1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a compliance test program for Holcim (US) Inc. d/b/a Lafarge Alpena at the Alpena Plant in Alpena, Michigan, on the Clinker Coolers 22 and 23 and Clinker Coolers KG5 Fan 92 and 93 Stacks on July 30 and August 5, 2020. This report summarizes the results of the test program and test methods.

The test location, test date, and test parameter are summarized below.

TEST INFORMATION		
Test Location	**Test Date**	**Test Parameter**
Clinker Coolers 22 and 23 and Clinker Coolers KG5 Fan 92 and 93 Stacks	July 30 and August 5, 2020	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.*"

Test Location	Parameter	Dates	Emission Rate	Emission Limit	CPMS SSOL*
Clinker Cooler 22	FPM	7/30/2020	0.009 lb/ton	0.07 lb/ton	4.18
Clinker Cooler 23	FPM	7/30/2020	0.022 lb/ton	0.07 lb/ton	4.11
Clinker Cooler KG5 Fan 92 Stack	FPM	8/5/2020	0.036 lb/ton	0.07 lb/ton	5.32
Clinker Cooler KG5 Fan 93 Stack	FPM	8/5/2020	0.046 lb/ton	0.07 lb/ton	4.82

*The CPMS SSOL was based on mA recorded by CPMS during testing.

Note that the plant data acquisition handling system (DAHS) times are 58 minutes behind actual time.

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, MI 49707	Mr. Travis Weide Area Environmental & Public Affairs Manager 989-358-3321 travis.weide@lafargeholcim.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Christopher Trezak Senior Project Manager 630-993-2100 (phone) ctrezak@mp-mail.com
Testing Company Personnel		Mr. Ryan Simon Test Engineer
		Mr. Charles Reice Test Engineer
		Mr. Chris Menet Test Engineer
		Mr. Jeremy Carlson Test Engineer
		Mr. Scott McGough Test Engineer
		Mr. Christopher Buglio Test Technician
		Mr. Ken Beckham Test Technician
		Mr. Luke Mazzocco Test Technician
		Mr. William Petrovich Test Technician

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. CEM data and process data as provided by Holcim (US) Inc. 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
Clinker Cooler 22 and 23 (Identical)	85" x 66"	4	4.25"	>0.5	>2.0	FPM	24
Clinker Cooler KG5 Fan 93 Stack (Identical)	62" x 75.5"	6	4.5"	>0.5	>2.0	FPM	28

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 9-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 (O_2)/Carbon Dioxide (CO_2) Determination

A fyrite analyzer was used to determine O_2 and CO_2 concentrations in the stack gas. Grab samples were performed during testing in order to determine O_2 and CO_2 concentrations.

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: Holcim (US) Inc.
Facility: Alpena Plant
Test Location: Clinker Cooler 22
Test Method: 5

Source Condition	Normal	Normal	Normal	
Date	7/30/20	7/30/20	7/30/20	
Start Time	8:25	10:02	11:30	
End Time	9:31	11:08	12:36	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	263.2	252.5	251.5	255.7
Flue Gas Moisture, percent by volume	2.5%	1.6%	2.2%	2.1%
Average Flue Pressure, in. Hg	29.27	29.27	29.27	29.27
Gas Sample Volume, dscf	42.362	49.76	49.364	47.162
Average Gas Velocity, ft/sec	20.776	22.847	22.550	22.058
Gas Volumetric Flow Rate, acfm	48,562	53,402	52,708	51,557
Gas Volumetric Flow Rate, dscfm	33,824	38,099	37,435	36,453
Gas Volumetric Flow Rate, scfm	34,689	38,719	38,268	37,225
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	96.6	100.7	101.7	99.7
Clinker Production Rate, ton/hr	74.4	74.5	75.4	74.8
CPMS Response, mA	4.02	4.03	4.04	4.03
Filterable Particulate Matter (Method 5)				
grams collected	0.00283	0.00716	0.00937	0.00645
grains/acf	0.0007	0.0016	0.0021	0.0015
grains/dscf	0.0010	0.0022	0.0029	0.0020
lb/hr	0.299	0.725	0.940	0.655
lb/ton	0.004	0.010	0.012	0.009
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton		0.07		
CPMS Zero, mA		4.00		
Filterable Particulate Matter, % of Emissions Limit		12.5%		
SSOL		4.18		

