mostardi platt

Mercury and Air Toxics Standard Particulate Matter and Hydrogen Chloride Emissions Test Report

Lansing Board of Water and Light
Erickson Station
Unit 1 Stack
Lansing, Michigan
June 25 and 26, 2019

Report Submittal Date
July 11, 2019

Project No. M191306B

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

Chicago, IL | Crown Point, IN | Concord, NC | Mendota Heights, MN | Denver, CO

TABLE OF CONTENTS

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 Erickson Station on the Unit 1 Stack in Lansing, Michigan on June 25 and 26, 2019. 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 1 Stack	June 25 and 26, 2019	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 1 Stack	FPM	≤0.030 lb/mmBtu	≤0.015 lb/mmBtu	0.004 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	≤0.001 lb/mmBtu	0.001 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 HCl Run No. 1 was not analyzed due to sampling equipment malfunction. The teflon sample line had overheated and melted during the run. A fourth test run was conducted and all four test runs are included in Appendix F. Emissions are based on Runs 2, 3, and 4.

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	Mr. Nathan Hude Environmental Regulatory Compliance (517) 490-3069 (cell phone) nathan.hude@lbwl.com
Test Facility	Lansing Board of Water and Light Erickson Station 3725 South Canal Road Lansing, Michigan 48917	
Testing Company Representative	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Stuart L. Burton Project Manager (630) 993-2100 (phone) sburton@mp-mail.com

The test crew consisted of Messrs. A. Riddle, C. Eldridge, K. Beckham, R. Simon, 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 1 Stack	7.9	11.3	FPM, HCl	12

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: Erickson Station
Test Location: Unit 1 Stack
Test Method: 5 MATS

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**6/25/19**	**6/25/19**	**6/25/19**	
Start Time	**9:35**	**12:30**	**15:10**	
End Time	**11:44**	**14:39**	**17:19**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	331.5	336.2	336.3	334.7
Flue Gas Moisture, percent by volume	12.1%	11.4%	12.4%	12.0%
Average Flue Pressure, in. Hg	28.59	28.59	28.59	28.59
Gas Sample Volume, dscf	90.362	98.251	98.265	95.626
Average Gas Velocity, ft/sec	43.955	45.568	45.608	45.044
Gas Volumetric Flow Rate, acfm	598,614	620,584	621,128	613,442
Gas Volumetric Flow Rate, dscfm	335,161	348,414	344,633	342,736
Gas Volumetric Flow Rate, scfm	381,509	393,192	393,496	389,399
Average %CO_2 by volume, dry basis	14.1	13.7	14.9	14.2
Average %O_2 by volume, dry basis	5.4	6.4	5.5	5.8
Isokinetic Variance	98.0	102.5	103.6	101.4
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	0.01409	0.00991	0.01048	0.01149
mg/dscm	5.507	3.562	3.766	4.2783
grains/acf	0.0013	0.0009	0.0009	0.0010
grains/dscf	0.0024	0.0016	0.0016	0.0019
lb/hr	6.912	4.648	4.861	5.474
lb/mmBtu (Standard Fd Factor)	0.005	0.003	0.003	0.004

Client: Lansing Board of Water and Light
Facility: Erickson Station
Test Location: Unit 1 Stack
Test Method: 26A

Source Condition	Normal	Normal	Normal	
Date	6/26/19	6/26/19	6/26/19	
Start Time	7:22	9:21	11:15	
End Time	9:07	11:06	13:00	
	Run 2	Run 3	Run 4	Average
Stack Conditions				
Average Gas Temperature, °F	323.9	332.0	336.3	330.7
Flue Gas Moisture, percent by volume	13.1%	13.1%	12.8%	13.0%
Average Flue Pressure, in. Hg	28.73	28.73	28.73	28.73
Gas Sample Volume, dscf	79.935	79.504	79.648	79.696
Average Gas Velocity, ft/sec	45.591	46.033	46.130	45.918
Gas Volumetric Flow Rate, acfm	620,892	626,911	628,233	625,345
Gas Volumetric Flow Rate, dscfm	348,904	348,587	348,740	348,744
Gas Volumetric Flow Rate, scfm	401,513	401,289	399,926	400,909
Average $\%CO_2$ by volume, dry basis	13.8	13.6	13.6	13.7
Average $\%O_2$ by volume, dry basis	5.9	5.8	5.7	5.8
Isokinetic Variance	104.1	103.6	103.8	103.8
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	3170.00	3425.00	3930.00	3508.33
ppm	0.92	1.00	1.15	1.03
mg/dscm	1.40	1.52	1.74	1.55
lb/hr	1.830	1.986	2.276	2.031
lb/mmBtu (Standard Fd Factor)	0.001	0.001	0.002	0.001

