

1.0 EXECUTIVE SUMMARY

Mostardi Platt conducted a particulate emission compliance test program for Holcim (US) Inc. Lafarge Alpena at the Alpena Cement Plant in Alpena, Michigan, on the Kiln 19 Breaching Duct on October 28, 2022 and on the Kiln 20 Breaching Duct on October 19, 2022. This report summarizes the results of the test program and test methods.

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

TEST INFORMATION		
Test Locations	Test Dates	Test Parameter
Kiln 19 Breaching Duct	October 28, 2022	Filterable Particulate Matter (FPM)
Kiln 20 Breaching Duct	October 19, 2022	Filterable Particulate Matter (FPM)

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.*"

Parameter	Date	Units	Emission Rate	Emission Limit	CPMS SSOL
FPM	10/28/2022	lb/ton	0.003 lb/ton	0.07 lb/ton	6.37

Parameter	Date	Units	Emission Rate	Emission Limit	CPMS SSOL
FPM	10/19/2022	lb/ton	0.005 lb/ton	0.07 lb/ton	8.62

The CPMS SSOL was determined to be 6.37 for Kiln 19 and 8.62 for Kiln 20 (based on mA recorded by CPMS during testing respectively).

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

TEST PERSONNEL INFORMATION		
Location	Address	Contact
Test Facility	Holcim (US) Inc. Alpena Plant 1435 Ford Avenue Alpena, Michigan 49707	Mallory Miller Area Environmental Manager Mallory.Miller@lafargeholcim.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Chris Trezak Project Manager (Kiln 20) 630-993-2100 (phone) ctrezak@mp-mail.com
		Paul Coleman Project Manager (Kiln 19) 630-993-2100 (phone) pcoleman@mp-mail.com
Testing Company Personnel		Joshua Kukla Test Engineer (Kiln 20)
		Donald Jordan Test Engineer (Kiln 19)
		Aaron Benninghoff Test Technician (Both Kilns)

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. Reference Method and CEM data and process data as provided by Holcim (US) Inc. are included in Appendix E and 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 AT KILN 19 OUTLET DUCT							
Stack Dimensions (Feet)	Stack Area (Square Feet)	No. of Ports	Port Length (Inches)	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
8.00 x 9.917	79.336	3	3.25	0.7	0.8	FPM	42

TEST POINT INFORMATION AT KILN 20 OUTLET DUCT							
Stack Dimensions (Feet)	Stack Area (Square Feet)	No. of Ports	Port Length (Inches)	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
8.00 x 8.75	70.000	3	3.25	0.47	1.11	FPM	42

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. A 8-foot-long S-type pitot tube, 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 (O₂)/Carbon Dioxide (CO₂) Determination

Stack gas O₂ and CO₂ concentrations were determined in accordance with USEPA Method 3A. An ECOM analyzer was used to determine the O₂ and CO₂ concentrations in the manner specified in the Method. The O₂ instrument operates in the nominal range of 0% to 25% with the specific range determined by the high-level calibration gas. The CO₂ 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. Calibration data and copies of the gas cylinder certifications are found in Appendices H and I. This testing met the performance specifications as outlined in the Method.

Method 5 Filterable Particulate Matter (FPM) Determination

Stack gas filterable PM concentrations and emission rates were determined in accordance with Method 5. The probe and filter housing were maintained at a temperature of 248°F +/- 25°F. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate. Four impingers were utilized, the first two each containing 100ml of deionized water, the third was empty, and the fourth contained approximately 200 grams of silica gel. The impingers were weighed prior to and after each test run in order to determine moisture content of the stack gas. The total sample time was 84 minutes, with forty-two (42) sample points being utilized (14 points per port, 3 total ports). A minimum of 1 dscm was sampled for each run.

PM in the sample probe was recovered utilizing acetone; a minimum of three passes of the probe brush through the entire probe was performed, followed by a visual inspection of the acetone exiting the probe. If the acetone solution exiting the probe was clear, the wash was considered complete, if not, another pass of the brush through the probe was made and inspected until the solution was clear. The nozzle was then removed from the probe and cleaned in a similar manner, utilizing an appropriately sized nozzle brush. The probe wash and filter catch were analyzed by Mostardi Platt personnel. Laboratory analysis data are found in Appendix D. Calibration data are presented in Appendix H.

