



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 Michigan, MI
Client Reference No. 4701230436

CleanAir Project No. 13641
A2LA ISO 17025 Certificate No. 4342.01
A2LA / STAC Certificate No. 4342.02
Revision R0, Final Report
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1. PROJECT OVERVIEW

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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 second quarter of 2018.

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**

<u>Source</u> Constituent	<u>Sampling</u> Method	<u>Average</u> Emission	<u>Emission</u> Limit ¹
<u>Unit 9 Stack</u> HCl (lb/MMBtu)	EPA Method 26A EPA M19	3.9E-04	2.0E-03

¹ Emission limit obtained from 40 CFR Part 63, Subpart UUUUU, Table 2.

Test Program Details

Parameters

The test program was performed in accordance with the procedures of EPA Method 26A and the requirements of 40 CFR 63, Subpart UUUUU, Table 2. The test program included the following emission measurements:

- oxygen (O₂)
- carbon dioxide (CO₂)
- hydrogen chloride (HCl)
- flue gas moisture (H₂O)

Sampling was performed using EPA Method 26A (Modified) for HCl measurements. In addition, EPA Method 3 and 4 were combined with the EPA Method 26A sampling system to determine CO₂ and moisture content, respectively. Specific details of the procedures used are included in Section 4 and Appendix A.

Schedule

Testing was performed on June 28, 2018. 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	USEPA Method 26A	HCl	06/28/18	08:23	09:23
2	Unit 9 Stack	USEPA Method 26A	HCl	06/28/18	12:53	13:53
3	Unit 9 Stack	USEPA Method 26A	HCl	06/28/18	15:08	16:08

Discussion

A total of three (3) consecutive 60-minute runs were performed. Testing took place at the Unit 9 stack EPA sampling platform.

EPA Method 26A (Modified) was used for HCl measurements. Based on the stack temperature and moisture content of the flue gas, sampling was performed at a constant sample rate (+/- 10%) at a single sampling point during each test run. In accordance with 40 CFR 63, Subpart UUUUU, Table 2, a minimum of 0.75 dry standard cubic meters (dscm) of flue gas were sampled for each test run. Samples were analyzed for chlorides only (halogens not analyzed) using Ion Chromatography (IC) by Clean Air Engineering located in Palatine, IL.

EPA Method 3 was combined with the EPA Method 26A (Modified) sampling system. Integrated gas samples were collected during each test run and analyzed for oxygen and carbon dioxide using an instrumental analyzer, calibrated according to EPA Method 3A and 7E procedures.

EPA Method 4 was combined with the EPA Method 26A (Modified) sampling system to determine the moisture content of the flue gas.

The Fc Factor and emissions calculations detailed in EPA Method 19 were used to determine HCl emission rates in units of lb/MMBtu to determine compliance with the HCl emission rate listed in 40 CFR 63, Subpart UUUUU, Table 2 for existing EGUs.

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 (2018)		Jun 28	Jun 28	Jun 28	
Start Time (approx.)		08:23	12:53	15:08	
Stop Time (approx.)		09:23	13:53	16:08	
Process Conditions					
P ₁	Operating Load - (MW)	324	324	324	324
P ₂	Steam Load - (Klb/hr)	2,325	2,297	2,310	2,311
F _c ¹	Carbon dioxide-based F-factor (dscf/MMBtu)	1,800	1,800	1,800	1,800
Gas Conditions					
O ₂	Oxygen (dry volume %)	6.2	6.4	6.3	6.3
CO ₂	Carbon dioxide (dry volume %)	13.0	12.7	12.9	12.9
T _s	Sample temperature (°F)	284	294	291	290
B _w	Actual water vapor in gas (% by volume)	12.44	12.58	12.58	12.53
Hydrogen Chloride (HCl) Results					
C _{sd}	HCl Concentration (ppmdv)	0.28	0.30	0.31	0.30
C _a	HCl Concentration (ppmwv)	0.25	0.27	0.27	0.26
E _{Fc}	HCl Rate - Fc-based (lb/MMBtu)	3.7E-04	4.1E-04	4.0E-04	3.9E-04

¹ Fc Factor listed for bituminous coal in EPA Method 19.

3. DESCRIPTION OF INSTALLATION

Process Description

The DTE Energy (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.

