



# Boiler 1 NOx Emissions Test Report

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Prepared for:  
**General Motors, LLC**  
Detroit, MI

Detroit-Hamtramck Assembly Center  
2500 East General Motors Boulevard  
Detroit, Michigan

Project No. 15-4777.00  
January 7, 2016

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### EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by General Motors, LLC (GM) to measure oxides of nitrogen (NO<sub>x</sub>) emission rates from one boiler at the GM Detroit-Hamtramck Assembly Plant located in Detroit, Michigan. The facility operates under Michigan Department of Environmental Quality (MDEQ) PTI No. 91-15.

The emissions test program was conducted on November 24, 2015. The results of the emission test program are summarized by Table I.

**Table I**  
**Boiler 1**  
**Emissions Test Results Summary**  
**Test Dates: November 24, 2015**

<b>Emission Unit</b>	<b>Pollutant</b>	<b>Emission Limitation</b>	<b>Emission Test Result</b>
EUBOILER1	NO <sub>x</sub>	0.2 lbs/MMBtu	0.07 lbs/MMBtu

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- A Field and Computer Generated Raw Data and Field Notes
- B equipment calibration and span gas documents
- C Example Calculations
- D Compact Disk with all BTEC's CEMS data files



## 1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by General Motors, LLC (GM) to measure oxides of nitrogen (NOx) emission rates from one boiler at the GM Detroit-Hamtramck Assembly Plant located in Detroit, Michigan. The facility operates under Michigan Department of Environmental Quality (MDEQ) PTI No. 91-15. The emissions test program was conducted on November 24, 2015.

The Air Quality Division (AQD) of Michigan's Department of Environmental Quality has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (December 2013). The following is a summary of the emissions test program and results in the format suggested by the aforementioned document.

### 1.a Identification, Location, and Dates of Test

GM Detroit-Hamtramck Assembly Plant is located in Detroit, Michigan. Sampling and analysis for the emission test program was conducted on November 24, 2015.

### 1.b Purpose of Testing

Emissions testing of Boiler 1 was required by Michigan Department of Environmental Quality (MDEQ) PTI No. 91-15.

### 1.c Source Description

The emission unit is one natural gas fired boiler as summarized by Table 1.

**Table 1**  
**Emission Units Summary**

Boiler No.	Fuel(s)	Heat Input Capacity (MMBtu/hr)
1	Natural Gas	84

### 1.d Test Program Contact

The contact for information regarding the test program as well as the test report is as follows:

Ms. Jennifer Tegen  
GECS – Facility Air Compliance & Permit  
GM Warren Technical Center  
30200 Mound Road – Bldg 1-11



Mail Code: 480-111-1N  
Warren, MI 48092  
(810) 706-1319

Ms. Meghan Kennedy  
Environmental Engineer  
General Motors, LLC  
Detroit-Hamtramck Assembly  
2500 East General Motors Boulevard  
Detroit, MI 48211  
(248) 409-8974

### 1.e Testing Personnel

Names and affiliations for personnel who were present during the testing program are summarized by Table 2.

**Table 2**  
**Testing Personnel**

Name	Affiliation
Meghan Kennedy	GM
Jessica Jeffery	GM
Barry Boulianne	BTEC
Paul Diven	BTEC
Brad Gier	BTEC

### 2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions test program.

#### 2.a Operating Data

Boiler steam load (lbs/hr) for Boiler No. 1 was monitored throughout the emissions test program and is summarized in Appendix A.

#### 2.b Applicable Permit

Boiler No. 1 is covered by Michigan Department of Environmental Quality (MDEQ) PTI No. 91-15.

#### 2.c Results

The results of the emissions test program are summarized by table 5.

## 2.d Emission Regulation Comparison

Emission limitations for Boiler No. 1 are summarized by Table 3.

**Table 3  
Emission Limitations**

Source	Emission Limit	Emission Limit
EUBOILER1	0.2	NO <sub>x</sub> lbs/MMBtu

## 3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

### 3.a Process Description

The emission unit is one natural gas fired boiler as summarized by Table 1.

**Table 1  
Emission Units Summary**

Boiler No.	Fuel(s)	Heat Input Capacity (MMBtu/hr)
1	Natural Gas	84

The boiler exhausts to a single, common, freestanding masonry exhaust stack.

### 3.b Process Flow Diagram

Due to the simplicity of the boiler process, a process flow diagram is not necessary.

### 3.c Raw and Finished Materials

The primary raw materials used by the boiler include natural gas, and water and the product is steam. The steam flowrate for each test run is summarized on the summary sheets presented in Appendix A.

### 3.d Process Capacity

The capacity of the boiler is summarized in Section 3.a.

### 3.e Process Instrumentation

Process instrumentation relevant to the emissions test program includes the measurement of boiler steam generated and natural gas use. Relevant data regarding each monitoring device are summarized by the summary sheets presented in Appendix A.

## 4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling.

### 4.a Sampling Train and Field Procedures

Sampling and analysis procedures utilized the following test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- Method 3A, “*Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources*”, was used to measure the O<sub>2</sub> concentration of the exhaust gas.
- Method 7E, “*Determination of Nitrogen Oxides Emissions from Stationary Sources*”, was used to measure the NO<sub>x</sub> concentration of the exhaust gas.

