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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
August 29, 2017

Report Submittal Date
September 13, 2017

Project No. M172209B

888 Industrial Drive
Elmhurst, Illinois 60126
630-993-2100

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 August 29, 2017. 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 5 ESP Outlet Duct	August 29, 2017	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	0.0096 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	≤0.001 lb/mmBtu	0.0005 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 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. Trista Gregorski Environmental Engineer (517)702-6865 (phone) trista.gregorski@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. Stuart L. Burton Project Manager (630) 993-2100 (phone) burton@mp-mail.com

The test crew consisted of Messrs. B. Collins, B. Garcia, D. Kossack, M. Newsome, and S. Burton 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	0.49	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 by Mostardi Platt in Elmhurst, Illinois. 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**	**High**	**High**	
Date	**8/29/17**	**8/29/17**	**8/29/17**	
Start Time	**8:00**	**10:45**	**13:25**	
End Time	**10:07**	**12:52**	**15:32**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	342.4	353.9	362.7	353.0
Flue Gas Moisture, percent by volume	11.0%	11.0%	10.8%	10.9%
Average Flue Pressure, in. Hg	29.39	29.39	29.39	29.39
Gas Sample Volume, dscf	74.531	73.836	74.245	74.204
Average Gas Velocity, ft/sec	51.609	52.151	52.770	52.177
Gas Volumetric Flow Rate, acfm	278,688	281,613	284,956	281,752
Gas Volumetric Flow Rate, dscfm	160,243	159,637	160,283	160,054
Gas Volumetric Flow Rate, scfm	180,112	179,424	179,622	179,719
Average %CO_2 by volume, dry basis	14.2	14.1	14.3	14.2
Average %O_2 by volume, dry basis	5.8	5.8	5.7	5.8
Isokinetic Variance	102.4	101.8	102.0	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	0.02451	0.02207	0.02482	0.02380
grains/acf	0.0029	0.0026	0.0029	0.0028
grains/dscf	0.0051	0.0046	0.0052	0.0050
lb/hr	6.970	6.311	7.087	6.789
lb/mmBtu (Standard Fd Factor)	0.0099	0.0090	0.0099	0.0096

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

Source Condition	High	High	High	
Date	8/29/17	8/29/17	8/29/17	
Start Time	8:35	11:18	14:00	
End Time	10:28	13:12	15:54	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	345.6	354.5	360.8	353.6
Flue Gas Moisture, percent by volume	11.3%	10.7%	11.5%	11.2%
Average Flue Pressure, in. Hg	29.39	29.39	29.39	29.39
Gas Sample Volume, dscf	45.106	44.659	45.443	45.069
Average Gas Velocity, ft/sec	52.588	52.638	54.048	53.091
Gas Volumetric Flow Rate, acfm	283,974	284,245	291,859	286,693
Gas Volumetric Flow Rate, dscfm	162,043	161,683	163,157	162,294
Gas Volumetric Flow Rate, scfm	182,788	180,969	184,380	182,712
Average %CO_2 by volume, dry basis	14.0	14.1	14.3	14.1
Average %O_2 by volume, dry basis	5.8	5.8	5.7	5.8
Isokinetic Variance	102.6	101.8	102.7	102.4
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	818.6	611.5	828.0	752.7
ppm	0.42	0.32	0.42	0.39
mg/dscm	0.64	0.48	0.64	0.59
lb/hr	0.3890	0.2928	0.3932	0.3583
lb/mmBtu (Standard Fd Factor)	0.0005	0.0004	0.0005	0.0005

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
Stuart L. Burton

_____ Quality Assurance
Scott W. Banach