



**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
September 18, 2018**

**Report Submittal Date
October 3, 2018**

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Mostardi Platt

Project No. M183803

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 September 18, 2018. 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	September 18, 2018	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	LEE Emission Limits	Emission Rates
Unit 5 ESP Outlet Duct	FPM	≤0.030 lb/mmBtu	≤0.015 lb/mmBtu	0.0136 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	≤0.001 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 analyzed by Mostardi Platt. 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. Lori Myott Manager, Environmental Services Department (517) 702-6639 (phone) lori.myott@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 E. Jensen Senior Project Manager (630) 993-2100 cjensen@mp-mail.com

The test crew consisted of Messrs. Ken Krofel, Hector Mendoza, Paul Coleman, Jacob Adams, and Chris Jensen of Mostardi Platt.

2.0 TEST METHODOLOGY

AIR QUALITY DIVISION

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	0.5	2.0	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 (O₂)/Carbon Dioxide (CO₂) 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 Mostardi Platt 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.

3.0 TEST RESULT SUMMARIES

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

	Source Condition	High Load	High Load	High Load	
	Date	9/18/18	9/18/18	9/18/18	
	Start Time	7:15	10:27	13:25	
	End Time	9:42	12:49	15:47	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	351.2	359.4	346.2	352.3	
Flue Gas Moisture, percent by volume	10.9%	11.8%	11.3%	11.3%	
Average Flue Pressure, in. Hg	28.28	28.28	28.28	28.28	
Gas Sample Volume, dscf	80.864	80.138	81.213	80.738	
Average Gas Velocity, ft/sec	55.407	56.026	55.853	55.762	
Gas Volumetric Flow Rate, acfm	299,197	302,541	301,605	301,114	
Gas Volumetric Flow Rate, dscfm	163,971	162,549	165,616	164,045	
Gas Volumetric Flow Rate, scfm	184,076	184,273	186,708	185,019	
Average %CO ₂ by volume, dry basis	13.1	13.0	12.7	12.9	
Average %O ₂ by volume, dry basis	6.7	6.6	6.8	6.7	
Isokinetic Variance	102.6	102.6	102.0	102.4	
Standard Fuel Factor Fd, dscf/mmBtu	9,820.0	9,820.0	9,820.0	9,820.0	
Filterable Particulate Matter (Method 5 MATS)					
grams collected	0.02952	0.03467	0.03924	0.03448	
mg/dscm	12.892	15.278	17.063	15.0777	
grains/acf	0.0031	0.0036	0.0041	0.0036	
grains/dscf	0.0056	0.0067	0.0075	0.0066	
lb/hr	7.917	9.301	10.583	9.267	
lb/mmBtu (Standard Fd Factor)	0.0116	0.0137	0.0155	0.0136	

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

Source Condition	High Load	High Load	High Load	
Date	9/18/18	9/18/18	9/18/18	
Start Time	7:15	10:27	13:25	
End Time	9:07	12:16	15:14	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	355.2	365.4	353.8	358.1
Flue Gas Moisture, percent by volume	12.1%	12.2%	11.7%	12.0%
Average Flue Pressure, in. Hg	28.28	28.28	28.28	28.28
Gas Sample Volume, dscf	70.420	70.533	69.836	70.263
Average Gas Velocity, ft/sec	55.297	56.296	55.440	55.678
Gas Volumetric Flow Rate, acfm	298,606	303,996	299,376	300,659
Gas Volumetric Flow Rate, dscfm	160,767	161,349	162,108	161,408
Gas Volumetric Flow Rate, scfm	182,811	183,813	183,592	183,405
Average %CO ₂ by volume, dry basis	13.1	13.0	12.7	12.9
Average %O ₂ by volume, dry basis	6.7	6.6	6.8	6.7
Isokinetic Variance	102.6	102.4	100.9	102.0
Standard Fuel Factor Fd, dscf/mmBtu	9,820.0	9,820.0	9,820.0	9,820.0
Hydrogen Chloride (HCl) Emissions				
ug of sample collected	1395.50	1399.20	1459.00	1417.90
ppm	0.46	0.46	0.49	0.47
mg/dscm	0.70	0.70	0.74	0.71
lb/hr	0.4214	0.4234	0.4480	0.4309
lb/mmBtu (Standard Fd Factor)	0.0006	0.0006	0.0007	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



Christopher E. Jensen

Program Manager



Scott W. Banach

Quality Assurance