

FINAL REPORT



ST MARYS CEMENT

CHARLEVOIX, MICHIGAN

2024 RELATIVE ACCURACY TESTING AUDIT (RATA) SOURCE
TESTING REPORT PART 60 (MERCURY) EUINLINEKILN

RWDI #2409155

November 6, 2024

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI USA LLC (RWDI) was retained by St Marys Cement U.S. LLC (SMC) to complete the Relative Accuracy Testing Audit (RATA) emission sampling program at their facility located at 16000 Bells Bay Road, Charlevoix, Michigan. The test program was conducted to fulfill the requirements of the Michigan Department of Environment, Great Lakes and Energy (EGLE) Renewable Operating Permit (ROP) # MI-ROP-B1559-2014, Permit To Install (PTI) 140-15C, and in accordance with NESHAP for Portland Cement Manufacturing Industry and Standards for Performance for Portland Cement Plants, 40 CFR Part 63, Subpart LLL and 40 CFR 52, Subpart X and 40 CFR 60, Appendix B. The testing program included a RATA was performed to determine the relative accuracy (RA) of the nitrogen oxides (NOx), sulfur dioxide (SO₂), oxygen (O₂), carbon dioxide (CO₂), mercury (Hg) and VFR CEMS that serve the In-Line Raw Mill Kiln Main Stack (EUINLINEKILN).

RATA for nitrogen oxides (NOx), sulfur dioxide (SO₂), oxygen (O₂), carbon dioxide (CO₂), and VFR CEMS was completed on June 19th, 2024 and reported to EGLE in August of 2024. The RATA for the rental VOC CEMS system was completed on September 10, 2024 and was reporting to EGLE in October of 2024. In June of 2024, RWDI completed twelve (12) 30-minute samples however, however, due to a communication error regarding the Mercury samples, SMC completed a five (5) day sample during the same period. RWDI's data for June sampling was provided to EGLE in the August 2024 report.

This report covers the RATA for Mercury that was completed on September 10th and 11th, 2024 for the following:

Kiln Main Stack (EUINLINEKILN):

- Mercury (µg/scm)

Executive Table ii: Results Summary - EUINLINEKILN

Parameter	Performance Test Data		Relative Accuracy (RA)	
	Reference Method Data	SMC Data	Performance Demonstrated	Performance Required
Mercury (Hg)	0.11 µg/scm	0.14 µg/scm	0.03 µg/scm Absolute Difference (PASS)	≤1.0 µg/scm Absolute Difference*
Total Number of Runs	12	12	12	--
Number of Runs Used in RA	9	9	9	Minimum of 9
Average Clinker Production (tons/hr)	251.85			--

Note: * As outlined in Performance Specification 12B, since the RM is ≤5.0 ug/scm the RA criteria is ≤1.0 ug/scm.



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1 INTRODUCTION

RWDI USA LLC (RWDI) was retained by St Marys Cement U.S. LLC (SMC) to complete the Relative Accuracy Testing Audit (RATA) emission sampling program at their facility located at 16000 Bells Bay Road, Charlevoix, Michigan. The test program was conducted to fulfill the requirements of the Michigan Department of Environment, Great Lakes and Energy (EGLE) Renewable Operating Permit (ROP) # MI-ROP-B1559-2014, Permit To Install (PTI) 140-15C, and in accordance with NESHAP for Portland Cement Manufacturing Industry and Standards for Performance for Portland Cement Plants, 40 CFR Part 63, Subpart LLL and 40 CFR 52, Subpart X and 40 CFR 60, Appendix B. The testing program included a RATA was performed to determine the relative accuracy (RA) of the nitrogen oxides (NO_x), sulfur dioxide (SO₂), oxygen (O₂), carbon dioxide (CO₂), mercury (Hg) and VFR CEMS that serve the In-Line Raw Mill Kiln Main Stack (EUINLINEKILN).

RATA for nitrogen oxides (NO_x), sulfur dioxide (SO₂), oxygen (O₂), carbon dioxide (CO₂), and VFR CEMS was completed on June 19th, 2024 and reported to EGLE in August of 2024. The RATA for the rental VOC CEMS system was completed on September 10, 2024 and was reporting to EGLE in October of 2024. In June of 2024, RWDI completed twelve (12) 30-minute samples however, due to a communication error regarding the Mercury samples, SMC completed a five (5) day sample during the same period. RWDI's data for June sampling was provided to EGLE in the August 2024 report.

This report covers the RATA for Mercury that was completed on September 10th and 11th, 2024 for the following:

Kiln Main Stack (EUINLINEKILN):

- Mercury (µg/scm)

The annual RATA was completed under normal operating conditions.

