1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a compliance particulate test program for St Marys Cement at the Charlevoix Plant in Charlevoix, Michigan on the Main Kiln Stack and Cooler Stack. Main Kiln particulate testing was performed during both "mill on" and "mill off" conditions. This report summarizes the results of the test program and test methods. St Marys Cement operates under Michigan Renewable Operating Permit MI-ROP-B1559-2014 and Permit to Install 140-15.

The test locations, test dates, and test parameter are summarized below.

TEST INFORMATION		
Test Locations	**Test Dates**	**Test Parameter**
Main Kiln Stack (Mill On)	September 23 and 24, 2020	Filterable Particulate Matter (FPM)
Main Kiln Stack (Mill Off)	September 25 and 28, 2020	
Clinker Cooler Stack	September 22, 2020	

The purpose of the test program was to demonstrate compliance with Title 40, *Code of Federal Regulations*, Part 60 (40CFR60), and 40CFR63, Subpart LLL "*National Emission Standards for Hazardous Air Pollutants (NESHAP) for the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants.*" Specifically, to demonstrate that each of the below listed sources meet their FPM emission limit and to establish a site-specific operating limit (SSOL) for each emission point's continuous parameter monitoring system (CPMS).

Test Location	Parameter	Emission Rate	Fraction of Time in Applicable Mode	PM Time Weighted Average Emissions	Emission Limit	CPMS 3-run Average	CPMS SSOL
Main Kiln Stack (Mill On)	FPM	0.011 lb/ton	90%	0.013 lb/ton	0.07 lb/ton	3.32 mg/m^3	13.24
Main Kiln Stack (Mill Off)	FPM	0.034 lb/ton	10%			2.96 mg/m^3	
Clinker Cooler Stack	FPM	0.011 lb/ton	100%	0.011 lb/ton	0.02 lb/ton	0.58 mg/m^3	0.78

The identifications of the individuals associated with the test program are summarized below.

TEST PERSONNEL INFORMATION		
Location	**Address**	**Contact**
Test Facility	St Marys Cement Charlevoix Cement Plant 16000 Bells Bay Road Charlevoix, Michigan 49720	Ms. Laurie Leaman Environmental Manager (231) 237-1387 laurie.leaman@vcimentos.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Eric Ehlers Director, Field Operations 630-993-2100 (phone) eehlers@mp-mail.com

The test crew consisted of Messrs. J. Nestor, J. Carlson, and E. Ehlers. Mr. Jeremy Howe of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) observed portions of the test program.

2.0 TEST METHODOLOGY

Emission testing was conducted following the United States Environmental Protection Agency (USEPA) methods specified in 40CFR60, Appendix A in addition the Mostardi Platt Quality Manual. Schematics of the test section diagrams and sampling trains used are included in Appendix A and B respectively. Calculation nomenclature are included in Appendix C. Laboratory analysis for each test run are included in Appendix D. The computerized reference method test data is included in Appendix E. CPMS data and process data as provided by St Marys Cement are also included in Appendix F.

The following methodologies were used during the test program:

Method 1 Sample and Velocity Traverse Determination

Test measurement points were selected in accordance with USEPA Method 1, 40CFR60, Appendix A. The characteristics of the measurement location are summarized below.

TEST POINT INFORMATION							
Test Location	**Stack Dimensions**	**No. of Ports**	**Port Length (Inches)**	**Upstream Diameters**	**Downstream Diameters**	**Test Parameter**	**Number of Sampling Points**
Main Kiln	10.58'	2	6	7.86	15.72	FPM	12
Clinker Cooler Stack	10.22'	4	6.5	2.0	8.0	FPM	12

Method 2 Volumetric Flow Rate Determination

Gas velocity was measured following USEPA Method 2, 40CFR60, Appendix A, for purposes of calculating stack gas volumetric flow rate and emission rates on a lb/hr basis. S-type pitot tubes, 0-10" differential pressure gauge, and K-type 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. Copies of field data sheets are included in

Appendix G. Calibration data are presented in Appendix H. This testing met the performance specifications as outlined in the Method.

Method 3A Oxygen (O_2)/Carbon Dioxide (CO_2) Determination

Flue gas O_2 and CO_2 concentrations for the Main Kiln Stack were determined in accordance with USEPA Method 3A. A Servomex analyzer was used to determine the O_2 and CO_2 concentrations by connecting the analyzer to the exit of the dry gas meter. The O_2 instrument operates in the nominal range of 0% to 25% with the specific range determined by the high-level calibration gas. The CO_2 instrument operates in the nominal range of 0% to 20% with the specific range determined by the high-level calibration gas. High and mid-range calibrations were performed using USEPA Protocol gas. Zero nitrogen (a low ppm pollutant in balance nitrogen calibration gases) was introduced during other instrument calibrations to check instrument zero. Zero and mid-range calibrations were performed using USEPA Protocol gas after each test run. Copies of the gas cylinder certifications are found in Appendix H. For testing on the Clinker Cooler Stack, per section 8.6 of USEPA Method 2, this source is considered ambient and therefore 0.0% CO_2 and 20.9% O_2 concentrations were used for molecular weight determination at these test locations.

