mostardi platt

Particulate Matter Compliance Emissions Test Report

Holcim (US) Inc. d/b/a Lafarge Alpena
Alpena Cement Plant
Kilns 20, 21, 22, and 23 Indirect Firing Baghouses
Alpena, Michigan
June 22 through 23, 2022 and
July 6 and July 8, 2022

Report Submittal Date
August 30, 2022

Project No. M222412A

Crown Point, IN | Mendota Heights, MN | Denver, CO | Henderson, NV

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

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1.0 EXECUTIVE SUMMARY

Mostardi Platt conducted a total particulate matter compliance test program on the Kiln 20, 21, 22, and 23 Indirect Firing Baghouses for Holcim (US) Inc. d/b/a Lafarge Alpena at the Alpena Cement Plant in Alpena, Michigan. 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**
Kilns 20, 21, 22, and 23 Indirect Firing Baghouses	June 22 through 23, July 6, and July 8, 2022	Filterable Particulate Matter (FPM), Condensable Particulate Matter (CPM), and Total Particulate Matter (TPM/PM_{10})

The purpose of the test program was to demonstrate compliance with the State of Michigan Renewal Operating Permit, specifically, to demonstrate that each of the below listed sources meet their FPM (and <PM_{10}, as applicable) emission limit.

Test Location	Parameter	Test Result	Emission Limit
Kiln 20 Indirect Firing Baghouse	FPM	0.002 lb/1,000 lb exhaust gas, dry	0.15 lb/1,000 lb exhaust gas, dry
Kiln 20 Indirect Firing Baghouse	PM_{10}	0.2 lb/hr	1.8 lb/hr
Kiln 21 Indirect Firing Baghouse	FPM	0.016 lb/1,000 lb exhaust gas, dry	0.15 lb/1,000 lb exhaust gas, dry
Kiln 21 Indirect Firing Baghouse	PM_{10}	1.4 lb/hr	1.8 lb/hr
Kiln 22 Indirect Firing Baghouse	FPM	0.019 lb/1,000 lb exhaust gas, dry	0.15 lb/1,000 lb exhaust gas, dry
Kiln 22 Indirect Firing Baghouse	PM_{10}	2.5 lb/hr	2.9 lb/hr
Kiln 23 Indirect Firing Baghouse	FPM	0.012 lb/1,000 lb exhaust gas, dry	0.15 lb/1,000 lb exhaust gas, dry
Kiln 23 Indirect Firing Baghouse	PM_{10}	2.0 lb/hr	2.9 lb/hr

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	Ms. Mallory Miller Area Environmental Engineer 224-517-6896 Mallory.miller@lafargeholcim.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Chris Trezak Senior Project Manager 630-993-2100 (phone) ctrezak@mp-mail.com

The test crew consisted of Messrs. C. Buglio, K. Beckham, D. Jordan, M. Friduss, D. Jordan, R. Spoolstra, J. Meyerhoff, and C. Trezak.

2.0 TEST METHODOLOGY

Emission testing was conducted following the United States Environmental Protection Agency (USEPA) methods specified in 40CFR60, Appendix A and 40CFR51, Appendix M 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**	**Upstream Diameters**	**Downstream Diameters**	**Test Parameter**	**Number of Sampling Points**
Kiln 20 Indirect Firing Baghouse	2.33 Feet	2	>2.0	>8.0	FPM/PM_{10}	12
Kiln 21 Indirect Firing Baghouse	2.29 Feet	2	5.5	3.8	FPM/PM_{10}	12
Kiln 22 Indirect Firing Baghouse	3.0 Feet	2	>0.5	>2.0	TPM/PM_{10}	24
Kiln 23 Indirect Firing Baghouse	3.04167 Feet	2	2.6	9.9	FPM/PM_{10}	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 particulate 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. All testing was considered to be ambient, per section 8.6 of USEPA Method 2, and therefore a dry molecular weight of 29.0 was used at this location.

