Part 70 Operating Permit
MI-ROP-A4043-2019
NSPS Subpart Db
Compliance CEMS Certification
Sampling Report

Gas Fired Boilers #13 & #14
(432 Boilers)

Dow Silicones Corporation
Michigan Operations
Midland, Michigan

Sampling Dates:
Boiler 13 May 29, 2019
Boiler 14 May 30, 2019

**** Please note the process unit is the final copy holder and owner of this document. A temporary electronic copy will be retained by test team for a short period of time.***

1.1 Summary of Test Program

This report contains the results of the Performance Specification Test for the Continuous Emission Monitoring Systems for NOx and Oxygen that are performed on the 432 Boilers owned and operated by Dow Silicones Corporation. This testing was completed as required by NSPS Subpart Db and the Renewable Operating Permit (ROP). Prior performance specification testing was conducted on boiler nos. 12, 13 and 14 on March 19, 20, and 21, 2019. The results of this test indicated compliance for boiler no. 12 only. Therefore, on May 29 and 30, 2019, boiler nos. 13 and 14 were re-tested to certify compliance for the NOx and O2 CEMS.

The internal stack testing team (AECom Inc) performed relative accuracy (RA) testing. The following table summarizes the pertinent data for this compliance test:

Responsible Groups	• Dow Silicones Corporation • Michigan Department of Environment, Great Lakes, and Energy (EGLE) • Environmental Protection Agency (EPA)
Applicable Regulations	• MI-ROP-A4043-2019 • 40 CFR 60 NSPS Subpart Db
Industry / Plant	• 432 Building
Plant Location	• Dow Silicones Corporation Midland, Michigan 48667
Unit Initial Start-up	• December 2006 Boiler 13 • December 2006 Boiler 14
Date of Last RATA	• Boiler 13 March 19, 2019 • Boiler 14 March 20, 2019
Air Pollution Control Equipment	• Low NOx Burners • Exclusive use of Natural Gas
Emission Points	• Boiler 13 – Vent SV432-002 • Boiler 14 – Vent SV432-003
Pollutants/Diluent Measured	• Nitrogen Oxides (NOx) • Oxygen (O_2)
Test Dates	• Boiler 13 – May 29, 2019 RATA • Boiler 14 – May 30, 2019 RATA

1.2 Key Personnel

The key personnel who coordinated the test program are:

- Robbie Seibert is the Process Focal Point. The Process Focal Point is responsible for coordinating the plant operation during the test and ensuring the unit was operating at the agreed upon conditions in the test plan. They also serve as the key contact for collecting any process data required and providing all technical support related to process operation

- Laura Maiers is the Environmental Focal Point for this unit. The Environmental Focal Point is responsible for ensuring that all regulatory requirements and citations are reviewed and considered for the testing. All agency communication will be completed through this role. Contact information is 989-496-5327.

- Chuck Glenn is the Test Plan Coordinator. The Test Plan Coordinator is responsible for the overall leadership of the sampling program. They also develop the overall testing plan and determined the correct sample methods.

- Spencer Hurley is the Test Plan Coordinator Back-up. The Test Plan Coordinator Back-up is assists with leadership of the sampling plan is needed. They also serve as the technical review role of the test data.

- Michael Abel is a PhD chemist who serves in many roles for Environmental Analytical Chemistry (EAC). One of the roles he performs is as a technical contact for air sampling. Michael serves as a quality assurance and technical reviewer of the final test report.

- James Edmister is the Sample Team Leader. The Sample Team Leader is responsible for ensuring that the data generated met the quality assurance objectives of the plan. Kyle Kennedy and Randy Reinke were the sampling technicians that performed the testing.

2.0 PLANT AND SAMPLING LOCATION DESCRIPTION

2.1 Facility Description

432 Building is used to provide steam to chemical manufacturing plants located in the Dow Silicones Corporation Midland Site, which includes three natural gas boilers and all required ancillary equipment. Boiler feed water is imported from existing site infrastructure. Natural gas (High Pressure Fuel Gas, HPFG) provide fuel for these three boilers. Steam produced in the auxiliary boilers will be sent throughout the Dow Silicones Corporation Midland site at 150 psig.

