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REPORT ON HYDROGEN CHLORIDE TESTING

Trenton Channel Power Plant
4695 West Jefferson Ave
Trenton Channel, MI 48183
Unit 9 Stack

DTE Energy
One Energy Plaza
Detroit, MI
Client Reference No. 4701079838

CleanAir Project No. 13244
STAC Certificate No. 2007.002.0113.1217
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May 17, 2017

1. PROJECT OVERVIEW

Test Program Summary

DTE Energy contracted CleanAir Engineering (CleanAir) to perform air emissions compliance testing on the Unit 9 Stack at the Trenton Channel Power Plant (TCPP) located in Trenton Channel, Michigan. The objective of the test program was to demonstrate quarterly compliance with the hydrogen chloride (HCl) emission limit required by 40 CFR Part 63, Subpart UUUUU. Compliance testing was performed to meet the requirements for testing in the first quarter of 2017.

A summary of the test program results is presented in Table 1-1. Section 2 Results provide a more detailed account of the test conditions and data analysis. Test program information, including the test parameters, on-site schedule and a project discussion, begin at the bottom of this page.

Table 1-1:
Summary of Results

Source Constituent	Sampling Method	Average Emission	Limit[1]
Unit 9 Stack			
HCl (lb/MMBtu)	ASTM 6348 EPA M19	0.0013	0.0020

[1] Emission limit outlined in 40 CFR Part 63, Subpart UUUUU, Table 2.

Test Program Details

Parameters

The test program was performed in accordance with the Test Plan submitted to the Michigan Department of Environmental Quality (MDEQ) Air Quality Division (AQD) and approved on January 20, 2017. The test program included the following emission measurements:

- oxygen (O_2)
- carbon dioxide (CO_2)
- hydrogen chloride (HCl)
- flue gas moisture (H_2O)

Sampling was performed using ASTM D6348 for HCl, CO_2 and moisture content. ASTM D6348 uses fourier transform infrared spectroscopy (FTIR) analytical principle for analysis of the flue gas sample on a semi-continuous basis. Oxygen was measured using EPA Method 3A as a QA/QC measure. One coal sample was taken during the HCl testing in order to determine a fuel specific Fc factor (EPA Method 19) to calculate mass emissions in units of lb/MMBtu.

Schedule

Testing was performed on March 21, 2017. The on-site schedule followed during the test program is outlined in Table 1-2.

Table 1-2:
Test Schedule

Run Number	Location	Method	Analyte	Date	Start Time	End Time
1	Unit 9 Stack	Method 3A	O_2	3/21/17	15:32	16:32
2	Unit 9 Stack	Method 3A	O_2	3/21/17	17:07	18:07
3	Unit 9 Stack	Method 3A	O_2	3/21/17	18:34	19:34
1	Unit 9 Stack	ASTM D6348	HCl, CO_2	3/21/17	15:32	16:32
2	Unit 9 Stack	ASTM D6348	HCl, CO_2	3/21/17	17:07	18:07
3	Unit 9 Stack	ASTM D6348	HCl, CO_2	3/21/17	18:34	19:34
1	Unit 9 Stack	ASTM D6348	H2O	3/21/17	15:32	16:32
2	Unit 9 Stack	ASTM D6348	H2O	3/21/17	17:07	18:07
3	Unit 9 Stack	ASTM D6348	H2O	3/21/17	18:34	19:34

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Discussion

A total of three consecutive 60 - minute runs were performed. Testing took place at the Unit 9 stack EPA sampling platform. Flue gas was extracted from a single point inside the 10% centroidal area of the stack through a heated probe and Teflon® filter then through two 100 ft. heated sample lines down to the FTIR analyzer located inside an environmentally controlled trailer.

A constant sample flow was maintained using a heated pump, which delivered sample gas to the FTIR analyzer through a 10 ft. heated sample line and a heated valve connected to the inlet port of the analyzer. This heated valve assembly allowed the selection of calibration or sample gas.

All components of the sampling system were heated to 375˚F and exposed connections were wrapped with insulation to prevent moisture condensation and maintain a representative sample. A detailed picture of the sampling system can be found in Appendix A

The exit of the FTIR was connected to a gas conditioner for removal of moisture by means of a ⅜" Teflon® line to prevent back pressure. The flue gas was then delivered to a paramagnetic analyzer for oxygen concentration analysis.

Prior to Run 1, a dynamic spike for the QA gas (HCl) was performed resulting in a 79% recovery. ASTM D6348 requires a recovery between 70% and 130% for acceptable results. The post-test QA spike resulted in a 99.6% recovery. Based on the recovery result no bias correction factor was applied to the final HCl concentration results.

