



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

**Lansing Board of Water and Light  
Eckert Station  
Unit 6 ESP Outlet Duct  
Lansing, Michigan  
July 27 and 28, 2016**

**Report Submittal Date  
August 29, 2016**

**RECEIVED**

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**AIR QUALITY DIV.**

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**Project No. M163003C**

## 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 6 ESP Outlet Duct in Lansing, Michigan on July 27 and 28, 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 Date	Test Parameters
Unit 6 ESP Outlet Duct	July 27 and 28, 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.

TEST RESULTS			
Test Location	Test Parameter	Emission Limits	Emission Rates
Unit 6 ESP Outlet Duct	FPM	≤0.030 lb/mmBtu	0.0075 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	0.0009 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 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) 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 6 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. A Servomex 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 6 ESP Outlet Duct  
**Test Method:** 5 MATS

	Source Condition	High Load	High Load	High Load	
	Date	7/28/16	7/28/16	7/28/16	
	Start Time	6:30	9:00	11:25	
	End Time	8:37	11:07	13:32	
		Run 1	Run 2	Run 3	Average
<b>Stack Conditions</b>					
Average Gas Temperature, °F		351.5	363.1	358.3	357.6
Flue Gas Moisture, percent by volume		12.2%	12.3%	12.6%	12.4%
Average Flue Pressure, in. Hg		28.33	28.33	28.33	28.33
Gas Sample Volume, dscf		80.509	80.142	77.234	79.295
Average Gas Velocity, ft/sec		62.045	62.324	61.563	61.977
Gas Volumetric Flow Rate, acfm		335,042	336,549	332,442	334,678
Gas Volumetric Flow Rate, dscfm		181,208	179,243	177,430	179,294
Gas Volumetric Flow Rate, scfm		206,364	204,388	203,074	204,609
Average %CO <sub>2</sub> by volume, dry basis		15.3	15.5	15.6	15.5
Average %O <sub>2</sub> by volume, dry basis		4.4	4.2	4.1	4.2
Isokinetic Variance		104.4	105.0	102.3	103.9
Standard Fuel Factor F <sub>d</sub> , dscf/mmBtu		9,820.0	9,820.0	9,820.0	9,820.0
<b>Filterable Particulate Matter (Method 5 MATS)</b>					
grams collected		0.0229	0.0199	0.0226	0.0218
mg/dscm		10.045	8.769	10.334	9.7159
grains/acf		0.0024	0.0020	0.0024	0.0023
grains/dscf		0.0044	0.0038	0.0045	0.0042
lb/hr		6.817	5.886	6.867	6.523
lb/mmBtu (Standard F <sub>d</sub> Factor)		0.0078	0.0067	0.0079	0.0075

Client: Lansing Board of Water and Light  
 Facility: Eckert Station  
 Test Location: Unit 6 ESP Outlet Duct  
 Test Method: 26A

Source Condition	High Load	High Load	High Load	
Date	7/27/16	7/27/16	7/27/16	
Start Time	9:30	12:08	14:30	
End Time	11:37	14:15	16:37	
	Run 1	Run 2	Run 3	Average
<b>Stack Conditions</b>				
Average Gas Temperature, °F	355.6	367.1	370.7	364.5
Flue Gas Moisture, percent by volume	12.4%	12.2%	13.1%	12.6%
Average Flue Pressure, in. Hg	28.39	28.39	28.39	28.39
Gas Sample Volume, dscf	78.196	79.375	80.018	79.196
Average Gas Velocity, ft/sec	60.597	61.219	61.255	61.024
Gas Volumetric Flow Rate, acfm	327,225	330,581	330,774	329,527
Gas Volumetric Flow Rate, dscfm	176,013	175,720	173,361	175,031
Gas Volumetric Flow Rate, scfm	201,001	200,224	199,474	200,233
Average %CO <sub>2</sub> by volume, dry basis	15.4	15.8	15.9	15.7
Average %O <sub>2</sub> by volume, dry basis	4.3	3.9	3.8	4.0
Isokinetic Variance	104.4	106.1	108.4	106.3
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	2600.00	2500.00	2600.00	2566.67
ppm	0.77	0.73	0.76	0.75
mg/dscm	1.17	1.11	1.15	1.14
Ib/hr	0.774	0.732	0.745	0.750
Ib/mmBtu (Standard Fd Factor)	0.0009	0.0008	0.0009	0.0009

## 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