. Clair Power Plant | County: St. Clair

Source Address: 4901 Pointe Drive | City: East China Township

AQD Source ID (SRN): B2796 | ROP No.: MI-ROP-B2796-2015c | ROP Section No.: 1

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From 2-10-2022 To 2-10-2022

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

ROP Emissions Test Report, EU-BOILER6-SC HCl 1st Qtr 2022

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Leann Warner	Plant Manager	810-326-6201
Name of Responsible Official (print or type)	Title	Phone Number

Leann Warner — 2-11-22

Signature of Responsible Official — Date

* Photocopy this form as needed.

EQP 5736 (Rev 04/30/2019)

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COMPLIANCE TEST REPORT

for

QUARTERLY HYDROGEN CHLORIDE (HCL) EMISSIONS

EU-BOILER6-SC (UNIT 6)

(SRN: B2796)

1st Quarter 2022

St. Clair Power Plant
East China, Michigan

February 10, 2022

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

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B Field Sampling and Validation Data
C Process Operational Data
D Example Calculations
E Analytical Data

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EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Safety (EM&S) Ecology, Monitoring, and Remediation performed 1st Quarter 2022 Hydrogen Chloride (HCl) emissions testing on the exhaust of EU-BOILER6-SC (Unit 6) 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 February 10, 2022.

A summary of the emission test results are shown below:

Emissions Testing Summary
St. Clair Power Plant
EU-BOILER6-SC (Unit 6)

Source	Date	Load (GMW)	HCl (lbs/MmBtu)(1)
Unit 6	2-10-22	222	0.0009

(1) MATS Limit 0.002 lbs/MMBtu

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1.0 INTRODUCTION

DTE Energy's Environmental Management and Safety (EM&S) Ecology, Monitoring, and Remediation performed 1st Quarter 2022 Hydrogen Chloride (HCl) emissions testing on the exhaust of EU-BOILER6-SC (Unit 6) 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 February 10, 2022.

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 Ms. Regina Angellotti from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), dated November 10, 2020[2]. The following DTE Energy personnel participated in the testing program: Mr. Thomas Snyder, Senior Environmental Specialist, and Mr. Mark Westerberg, Senior Environmental Specialist. Mr. Snyder was the project leader. Mr. Dominic Vendittelli, Associate 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 2-3 each have Babcock and Wilcox boilers capable of producing 1,070,000 pounds per hour of steam. Units 2 and 3 are equipped with Allis Chalmers turbine generators each with a nominally rated capability of 170 megawatts (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.

The air pollution control equipment on Units 2-3 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 pollution control equipment on Unit 6 consists of Research Corporation electrostatic

[1] EGLE, Test Plan, Submitted October 2, 2020. (Attached-Appendix A)
[2] EGLE, Approval Letter, dated November 10, 2020. (Attached-Appendix A)

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 EU-BOILER6-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
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 CARBON DIOXIDE (ASTM D6348)

3.2.1 Sampling Method

Carbon dioxide (CO_2) emissions were evaluated using ASTM D6348, "Measurement of Vapor Phase Organic Emissions by Extractive Fourier Transform Infrared (FTIR)".

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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.

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

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

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.

3.3.3 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 B.

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 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 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 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 Unit 6. HCl emissions are presented in parts per million on a wet basis (ppm_w) and pounds per million BTU (lbs/MMBtu). The EU-BOILER6-SC (Unit 6) HCl emissions during the testing averaged 0.43 ppm and 0.0009 lb/MMBtu. Unit 6 demonstrated average HCl emissions below the Subpart UUUUU limit of 0.0020 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 ($\%_{wet}$).

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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

This report prepared by: _____

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

This report reviewed by: Mark Grigereit

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

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RESULTS TABLES

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TABLE NO. 1
HYDROGEN CHLORIDE EMISSIONS TESTING RESULTS
St.Clair Power Plant - Unit 6
February 10, 2022

Test	Test Date	Test Time	Unit Load (GMW)	DSI Injection Rate (lb/hr)	ACI Injection Rate (lb/hr)	CO_2 Concentration ($\%_{wet,corrected}$)	HCl Concentration ($ppmv_{wet}$)	HCl Emissions (lbs/MMBtu)[1][2]
HCl-1	**10-Feb-22**	10:09-11:09	222	3006	161	8.8	0.51	0.0011
HCl-2		11:23-12:23	222	3012	137	9.0	0.43	0.0009
HCl-3		12:32-13:32	222	2990	166	9.0	0.36	0.0007
	Average:		*222*	*3003*	*155*	*8.9*	*0.43*	*0.0009*