Client:	**Holcim (US) Inc.**
Facility:	**Alpena Plant**
Test Location:	**Clinker Cooler 23**
Test Method:	**5**

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**7/30/20**	**7/30/20**	**7/30/20**	
Start Time	**16:00**	**17:20**	**18:33**	
End Time	**17:03**	**18:23**	**19:36**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	256.9	247.9	223.9	242.9
Flue Gas Moisture, percent by volume	2.1%	5.8%	1.9%	3.3%
Average Flue Pressure, in. Hg	29.27	29.27	29.27	29.27
Gas Sample Volume, dscf	52.78	52.895	45.241	50.305
Average Gas Velocity, ft/sec	28.406	27.726	23.343	26.492
Gas Volumetric Flow Rate, acfm	66,396	64,807	54,563	61,922
Gas Volumetric Flow Rate, dscfm	46,835	44,519	40,415	43,923
Gas Volumetric Flow Rate, scfm	47,829	47,278	41,202	45,436
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	97.0	102.3	96.4	98.6
Clinker Production Rate, ton/hr	70.3	69.9	70.3	70.2
CPMS Response, mA	4.07	4.05	4.02	4.05
Filterable Particulate Matter (Method 5)				
grams collected	0.01671	0.01363	0.00963	0.01332
grains/acf	0.0034	0.0027	0.0024	0.0028
grains/dscf	0.0049	0.0040	0.0033	0.0041
lb/hr	1.961	1.517	1.138	1.539
lb/ton	0.028	0.022	0.016	0.022
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton		0.07		
CPMS Zero, mA		4.00		
Filterable Particulate Matter, % of Emissions Limit		31.3%		
SSOL		4.11		

Client:	**Holcim (US) Inc.**
Facility:	**Alpena Plant**
Test Location:	**Clinker Cooler KG5 Fan 92**
Test Method:	**5**

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**8/5/20**	**8/5/20**	**8/5/20**	
Start Time	**9:05**	**11:00**	**12:41**	
End Time	**10:28**	**12:22**	**14:03**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	176.4	143.0	144.9	154.8
Flue Gas Moisture, percent by volume	2.1%	2.2%	2.0%	2.1%
Average Flue Pressure, in. Hg	29.36	29.36	29.36	29.36
Gas Sample Volume, dscf	48.744	49.445	50.401	49.530
Average Gas Velocity, ft/sec	19.395	18.781	19.090	19.089
Gas Volumetric Flow Rate, acfm	37,833	36,635	37,239	37,236
Gas Volumetric Flow Rate, dscfm	30,168	30,793	31,246	30,736
Gas Volumetric Flow Rate, scfm	30,806	31,479	31,898	31,394
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	102.2	101.6	102.0	101.9
Clinker Production Rate, ton/hr	33.0	34.2	34.6	33.9
CPMS Response, mA	5.04	4.77	4.92	4.91
Filterable Particulate Matter (Method 5)				
grams collected	0.01575	0.01547	0.01365	0.01496
grains/acf	0.0040	0.0041	0.0035	0.0039
grains/dscf	0.0050	0.0048	0.0042	0.0047
lb/hr	1.289	1.274	1.119	1.227
lb/ton	0.039	0.037	0.032	0.036

Site Specific Operating Limit (SSOL) Determination	
Source Emissions Limit, lb/ton	0.07
CPMS Zero, mA	4.00
Filterable Particulate Matter, % of Emissions Limit	51.7%
SSOL	5.32

Client:	**Holcim (US) Inc.**
Facility:	**Alpena Plant**
Test Location:	**Clinker Cooler KG5 Fan 93**
Test Method:	**5**