*Run No. 1 not analyzed due to sample equipment malfunction

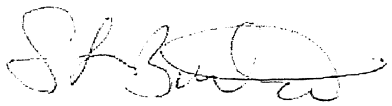
4.0 CERTIFICATION

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

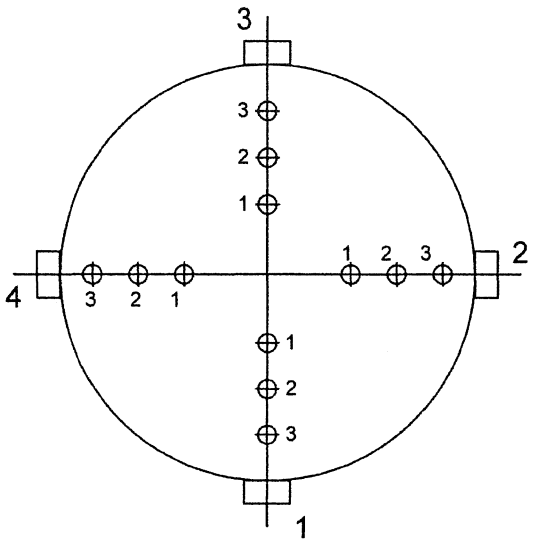
Appendix A - Plant Operating Data

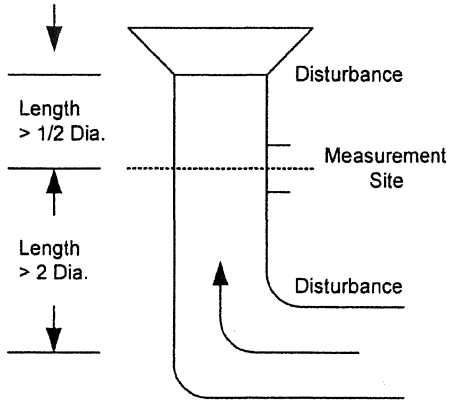
Date/Time	UNIT01 MW Value
06/25/2019 08:00	150
06/25/2019 08:15	154
06/25/2019 08:30	154
06/25/2019 08:45	154
06/25/2019 09:00	154
06/25/2019 09:15	154
06/25/2019 09:30	154
06/25/2019 09:45	154
06/25/2019 10:00	154
06/25/2019 10:15	154
06/25/2019 10:30	154
06/25/2019 10:45	154
06/25/2019 11:00	154
06/25/2019 11:15	154
06/25/2019 11:30	154
06/25/2019 11:45	154
06/25/2019 12:00	154
06/25/2019 12:15	154
06/25/2019 12:30	154
06/25/2019 12:45	154
06/25/2019 13:00	154
06/25/2019 13:15	154
06/25/2019 13:30	154
06/25/2019 13:45	154
06/25/2019 14:00	154
06/25/2019 14:15	154
06/25/2019 14:30	154
06/25/2019 14:45	154
06/25/2019 15:00	154
06/25/2019 15:15	154
06/25/2019 15:30	154
06/25/2019 15:45	154
06/25/2019 16:00	154

Date/Time	UNIT01 MW Value
06/26/2019 06:00	150
06/26/2019 06:15	155
06/26/2019 06:30	155
06/26/2019 06:45	154
06/26/2019 07:00	154
06/26/2019 07:15	153
06/26/2019 07:30	153
06/26/2019 07:45	154
06/26/2019 08:00	154
06/26/2019 08:15	155
06/26/2019 08:30	155
06/26/2019 08:45	155
06/26/2019 09:00	156
06/26/2019 09:15	156
06/26/2019 09:30	156
06/26/2019 09:45	156
06/26/2019 10:00	156
06/26/2019 10:15	156
06/26/2019 10:30	155
06/26/2019 10:45	154
06/26/2019 11:00	154
06/26/2019 11:15	154
06/26/2019 11:30	153
06/26/2019 11:45	153
06/26/2019 12:00	153
06/26/2019 12:15	148

