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Compliance Emissions Test Report

Lansing Board of Water and Light
REO Town Cogeneration Facility
Emergency Internal Combustion Engine
Lansing, Michigan
December 12 and 13, 2018

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AIR QUALITY DIVISION

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Project No. M184504D

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1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a compliance emissions test program for Lansing Board of Water and Light on December 12 and 13, 2018 at the REO Town Cogeneration Facility on the Emergency Internal Combustion Engine in Lansing, Michigan. This report summarizes the results of the test program and test methods used.

The test location, test dates, and test parameters are summarized below.

Test Location	Test Dates	Test Parameters
Emergency Internal Combustion Engine	December 12 and 13, 2018	Filterable Particulate Material (FPM), Condensable Particulate Matter (CPM), and Total Particulate Matter (TPM)

The purpose of the test program was to evaluate the emissions of the above test parameters with the regulation permit limits. Selected results of the test program are summarized below. A complete summary of emission test results follows the narrative portion of this report.

TEST RESULTS				
Test Location	**Test Dates**	**Test Parameter**	**Emission Limits**	**Emission Rates**
Emergency Internal Combustion Engine	12/12/18 and 12/13/18	FPM	0.12 lb/hr	0.032 lb/hr
		CPM	N/A	0.126 lb/hr
		TPM	0.13 lb/hr	0.158 lb/hr

Emissions on g/bhp-hr basis were calculated using Kilowatt data supplied by Lansing Board of Water and Light. The identifications of the individuals associated with the test program are summarized below.

TEST PERSONNEL INFORMATION		
Location	**Address**	**Contact**
Test Coordinator	Lansing Board of Water and Light 1232 Haco Drive P.O. Box 13007 Lansing, Michigan 48912	Ms. Lori Myott Manager, Environmental Services (517) 702-6639 (phone) Lori.myott@lbwl.com
Test Facility	REO Town Cogeneration Facility 1110 S. Pennsylvania Avenue Building E Lansing, Michigan	
Testing Company Representative	Mostardi Platt 888 Industrial Drive Lansing, Michigan 60126	Mr. Stuart L. Burton Project Manager (630) 993-2100 (phone) sburton@mp-mail.com

The test crew consisted of Messrs. C. Eldridge, K. Krofel, and S. Burton of Mostardi Platt.

2.0 TEST METHODOLOGY

Emission testing was conducted following the methods specified in 40 CFR, Part 60, Appendix A. Schematics of the test section diagrams and sampling trains used are included in Appendix A and B, respectively. Calculation examples and nomenclature are included in Appendix C. Copies of analyzer print-outs and field data sheets for each test run are included in Appendices F and G, respectively.

The following methodologies were used during the test program:

Method 1 Traverse Point Determination

Test measurement points were selected in accordance with Method 1 for volumetric flow. The characteristics of the measurement location are summarized below.

TEST POINT INFORMATION					
Location	Duct Diameter (Feet)	Area (Square Feet)	Upstream Disturbance Distance	Downstream Disturbance Distance	Number of Sampling Points
Emergency Internal Combustion Engine	1.125	0.994	~44.0'	~9.0'	12

An absence of cyclonic flow test was performed and the test location met the less than 20-degree angle requirement.

Gaseous Sampling Plan

Three points along 17%, 50%, and 83% of the stack diameter were used to sample gaseous emissions.

Method 2 Volumetric Flowrate Determination

Gas velocity was measured following Method 2, for purposes of calculating stack gas volumetric flow rate. An S-type pitot tube, differential pressure gauge, Thermal couple and temperature readout were used to determine gas velocity at each sample point. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

Method 3A Oxygen (O_2)/Carbon Dioxide (CO_2) Determination

Stack gas O_2 and CO_2 were determined in accordance with Method 3A. Servomex analyzers and an ECOM analyzer were used to determine stack gas oxygen and carbon dioxide content. All of the equipment used was calibrated in accordance with the specifications of the Method and calibration data are included in Appendix H. Copies of the gas cylinder certifications are included in Appendix I.