Source Condition	Normal	Normal	Normal	
Date	8/5/20	8/5/20	8/5/20	
Start Time	9:05	11:00	12:41	
End Time	10:28	12:22	14:03	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	157.5	132.4	139.2	143.0
Flue Gas Moisture, percent by volume	1.4%	1.3%	2.0%	1.6%
Average Flue Pressure, in. Hg	29.34	29.34	29.34	29.34
Gas Sample Volume, dscf	55.633	54.53	55.056	55.073
Average Gas Velocity, ft/sec	51.408	48.716	49.991	50.038
Gas Volumetric Flow Rate, acfm	100,279	95,028	97,515	97,607
Gas Volumetric Flow Rate, dscfm	82,947	81,972	82,620	82,513
Gas Volumetric Flow Rate, scfm	84,084	83,063	84,267	83,805
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	101.7	100.9	101.1	101.2
Clinker Production Rate, ton/hr	90.8	91.0	91.4	91.1
CPMS Response, mA	4.76	4.66	4.73	4.72
Filterable Particulate Matter (Method 5)				
grams collected	0.02154	0.02526	0.01624	0.02101
grains/acf	0.0049	0.0062	0.0039	0.0050
grains/dscf	0.0060	0.0071	0.0046	0.0059
lb/hr	4.247	5.022	3.223	4.164
lb/ton	0.047	0.055	0.035	0.046
Site Specific Operating Limit (SSOL) Determination				
Source Emissions Limit, lb/ton		0.07		
CPMS Zero, mA		4.00		
Filterable Particulate Matter, % of Emissions Limit		65.3%		
SSOL		4.82		

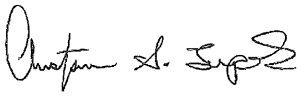
4.0 CERTIFICATION

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.

CERTIFICATION

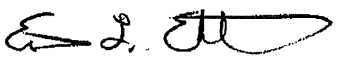
As the program manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results. The test program was performed in accordance with the test methods and the Mostardi Platt Quality Manual, as applicable.