Method 201A Filterable Particulate Matter Determination

Stack gas PM_{10} emission rates were determined in accordance with Method 201A, 40CFR51, Appendix M. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method. The samples were analyzed by Mostardi Platt in accordance with the Method in the Elmhurst, Illinois laboratory. Laboratory data is found in Appendix D. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data is presented in Appendix H.

Method 202 Condensable Particulate Determination

Stack gas condensable particulate matter concentrations and emission rates were determined in accordance with USEPA Method 202, in conjunction with Method 5 or Method 201A filterable particulate sampling. This method applies to the determination of CPM emissions from stationary sources. It is intended to represent condensable matter as material that condenses after passing through a filter and as measured by this method.

The CPM was collected in impingers after filterable particulate material was collected using Method 202. Compared to the December 17, 1991 promulgated Method 202, this Method includes the addition of a condenser, followed by a water dropout impinger immediately after the final heated filter. One modified Greenburg Smith impinger and an ambient temperature filter follow the water dropout impinger.

CPM was collected in the water dropout, modified Greenburg Smith impinger and ambient filter portion of the sampling train as described in this Method. The impinger contents were purged with nitrogen (N_2) immediately after sample collection to remove dissolved sulfur dioxide (SO_2) gases from the impingers. The impinger solution was then extracted with deionized water and hexane. The organic and aqueous fractions were dried and the residues weighed. The total of the aqueous, organic, and ambient filter fractions represents the CPM.

All sample recovery was performed at the test site by the test crew. Mostardi Platt personnel at the laboratory in Elmhurst, Illinois, performed all final particulate sample analyses. 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 RESULTS SUMMARIES

Client: Holcim (US) Inc.
Facility: Alpena Cement Plant
Test Location: Indirect Firing Baghouse 20
Test Method: 201A/202

Source Condition	Normal	Normal	Normal	
Date	7/8/22	7/8/22	7/8/22	
Start Time	8:20	10:22	12:22	
End Time	9:53	11:53	13:53	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	150.3	151.1	150.0	150.5
Flue Gas Moisture, percent by volume	5.2%	5.7%	4.7%	5.2%
Average Flue Pressure, in. Hg	29.64	29.64	29.64	29.64
Gas Sample Volume, dscf	35.720	35.513	35.402	35.545
Average Gas Velocity, ft/sec	81.698	81.526	80.701	81.308
Gas Volumetric Flow Rate, acfm	20,901	20,857	20,646	20,801
Gas Volumetric Flow Rate, dscfm	16,980	16,840	16,870	16,897
Gas Volumetric Flow Rate, scfm	17,909	17,850	17,700	17,820
Isokinetic Variance	103.4	103.6	103.1	103.4
Filterable <PM10 (Method 201A)				
grams collected	0.00235	0.00057	0.00259	0.00184
grains/acf	0.0008	0.0002	0.0009	0.0006
grains/dscf	0.0010	0.0002	0.0011	0.0008
lb/hr	0.1	0.0	0.2	0.1
lb/1000 lb of stack gas	0.002	0.000	0.002	0.002
Condensable PM (Method 202)				
grams collected	0.00213	0.00194	0.00024	0.00144
grains/acf	0.0007	0.0007	0.0001	0.0005
grains/dscf	0.0009	0.0008	0.0001	0.0006
lb/hr	0.1	0.1	0.0	0.1
Total PM<10 (Method 201A/202)				
grams collected	0.00448	0.00251	0.00283	0.00328
grains/acf	0.0016	0.0009	0.0010	0.0012
grains/dscf	0.0019	0.0011	0.0012	0.0014
lb/hr	0.3	0.2	0.2	0.2

Client:	**Holcim (US) Inc.**
Facility:	**Alpena Cement Plant**
Test Location:	**Indirect Firing Baghouse 21**
Test Method:	**201A/202**

