



**Mercury and Air Toxics Standard Particulate Matter and  
Hydrogen Chloride Emissions Test Report**

**Lansing Board of Water and Light  
Eckert Station  
Unit 5 ESP Outlet Duct  
Lansing, Michigan  
December 6 and 7, 2016**

**Report Submittal Date  
January 13, 2017**

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**Project No. M162305E**



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RENEWABLE OPERATING PERMIT  
REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating (RO) Permit program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as described in General Condition No. 22 in the RO Permit and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name Lansing Board of Water & Light County Ingham  
Source Address 601 Island Ave City Lansing  
AQD Source ID (SRN) B2647 RO Permit No. MI-ROP-B2647-2012c RO Permit Section No. \_\_\_\_\_

Please check the appropriate box(es):

**Annual Compliance Certification** (General Condition No. 28 and No. 29 of the RO Permit)

Reporting period (provide inclusive dates): From \_\_\_\_\_ To \_\_\_\_\_

1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the RO Permit.

2. During the entire reporting period this source was in compliance with all terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the RO Permit, unless otherwise indicated and described on the enclosed deviation report(s).

**Semi-Annual (or More Frequent) Report Certification** (General Condition No. 23 of the RO Permit)

Reporting period (provide inclusive dates): From \_\_\_\_\_ To \_\_\_\_\_

1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred.

2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

**Other Report Certification**

Reporting period (provide inclusive dates): From 12/06/2016 To 12/07/2016

Additional monitoring reports or other applicable documents required by the RO Permit are attached as described:  
Eckert Unit 5 - Mercury and Air Toxics Standard Particulate Matter and Hydrogen Chloride  
Emissions Test Report

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete.

<u>Lori Myott</u>	<u>Manager, Environmental Dept</u>	<u>517-702-6153</u>
Name of Responsible Official (print or type)	Title	Phone Number
		<u>1-20-2017</u>
Signature of Responsible Official		Date

## 1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a Mercury and Air Toxics Standards (MATS) filterable particulate matter and hydrogen chloride emissions test program for the Lansing Board of Water and Light at the Eckert Station on the Unit 5 ESP Outlet Duct in Lansing, Michigan on December 6 and 7, 2016. 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 INFORMATION		
Test Location	Test Dates	Test Parameters
Unit 5 ESP Outlet Duct	December 6 and 7, 2016	Filterable Particulate Matter (FPM) and Hydrogen Chloride (HCl)

The purpose of the test program was to demonstrate FPM and HCl emissions qualify for the LEE designation as required by 40 CFR Part 63, Subpart UUUUU. 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 Parameter	Emission Limits	Emission Rates
Unit 5 ESP Outlet Duct	FPM	≤0.030 lb/mmBtu	0.0099 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	0.0006 lb/mmBtu

Emissions on lb/mmBtu basis were determined using a standard  $F_d$ -Factor of 9,820 dscf/mmBtu for sub-bituminous coal. Plant operating data as provided by Lansing Board of Water and Light is included in Appendix A.

The Stationary Source Audit Sample Program audit sample was obtained from ERA and submitted for analysis to Maxxam Analytical. The results of the audit sample was compared to the assigned value by ERA and found to be acceptable. The audit sample result and evaluation are appended to this report.

The identifications of 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. Trista Gregorski Environmental Engineer (517)702-6865 (phone) tmg@lbwl.com
Test Facility	Lansing Board of Water and Light Eckert Station 601 Island Ave Lansing, Michigan 48901	
Testing Company Representative	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Stuart Burton Project Manager (630) 993-2100 (phone) sburton@mp-mail.com

The test crew consisted of Messrs. B. Garcia, D. Dixon, and S. Burton of Mostardi Platt.

## 2.0 TEST METHODOLOGY

Emissions testing was conducted following the methods specified in 40CFR60, Appendix A. A schematic of the test section diagram is found in Appendix B and schematics of the sampling trains used are included in Appendix C. Calculation nomenclature and sample calculations are included in Appendix D. Laboratory analysis data are found in Appendix E. Copies of analyzer print-outs for each test run are included in Appendix F and field data sheets are found in Appendix G.

The following methodologies were used during the test program:

### Method 1 Traverse Point Determination

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

TEST POINT INFORMATION				
Location	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
Unit 5 ESP Outlet Duct	0.49	1.95	FPM, HCl	32

### 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, thermocouple 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<sub>2</sub>)/Carbon Dioxide (CO<sub>2</sub>) Determination

Stack gas molecular weight was determined in accordance with Method 3A. An ECOM analyzer was used to determine stack gas oxygen and carbon dioxide content and, by difference, nitrogen content. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H and copies of the gas cylinder certifications are found in Appendix I.