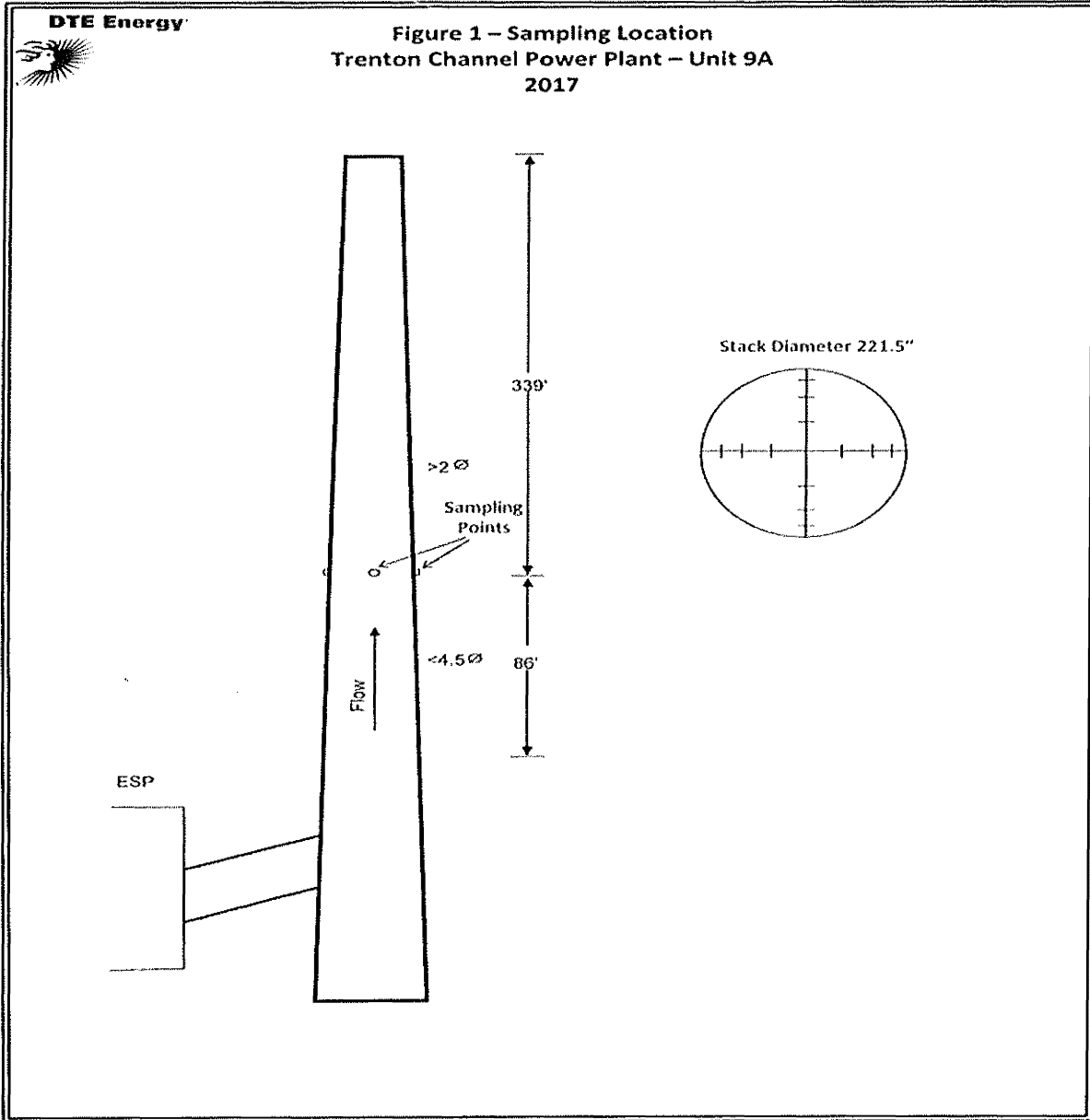
Test Location

Table 3-1 presents the sampling point information. Figure 3-1 shows a diagram of the EPA sampling location. Figure 3-2 shows the layout of the test location and sampling point used. The sampling point was calculated based on EPA Method 1, Table 1-2 criteria (29.6% of diameter).