3.0 TEST RESULT SUMMARIES

Client: Holcim (US) Inc.
Facility: Alpena Cement Plant
Test Location: Kiln 19 Breaching Duct
Test Method: 5

	Source Condition	Normal	Normal	Normal	
	Date	10/28/22	10/28/22	10/28/22	
	Start Time	8:00	10:50	12:53	
	End Time	9:33	12:23	14:24	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	410.7	411.0	412.5	411.4	
Flue Gas Moisture, percent by volume	4.7%	5.3%	5.2%	5.1%	
Average Flue Pressure, in. Hg	29.72	29.72	29.72	29.72	
Gas Sample Volume, dscf	70.443	69.747	67.263	69.151	
Average Gas Velocity, ft/sec	33.822	32.854	31.641	32.772	
Gas Volumetric Flow Rate, acfm	160,997	156,390	150,615	156,001	
Gas Volumetric Flow Rate, dscfm	92,454	89,143	85,861	89,153	
Gas Volumetric Flow Rate, scfm	96,985	94,182	90,538	93,902	
Average %CO ₂ by volume, dry basis	17.1	17.1	17.7	17.3	
Average %O ₂ by volume, dry basis	9.2	9.1	9.0	9.1	
Isokinetic Variance	99.1	101.8	101.9	100.9	
Clinker Production Rate, ton/hr	54.7	53.9	54.0	54.2	
CPMS Response, mA	4.066	4.264	4.100	4.143	
Filterable Particulate Matter (Method 5)					
grams collected	0.00041	0.00098	0.00164	0.00101	
grains/acf	0.0001	0.0001	0.0002	0.0001	
grains/dscf	0.0001	0.0002	0.0004	0.0002	
lb/hr	0.071	0.166	0.277	0.171	
lb/ton of clinker	0.001	0.003	0.005	0.003	
Site Specific Operating Limit (SSOL) Determination					
Source Emissions Limit, lb/ton			0.07		
CPMS Zero, mA			4.00		
Filterable Particulate Matter, % of Emissions Limit			4.5%		
SSOL			6.37		

1.0 EXECUTIVE SUMMARY

Mostardi Platt conducted a particulate emission compliance test program for Holcim (US) Inc. Lafarge Alpena at the Alpena Cement Plant in Alpena, Michigan, on the Kiln 19 Breaching Duct on October 28, 2022 and on the Kiln 20 Breaching Duct on October 19, 2022. This report summarizes the results of the test program and test methods.

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

TEST INFORMATION		
Test Locations	Test Dates	Test Parameter
Kiln 19 Breaching Duct	October 28, 2022	Filterable Particulate Matter (FPM)
Kiln 20 Breaching Duct	October 19, 2022	Filterable Particulate Matter (FPM)

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.*"

Parameter	Date	Units	Emission Rate	Emission Limit	CPMS SSOL
FPM	10/28/2022	lb/ton	0.003 lb/ton	0.07 lb/ton	6.37

Parameter	Date	Units	Emission Rate	Emission Limit	CPMS SSOL
FPM	10/19/2022	lb/ton	0.005 lb/ton	0.07 lb/ton	8.62

The CPMS SSOL was determined to be 6.37 for Kiln 19 and 8.62 for Kiln 20 (based on mA recorded by CPMS during testing respectively).

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

TEST PERSONNEL INFORMATION		
Location	Address	Contact
Test Facility	Holcim (US) Inc. Alpena Plant 1435 Ford Avenue Alpena, Michigan 49707	Mallory Miller Area Environmental Manager Mallory.Miller@lafargeholcim.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Chris Trezak Project Manager (Kiln 20) 630-993-2100 (phone) ctrezak@mp-mail.com
Testing Company Personnel		Paul Coleman Project Manager (Kiln 19) 630-993-2100 (phone) pcoleman@mp-mail.com
		Joshua Kukla Test Engineer (Kiln 20)
	Donald Jordan Test Engineer (Kiln 19)	
	Aaron Benninghoff Test Technician (Both Kilns)	

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. Reference Method and CEM data and process data as provided by Holcim (US) Inc. are included in Appendix E and 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 AT KILN 19 OUTLET DUCT							
Stack Dimensions (Feet)	Stack Area (Square Feet)	No. of Ports	Port Length (Inches)	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
8.00 x 9.917	79.336	3	3.25	0.7	0.8	FPM	42