1.1 Location and Dates of Testing

RATA testing on EUINLINEKILN on September 10-11, 2024. The test program was completed at SMC at 16000 Bells Bay Road, in Charlevoix, Michigan.



1.2 Purpose of Testing

The testing was conducted to fulfill the requirements of Michigan Department of Environment, Great Lakes and Energy (EGLE) Renewable Operating Permit (ROP) # MI-ROP-B1559-2014, Permit To Install (PTI) 140-15C, and in accordance with NESHAP for Portland Cement Manufacturing Industry and Standards for Performance for Portland Cement Plants, 40 CFR Part 63, Subpart LLL and 40 CFR 52, Subpart X and 40 CFR 60, Appendix B.

1.3 Personnel Involved in Testing

Table 1.3.1: Testing Personnel

Personnel (Title & Email)	Affiliation	Phone Number
Laurie Leaman Environmental Manager Laurie.Leaman@vcimentos.com	St Mary Cement	(231) 237-1387
Brad Bergeron Technical Director Brad.Bergeron@rwdi.com	RWDI USA LLC 24445 Forterra Drive Warren, MI 48089	(248) 234-3885
Steve Smith Project Manager Steve.Smith@rwdi.com		(971) 940-5038
Mason Sakshaug Supervisor, Source Mason.Sakshaug@rwdi.com		(989) 323-0355
Roy Zimmer Field Technician Roy.Zimmer@rwdi.com		(248) 841-8442
Kate Strang Field Technician Kate.Strang@rwdi.com		
Shane Rabideau Field Technician Shane.Rabideau@rwdi.com		



2 SOURCE DESCRIPTION

SMC owns and operates a Portland cement manufacturing facility located on the shores of Lake Michigan at 16000 Bells Bay Road in Charlevoix, Charlevoix County, Michigan. Operations include one dry process rotary kiln, quarry operations; conveying, storage, grinding, and blending systems for raw materials; a preheater tower; a clinker cooler; clinker conveying, storage, and grinding systems; cement storage systems; and shipping facilities.

Particulate from the kiln process is controlled by a baghouse on the kiln exhaust system. Dust collectors, engineered controls, and/or dust suppression systems have been installed at various locations throughout the facility to control particulate matter from other processes.

2.1 Kiln (EUINLINEKILN)

Table 2.1.1: Summary of Sampling Program – Kiln (EUINLINEKILN)

	EUINLINEKILN
Emission Unit Description [Including Process Equipment & Control Device(s)]	Represents the in-line calciner with indirect firing, in-line kiln with indirect firing and equipment associated with the treatment of exhaust gases including the north conditioning tower, south conditioning tower and the Kiln Main Stack baghouse
Parameter Tested	Hg
Stack Dimensions	127"
Traverse Points	1
Testing Monitoring Methods	Refer to Section 4.0
Testing Schedule	Refer to Section 1.2

The sampling ports for the RATA testing are located outside the building within the exhaust duct. During the RATA, SMC personnel operated kiln process to ensure they are operating within at least 50% of maximum load.

2.2 Operating Data

SMC personnel collected the process data and verified the unit was operating correctly and production was at acceptable capacity. The process data for the Kiln is in **Appendix A**.

2.3 Applicable Permit Number

MI-ROP-B1559-2014 and PTI 140-15C.

2.4 Process Flow Sheet or Diagram (if applicable)

Process flow diagram is available upon request.



2.5 Type and Quantity of Raw and Finished Materials

Raw materials are primarily limestone and smaller portions of iron, alumina, and silica. Finished materials are clinker and cement.

2.6 Process Instrumentation Monitored During the Test

Plant personnel recorded the following process data:

- **Kiln (EUINLINEKILN):**
 - Hg data from sorbent tube sampling system
 - Production Rate (tons per hour)

2.7 Continuous Emission Monitors Specifications

The following is a list of the monitors related to this program at SMC.

Table 2.7.1: Summary of SMC Sorbent Tube Sampling System – EUINLINEKILN

Parameter	Hg
Make:	Apex
Model:	XC-6000EM
Serial No.:	1605368
Span:	-

2.8 Reference Method Analyzers

The following outlines the Reference Method equipment used on-site during the RATA testing.

Table 2.8.1: Reference Method (RM) Sorbent Tube Sampling System

Pollutant	Specifications		
	Manufacturer	Serial Number	Range
Mercury	Apex 208306AB	1030-120312-1	Not Applicable



3 SAMPLING AND ANALYTICAL PROCEDURES

3.1 Description of Sampling Train and Field Procedures

3.1.1 Method Listing:

The following test methods are referenced for the test program. These methods can be found in 40 CFR, Part 60, Appendix A and B.