MOSTARDI PLATT



Project Manager

Christopher S. Trezak



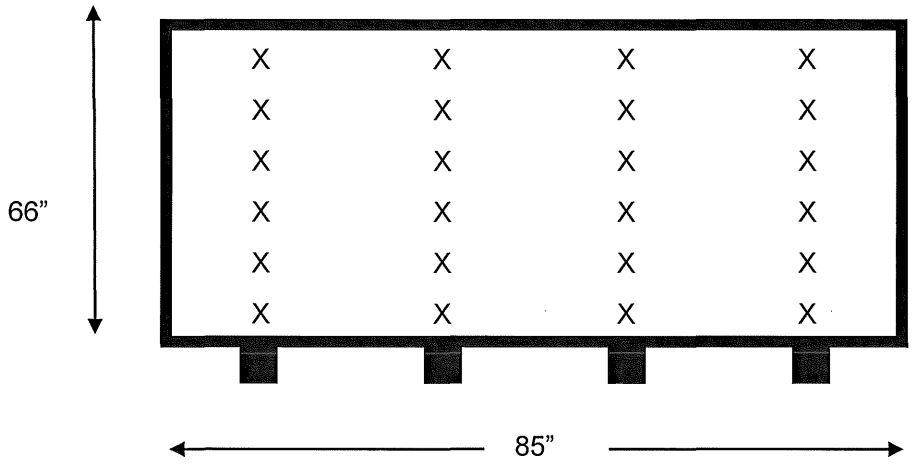
Quality Assurance

Eric L. Ehlers

APPENDICES

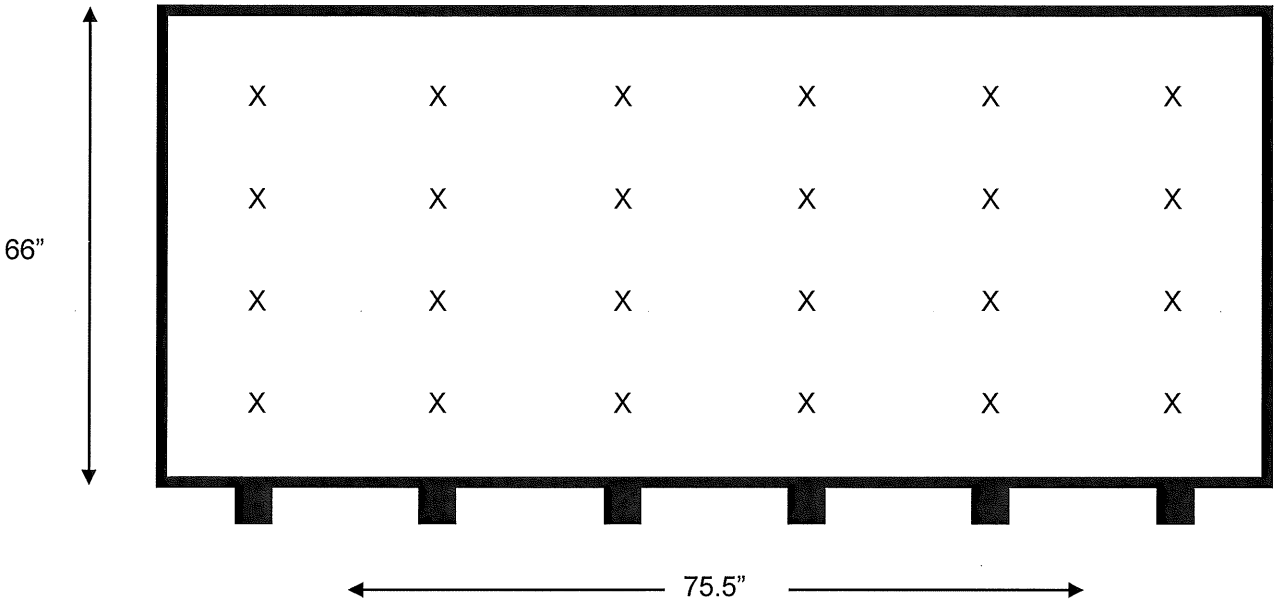
Appendix A - Test Section Diagrams

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Project:	Holcim (US) Inc. Alpena, Michigan
Test Location:	Clinker Coolers 22 and 23 (Each Identical)
Test Date:	July 30, 2020
Stack Dimensions:	66" x 85"
Stack Area:	38.96 Square Feet
No. Points Per Port:	6
No. of Ports:	4

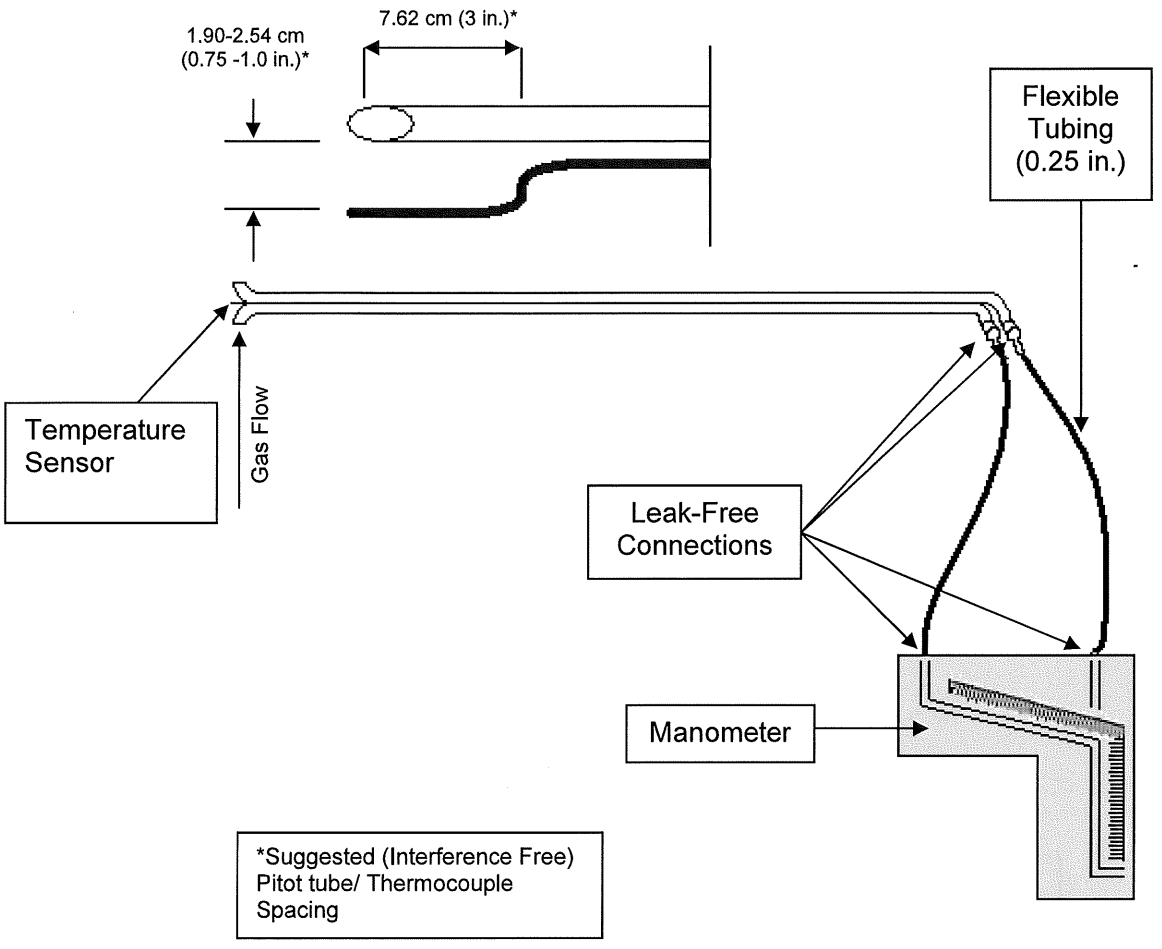
EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