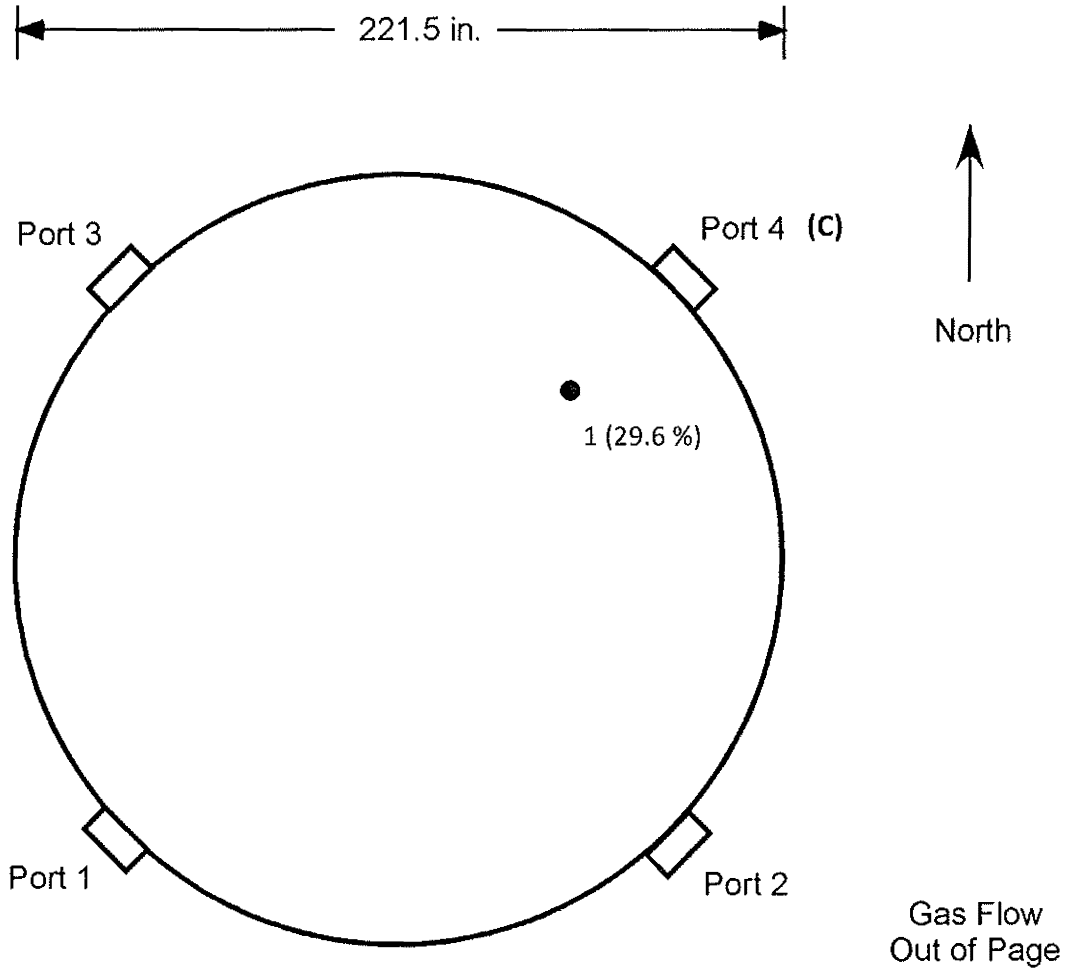
**Table 3-1:
 Sampling Information**

Source		Run	Points per	Minutes	Total		
Constituent	Method	No.	Port	per Point	Minutes	Figure	
Unit 9 Stack							
HCl	EPA Method 26A (Modified)	1-3	1	1	60	60	3-2

Figure 3-1:
Unit 9 EPA Sampling Location



**Figure 3-2:
 Unit 9 Sampling Point Layout**



Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
Point 1 - EPA Method 1	29.6	65.6

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

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4. METHODOLOGY

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Procedures and Regulations

The test program sampling measurements followed procedures and regulations outlined by the USEPA and Michigan Department of Environmental Quality (DEQ). These methods appear in detail in Title 40 of the CFR and at <https://www.epa.gov/emc>.

Appendix A includes diagrams of the sampling apparatus, as well as specifications for sampling, recovery, and analytical procedures. Any modifications to standard test methods are explicitly indicated in this appendix. In accordance with ASTM D7036 requirements, CleanAir included a description of any such modifications along with the full context of the objectives and requirements of the test program in the test protocol (if required) submitted prior to the measurement portion of this project. Modifications to standard methods are not covered by the ISO 17025 and TNI portions of CleanAir's A2LA accreditation.

CleanAir follows specific QA/QC procedures outlined in the individual methods and in USEPA "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source-Specific Methods," EPA/600/R-94/038C. Appendix D contains additional QA/QC measures, as outlined in CleanAir's internal Quality Manual.

Title 40 CFR Part 60, Appendix A

Method 1	"Sample and Velocity Traverses for Stationary Sources"
Method 3A	"Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 4	"Determination of Moisture Content in Stack Gases"
Method 19	"Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide and Nitrogen Oxide Emission Rates"
Method 26A	"Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method"

End of Section