

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 August 29, 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 6 ESP Outlet Duct	August 29, 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*	***0.0084 lb/mmBtu
	FPM	≤0.20 lbs/1000 lbs of exhaust gases, corrected to 50% Excess Air	N/A	*** 0.0087 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	***0.0067 wet lbs/1000 lbs of exhaust gases, corrected to 50% Excess Air
	HCl	≤0.002 lb/mmBtu	≤0.001 lb/mmBtu**	0.0007 lb/mmBtu

*LEE designation for FPM is established if the FPM emissions measured during the initial compliance test and all subsequent quarterly testing completed over the initial 3-year period are less than 50% of the applicable emission limit, which equates to 0.015 lb/mmBtu.

** LEE designation for HCl is established if the HCl emissions measured during the initial compliance test and all subsequent quarterly testing completed over the initial 3-year period are less than 50% of the applicable emission limit, which equates to 0.001 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 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. 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 Jensen Project Supervisor (630) 993-2100 (phone) cjensen@mp-mail.com

The test crew consisted of Messrs. P. Coleman, C. Eldridge, M. Platt, J. Kukla and C. Jensen 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 (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 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 6 ESP Outlet Duct
 Test Method: 5 MATS

	Source Condition	High Load	High Load	High Load	
	Date	8/29/18	8/29/18	8/29/18	
	Start Time	7:05	9:45	12:23	
	End Time	9:23	12:04	14:40	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	329.6	339.6	339.7	336.3	
Flue Gas Moisture, percent by volume	12.0%	12.5%	10.5%	11.7%	
Average Flue Pressure, in. Hg	28.27	28.27	28.27	28.27	
Gas Sample Volume, dscf	102.531	103.124	104.058	103.238	
Average Gas Velocity, ft/sec	52.747	54.467	54.431	53.882	
Gas Volumetric Flow Rate, acfm	284,835	294,122	293,928	290,962	
Gas Volumetric Flow Rate, dscfm	158,343	160,495	164,195	161,011	
Gas Volumetric Flow Rate, scfm	179,983	183,519	183,377	182,293	
Average %CO ₂ by volume, dry basis	14.2	14.3	14.4	14.3	
Average %O ₂ by volume, dry basis	5.5	5.3	5.1	5.3	
Isokinetic Variance	102.8	102.0	100.6	101.8	
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	0.02416	0.02957	0.03587	0.02987	
mg/dscm	8.321	10.126	12.173	10.2070	
grains/acf	0.0020	0.0024	0.0030	0.0025	
grains/dscf	0.0036	0.0044	0.0053	0.0044	
lb/hr	4.935	6.087	7.486	6.169	
Dry lbs particulate/1000 lbs of stack gas	0.0066	0.0080	0.0096	0.0081	
Wet lbs particulate/1000 lbs of stack gas	0.0061	0.0074	0.0090	0.0075	
Dry lbs particulate/1000 lbs of stack gas at 50% Excess Air	0.0071	0.0087	0.0103	0.0087	
Wet lbs particulate/1000 lbs of stack gas at 50% Excess Air	0.0055	0.0066	0.0080	0.0067	
lb/mmBtu (Standard Fd Factor)	0.0069	0.0083	0.0099	0.0084	

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

Source Condition	High Load	High Load	High Load	
Date	8/29/18	8/29/18	8/29/18	
Start Time	7:05	9:45	12:23	
End Time	8:50	11:33	14:08	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	327.0	339.6	343.2	336.6
Flue Gas Moisture, percent by volume	12.2%	12.6%	12.3%	12.4%
Average Flue Pressure, in. Hg	28.27	28.27	28.27	28.27
Gas Sample Volume, dscf	73.123	71.488	71.729	72.113
Average Gas Velocity, ft/sec	54.866	55.535	55.563	55.321
Gas Volumetric Flow Rate, acfm	296,274	299,890	300,041	298,735
Gas Volumetric Flow Rate, dscfm	164,874	163,555	163,534	163,988
Gas Volumetric Flow Rate, scfm	187,813	187,111	186,375	187,100
Average %CO ₂ by volume, dry basis	14.2	14.3	14.4	14.3
Average %O ₂ by volume, dry basis	5.5	5.4	5.1	5.3
Isokinetic Variance	103.9	102.4	102.7	103.0
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	1800.11	1776.80	1621.21	1732.71
ppm	0.57	0.58	0.53	0.56
mg/dscm	0.87	0.88	0.80	0.85
lb/hr	0.5369	0.5377	0.4889	0.5212
lb/mmBtu (Standard Fd Factor)	0.0007	0.0007	0.0006	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



Christopher E. Jensen

Program Manager



Scott W. Banach

Quality Assurance