



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

**Lansing Board of Water and Light  
Eckert Station  
Unit 4 ESP Outlet Duct  
Lansing, Michigan  
June 26, 2018**

**Report Submittal Date  
July 10, 2018**

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**Project No. M182604A**

## 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 4 ESP Outlet Duct in Lansing, Michigan on June 26, 2018. This report summarizes the results of the test program and test methods used.

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

TEST INFORMATION		
Test Location	Test Date	Test Parameters
Unit 4 ESP Outlet Duct	June 26, 2018	Filterable Particulate Matter (FPM) and Hydrogen Chloride (HCl)

The purpose of the test program was to document FPM and HCl emissions to 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	LEE Emission Limits	Emission Rates
Unit 4 ESP Outlet Duct	FPM	≤0.030 lb/mmBtu	≤0.015 lb/mmBtu	0.0133 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	≤0.001 lb/mmBtu	0.0007 lb/mmBtu

Emissions on lb/mmBtu basis were determined using a standard F<sub>d</sub>-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 were 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 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. 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. Christopher Eldridge Project Manager (630) 993-2100 (phone) celdridge@mp-mail.com

The test crew consisted of Messrs. J. Hansen, J. Kukla, R. Simon, T. Schmidt, and C. Eldridge 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 4 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.

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### 3.0 TEST RESULT SUMMARIES

**Client:** Lansing Board of Water and Light  
**Facility:** Eckert Station  
**Test Location:** Unit 4 ESP Outlet Duct  
**Test Method:** 5 MATS

	Source Condition	Normal	Normal	Normal	
	Date	6/26/18	6/26/18	6/26/18	
	Start Time	8:18	11:22	14:43	
	End Time	10:42	13:46	17:05	
	Run 1	Run 2	Run 3	Average	
<b>Stack Conditions</b>					
Average Gas Temperature, °F	333.2	342.1	347.2	340.8	
Flue Gas Moisture, percent by volume	11.4%	11.6%	11.7%	11.6%	
Average Flue Pressure, in. Hg	28.57	28.57	28.57	28.57	
Gas Sample Volume, dscf	109.115	110.121	108.882	109.373	
Average Gas Velocity, ft/sec	56.007	56.510	56.711	56.409	
Gas Volumetric Flow Rate, acfm	302,435	305,154	306,238	304,609	
Gas Volumetric Flow Rate, dscfm	170,306	169,482	168,962	169,583	
Gas Volumetric Flow Rate, scfm	192,206	191,772	191,254	191,744	
Average %CO <sub>2</sub> by volume, dry basis	14.3	14.4	14.5	14.4	
Average %O <sub>2</sub> by volume, dry basis	5.2	5.2	5.3	5.2	
Isokinetic Variance	101.8	103.2	102.3	102.4	
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	0.04859	0.05972	0.04292	0.05041	
mg/dscm	15.726	19.152	13.921	16.2660	
grains/acf	0.0039	0.0046	0.0034	0.0040	
grains/dscf	0.0069	0.0084	0.0061	0.0071	
lb/hr	10.030	12.156	8.809	10.332	
lb/mmBtu (Standard Fd Factor)	0.0128	0.0156	0.0114	0.0133	

Client: Lansing Board of Water and Light  
 Facility: Eckert Station  
 Test Location: Unit 4 ESP Outlet Duct  
 Test Method: 26A

Source Condition	Normal	Normal	Normal	
Date	6/26/18	6/26/18	6/26/18	
Start Time	8:18	11:22	14:43	
End Time	10:11	13:10	16:29	
	Run 1	Run 2	Run 3	Average
<b>Stack Conditions</b>				
Average Gas Temperature, °F	328.6	337.5	344.3	336.8
Flue Gas Moisture, percent by volume	11.4%	11.8%	11.4%	11.5%
Average Flue Pressure, in. Hg	29.09	29.09	29.09	29.09
Gas Sample Volume, dscf	81.947	82.122	77.412	80.494
Average Gas Velocity, ft/sec	56.902	57.911	56.181	56.998
Gas Volumetric Flow Rate, acfm	307,271	312,717	303,377	307,788
Gas Volumetric Flow Rate, dscfm	177,237	177,594	171,538	175,456
Gas Volumetric Flow Rate, scfm	199,984	201,255	193,591	198,277
Average %CO <sub>2</sub> by volume, dry basis	14.3	14.4	14.5	14.4
Average %O <sub>2</sub> by volume, dry basis	5.2	5.2	5.3	5.2
Isokinetic Variance	107.5	107.5	104.9	106.6
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	1928.73	1998.81	1818.91	1915.48
ppm	0.55	0.57	0.55	0.55
mg/dscm	0.83	0.86	0.83	0.84
lb/hr	0.5518	0.5718	0.5331	0.5522
lb/mmBtu (Standard Fd Factor)	0.0007	0.0007	0.0007	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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Christopher Eldridge

Program Manager



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Scott W. Banach

Quality Assurance