Appendix B - Test Section Diagram

EQUAL AREA TRAVERSE FOR ROUND DUCTS

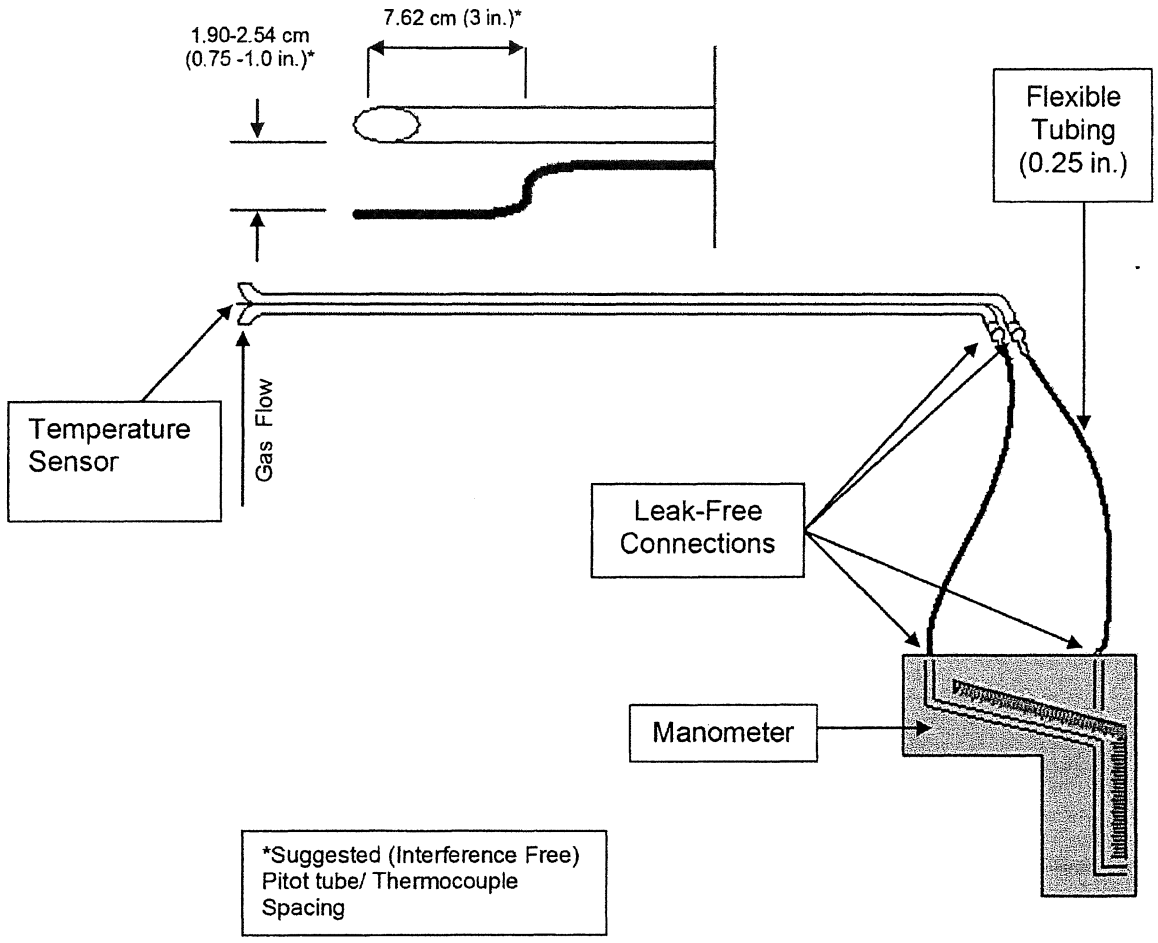




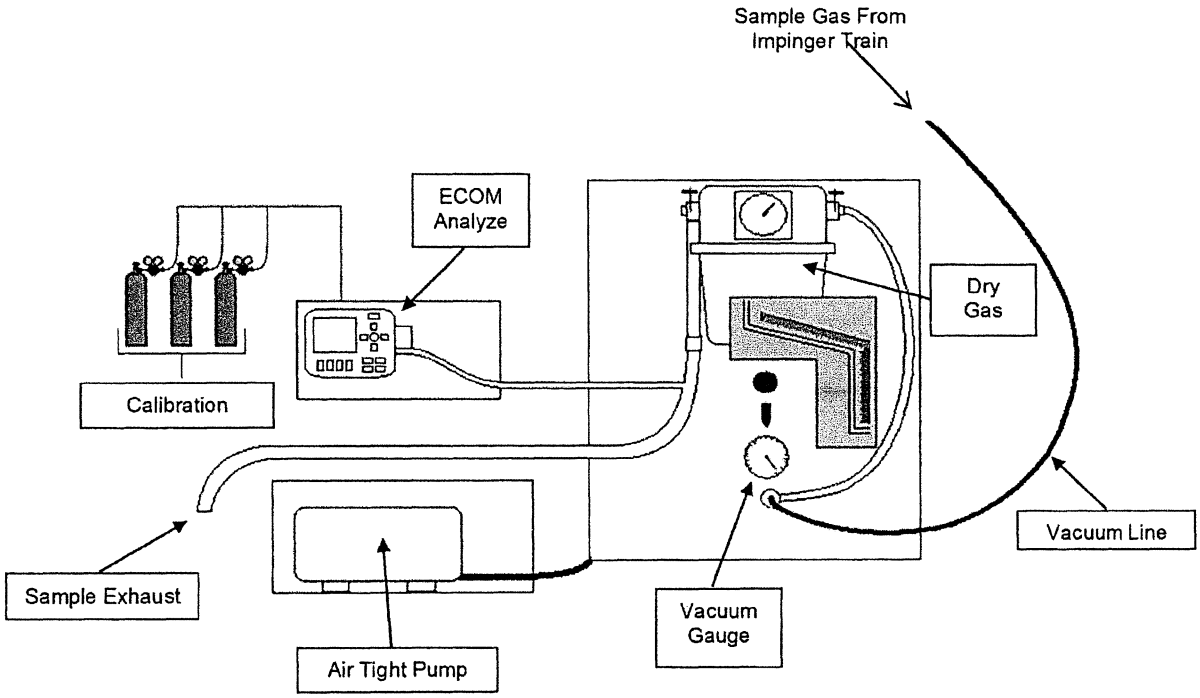
Job:	Lansing Board of Water and Light Erickson Station Lansing, Michigan
Date:	June 25 and 26, 2019
Test Location:	Unit 1 Stack
Stack Diameter:	17.0 feet
Stack Area:	226.980 feet squared
No. Points Across Diameter:	3
No. of Ports:	4
Port Length:	78 inches