2.2 Control Equipment Descriptions

The boilers utilize a low NOx burner design with O2 trim to reduce the stack NOx concentration.

2.3 Flue Gas Sampling Locations

Emission sampling was conducted from each boiler stack for the RATA testing. Each stack has sampling ports installed at a height which complies with the requirements of 40 CFR 60, Appendix A, Reference Method 1. The sample locations are a minimum of two diameters upstream of gas flow disturbances.

FIGURE 2.1: FACILITY DIAGRAM

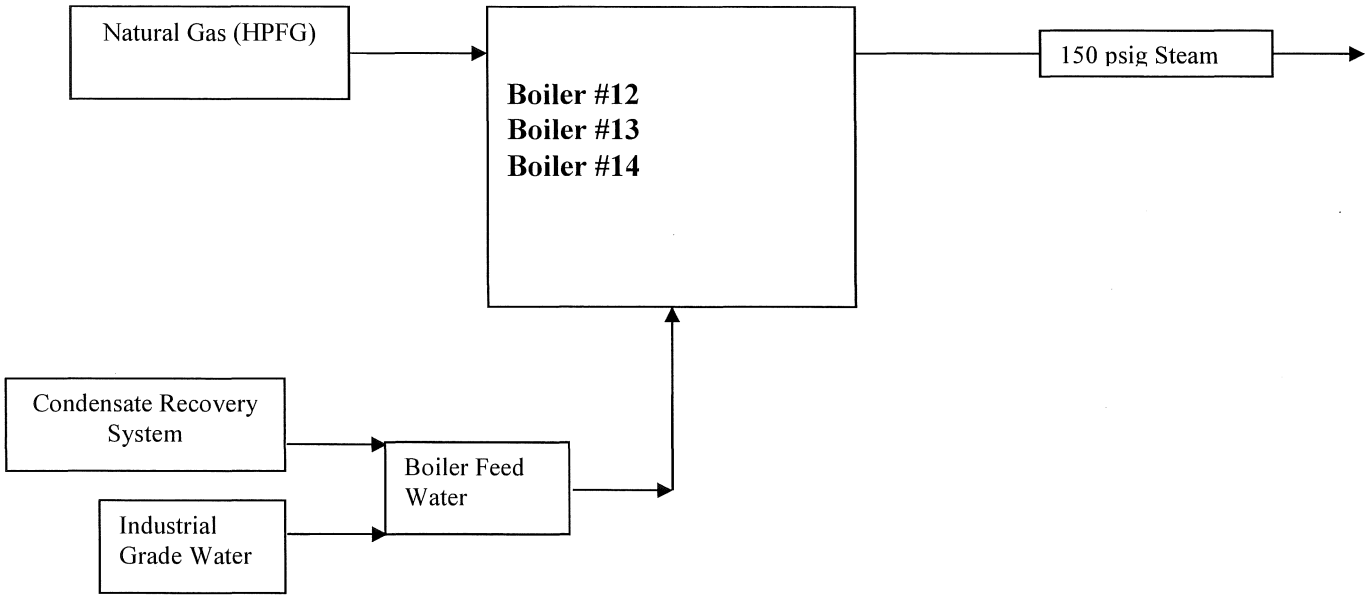
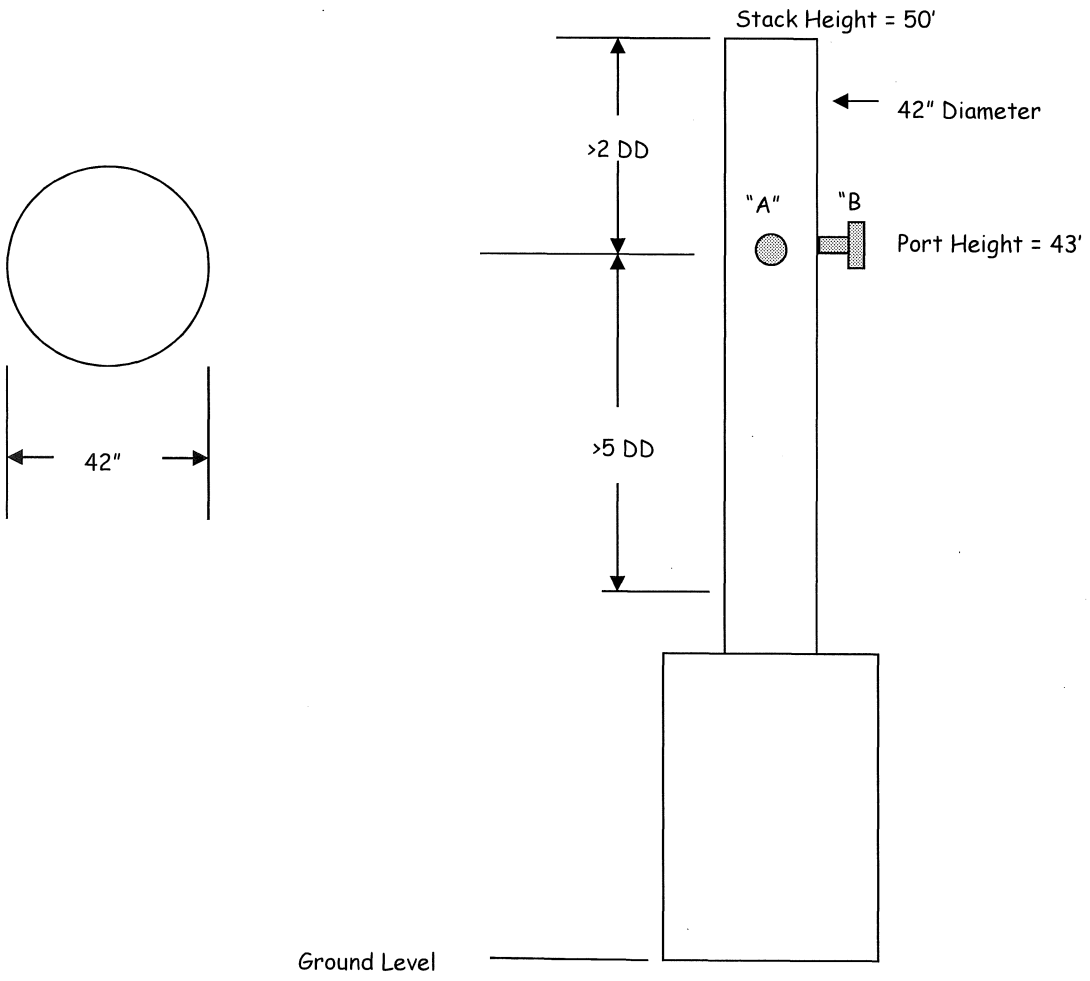