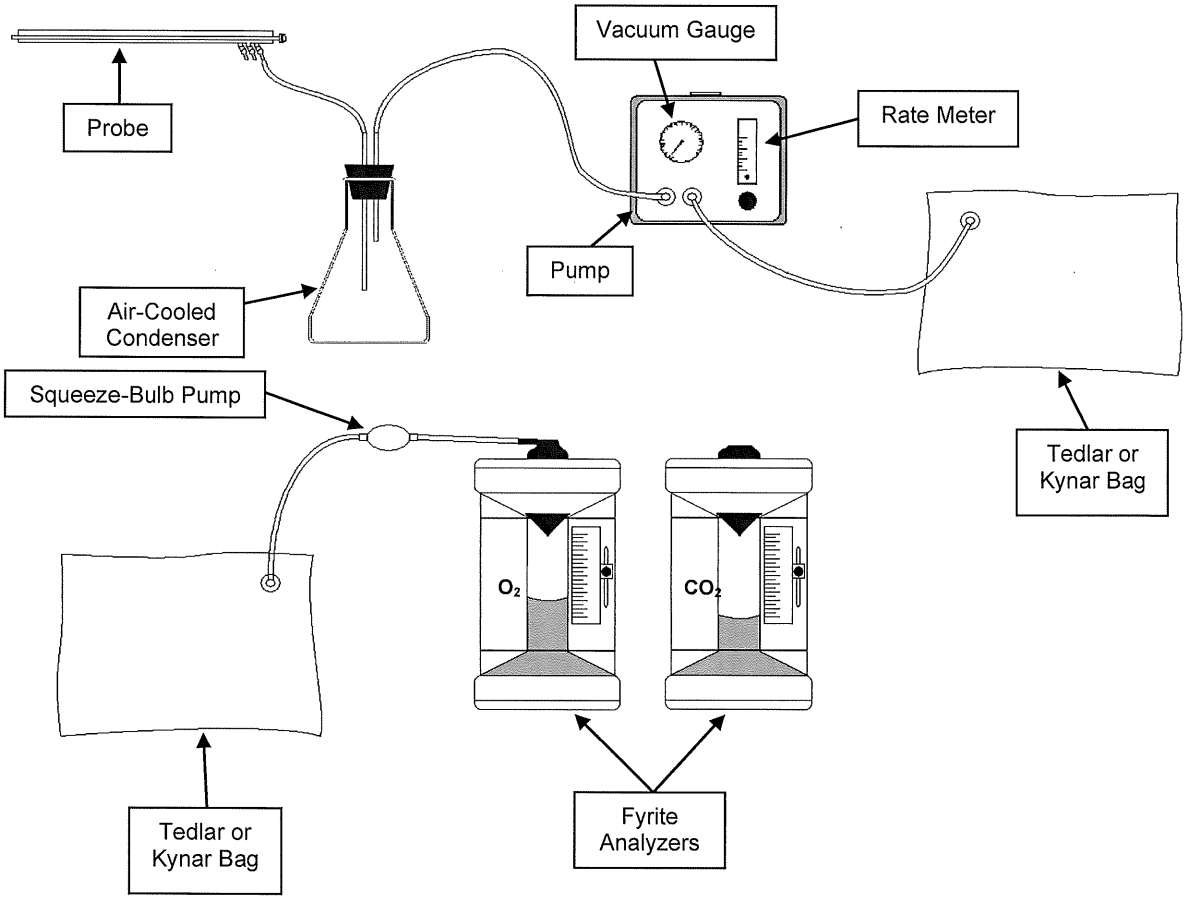
Project:	Holcim (US) Inc. Alpena, Michigan
Test Location:	Clinker Cooler KG5 Fan 92 and 93 Stacks (Each Identical)
Test Date:	August 5, 2020
Stack Dimensions:	62" x 75.5"
Stack Area:	32.51 Square Feet
No. Points Per Port:	4
No. of Ports:	6