TEST POINT INFORMATION AT KILN 20 OUTLET DUCT							
Stack Dimensions (Feet)	Stack Area (Square Feet)	No. of Ports	Port Length (Inches)	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
8.00 x 8.75	70.000	3	3.25	0.47	1.11	FPM	42

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. A 8-foot-long S-type pitot tube, 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 (O₂)/Carbon Dioxide (CO₂) Determination

Stack gas O₂ and CO₂ concentrations were determined in accordance with USEPA Method 3A. An ECOM analyzer was used to determine the O₂ and CO₂ concentrations in the manner specified in the Method. The O₂ instrument operates in the nominal range of 0% to 25% with the specific range determined by the high-level calibration gas. The CO₂ 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. Calibration data and copies of the gas cylinder certifications are found in Appendices H and I. This testing met the performance specifications as outlined in the Method.

Method 5 Filterable Particulate Matter (FPM) Determination

Stack gas filterable PM concentrations and emission rates were determined in accordance with Method 5. The probe and filter housing were maintained at a temperature of 248°F +/- 25°F. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate. Four impingers were utilized, the first two each containing 100ml of deionized water, the third was empty, and the fourth contained approximately 200 grams of silica gel. The impingers were weighed prior to and after each test run in order to determine moisture content of the stack gas. The total sample time was 84 minutes, with forty-two (42) sample points being utilized (14 points per port, 3 total ports). A minimum of 1 dscm was sampled for each run.

PM in the sample probe was recovered utilizing acetone; a minimum of three passes of the probe brush through the entire probe was performed, followed by a visual inspection of the acetone exiting the probe. If the acetone solution exiting the probe was clear, the wash was considered complete, if not, another pass of the brush through the probe was made and inspected until the solution was clear. The nozzle was then removed from the probe and cleaned in a similar manner, utilizing an appropriately sized nozzle brush. The probe wash and filter catch were analyzed by Mostardi Platt personnel. Laboratory analysis data are found in Appendix D. Calibration data are presented in Appendix H.

3.0 TEST RESULT SUMMARIES

Client: Holcim (US) Inc.
Facility: Alpena Cement Plant
Test Location: Kiln 19 Breaching Duct
Test Method: 5

Source Condition	Normal	Normal	Normal	
Date	10/28/22	10/28/22	10/28/22	
Start Time	8:00	10:50	12:53	
End Time	9:33	12:23	14:24	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	410.7	411.0	412.5	411.4
Flue Gas Moisture, percent by volume	4.7%	5.3%	5.2%	5.1%
Average Flue Pressure, in. Hg	29.72	29.72	29.72	29.72
Gas Sample Volume, dscf	70.443	69.747	67.263	69.151
Average Gas Velocity, ft/sec	33.822	32.854	31.641	32.772
Gas Volumetric Flow Rate, acfm	160,997	156,390	150,615	156,001
Gas Volumetric Flow Rate, dscfm	92,454	89,143	85,861	89,153
Gas Volumetric Flow Rate, scfm	96,985	94,182	90,538	93,902
Average %CO ₂ by volume, dry basis	17.1	17.1	17.7	17.3
Average %O ₂ by volume, dry basis	9.2	9.1	9.0	9.1
Isokinetic Variance	99.1	101.8	101.9	100.9
Clinker Production Rate, ton/hr	54.7	53.9	54.0	54.2
CPMS Response, mA	4.066	4.264	4.100	4.143
Filterable Particulate Matter (Method 5)				
grams collected	0.00041	0.00098	0.00164	0.00101
grains/acf	0.0001	0.0001	0.0002	0.0001
grains/dscf	0.0001	0.0002	0.0004	0.0002
lb/hr	0.071	0.166	0.277	0.171
lb/ton of clinker	0.001	0.003	0.005	0.003
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton			0.07	
CPMS Zero, mA			4.00	
Filterable Particulate Matter, % of Emissions Limit			4.5%	
SSOL			6.37	

Client: Holcim (US) Inc.
Facility: Alpena Cement Plant
Test Location: Kiln 20 Breaching Duct
Test Method: 5