Method 30B: Determination of —Determination of Total Vapor Phase Mercury Emissions from Coal-Fired Combustion sources using Carbon Sorbent Traps.

3.1.2 Mercury

Known volumes of flue gas was extracted from EUINLINEKILN through paired, in-stack sorbent media traps at an appropriate flow rate. Collection of mercury on the sorbent media in the stack mitigates potential loss of mercury during transportation through probe/sample line. For each test run, paired train sampling is required to determine measurement precision and verify acceptability of the measured emissions data. The sorbent traps were recovered from the sampling system and sent to Ohio Lumex for analysis. One of each paired tubes were also spiked to ensure accuracy of laboratory data.

3.2 Description of Recovery and Analytical Procedures

All testing used real time data from the analyzers with the exception of Mercury. Mercury was sent out to a 3rd Party laboratory for evaluation (Ohio Lumex).

4 PERFORMANCE LIMITS

The applicable emission limits are outlined below.

Table 4.1: Part 60 RA Requirements – EUINLINEKILN

Parameter	Regulatory Reference	Allowable Limit
Mercury (Hg)	Part 60, Appendix B, Performance Specification 12B	≤1.0 µg/scm*

Note: * As outlined in Performance Specification 12B, since the RM is ≤5.0 ug/scm the RA criteria is ≤1.0 ug/scm.



5 TEST RESULTS AND DISCUSSION

5.1 Detailed Results

Table 5.1.1: Results Summary - EUINLINEKILN

Parameter	Performance Test Data		Relative Accuracy (RA)	
	Reference Method Data	SMC Data	Performance Demonstrated	Performance Required
Mercury (Hg)	0.11 µg/scm	0.14 µg/scm	0.03 µg/scm Absolute Difference (PASS)	≤1.0 µg/scm Absolute Difference *
Total Number of Runs	12	12	12	--
Number of Runs Used in RA	9	9	9	Minimum of 9
Average Clinker Production (tons/hr)	251.85			--

Note: * As outlined in Performance Specification 12B, since the RM is ≤5.0 ug/scm the RA criteria is ≤1.0 ug/scm.

Based on the results of the RATA, all analytes were determined to be within acceptable Relative Accuracy (RA) tolerances as per USEPA Performance Specification 12B. The results can be found in the following sections:

- EUINLINEKILN:
 - CEMS Data:
 - **Appendix A** for SMC Sorbent Tube Sampling System Data and Process Data
 - **Appendix B** for Reference Method Sorbent Tube Sampling System Data

Calibration records can be found in **Appendix C**. Field notes are provided in **Appendix D**. **Appendix E** contains example calculations and **Appendix F** contains the Approval Letter from EGLE and a copy of the original Source Testing Plan.

5.2 Variations in Testing Procedures

No variations.

5.3 Modifications to Program

No modifications to the program.



5.4 Process Upset Conditions During Testing

There were normal process breaks during production.

5.5 Maintenance Performed in Last Three Months

Only routine maintenance has been performed.

5.6 Re-Test

Due to a communication error regarding the Mercury samples in June of 2024, comparison of results was not feasible and is covered under the August 2024 report submitted to EGLE. The RATA for Mercury was completed during the third quarter on September 10-11, 2024. This completes the testing for the Mercury RATA.

5.7 Audit Samples

This test did not require any audit samples.

5.8 Laboratory Data

Laboratory data for Mercury Reference Method sampling is provided in **Appendices A and B**.

5.9 Calibration Records

Calibration records can be found in **Appendix C**.

5.10 Field Data Sheets

Field data sheets can be found in **Appendix D**.

5.11 Sample Calculations

Sample calculations can be found in **Appendix E**.

5.12 Source Testing Plan

Source testing plan and EGLE correspondence can be found in **Appendix F**.



TABLES



Table 1 : Main Stack RATA Results - Hg

9/10/2024 and 9/11/2024

Test	Date	RWDI Time		Mercury (Hg)		
		Start Time	End Time	RM (ug/m ³)	Facility Data (ug/m ³)	di (ug/m ³)
1	10-Sep-24	9:34	10:04	0.11	0.31	0.20
2	10-Sep-24	10:58	11:28	0.12	0.20	0.08
3	10-Sep-24	11:53	12:23	0.13	0.15	0.02
4	10-Sep-24	12:40	13:10	0.13	0.16	0.04
5	10-Sep-24	13:27	13:57	0.13	0.18	0.05
6	11-Sep-24	8:25	8:55	0.10	0.10	0.01
7	11-Sep-24	9:12	9:42	0.09	0.11	0.02
8	11-Sep-24	10:03	10:33	0.10	0.13	0.03
9	11-Sep-24	10:56	11:26	0.11	0.13	0.02
10	11-Sep-24	11:46	12:16	0.13	0.14	0.01
11	11-Sep-24	12:35	13:05	0.09	0.06	-0.04
12	11-Sep-24	13:25	13:55	0.11	0.11	0.01
AVERAGE				0.11	0.14	0.03
STDS				0.02	0.03	0.03
n				9		
t _{0.025}				2.306		
d				0.003		
cc				0.019		
Absolute Difference Limit (PS 12B)				1.0 ug/m ³		
Is Absolute Difference Less than PS 12B Limit)				0.03 Pass		