Method 5 Filterable Particulate Matter (FPM) Determination

Particulate matter was sampled in accordance with USEPA Method 5, 40CFR60, Appendix A. The particulate matter sampling train was manufactured by Environmental Supply Corporation and meets all specifications required by Method 5. Velocity pressures were determined simultaneously during sampling with an S-type pitot tube and inclined manometer. All temperatures will be measured using K-type thermocouples with calibrated digital temperature indicators. The probe and filter temperatures were maintained at 248°F +/- 25°F throughout sampling.

The filter media are high purity quartz that meet all requirements of Method 5. All sample contact surfaces of the train were washed with HPLC reagent-grade acetone. These washes were placed in sealed and marked containers for analysis.

All sample recoveries were performed at the test site by the test crew. All final particulate sample analyses were performed by Mostardi Platt personnel at the laboratory in Elmhurst, Illinois.

Laboratory analysis data are found in Appendix D. Calibration data are presented in Appendix H.

3.0 TEST RESULT SUMMARIES

Client:	**St Marys Cement**
Facility:	**Charlevoix Cement Plant**
Test Location:	**Kiln Stack**
Test Method:	**5**

Source Condition	Mill On	Mill On	Mill On	
Date	9/23/20	9/23/20	9/24/20	
Start Time	14:05	16:37	7:45	
End Time	16:08	18:42	9:49	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	224.4	232.4	223.8	226.9
Flue Gas Moisture, percent by volume	11.1%	11.5%	13.4%	12.0%
Average Flue Pressure, in. Hg	29.62	29.62	29.41	29.55
Gas Sample Volume, dscf	94.731	97.128	96.45	96.103
Average Gas Velocity, ft/sec	85.437	87.871	88.195	87.168
Gas Volumetric Flow Rate, acfm	450,672	463,510	465,219	459,800
Gas Volumetric Flow Rate, dscfm	306,026	309,673	305,865	307,188
Gas Volumetric Flow Rate, scfm	344,232	349,948	353,169	349,116
Average $\%CO_2$ by volume, dry basis	17.5	17.8	17.2	17.5
Average $\%O_2$ by volume, dry basis	9.2	8.9	9.3	9.1
Isokinetic Variance	102.0	103.3	103.9	103.1
Clinker Production Rate, ton/hr	250.50	255.29	246.75	250.85
CPMS Response, mg/m^3	0.90	4.87	4.19	3.32
Filterable Particulate Matter (Method 5)				
grams collected	0.00733	0.00520	0.00651	0.00635
grains/acf	0.0008	0.0006	0.0007	0.0007
grains/dscf	0.0012	0.0008	0.0010	0.0010
lb/hr	3.132	2.193	2.730	2.685
lb/ton	0.013	0.009	0.011	0.011

Site Specific Operating Limit (SSOL) Determination	
Source Emissions Limit, lb/ton	0.07
CPMS Zero, mg/m^3	0.00
Filterable Particulate Matter, % of Emissions Limit	15.3%
CPMS 3-run Average	3.32 mg/m^3
% Operating Time Mill On	90%
SSOL	13.24

Client:	**St Marys Cement**
Facility:	**Charlevoix Cement Plant**
Test Location:	**Kiln Stack**
Test Method:	**5**

Source Condition	**Mill Off**	**Mill Off**	**Mill Off**	
Date	**9/25/20**	**9/25/20**	**9/28/20**	
Start Time	**6:15**	**7:40**	**11:55**	
End Time	**7:21**	**8:43**	**12:58**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	325.7	321.2	345.4	330.8
Flue Gas Moisture, percent by volume	13.6%	14.1%	13.6%	13.8%
Average Flue Pressure, in. Hg	29.44	29.44	29.21	29.36
Gas Sample Volume, dscf	39.702	38.578	38.625	38.968
Average Gas Velocity, ft/sec	81.662	78.519	81.465	80.549
Gas Volumetric Flow Rate, acfm	430,755	414,180	429,717	424,884
Gas Volumetric Flow Rate, dscfm	246,130	236,535	237,616	240,094
Gas Volumetric Flow Rate, scfm	284,877	275,493	275,053	278,474
Average %CO_2 by volume, dry basis	26.4	27.6	22.7	25.6
Average %O_2 by volume, dry basis	6.3	5.9	6.7	6.3
Isokinetic Variance	106.3	107.4	107.1	106.9
Clinker Production Rate, ton/hr	239.10	240.36	229.90	236.45
CPMS Response, mg/m^3	0.45	0.60	7.76	2.94
Filterable Particulate Matter (Method 5)				
grams collected	0.00390	0.01212	0.01327	0.00976
grains/acf	0.0009	0.0028	0.0029	0.0022
grains/dscf	0.0015	0.0048	0.0053	0.0039
lb/hr	3.198	9.828	10.797	7.941
lb/ton	0.013	0.041	0.047	0.034

