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 4 ESP Outlet Duct in Lansing, Michigan on September 12, 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 4 ESP Outlet Duct	September 12, 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	*0.0055 lb/mmBtu
	FPM	≤0.20 lbs/1000 lbs of exhaust gases, corrected to 50% Excess Air	N/A	* 0.0058 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	*0.0044 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

*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 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. Paul Coleman Project Manager (630) 993-2100 (phone) pcolemant@mp-mail.com

The test crew consisted of Messrs. H. Mendoza, J. Gross, J. Kukla, C. Eldridge, P. Lyons, and P. Coleman 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 4 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_2)/Carbon Dioxide (CO_2) 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 at the Elmhurst, Illinois laboratory of Mostardi Platt. 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 4 ESP Outlet Duct**
Test Method:	**5 MATS**

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**9/12/18**	**9/12/18**	**9/12/18**	
Start Time	**7:18**	**10:02**	**12:55**	
End Time	**9:33**	**12:17**	**15:11**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	330.2	335.5	353.5	339.7
Flue Gas Moisture, percent by volume	11.3%	11.7%	12.6%	11.9%
Average Flue Pressure, in. Hg	28.50	28.50	28.50	28.50
Gas Sample Volume, dscf	82.502	89.966	86.563	86.3436667
Average Gas Velocity, ft/sec	55.303	60.333	60.704	58.780
Gas Volumetric Flow Rate, acfm	298,635	325,796	327,804	317,412
Gas Volumetric Flow Rate, dscfm	168,550	181,842	177,070	175,821
Gas Volumetric Flow Rate, scfm	190,056	205,966	202,650	199,557
Average %CO_2 by volume, dry basis	14.1	14.1	15.1	14.4
Average %O_2 by volume, dry basis	5.7	5.6	4.5	5.3
Isokinetic Variance	101.8	102.9	101.7	102.1
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	0.01248	0.01692	0.02028	0.01656
mg/dscm	5.342	6.642	8.274	6.7524
grains/acf	0.0013	0.0016	0.0020	0.0016
grains/dscf	0.0023	0.0029	0.0036	0.0029
lb/hr	3.372	4.523	5.487	4.461
Dry lbs particulate/1000 lbs of stack gas	0.0042	0.0053	0.0065	0.0053
Wet lbs particulate/1000 lbs of stack gas	0.0039	0.0049	0.0060	0.0049
Dry lbs particulate/1000 lbs of stack gas at 50% Excess Air	0.0045	0.0057	0.0071	0.0058
Wet lbs particulate/1000 lbs of stack gas at 50% Excess Air	0.0036	0.0045	0.0052	0.0044
lb/mmBtu (Standard Fd Factor)	0.0045	0.0056	0.0065	0.0055

Client: Lansing Board of Water and Light
Facility: Eckert Station
Test Location: Unit 4 ESP Outlet Duct
Test Method: 26A MATS

Source Condition	Normal	Normal	Normal	
Date	9/12/18	9/12/18	9/12/18	
Start Time	7:00	10:02	12:55	
End Time	8:43	11:45	14:38	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	340.0	353.3	351.2	348.2
Flue Gas Moisture, percent by volume	12.7%	12.7%	11.6%	12.3%
Average Flue Pressure, in. Hg	28.50	28.50	28.50	28.50
Gas Sample Volume, dscf	74.726	79.960	78.964	77.883
Average Gas Velocity, ft/sec	56.998	61.945	60.784	59.909
Gas Volumetric Flow Rate, acfm	307,792	334,505	328,233	323,510
Gas Volumetric Flow Rate, dscfm	168,962	180,628	179,856	176,482
Gas Volumetric Flow Rate, scfm	193,489	206,855	203,501	201,282
Average $\%CO_2$ by volume, dry basis	14.1	14.1	15.1	14.4
Average $\%O_2$ by volume, dry basis	5.7	5.6	4.5	5.3
Isokinetic Variance	103.6	103.7	102.8	103.4
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	1950.69	1941.17	1893.08	1928.31
ppm	0.61	0.57	0.56	0.58
mg/dscm	0.92	0.86	0.85	0.88
lb/hr	0.583	0.580	0.570	0.578
lb/mmBtu (Standard Fd Factor)	0.0008	0.0007	0.0007	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

Program Manager

Paul Coleman

Quality Assurance

Scott W. Banach