Exhaust gas O<sub>2</sub> content was measured using a M&C PMA 100 O<sub>2</sub> gas analyzer. Exhaust gas NO<sub>x</sub> content was measured using a Thermo Electron 42C NO<sub>x</sub> gas analyzer. A sample of the gas stream was drawn through a stainless-steel probe with an in-line glass fiber filter to remove any particulate, a heated Teflon<sup>®</sup> sample line, and through an electronic sample conditioner to remove the moisture from the sample before it enters the analyzers. Data was recorded at 4-second intervals on a PC equipped with data acquisition software.

### 4.b Recovery and Analytical Procedures

Because all measurements were conducted using on-line analyzers, no samples were recovered during the test program.

### 4.c Sampling Ports

The reference method exhaust gas sample port is located approximately in the middle of the exhaust stack at the same elevation where the CEM system extracts its sample.





#### 4.d Traverse Points

The sampling probe was moved to three separate points with each point at a location approximately 16.7%, 50%, and 83.3% of the stack inside diameter.

### 5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

#### 5.a Results Tabulation

The results of the emissions test program are summarized by table 5. Relevant raw test data for each test run and for analyzer calibrations are provided electronically in Appendix B.

#### 5.b Discussion of Results

The results are below the limit of 0.2 lbs/MMBtu.

**Table 4**  
**Test Results**

Parameter	Emission Limit	Test Result
NOx Emission Rate (lbs/MMBtu)	0.2	0.07

#### 5.c Sampling Procedure Variations

During a phone conversation between Barry Boulianne and the MDEQ on Monday November 23, 2015, it was agreed that BTEC did not need to perform the flow testing as was originally indicated in the test plan. The reason for the change is that the flow will not impact the testing results as the NOx is limited to 0.2 lb/MMBTU and therefore does not factor into the equation.

#### 5.d Process or Control Device Upsets

No upset conditions occurred during testing.

#### 5.e Control Device Maintenance

There is no add-on control device for Boiler No. 1 that would affect NOx emissions.

#### 5.f Re-Test Changes

This was not a re-test.



### **5.g Audit Sample Analyses**

No audit samples were requested by AQD.

### **5.h Calibration Sheets**

Certificates of analysis for the calibration gases used during testing are provided as Appendix B.

### **5.i Sample Calculations**

Sample calculations are provided as Appendix C.

### **5.j Field Data Sheets**

Copies of field data sheets and relevant field notes are provided as Appendix A.

### **5.k Laboratory Data**

No laboratory analysis was included in this test program.

**Table 5**  
**Boiler 1 NOx Emission Rate**  
**GM Detroit-Hamtramck Assembly**  
**Detroit, MI**  
**BTEC Project No. 15-4777.00**  
**Sampling Date: 11/24/15**

Parameter	Run 1	Run 2	Run 3	Average
Test Run Date	11/24/2015	11/24/2015	11/24/2015	
Test Run Time	9:13-10:13	10:26-11:26	11:39-12:39	
Oxygen Concentration (%)	14.2	14.2	14.2	<b>14.2</b>
Oxygen Concentration (%; drift corrected as per USEPA 7E)	14.3	14.4	14.3	<b>14.3</b>
Outlet Oxides of Nitrogen Concentration (ppmv)	20.1	21.2	20.5	<b>20.6</b>
Outlet NOx Concentration (ppmv, corrected as per USEPA 7E)	20.0	20.6	19.9	<b>20.1</b>
Outlet NOx Emission Rate (lbs/MMBtu)	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>

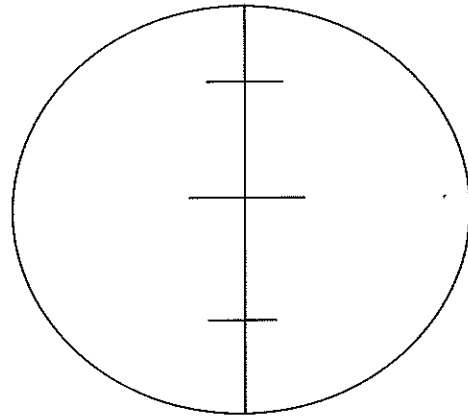
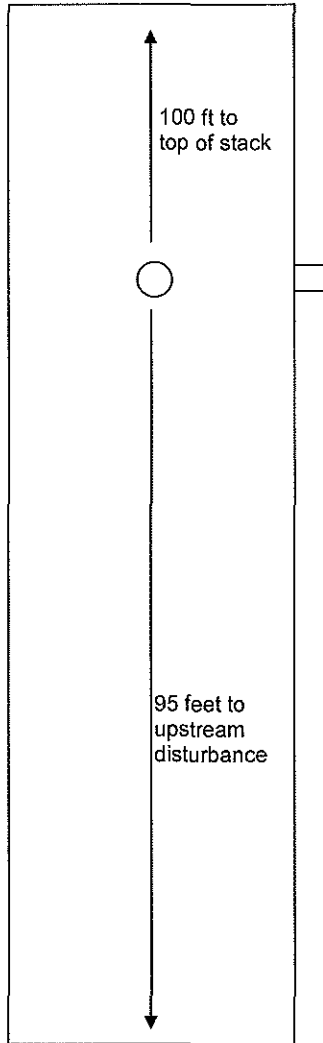
scfm = standard cubic feet per minute  
 ppmv = parts per million on a volume-to-volume basis  
 pph = pounds per hour