	Source Condition	Normal	Normal	Normal	
	Date	10/19/22	10/19/22	10/19/22	
	Start Time	10:00	12:26	14:55	
	End Time	11:34	13:57	16:26	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	370.8	376.0	379.2	375.3	
Flue Gas Moisture, percent by volume	5.0%	6.7%	7.1%	6.3%	
Average Flue Pressure, in. Hg	28.93	28.93	28.93	28.93	
Gas Sample Volume, dscf	60.574	60.482	60.772	60.609	
Average Gas Velocity, ft/sec	38.879	39.135	39.544	39.186	
Gas Volumetric Flow Rate, acfm	163,292	164,369	166,083	164,581	
Gas Volumetric Flow Rate, dscfm	95,327	93,664	93,821	94,271	
Gas Volumetric Flow Rate, scfm	100,330	100,367	101,020	100,572	
Average %CO ₂ by volume, dry basis	17.8	17.7	18.3	17.9	
Average %O ₂ by volume, dry basis	9.0	8.7	8.3	8.7	
Isokinetic Variance	100.4	102.1	102.4	101.6	
Clinker Production Rate, ton/hr	54.0	54.0	54.1	54.0	
CPMS Response, mA	4.341	4.416	4.530	4.4	
Filterable Particulate Matter (Method 5)					
grams collected	0.00118	0.00169	0.00097	0.00128	
grains/acf	0.0002	0.0002	0.0001	0.0002	
grains/dscf	0.0003	0.0004	0.0002	0.0003	
lb/hr	0.246	0.346	0.198	0.263	
lb/ton of clinker	0.005	0.006	0.004	0.005	
Site Specific Operating Limit (SSOL) Determination					
Source Emissions Limit, lb/ton			0.07		
CPMS Zero, mA			4.00		
Filterable Particulate Matter, % of Emissions Limit			7.0%		
SSOL			8.62		

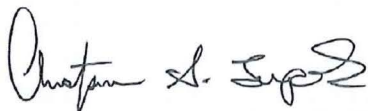
RECEIVED
FEB 14 2023
AIR QUALITY DIVISION

4.0 CERTIFICATION

Mostardi Platt is pleased to have been of service to Holcim (US) Inc. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

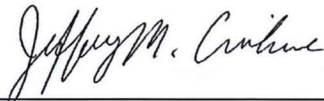
As the program manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results. The test program was performed in accordance with the test methods and the Mostardi Platt Quality Manual, as applicable.