FIGURE 2.2: OUTLET STACK SCHEMATIC



3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 Objectives and Test Matrix

The purpose of these Performance Specification Tests was to demonstrate compliance with the CEMS testing requirements. This testing was completed as required by NSPS Subpart Db and the ROP. The specific objectives of this test were:

- Measure the NOx emissions from the boiler stacks
- Determine the O_2 concentration from the boiler stacks

Table 3.1 presents a summary for the results for the Performance Specification Test for CEMS RATA.

3.2 Facility Operations

During the CEMS tests, the plant was operated at greater than 50% of the full load rating of the boiler being tested. Although these units are currently operated as standby units, which is different than how they were operated in the past (and during past tests), it was proposed to operate the units at greater than 50% of the previous normal load during testing. Prior to becoming standby units, the previous normal load was approximately 60 MMBtu/hr heat input.

3.3 Comments/Exceptions

- This Performance Specification Test for the boiler stacks consisted of up to 12 total 21-minute runs. A minimum of nine runs are used for RATA calculations as allowed by 40 CFR Part 60, PS 2, 3 and 4.
- The NOx CEMS for Boilers #13 and #14 did not pass the RATA completed in March. This is the retest after corrective actions were completed.

Summary of Results
Boiler 13, Vent SV432-002
Continuous Emission Monitor Certification

NOx Monitoring

Test Type	NOx Monitor Results lb/mmBtu	Allowable	Pass/Fail Semi/Annual
Relative Accuracy	39 %	20% RA using RM or 10% RA using EL	Use Alternative
	8 %		Pass
			Pass

***Emission limit is 0.10 NOx lb/Mmbtu based on instantaneous value found in NSPS Subpart Db.**

O2 Monitoring

Test Type	O2 Monitor Results	Allowable	Pass/Fail Semi/Annual
Relative Accuracy	0.0 %	No greater than 20% of mean value of RM or the absolute difference between RM and CEMS <= 1.0%	Pass
	0.0 %		Pass
			Pass

Summary of Results
Boiler 14, Vent SV432-003
Continuous Emission Monitor Certification

NOx Monitoring

Test Type	NOx Monitor Results lb/mmBtu	Allowable	Pass/Fail Semi/Annual
Relative Accuracy	19 %	20% RA using RM or 10% RA using EL	Pass
	8 %		Pass
			Pass

***Emission limit is 0.10 NOx lb/Mmbtu based on instantaneous value found in NSPS Subpart Db.**

O2 Monitoring

Test Type	O2 Monitor Results	Allowable	Pass/Fail Semi/Annual
Relative Accuracy	4.2 %	No greater than 20% of mean value of RM or the absolute difference between RM and CEMS <= 1.0%	Pass
	0.2 %		Pass
			Pass

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Test Methods

The relative accuracies of Dow's CEMS determined by comparison to EPA methods for measurement of each component gas. The performance specifications (PS) required the use of the following methods:

- PS 2 – Method 7E for NOx; and
- PS 3 – Method 3A for O2.

4.2 Procedures

The above methods are performed using mobile continuous emission monitors. Gases were withdrawn from the stack and transported to monitors located at ground level. A stainless-steel probe is inserted into the stack and used to collect sample gas. A Teflon sample line heated to 250°F transported sample gas from the probe to the analyzers. The analyzers are kept at a constant temperature inside the mobile laboratory.

Sample gas is collected continuously from the stack for a period of 21 minutes. As per Michigan Department of EGLE allowance, a stratification check was completed prior to sampling as found in EPA M7E. Since the stack met the requirements to be considered to have no stratification, sampling was completed at a single point that most closely matched the mean of the three points checked. At the mobile laboratory, the stack gas is routed to a condenser and then transported to the analyzers for analysis.

The Relative Accuracy Tests are conducted by comparison of the CEMS response to a value measured by a Performance Test Method (PTM) which, in this case, is Method 7E for Nitrogen Oxides and Method 3A for O_2.

EPA Method 3A (Gas Analysis for the Determination of Dry Molecular Weight)

EPA Method 3A (Instrumental Method) is utilized to determine the diluent during each run on the outlet.

An analyzer measures O_2 content on the basis of the strong paramagnetic properties of O_2 relative to other compounds present in combustion gases. In the presence of a magnetic field, O_2 molecules become temporary magnets. The analyzer determines the sample gas O_2 concentration by detecting the displacement torque of the sample test body in the presence of a magnetic field.

EPA Method 7E (Determination of Nitrogen Oxides)

EPA Method 7E is utilized to determine nitrogen oxide concentrations during each run on the outlet.

A NOx analyzer is used to monitor the concentration of NOx during each run. A sample of the effluent gas was continuously sampled and conveyed to an analyzer for measuring the concentration of NOx. The gas stream is directed through a NO_2

convertor to convert NO_2 to NO concentration. The analyzer yielded results of a total result of NOx.

4.3 List of Sampling Equipment

Stack Reference Instruments

REFERENCE METHOD	EQUIPMENT	ID #	RANGE	SPAN
Method 3A (O_2)	Teledyne Paramagnetic Analyzer	(S/N:376)	25 %	19.7%
Method 7E (NO_x)	Thermo Chemuliscience Analyzer	(S/N: 209997)	1000 ppm	29.7 ppm

Boiler 13 (Completed on Dry Basis)

Constituent	Unit	Manuf.	Model	Serial #	Span
Nitrogen Oxides	ppmv	Thermo	42I	630619177	0-500
Oxygen	vol %	Brand Gaus	4705	10556	0-25

Boiler 14 (Completed on Dry Basis)

Constituent	Unit	Manuf.	Model	Serial #	Span
Nitrogen Oxides	ppmv	Thermo	42I	0630619175	0-500
Oxygen	vol %	Brand Gaus	4705	10555	0-25

FIGURE 4.1: SAMPLING TRAIN USED FOR NOx & O_2 (M7E & M3A)