Co= Average of initial and final zero gases  
 Cma=Actual concentration of the calibration gas  
 Cm= Average of initial and final calibration gases

# Figures



STACK DIAMETER = 150"



Not to Scale

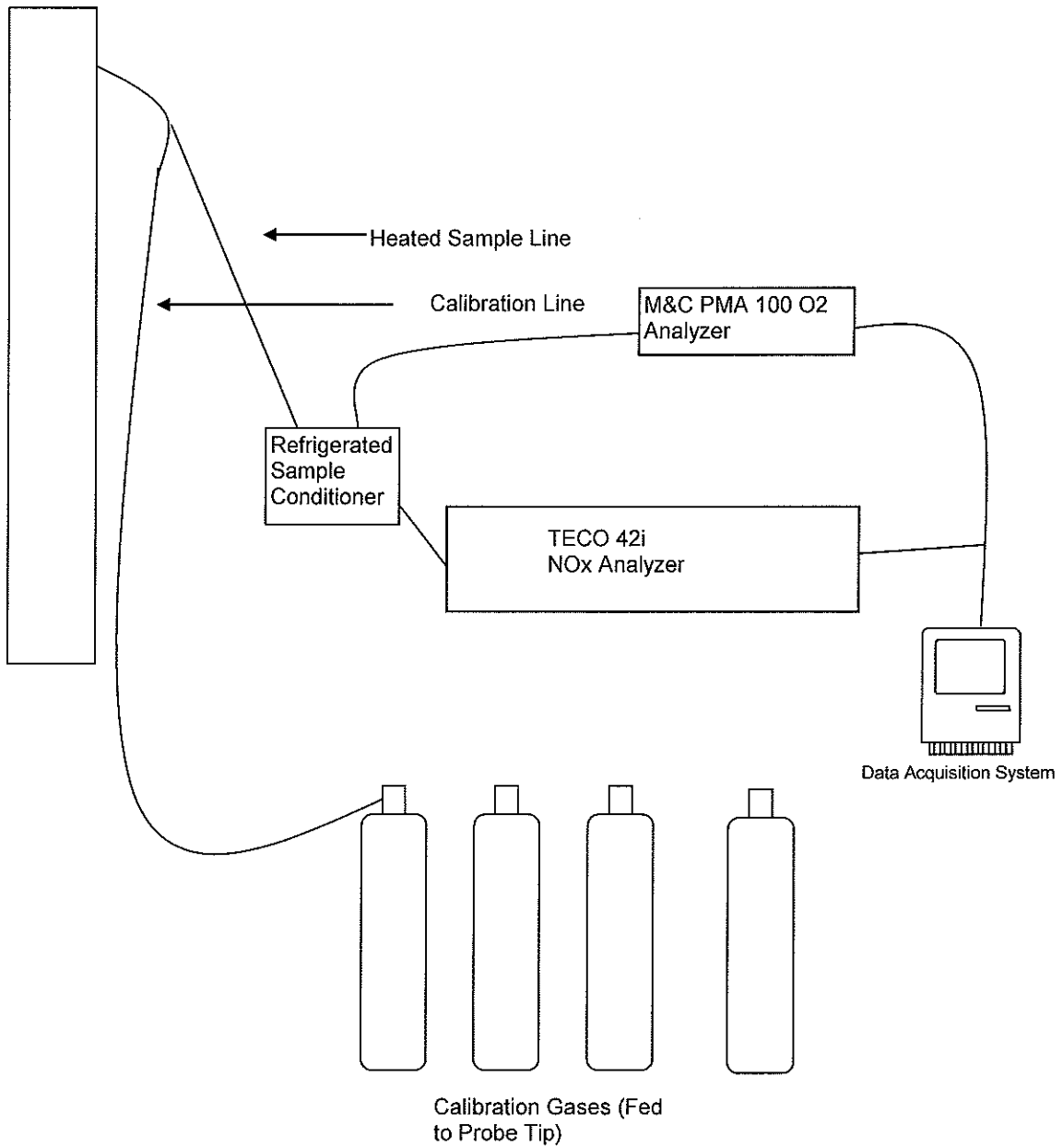
Points	Distance "
1	25.05
2	75.000
3	124.95

Figure No. 1

Site:  
Boiler Stack  
General Motors  
Hamtramck, Michigan

Sampling Dates:  
November 24, 2015

BT Environmental Consulting,  
Inc.  
4949 Fernlee Ave.  
Royal Oak, Michigan



**Figure 2**

**Site:**  
Boiler Stack  
General Motors  
Hamtramck, Michigan

**Sampling Dates:**  
November 24, 2015

**BT Environmental Consulting,  
Inc.**  
4949 Fernlee Ave.  
Royal Oak, Michigan