End of Section

2. RESULTS

This section summarizes the test program results. Additional detailed results are available in Appendix C.

Table 2-1:
Unit 9 Stack – Hydrogen Chloride

Run No.	1	2	3	Average
Date (2017)	Mar 21	Mar 21	Mar 21	
Start Time	15:32	17:07	18:34	
End Time	16:32	18:07	19:34	
Elapsed Time	1:00	1:00	1:00	
Operating Conditions				
Fc1 - Unit 9 Stack (dscf/MMBtu)	1,898	1,898	1,898	**1,898**
DSI Injection Rate (lb/hr)	402	445	425	**424**
Total ACI Injection Rate (lb/hr)	60	63	57	**60**
Gas Parameters				
Oxygen (O2) - Unit 9 Stack (%dv)	6.15	6.48	6.64	**6.42**
Carbon Dioxide (CO2) - Unit 9 Stack (%dv)	13.65	13.36	13.34	**13.45**
Moisture (H2O) - Unit 9 Stack (%wv)	10.39	10.18	10.10	**10.22**
Hydrochloric Acid (HCl) - Unit 9 Stack				
Concentration (ppmwv)	0.991	0.769	0.760	**0.840**
Concentration (ppmdv)	1.106	0.856	0.846	**0.936**
Mass Rate (lb/MMBtu) - Fc	1.45E-03	1.15E-03	1.14E-03	**1.25E-03**

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End of Section

3. DESCRIPTION OF INSTALLATION

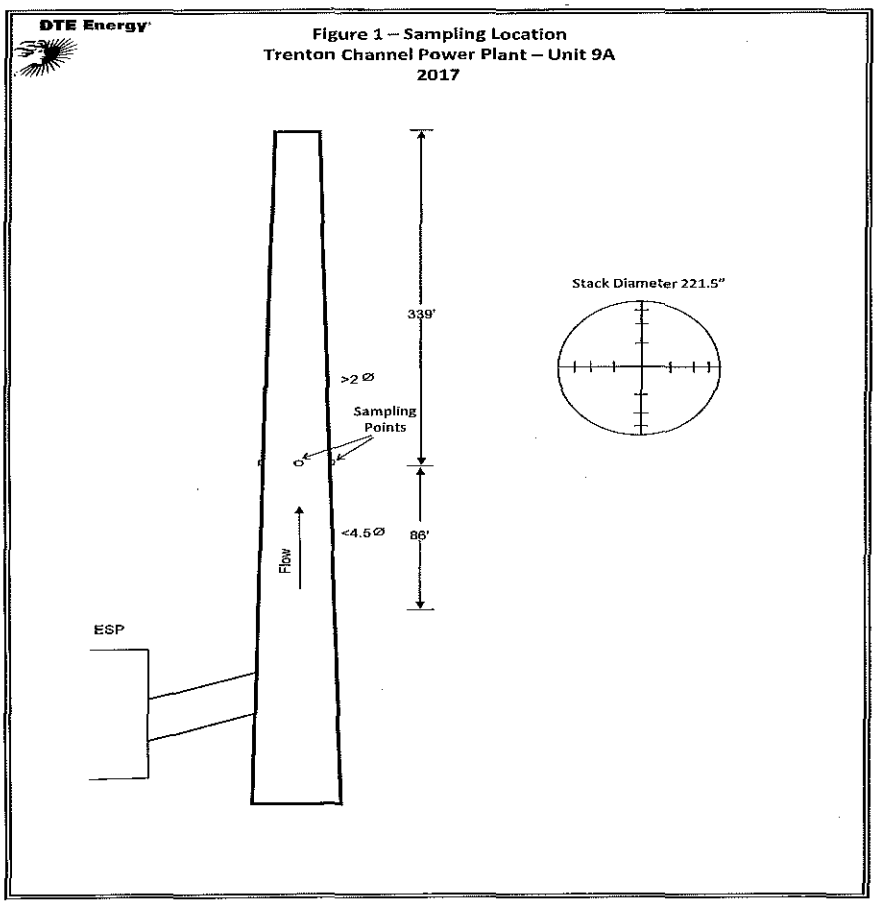
Process Description

The DTE Electric Company (DTE) owns and operates the Trenton Channel Power Plant located in Trenton, Michigan. The station currently operates one boiler (Boiler 9A). Boiler 9A is a Combustion Engineering boiler rated at 520 net Megawatts (MW), but based on the current fuel blend used the rating is reduced to a maximum capability of 460 net MW. Sampling was performed while the boiler was operating at a normal operating load.

