



**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 20 and 21, 2016**

**Report Submittal Date
November 4, 2016**

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Mostardi Platt

Project No. M162305D



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
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RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION

AIR QUALITY DIV.

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating (RO) Permit program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as described in General Condition No. 22 in the RO Permit and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name Lansing Board of Water & Light County Ingham

Source Address 601 Island Ave City Lansing

AQD Source ID (SRN) B2647 RO Permit No. MI-ROP-B2647-2012c RO Permit Section No. _____

Please check the appropriate box(es):

Annual Compliance Certification (General Condition No. 28 and No. 29 of the RO Permit)

Reporting period (provide inclusive dates): From _____ To _____

- 1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the RO Permit.
- 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the RO Permit, unless otherwise indicated and described on the enclosed deviation report(s).

Semi-Annual (or More Frequent) Report Certification (General Condition No. 23 of the RO Permit)

Reporting period (provide inclusive dates): From _____ To _____

- 1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred.
- 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

Other Report Certification

Reporting period (provide inclusive dates): From 09/20/2016 To 09/21/2016

Additional monitoring reports or other applicable documents required by the RO Permit are attached as described:

Eckert Unit 5 - Mercury and Air Toxics Standard Particulate Matter and Hydrogen Chloride

Emissions Test Report

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete.

Mark Matus

Director Technical Services

517-702-6153

Name of Responsible Official (print or type)

Title

Phone Number

11/10/2016

Signature of Responsible Official

Date

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 20 and 21, 2016. 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 20 and 21, 2016	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	Emission Rates
Unit 5 ESP Outlet Duct	FPM	≤0.030 lb/mmBtu	0.0095 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	0.0010 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 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. Trista Gregorski Senior Environmental Engineer (517)702-6003 (phone) tmg@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. Rich Sollars Project Manager (630) 993-2100 (phone) rsollars@mp-mail.com

The test crew consisted of Messrs. C. Eldridge, D. Dixon, and R. Sollars 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 (O₂)/Carbon Dioxide (CO₂) Determination

Stack gas molecular weight was determined in accordance with Method 3A. A Servomex 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 Maxxam Analytics, Inc. of Mississauga, Ontario. 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 (Elevated Temp. 320F)

	Source Condition	Max Load	Max Load	Max Load	
	Date	9/20/16	9/20/16	9/20/16	
	Start Time	7:10	10:10	12:55	
	End Time	9:32	12:32	15:17	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	385.2	398.7	398.0	394.0	
Flue Gas Moisture, percent by volume	8.7%	10.5%	10.3%	9.8%	
Average Flue Pressure, in. Hg	29.31	29.31	29.31	29.31	
Gas Sample Volume, dscf	83.935	83.389	84.208	83.844	
Average Gas Velocity, ft/sec	60.681	62.167	61.993	61.614	
Gas Volumetric Flow Rate, acfm	327,677	335,702	334,764	332,714	
Gas Volumetric Flow Rate, dscfm	183,094	181,003	180,948	181,682	
Gas Volumetric Flow Rate, scfm	200,550	202,216	201,827	201,531	
Average %CO ₂ by volume, dry basis	14.6	14.6	14.7	14.6	
Average %O ₂ by volume, dry basis	5.4	5.3	5.3	5.3	
Isokinetic Variance	101.8	102.3	103.4	102.5	
Fd Factor, dscf/mmBtu	9,820.0	9,820.0	9,820.0	9,820.0	
Filterable Particulate Matter (Method 5 Elevated Temp. 320F)					
grams collected	0.0272	0.0224	0.0326	0.0274	
grains/acf	0.0028	0.0022	0.0032	0.0027	
grains/dscf	0.0050	0.0041	0.0060	0.0050	
lb/hr	7.847	6.430	9.265	7.847	
lb/mmBtu (Standard Fd Factor)	0.0095	0.0078	0.0112	0.0095	

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

Source Condition	Max Load	Max Load	Max Load	
Date	9/21/16	9/21/16	9/21/16	
Start Time	6:45	9:25	12:02	
End Time	9:07	11:47	14:24	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	380.0	390.5	390.9	387.1
Flue Gas Moisture, percent by volume	11.3%	12.0%	11.8%	11.7%
Average Flue Pressure, in. Hg	29.28	29.28	29.28	29.28
Gas Sample Volume, dscf	82.855	83.258	82.505	82.873
Average Gas Velocity, ft/sec	61.092	61.924	61.905	61.640
Gas Volumetric Flow Rate, acfm	329,897	334,389	334,287	332,858
Gas Volumetric Flow Rate, dscfm	180,002	178,732	179,019	179,251
Gas Volumetric Flow Rate, scfm	202,932	203,171	203,005	203,036
Average %CO ₂ by volume, dry basis	14.7	14.8	14.8	14.8
Average %O ₂ by volume, dry basis	5.3	5.2	5.2	5.2
Isokinetic Variance	102.2	103.5	102.4	102.7
Fd Factor, dscf/mmBtu	9,820.0	9,820.0	9,820.0	9,820.0
Hydrogen Chloride (HCl) Emissions				
ug of sample collected	3300	2700	2300	2767
ppm	0.93	0.76	0.65	0.78
mg/dscm	1.41	1.15	0.98	1.18
lb/hr	0.9483	0.7667	0.6601	0.7917
lb/mmBtu (Standard Fd Factor)	0.0012	0.0009	0.0008	0.0010

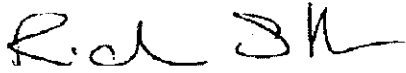
4.0 CERTIFICATION

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



Rich Sollars

Program Manager



Scott W. Banach

Quality Assurance