Notes:

RM = Reference Method (RWDI measurements)

Facility Data = St Marys Data

di = Difference between St Mary's Data and RM for each point

n = number of tests

t_{0.025} = value for a one-tailed t-test

| d | = Absolute mean difference between the St Mary's data and RM results

| cc | = Confidence coefficient

99 indicates test was omitted from calculating criteria

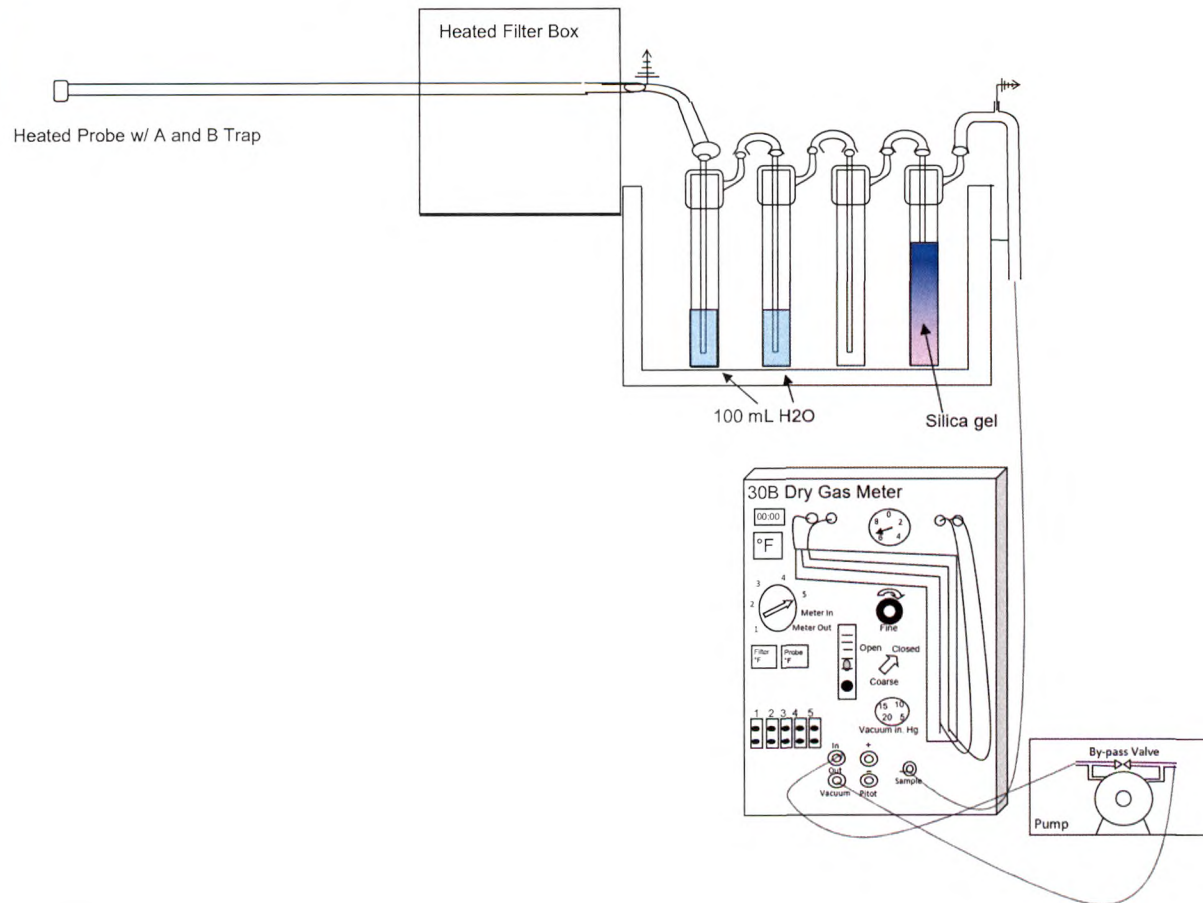


FIGURES





Figure No. 1: USEPA Method 30b Schematic



USEPA Method 30B

Main Kiln Stack (EUINLINEKILN)

St Mary Cement U.S. LLC

Charlevoix Plant

Charlevoix, MI