Site Specific Operating Limit (SSOL) Determination	
Source Emissions Limit, lb/ton	0.07
CPMS Zero, mg/m^3	0.00
Filterable Particulate Matter, % of Emissions Limit	48.2%
CPMS 3-run Average	2.96 mg/m^3
% Operating Time Mill On	10%
SSOL	13.24

Client:	**St Marys Cement**
Facility:	**Charlevoix Cement Plant**
Test Location:	**Clinker Cooler Stack**
Test Method:	**5**

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**9/22/20**	**9/22/20**	**9/22/20**	
Start Time	**7:00**	**9:50**	**12:35**	
End Time	**9:06**	**11:53**	**14:38**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	205.9	195.8	188.5	196.7
Flue Gas Moisture, percent by volume	1.2%	1.5%	1.1%	1.3%
Average Flue Pressure, in. Hg	29.71	29.71	29.72	29.71
Gas Sample Volume, dscf	114.176	108.399	109.478	110.684
Average Gas Velocity, ft/sec	50.459	48.458	47.637	48.851
Gas Volumetric Flow Rate, acfm	248,362	238,510	234,468	240,447
Gas Volumetric Flow Rate, dscfm	193,199	187,842	187,519	189,520
Gas Volumetric Flow Rate, scfm	195,511	190,666	189,624	191,934
Average %CO_2 by volume, dry basis	0.0	0.0	0.0	0.0
Average %O_2 by volume, dry basis	20.9	20.9	20.9	20.9
Isokinetic Variance	100.2	97.8	99.0	99.0
Clinker Production Rate, ton/hr	251.49	255.42	254.83	253.91
CPMS Response, mg/m^3	0.49	0.50	0.74	0.58
Filterable Particulate Matter (Method 5)				
grams collected	0.01171	0.01171	0.01386	0.01243
grains/acf	0.0012	0.0013	0.0016	0.0014
grains/dscf	0.0016	0.0017	0.0020	0.0018
lb/hr	2.620	2.684	3.140	2.815
lb/ton	0.010	0.011	0.012	0.011
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton		0.02		
CPMS Zero, mg/m^3		0.00		
Filterable Particulate Matter, % of Emissions Limit		55.4%		
SSOL		0.78		

4.0 Particulate Matter Continuous Parameter Monitoring System

Per St Marys Cement a Relative Accuracy Test Audit (RATA) report summarizing the calibration and monitor certification will be submitted under separate cover for EGLE review. In addition to the monitor certification, the PC MACT requires that all data recorded and used to establish parameters for monitoring are to be submitted, including the following, per 1349(b)(1)(vii):

- Make and Model
  - All units are Sick SP100
- Serial Number
  - Main Stack PM Monitor s/n 17398675 Probe 16408330
  - Clinker PM Monitor s/n 17278571 Probe 17258401
- Analytical Principal
  - The measuring system works according to the *scattered light measurement* principle (i.e., forward dispersion). A laser diode beams the dust particles in the gas flow with modulated light in the visual range (wavelength approximately 650 nanometers [nm]). A highly sensitive detector registers the light scattered by the particles, amplifies the light electrically, and feeds it to the measuring channel of a microprocessor as a central part of the measuring, control, and evaluation electronics. The measuring volume in the gas duct is defined through the intersection of the sender beam and the receiving aperture.
  - Continuous monitoring of the sender output registers the smallest changes in brightness of the light beam sent, which then serves to determine the measurement signal
- Span of Primary Analytical Range
  - The original system specifications were for a range of 0 to 200 milligrams per dry standard cubic meter (mg/dscm)
- Milliamp Value or Digital Equivalent to the Zero Output
  - The monitor output is in milligrams, with zero equal to zero
- Technique to Determine the Zero Value
  - The sender diode is switched off for *zero-point control* so that no signal is received. This means possible *drifts* or zero-point deviations are reliably detected in the overall system (e.g., due to an electronic defect). An error signal is generated when the *zero value* is outside the specified range.
- Average Milliamp or Digital Equivalent Signals Corresponding to Each PM Compliance Run
  - See Appendix A, raw data recorded by the CPMS monitors is attached.

5.0 CERTIFICATION

MOSTARDI PLATT is pleased to have been of service to St Marys Cement. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

CERTIFICATION

As the program 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. The test program was performed in accordance with the test methods and the Mostardi Platt Quality Manual, as applicable.

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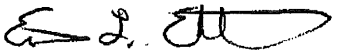
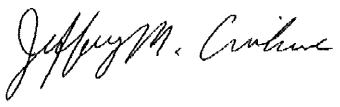


Project Manager

Eric L. Ehlers



Quality Assurance

Jeffrey M. Crivlare