



**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  
June 13 and 14, 2017**

**Report Submittal Date  
July 24, 2017**

**RECEIVED**

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**AIR QUALITY DIVISION**

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**Project No. M172404C**

# 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 June 13 and 14, 2017. 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	June 13 and 14, 2017	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	0.0184 lb/mmBtu
		≤0.015 lb/mmBtu (LEE Status)*	
	HCl	≤0.002 lb/mmBtu	0.00007 lb/mmBtu
		≤0.001 lb/mmBtu (LEE Status)**	

\*LEE designation for FPM is established if the FPM emissions measured during the initial compliance test and all subsequent quarterly testing completed over the initial 3-year period are less than 50% of the applicable emission limit, which equates to 0.015 lb/mmBtu.

\*\* LEE designation for HCl is established if the HCl emissions measured during the initial compliance test and all subsequent quarterly testing completed over the initial 3-year period are less than 50% of the applicable emission limit, which equates to 0.001 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) trista.gregorski@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. C. Eldridge, D. Kossack, N. Leslie, 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, HCI	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	Normal	Normal	Normal	
	Date	6/14/17	6/14/17	6/14/17	
	Start Time	8:10	11:03	13:50	
	End Time	10:34	13:24	16:08	
	Run 1	Run 2	Run 3	Average	
<b>Stack Conditions</b>					
Average Gas Temperature, °F	359.7	369.4	370.5	366.5	
Flue Gas Moisture, percent by volume	11.4%	12.0%	11.4%	11.6%	
Average Flue Pressure, in. Hg	28.86	28.86	28.86	28.86	
Gas Sample Volume, dscf	80.013	79.342	78.990	79.448	
Average Gas Velocity, ft/sec	54.829	54.249	54.347	54.475	
Gas Volumetric Flow Rate, acfm	296,077	292,946	293,475	294,166	
Gas Volumetric Flow Rate, dscfm	163,063	158,282	159,400	160,248	
Gas Volumetric Flow Rate, scfm	183,978	179,893	179,987	181,286	
Average %CO <sub>2</sub> by volume, dry basis	13.8	13.8	13.8	13.8	
Average %O <sub>2</sub> by volume, dry basis	6.2	6.1	6.1	6.1	
Isokinetic Variance	98.9	101.0	99.9	99.9	
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	0.04540	0.04531	0.05219	0.04763	
grains/acf	0.0048	0.0048	0.0055	0.0050	
grains/dscf	0.0088	0.0088	0.0102	0.0093	
lb/hr	12.237	11.955	13.929	12.707	
lb/mmBtu (Standard Fd Factor)	0.0175	0.0175	0.0202	0.0184	

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

	Source Condition	Normal	Normal	Normal	
	Date	6/13/17	6/13/17	6/13/17	
	Start Time	7:45	10:20	12:48	
	End Time	9:40	12:13	14:41	
		Run 1	Run 2	Run 3	Average
<b>Stack Conditions</b>					
Average Gas Temperature, °F		365.2	372.7	378.2	372.0
Flue Gas Moisture, percent by volume		11.7%	11.8%	12.0%	11.8%
Average Flue Pressure, in. Hg		28.90	28.90	28.90	28.90
Gas Sample Volume, dscf		71.209	71.641	73.965	72.272
Average Gas Velocity, ft/sec		54.206	54.364	56.473	55.014
Gas Volumetric Flow Rate, acfm		292,712	293,567	304,952	297,077
Gas Volumetric Flow Rate, dscfm		159,707	158,671	163,245	160,541
Gas Volumetric Flow Rate, scfm		180,919	179,806	185,553	182,093
Average %CO <sub>2</sub> by volume, dry basis		13.9	13.8	13.8	13.8
Average %O <sub>2</sub> by volume, dry basis		5.8	5.6	5.7	5.7
Isokinetic Variance		101.4	102.7	103.0	102.4
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		2200.00	1500.00	1600.00	1766.67
ppm		0.72	0.49	0.50	0.57
mg/dscm		1.09	0.74	0.76	0.86
lb/hr		0.6527	0.4395	0.4671	0.5198
lb/mmBtu (Standard Fd Factor)		0.0009	0.0006	0.0006	0.0007

## 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



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Stuart L. Burton

Program Manager



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Scott W. Banach

Quality Assurance