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BOZEN ENVIRONMENTAL, LLC

AUG 20 2014

AIR QUALITY DIV.

GASEOUS EMISSIONS TESTING

PERFORMED FOR

GRAND HAVEN BOARD OF LIGHT AND POWER

AT THE

Diesel Generating Station

Unit No. 1

July 17, 2014

**528 Harbor Drive
Grand Haven, MI 49417**

**Bozen Project No. 140402
August 19, 2014**

1.0 INTRODUCTION

Bozen Environmental, LLC. (Bozen) was retained by Grand Haven Board of Light and Power (GHBLP) to conduct emissions tests for carbon monoxide (CO) and oxygen (O₂) on the inlet and exhaust of the Catalytic Convertors serving Engine No. 1 at the Diesel Generating Station located in Grand Haven, Michigan.

The purpose of tests was to demonstrate compliance with 40 CFR Parts 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Stationary Reciprocating Internal Combustion Engine (RICE).

This test program was performed by Messrs. Eric Hagen and G.M. Gozzi of Bozen. Mr. Chris Morse of GHBLP provided assistance and coordinated the plant operating conditions during this test program. These tests were authorized by and performed for Grand Haven Board of Power and Light.

1.1 SOURCE DESCRIPTION

Engine No. 1 is a gas-fired RICE rated at 7 megawatts. This unit is equipped with Catalytic Convertors for CO emissions controls. Each of two exhausts are equipped with catalytic convertors.

2.0 SUMMARY OF RESULTS

West Duct

Inlet

O ₂	9.1 %
CO	252.5 parts per million
CO	127.0 parts per million*

Outlet

O ₂	9.2 %
CO	8.5 parts per million
CO	4.3 parts per million*

East Duct

Inlet

O ₂	9.3 %
CO	270.4 parts per million
CO	137.6 parts per million*

Outlet	
O₂	9.3 %
CO	2.6 parts per million
CO	1.3 parts per million*

*CO parts per million corrected to 15% oxygen

3.0 DISCUSSION OF RESULTS

Test Results from this program are tabulated and can be found on page 6. The test consisted of paired inlet and outlet sixty minute test runs for oxygen and carbon monoxide. The exhausts were tested consecutively. No problems were encountered with the test equipment during the course of this test program once the testing began. Operations appeared normal during the entire program except during test run 2 of the West Duct. Testing was paused for a unit trip due to a main gas line leak. Test was restarted after the facility made the appropriate repairs and achieve generating load.

4.0 TEST PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed as described in the CFR, Title 40, Part 60, Appendix A, and the latest revision thereof.

Reference method monitors require that the effluent gas sample be conditioned to eliminate any possible interference (i.e., particulate matter and moisture) before being transported and injected into each analyzer. All components of the sampling system that contact the sample were constructed of Type 316 stainless steel and Teflon. The output signal from each monitor was connected to a computerized ESC data acquisition system (DAS). The

configuration of the sampling system allowed for injection of calibration gases directly through the sampling system. A diagram of the reference monitoring system is illustrated and can be found appended.

4.1 DILUENT DETERMINATION (METHOD 3A)

A sample was drawn continuously from the gas stream utilizing a heated probe and conditioning system as describe previously. The dry clean gas was conveyed to the analyzer to determination the O₂. Prior to sampling the analyzer was calibrated using high range mid-range and zero certified gases. Prior to sampling the analyzer was calibrated using high range, mid-range and zero gases. A Servomex 1410 analyzer was used for the O₂ analysis.

4.2 CARBON MONOXIDE DETERMINATION (METHOD 10)

A sample was drawn continuously from the gas stream utilizing a heated probe and conditioning system as describe previously. The dry clean gas was conveyed to the analyzer to determination the CO content. Prior to sampling the analyzer was calibrated using high range mid-range and zero certified gases. A TECO 60i and 48i analyzers were used for the CO analysis.

5.0 QUALITY ASSURANCE PROCEDURES

Bozen recognizes the previously mentioned reference methods to be very technique oriented and attempts to minimize any factors in the field that could increase error by implementing a quality assurance program into every testing activity segment.

U.S. EPA Protocol No. 1 gas standards were used to calibrate the VOC RM analyzers during the test program. These gases are certified according to the *U.S. EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards; Procedure G-1*; and are certified to have a total relative uncertainty of ± 1 percent.

6.0 ACKNOWLEDGEMENTS

Bozen Environmental, LLC, would like to thank the following BLP personnel for their assistance in completing this project:

Jeff Chandler	Board of Light and Power J. B. Sims Station
Chris Morse	Board of Light and Power J. B. Sims Station

7.0 CERTIFICATION

Having written this report and supervised the test program, I hereby certify that this data, information, and results to be true and accurate in accordance with the test procedures used.

Respectfully Submitted:

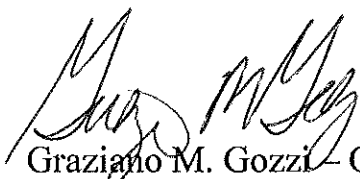

Graziano M. Gozzi - QSTI
Project Manager
Bozen Environmental, LLC

Table 1

Project: **GRAND HAVEN BOARD OF LIGHT & POWER**
 Site: **Diesel Plant**
 Location: **#1 EngineCatalytic Converter**
 LOAD (MW): **6.8**
 Test Date: **07/17/14**

West Duct

Inlet			Corrected CO to 15% O2
Run No.			
1	CO ppm	257.3	
	O2 %	9.1	129.2
2	CO ppm	252.4	
	O2 %	9.1	126.3
3	CO ppm	247.7	
	O2 %	9.2	125.5
Average			127.0

Outlet			Corrected CO to 15% O2	Efficiency %
Run No.				
1	CO ppm	12.5		
	O2 %	9.1	6.2	95.2%
2	CO ppm	10.4		
	O2 %	9.1	5.2	95.9%
3	CO ppm	2.6		
	O2 %	9.3	1.3	98.9%
Average			4.3	96.7%

East Duct

Inlet			Corrected CO to 15% O2
Run No.			
1	CO ppm	275.0	
	O2 %	9.4	140.8
2	CO ppm	267.1	
	O2 %	9.3	135.5
3	CO ppm	269.1	
	O2 %	9.3	136.6
Average			137.6

Outlet			Corrected CO to 15% O2	Efficiency %
Run No.				
1	CO ppm	2.6		
	O2 %	9.3	1.3	99.1%
2	CO ppm	2.6		
	O2 %	9.3	1.3	99.0%
3	CO ppm	2.6		
	O2 %	9.3	1.3	99.0%
Average			1.3	99.0%