

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 December 4, 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	December 4, 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	*0.0198 lb/mmBtu
	FPM	≤0.20 lbs/1000 lbs of exhaust gases, corrected to 50% Excess Air	N/A	* 0.0199 dry lbs/1000 lbs of exhaust gases, corrected to 50% Excess Air
	FPM	≤0.20 lbs/1000 lbs of exhaust gases, corrected to 50% Excess Air	N/A	*0.0160 wet lbs/1000 lbs of exhaust gases, corrected to 50% Excess Air
	HCl	≤0.002 lb/mmBtu	≤0.001 lb/mmBtu	0.0006 lb/mmBtu

*Probe and filter were maintained at Method 5 MATS temperatures during testing

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. Jacob W. Howe Project Manager (630) 993-2100 jhowe@mp-mail.com

The test crew consisted of Messrs. K. Krofel, H. Mendoza, S. McGough, C. Menet, and J. Howe 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	0.5	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 ESP Outlet Duct
Test Method: 5 MATS

	Source Condition	High Load	High Load	High Load	
	Date	12/4/18	12/4/18	12/4/18	
	Start Time	8:05	11:10	14:00	
	End Time	10:20	13:25	16:15	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	352.1	337.6	346.5	345.4	
Flue Gas Moisture, percent by volume	8.9%	10.2%	10.6%	9.9%	
Average Flue Pressure, in. Hg	28.52	28.52	28.52	28.52	
Gas Sample Volume, dscf	75.282	76.404	76.587	76.091	
Average Gas Velocity, ft/sec	51.613	51.592	52.313	51.839	
Gas Volumetric Flow Rate, acfm	278,711	278,594	282,489	279,931	
Gas Volumetric Flow Rate, dscfm	157,443	157,830	157,638	157,637	
Gas Volumetric Flow Rate, scfm	172,741	175,801	176,290	174,944	
Average %CO ₂ by volume, dry basis	13.5	13.7	13.8	13.7	
Average %O ₂ by volume, dry basis	6.0	5.8	5.5	5.8	
Isokinetic Variance	99.5	100.7	101.1	100.4	
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	0.02305	0.06347	0.06553	0.05068	
mg/dscm	10.813	29.336	30.216	23.4551	
grains/acf	0.0027	0.0073	0.0074	0.0058	
grains/dscf	0.0047	0.0128	0.0132	0.0102	
lb/hr	6.376	17.340	17.839	13.852	
Dry lbs/particulate/1000 lbs of stack gas	0.0086	0.0233	0.0240	0.0186	
Wet lbs/particulate/1000 lbs of stack gas	0.0081	0.0218	0.0224	0.0174	
Dry lbs/particulate/1000 lbs of stack gas at 50% Excess Air	0.0091	0.0248	0.0257	0.0199	
Wet lbs/particulate/1000 lbs of stack gas at 50% Excess Air	0.0076	0.0201	0.0203	0.0160	
lb/mmBtu (Standard Fd Factor)	0.0093	0.0249	0.0251	0.0198	

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

	Source Condition	Normal	Normal	Normal
	Date	12/4/18	12/4/18	12/4/18
	Start Time	8:05	11:10	14:00
	End Time	9:55	12:54	15:43
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	351.8	336.3	336.7	341.6
Flue Gas Moisture, percent by volume	10.0%	9.9%	9.6%	9.8%
Average Flue Pressure, in. Hg	28.52	28.52	28.52	28.52
Gas Sample Volume, dscf	78.634	78.197	77.573	78.135
Average Gas Velocity, ft/sec	53.650	52.813	52.401	52.955
Gas Volumetric Flow Rate, acfm	289,711	285,189	282,963	285,954
Gas Volumetric Flow Rate, dscfm	161,694	162,498	161,544	161,912
Gas Volumetric Flow Rate, scfm	179,621	180,273	178,768	179,554
Average %CO ₂ by volume, dry basis	13.5	13.7	13.8	13.7
Average %O ₂ by volume, dry basis	6.0	5.8	5.5	5.8
Isokinetic Variance	101.5	100.5	100.3	100.8
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	1766.30	1573.20	1635.60	1658.37
ppm	0.52	0.47	0.49	0.49
mg/dscm	0.79	0.71	0.74	0.75
lb/hr	0.4804	0.4324	0.4505	0.4544
lb/mmBtu (Standard Fd Factor)	0.0007	0.0006	0.0006	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

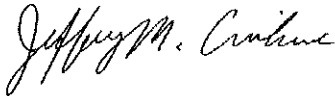
As project manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results, and the test program was performed in accordance with the methods specified in this test report.

MOSTARDI PLATT



Jacob W. Howe

Program Manager



Jeffrey M. Crivlare

Quality Assurance