Particulate emissions are controlled through the use of electrostatic precipitators (ESPs). Boiler 9A also uses Dry Sorbent Injection (DSI-trona) and Activated Carbon Injection (ACI) for control of acid gases, PM, PM10 and NOx and mercury emissions.

The testing reported in this document was performed at the Unit 9 stack EPA sampling platform. A schematic of the process, indicating sampling locations, is shown in Figure 3-1.

Figure 3-1:
Process Schematic



Test Location

Table 3-1 presents the sampling point information. The figure shown on page 6 represents the layout of the test location.

Table 3-1:
Sampling Information

Source Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
Unit 9 Stack							
HCl[1]	ASTM D6348	1-3	1	1	60	60	3-2

[1] HCl was sampled at single point within 10% centroidal area of the stack.

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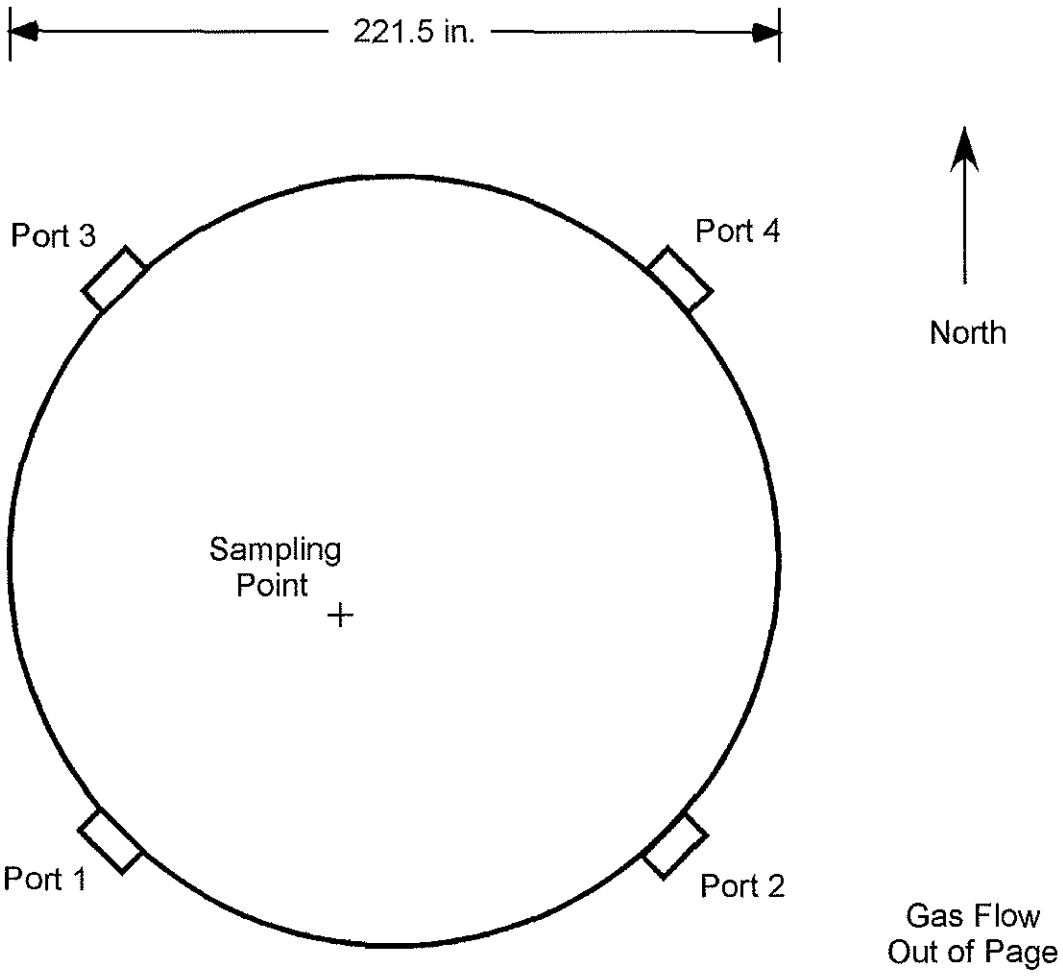
Figure 3-2:
Unit 9 Sampling Point Layout



Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	44.0	96.0

Duct diameters upstream from flow disturbance (A): 4.7 Limit: 2.0
Duct diameters downstream from flow disturbance (B): 18.4 Limit: 0.5

End of Section