Appendix C - Sample Train Diagrams

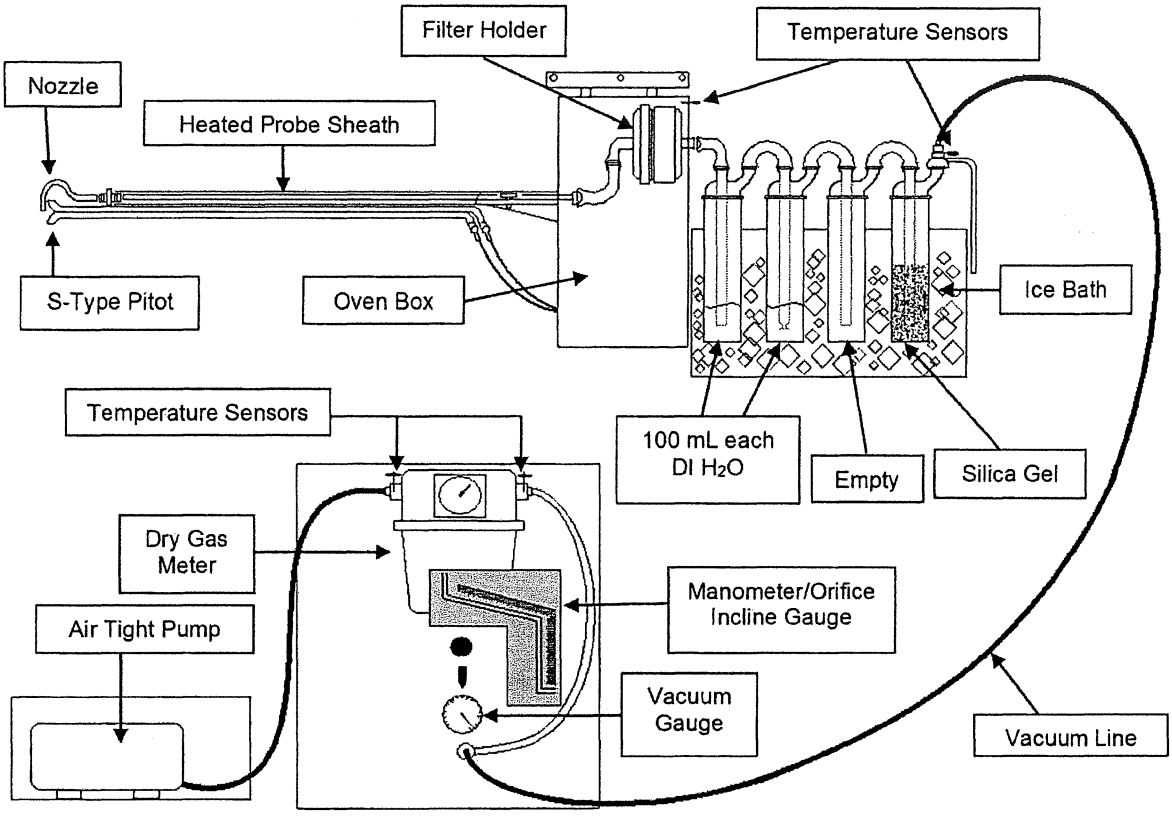
USEPA Method 2- Type S Pitot Tube Manometer Assembly



USEPA Method 3A - Integrated Oxygen/Carbon Dioxide Sample Train Diagram Utilizing ECOM To Measure from Sample Exhaust



USEPA Method 5- Particulate Matter Sample Train Diagram



USEPA Method 26A – HCl Sample Train Diagram