MOSTARDI PLATT



Christopher S. Trezak

Project Manager



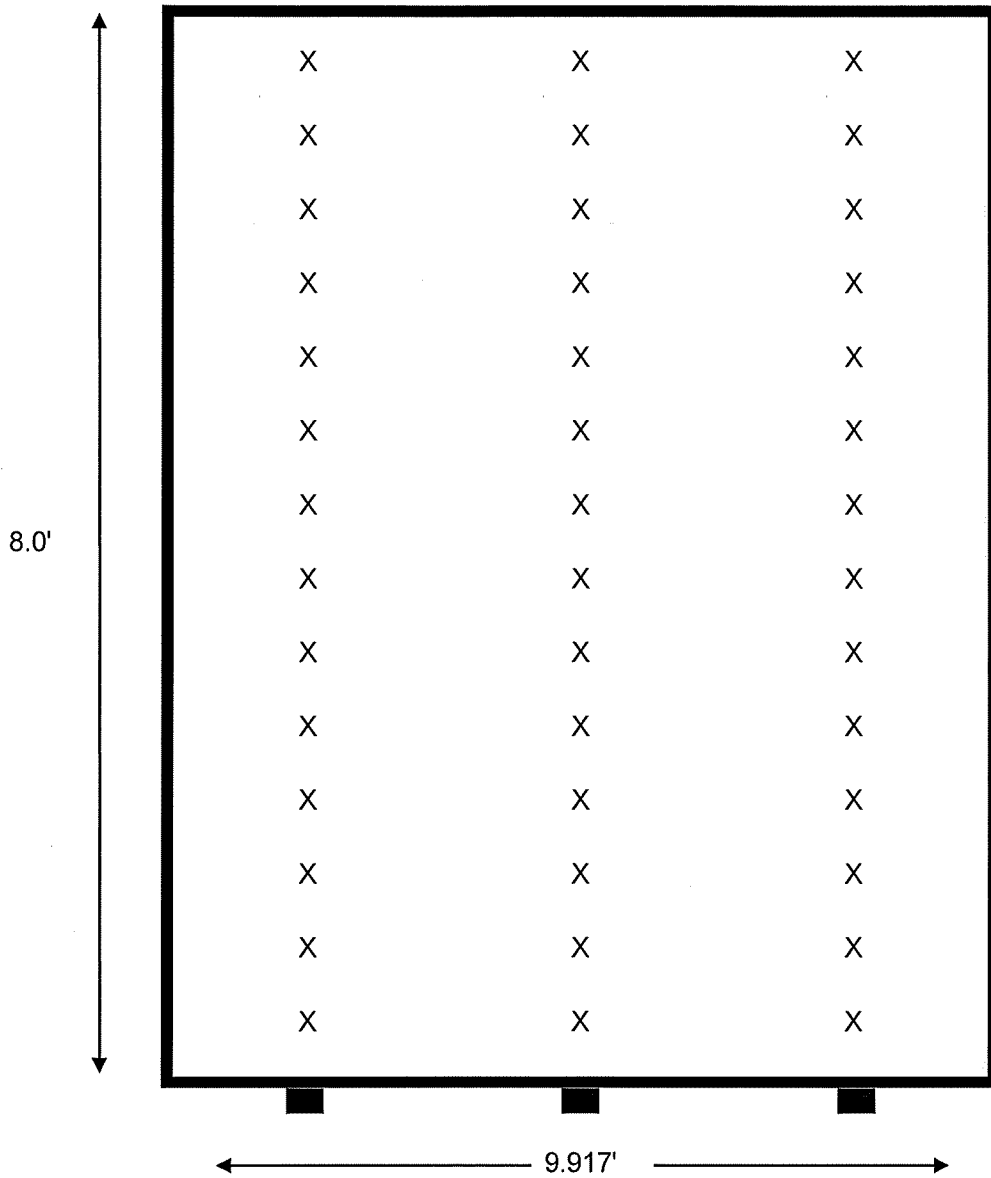
Jeffrey M. Crivlare

Quality Assurance

APPENDICES

Appendix A - Test Section Diagrams

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Job: Holcim (US) Inc.
Alpena Plant