Method 5 Particulate Determination

Stack gas particulate concentrations and emission rates were determined in accordance with Method 5, 40 CFR, Part 60, Appendix A at the test location. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method. Particulate matter in the sample probe was recovered using an acetone rinse. The probe wash and filter catch were analyzed by Mostardi Platt in accordance with the Method in the Elmhurst, Illinois laboratory. Laboratory data are found in Appendix D. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

Method 202 Condensable Particulate Determination

Stack gas condensable particulate matter concentrations and emission rates were determined in accordance with USEPA Method 202, in conjunction with Method 5 filterable particulate sampling. This method applies to the determination of condensable particulate matter (CPM) emissions from stationary sources. It is intended to represent condensable matter as material that condenses after passing through a filter and as measured by this method.

The CPM was collected in the impinger portion of the Method 5 (Appendix A, 40CFR60) type sampling trains. The impinger contents were immediately purged after each run with nitrogen (N_2) to remove dissolved sulfur dioxide (SO_2) gases from the impinger contents. The impinger solution was then extracted with hexane. The organic and aqueous fractions were then taken to dryness and the residues weighed. A correction was made for any ammonia present due to laboratory analysis procedures. The total of both fractions represents the CPM.

All sample recovery was performed at the test site by the test crew. Mostardi Platt personnel at the laboratory in Elmhurst, Illinois, performed all final particulate sample analyses. Laboratory data are found in Appendix D. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

3.0 TEST RESULT SUMMARY

Client: Lansing Board of Water and Light
Facility: REO Town Cogeneration Facility
Test Location: Emergency Internal Combustion Engine Stack
Test Method: 5/202

Source Condition	Normal	Normal	Normal	
Date	12/12/18	12/12/18	12/13/18	
Start Time	8:30	11:15	14:01	
End Time	10:35	13:30	16:03	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	758.3	759.6	757.2	758.4
Flue Gas Moisture, percent by volume	10.7%	10.0%	10.8%	10.5%
Average Flue Pressure, in. Hg	29.06	29.06	29.21	29.11
Gas Sample Volume, dscf	97.883	98.718	99.591	98.731
Average Gas Velocity, ft/sec	162.610	164.099	163.508	163.406
Gas Volumetric Flow Rate, acfm	9,698	9,787	9,752	9,746
Gas Volumetric Flow Rate, dscfm	3,648	3,706	3,686	3,680
Gas Volumetric Flow Rate, scfm	4,083	4,116	4,130	4,110
Average $\%CO_2$ by volume, dry basis	6.6	6.5	6.6	6.6
Average $\%O_2$ by volume, dry basis	9.4	9.6	9.4	9.5
Isokinetic Variance	101.9	101.2	102.7	101.9
Filterable Particulate Matter (Method 5)				
grams collected	0.00862	0.00596	0.00463	0.00640
grains/acf	0.0005	0.0004	0.0003	0.0004
grains/dscf	0.0014	0.0009	0.0007	0.0010
lb/hr	0.042	0.030	0.023	0.032
Condensable Particulate Matter (Method 202)				
grams collected	0.02812	0.02471	0.02392	0.02558
grains/acf	0.0017	0.0015	0.0014	0.0015
grains/dscf	0.0044	0.0039	0.0037	0.0040
lb/hr	0.139	0.123	0.117	0.126
Total Particulate Matter (5/202)				
grams collected	0.03674	0.03067	0.02855	0.03199
grains/acf	0.0022	0.0019	0.0017	0.0019
grains/dscf	0.0058	0.0048	0.0044	0.0050
lb/hr	0.181	0.153	0.140	0.158

4.0 CERTIFICATION

MOSTARDI PLATT is pleased to have been of service to Lansing Board of Water and Light. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

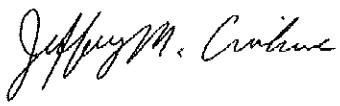
CERTIFICATION

As project manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results, and the test program was performed in accordance with the methods specified in this test report.

MOSTARDI PLATT

Program Manager

Stuart L. Burton



Quality Assurance

Jeffrey M. Crivlare