### Method 5 Filterable Particulate Matter (FPM) Determination

Stack gas FPM concentrations and emission rates were determined in accordance with USEPA Method 5, 40CFR60, Appendix A. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method. Filter and probe temperatures were elevated to 320° Fahrenheit as described in 40CFR63, Subpart UUUUU. 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. Sample analysis data are found in Appendix E. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

## **Method 26A Hydrogen Chloride (HCl) Determination**

Stack gas HCl concentrations and emission rates were determined in accordance with Method 26A, 40CFR60, Appendix A. An Environmental Supply Company sampling train was used to sample stack gas, in the manner specified in the Method. Analyses of the samples collected were conducted by Maxxam Analytics, Inc. of Mississauga, Ontario. Sample analysis data are found in Appendix E. 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 SUMMARIES

**Client:** Lansing Board of Water and Light  
**Facility:** Eckert Station  
**Test Location:** Unit 5 ESP Outlet Duct  
**Test Method:** 5 MATS

	Source Condition	High Load	High Load	High Load	
	Date	12/6/16	12/6/16	12/6/16	
	Start Time	8:05	10:40	13:20	
	End Time	10:13	12:47	15:27	
	Run 1	Run 2	Run 3	Average	
<b>Stack Conditions</b>					
Average Gas Temperature, °F	350.4	358.7	360.2	356.4	
Flue Gas Moisture, percent by volume	10.2%	11.9%	10.5%	10.9%	
Average Flue Pressure, in. Hg	28.54	28.54	28.46	28.51	
Gas Sample Volume, dscf	86.003	82.645	84.943	84.530	
Average Gas Velocity, ft/sec	51.914	50.065	51.489	51.156	
Gas Volumetric Flow Rate, acfm	280,334	270,349	278,042	276,242	
Gas Volumetric Flow Rate, dscfm	156,507	146,449	152,448	151,801	
Gas Volumetric Flow Rate, scfm	174,198	166,288	170,267	170,251	
Average %CO <sub>2</sub> by volume, dry basis	13.9	13.9	14.0	13.9	
Average %O <sub>2</sub> by volume, dry basis	4.8	4.9	4.9	4.9	
Isokinetic Variance	102.2	105.0	103.6	103.6	
Standard Fuel Factor Fd, dscf/mmBtu	9,820.0	9,820.0	9,820.0	9,820.0	
<b>Filterable Particulate Matter (Method 5 MATS)</b>					
grams collected	0.0305	0.0292	0.0287	0.0295	
grains/acf	0.0031	0.0030	0.0029	0.0030	
grains/dscf	0.0055	0.0055	0.0052	0.0054	
lb/hr	7.341	6.843	6.812	6.999	
lb/mmBtu (Standard Fd Factor)	0.0100	0.0100	0.0096	0.0099	

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Client: Lansing Board of Water and Light  
Facility: Eckert Station  
Test Location: Unit 5 ESP Outlet Duct  
Test Method: 26A

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	Source Condition	High Load	High Load	High Load	
	Date	12/7/16	12/7/16	7/27/16	
	Start Time	8:30	11:08	13:30	
	End Time	10:38	13:15	15:37	
	Run 1	Run 2	Run 3	Average	
<b>Stack Conditions</b>					
Average Gas Temperature, °F	345.8	352.8	359.8	352.8	
Flue Gas Moisture, percent by volume	10.1%	10.6%	10.9%	10.5%	
Average Flue Pressure, in. Hg	28.49	28.49	28.49	28.49	
Gas Sample Volume, dscf	84.489	85.042	83.401	84.311	
Average Gas Velocity, ft/sec	50.691	51.780	52.223	51.565	
Gas Volumetric Flow Rate, acfm	273,732	279,611	282,002	278,448	
Gas Volumetric Flow Rate, dscfm	153,511	154,677	153,990	154,059	
Gas Volumetric Flow Rate, scfm	170,772	172,924	172,914	172,203	
Average %CO <sub>2</sub> by volume, dry basis	13.8	13.7	13.9	13.8	
Average %O <sub>2</sub> by volume, dry basis	4.7	4.8	4.8	4.8	
Isokinetic Variance	102.4	102.3	100.7	101.8	
Standard Fuel Factor Fd, dscf/mmBtu	9,820.0	9,820.0	9,820.0	9,820.0	
<b>Hydrogen Chloride (HCl) Emissions</b>					
ug of sample collected	2000	1500	1600	1700	
ppm	0.55	0.41	0.45	0.47	
mg/dscm	0.84	0.62	0.68	0.71	
lb/hr	0.481	0.361	0.391	0.411	
lb/mmBtu (Standard Fd Factor)	0.0007	0.0005	0.0005	0.0006	

## 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

Scott W. Banach