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

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FIGURES

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Figure 1 – Sampling Location
St.Clair Power Plant – EU-BOILER6-SC (Unit 6)
February 10, 2022

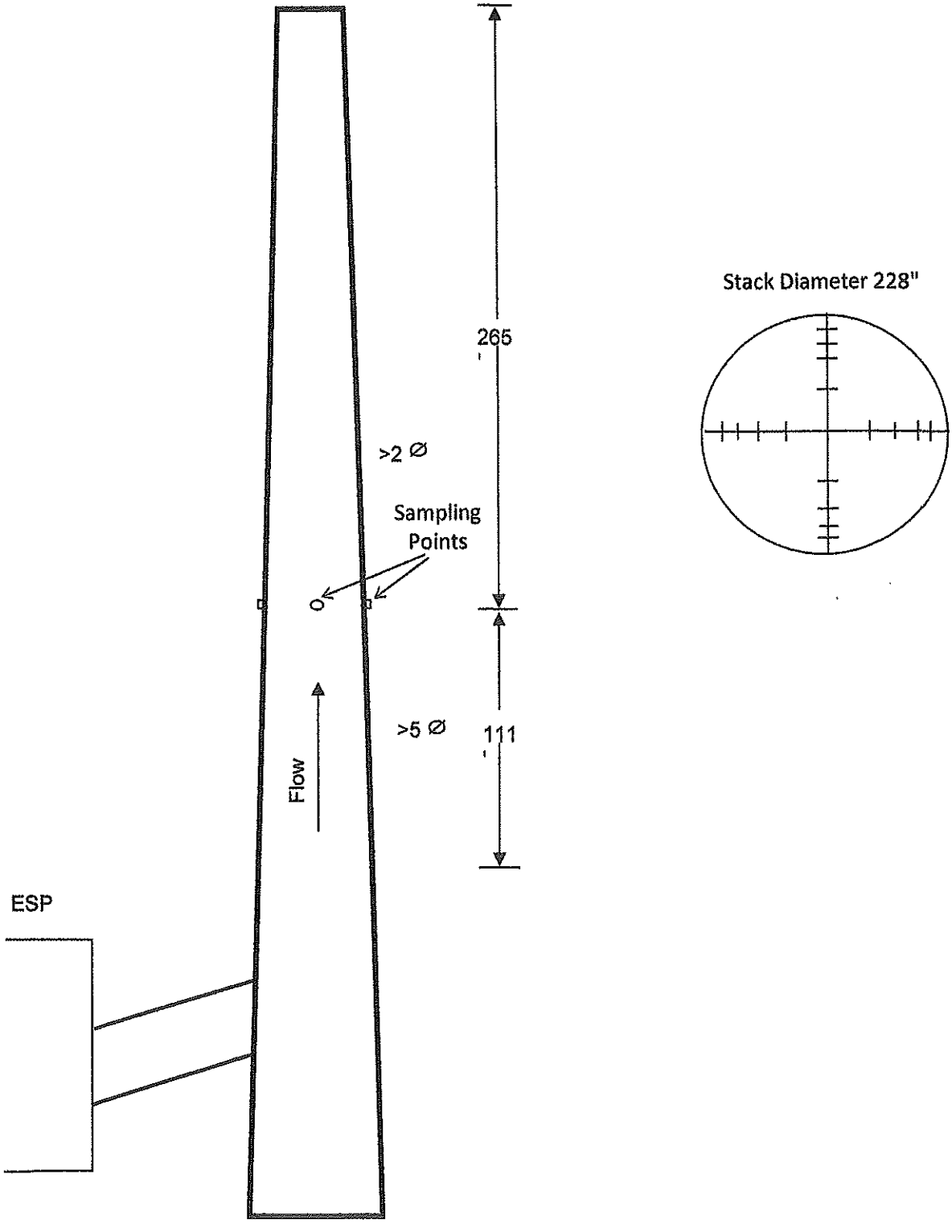

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Figure 2 – ASTM D6348
St.Clair Power Plant – EU-BOILER6-SC (Unit 6)
February 10, 2022