Date: October 28, 2022

Area: 79.336 square feet

Test Location: Kiln 19 Breaching Duct

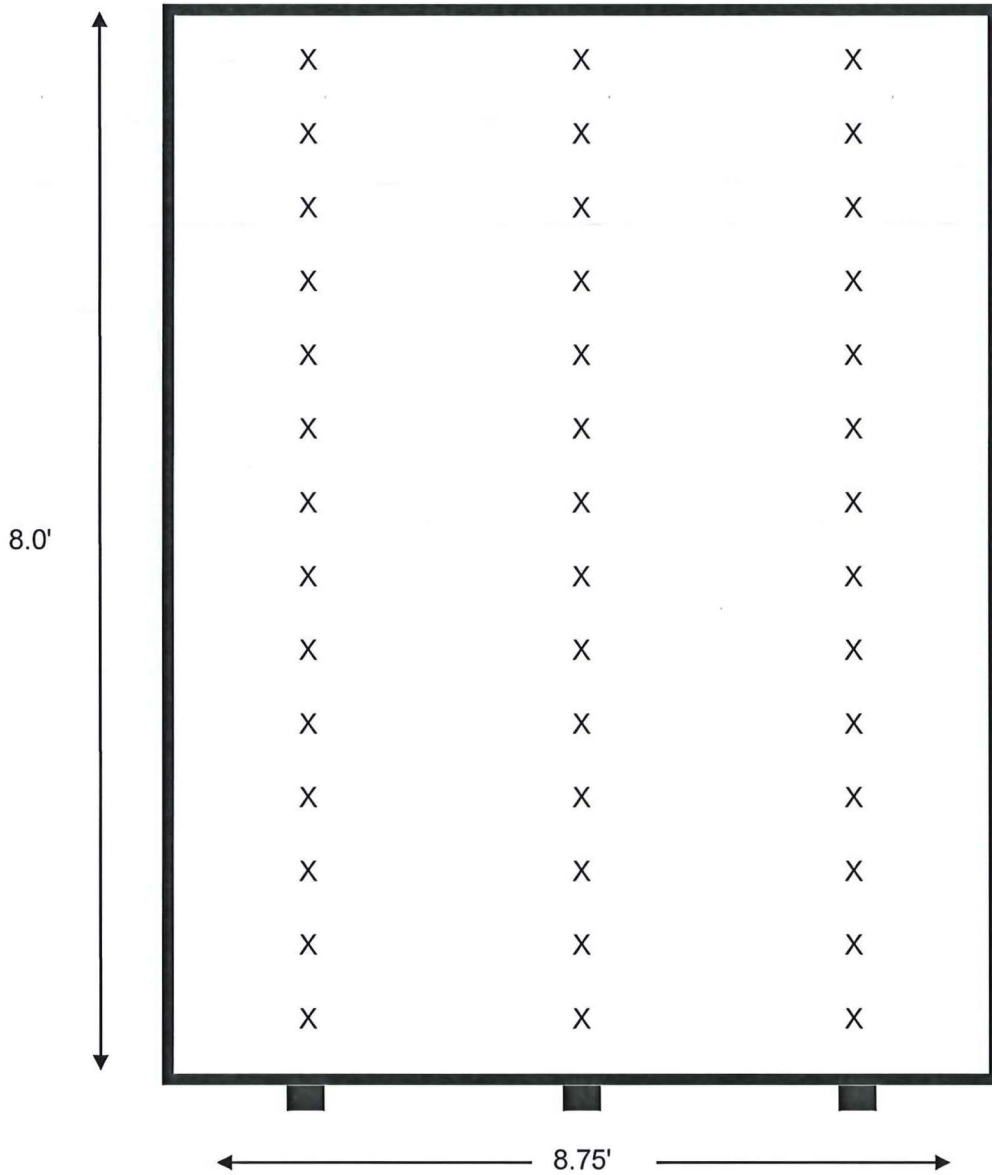
No. Test Ports: 3

Length: 8.00 feet

Tests Points per Port: 14

Width: 9.917 feet

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Job: Holcim (US) Inc.
Alpena Plant

