



**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 8 and 9, 2016**

**Report Submittal Date  
August 1, 2016**

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**Project No. M162305C**

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## 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 8 and 9, 2016. This report summarizes the results of the test program and test methods used.

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

<b>TEST INFORMATION</b>		
<b>Test Location</b>	<b>Test Date</b>	<b>Test Parameters</b>
Unit 5 ESP Outlet Duct	June 8 and 9, 2016	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.

<b>TEST RESULTS</b>			
<b>Test Location</b>	<b>Test Parameter</b>	<b>Emission Limits</b>	<b>Emission Rates</b>
Unit 5 ESP Outlet Duct	FPM	≤0.030 lb/mmBtu	0.0121 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	0.0014 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 Senior Environmental Engineer (517)702-6003 (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. Rich Sollars Project Manager (630) 993-2100 (phone) rsollars@mp-mail.com

The test crew consisted of Messrs. C. Eldridge, E. Charatz, J. Keable, and R. Sollars 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	24

### 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

	Source Condition	Max Load	Max Load	Max Load	
	Date	6/9/16	6/9/16	6/9/16	
	Start Time	7:00	9:35	12:15	
	End Time	9:14	11:49	14:29	
	Run 1	Run 2	Run 3	Average	
<b>Stack Conditions</b>					
Average Gas Temperature, °F	367.5	380.9	387.5	378.6	
Flue Gas Moisture, percent by volume	11.1%	11.5%	11.5%	11.4%	
Average Flue Pressure, in. Hg	28.26	28.26	28.26	28.26	
Gas Sample Volume, dscf	78.527	80.879	79.361	79.589	
Average Gas Velocity, ft/sec	57.679	59.176	58.932	58.596	
Gas Volumetric Flow Rate, acfm	311,467	319,550	318,231	316,416	
Gas Volumetric Flow Rate, dscfm	166,856	167,824	165,792	166,824	
Gas Volumetric Flow Rate, scfm	187,712	189,530	187,281	188,174	
Average %CO <sub>2</sub> by volume, dry basis	15.3	15.4	15.4	15.4	
Average %O <sub>2</sub> by volume, dry basis	4.4	4.3	4.2	4.3	
Isokinetic Variance	101.2	103.6	102.9	102.6	
Fd Factor, dscf/mmBtu	9,820.0	9,820.0	9,820.0	9,820.0	
<b>Filterable Particulate Matter (Method 5)</b>					
grams collected	0.0335	0.0297	0.0429	0.0354	
grains/acf	0.0035	0.0030	0.0043	0.0036	
grains/dscf	0.0066	0.0057	0.0083	0.0069	
lb/hr	9.414	8.151	11.853	9.806	
lb/mmBtu (Standard Fd Factor)	0.0117	0.0100	0.0146	0.0121	

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

	Source Condition	Max Load	Max Load	Max Load	
	Date	6/8/16	6/8/16	6/8/16	
	Start Time	13:30	16:00	18:26	
	End Time	15:44	18:14	20:40	
	Run 1	Run 2	Run 3	Average	
<b>Stack Conditions</b>					
Average Gas Temperature, °F		391.9	391.1	393.3	392.1
Flue Gas Moisture, percent by volume		11.0%	11.4%	11.1%	11.2%
Average Flue Pressure, in. Hg		28.21	28.21	28.21	28.21
Gas Sample Volume, dscf		86.636	84.631	86.233	85.833
Average Gas Velocity, ft/sec		58.384	58.272	58.722	58.459
Gas Volumetric Flow Rate, acfm		315,272	314,670	317,096	315,679
Gas Volumetric Flow Rate, dscfm		163,940	163,151	164,434	163,842
Gas Volumetric Flow Rate, scfm		184,243	184,062	185,010	184,438
Average %CO <sub>2</sub> by volume, dry basis		15.0	15.2	15.4	15.2
Average %O <sub>2</sub> by volume, dry basis		4.7	4.4	4.4	4.5
Isokinetic Variance		105.1	103.2	104.3	104.2
Fd Factor, dscf/mmBtu		9,820.0	9,820.0	9,820.0	9,820.0
<b>Hydrogen Chloride (HCl) Emissions</b>					
ug of sample collected		5600.00	4100.00	3300.00	4333.33
ppm		1.51	1.13	0.89	1.17
mg/dscm		2.28	1.71	1.35	1.78
lb/hr		1.402	1.046	0.832	1.093
lb/mmBtu (Standard Fd Factor)		0.0018	0.0013	0.0010	0.0014

## 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



Rich Sollars

Program Manager



Scott W. Banach

Quality Assurance

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