Appendix B - Sample Train Diagrams

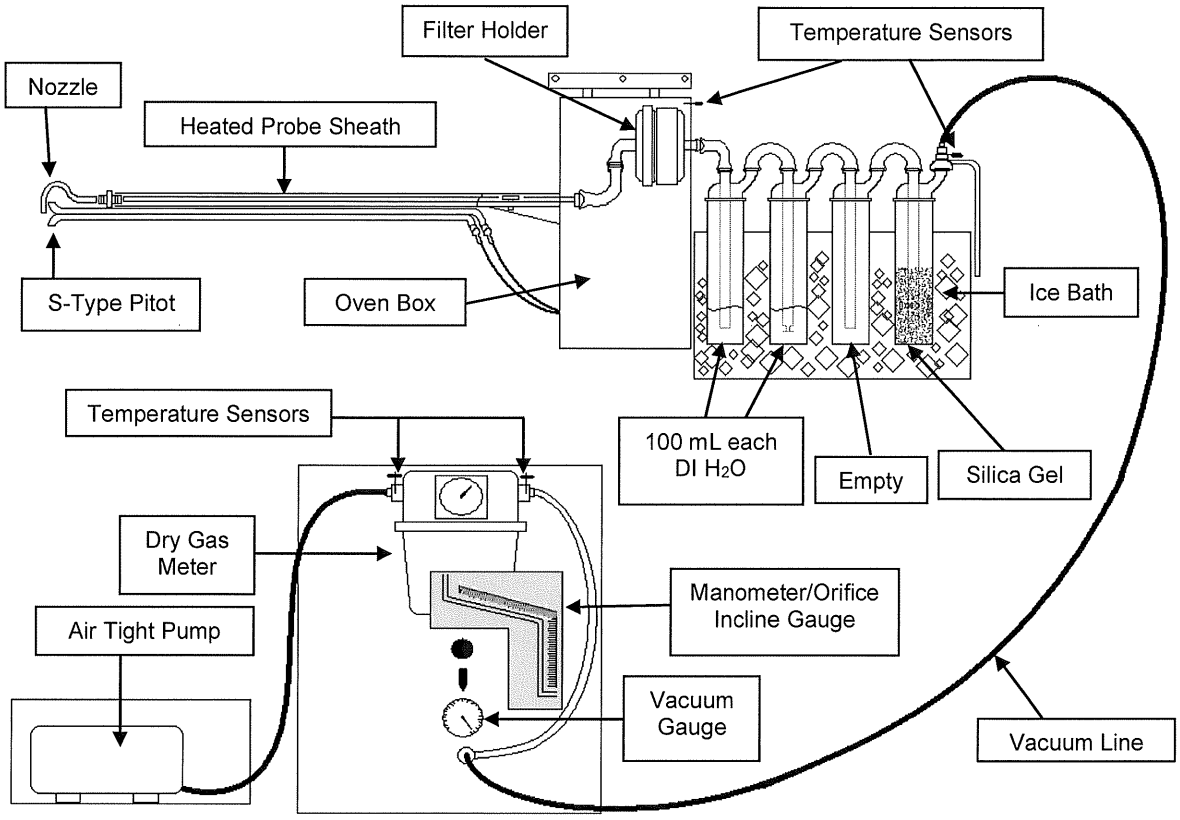
USEPA Method 2 – Type S Pitot Tube Manometer Assembly



USEPA Method 3 - Integrated Oxygen/Carbon Dioxide Sample Train Diagram Utilizing Fyrite Gas Analyzer



USEPA Method 5- Particulate Matter Sample Train Diagram



Appendix C - Calculation Nomenclature and Formulas