Date: October 19, 2022

Area: 70.00 square feet

Test Location: Kiln 20 Breaching Duct

No. Test Ports: 3

Length: 8.00 feet

Tests Points per Port: 14

Width: 8.75 feet

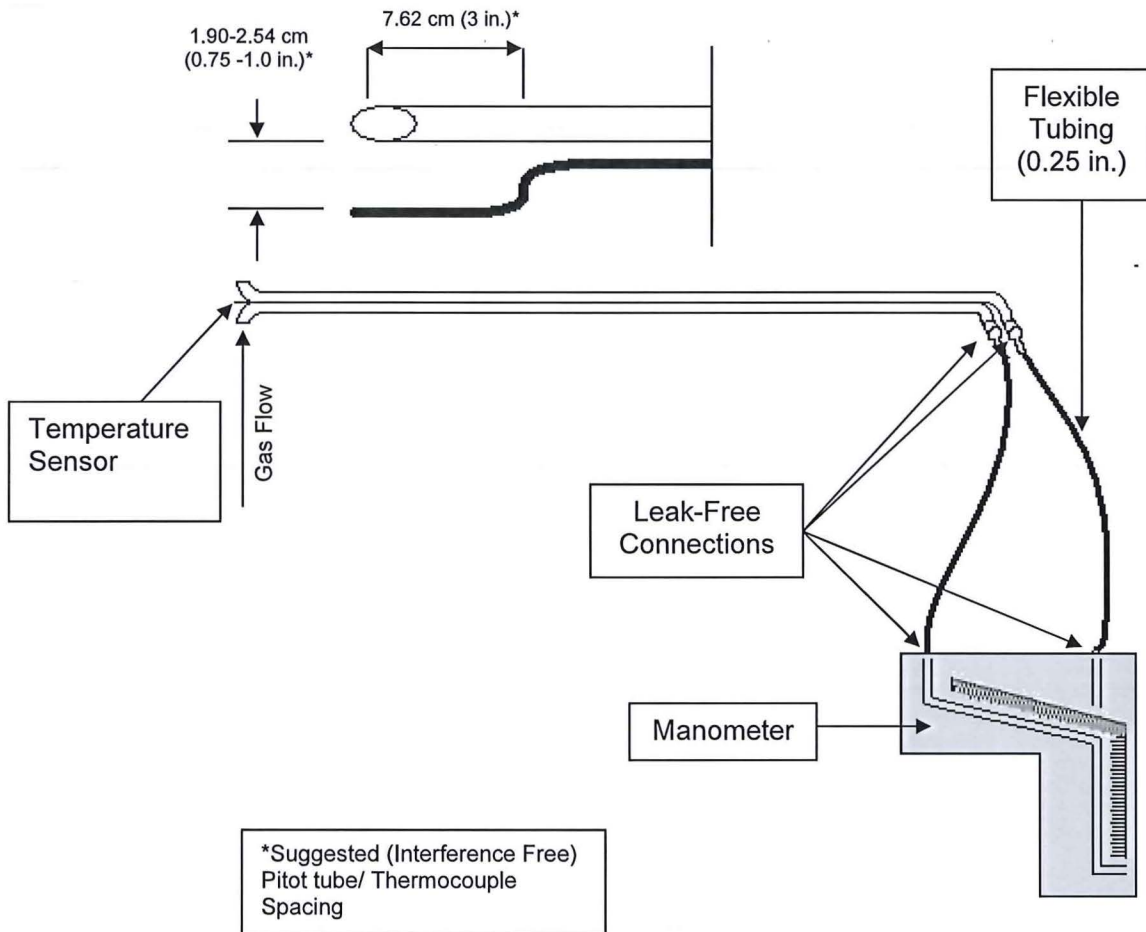
Appendix B - Sample Train Diagrams

RECEIVED

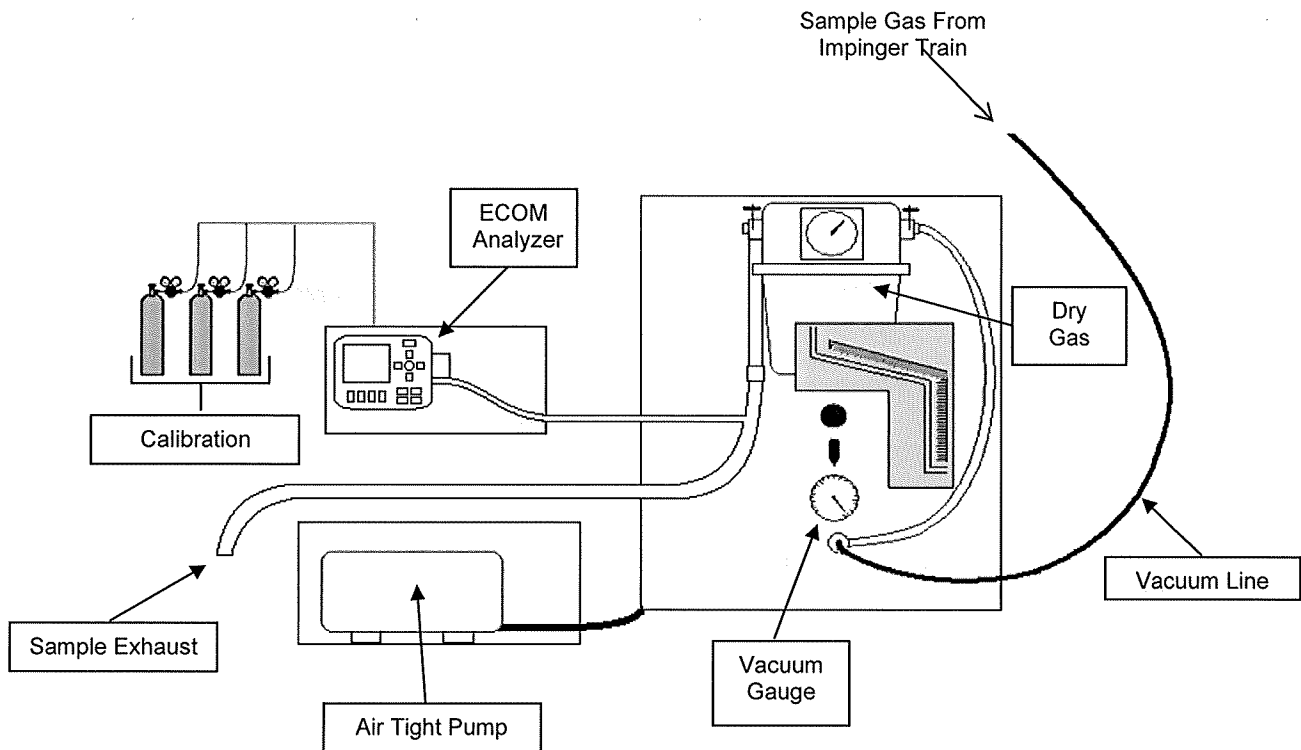
FEB 14 2023

AIR QUALITY DIVISION

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