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**7/6/22**	**7/6/22**	**7/6/22**	
Start Time	**11:40**	**14:55**	**17:20**	
End Time	**13:14**	**16:28**	**18:52**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	156.2	156.3	156.5	156.3
Flue Gas Moisture, percent by volume	5.9%	5.5%	5.9%	5.8%
Average Flue Pressure, in. Hg	29.43	29.43	29.43	29.43
Gas Sample Volume, dscf	34.664	34.572	35.070	34.769
Average Gas Velocity, ft/sec	80.714	80.502	80.429	80.548
Gas Volumetric Flow Rate, acfm	19,946	19,894	19,876	19,905
Gas Volumetric Flow Rate, dscfm	15,828	15,849	15,753	15,810
Gas Volumetric Flow Rate, scfm	16,813	16,765	16,745	16,774
Isokinetic Variance	95.2	94.8	96.7	95.6
Filterable <PM10 (Method 201A)				
grams collected	0.02185	0.01168	0.02465	0.01939
grains/acf	0.0077	0.0042	0.0086	0.0068
grains/dscf	0.0097	0.0052	0.0108	0.0086
lb/hr	1.3	0.7	1.5	1.2
lb/1000 lb of stack gas	0.019	0.010	0.021	0.016
Condensable PM (Method 202)				
grams collected	0.00143	0.00698	0.00347	0.00396
grains/acf	0.0005	0.0025	0.0012	0.0014
grains/dscf	0.0006	0.0031	0.0015	0.0017
lb/hr	0.1	0.4	0.2	0.2
Total PM<10 (Method 201A/202)				
grams collected	0.02328	0.01866	0.02812	0.02335
grains/acf	0.0082	0.0066	0.0098	0.0082
grains/dscf	0.0104	0.0083	0.0124	0.0104
lb/hr	1.4	1.1	1.7	1.4

Client:	**Holcim (US) Inc.**
Facility:	**Alpena Cement Plant**
Test Location:	**Indirect Firing Baghouse 22**
Test Method:	**201A/202**

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**6/22/22**	**6/22/22**	**6/23/22**	
Start Time	**14:23**	**16:25**	**6:00**	
End Time	**16:03**	**18:05**	**7:40**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	159.6	160.1	160.0	159.9
Flue Gas Moisture, percent by volume	4.2%	3.5%	3.5%	3.7%
Average Flue Pressure, in. Hg	28.83	28.83	28.83	28.83
Gas Sample Volume, dscf	37.888	38.209	38.511	38.203
Average Gas Velocity, ft/sec	83.923	84.211	84.259	84.131
Gas Volumetric Flow Rate, acfm	35,593	35,715	35,736	35,681
Gas Volumetric Flow Rate, dscfm	27,987	28,276	28,309	28,191
Gas Volumetric Flow Rate, scfm	29,229	29,304	29,326	29,286
Isokinetic Variance	99.6	98.7	99.4	99.2
Filterable <PM10 (Method 201A)				
grams collected	0.02393	0.02391	0.02501	0.02428
grains/acf	0.0077	0.0076	0.0079	0.0077
grains/dscf	0.0097	0.0097	0.0100	0.0098
lb/hr	2.3	2.3	2.4	2.4
lb/1000 lb of stack gas	0.019	0.019	0.019	0.019
Condensable PM (Method 202)				
grams collected	0.00208	0.00086	0.00111	0.00135
grains/acf	0.0007	0.0003	0.0004	0.0005
grains/dscf	0.0008	0.0003	0.0004	0.0005
lb/hr	0.2	0.1	0.1	0.1
Total PM<10 (Method 201A/202)				
grams collected	0.02601	0.02477	0.02612	0.02563
grains/acf	0.0083	0.0079	0.0083	0.0082
grains/dscf	0.0106	0.0100	0.0105	0.0104
lb/hr	2.5	2.4	2.5	2.5

Client:	**Holcim (US) Inc.**
Facility:	**Alpena Cement Plant**
Test Location:	**Indirect Firing Baghouse 23**
Test Method:	**201A/202**

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**7/6/22**	**7/6/22**	**7/6/22**	
Start Time	**11:03**	**13:53**	**16:18**	
End Time	**12:38**	**15:28**	**17:53**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	155.1	155.9	155.0	155.3
Flue Gas Moisture, percent by volume	6.0%	5.7%	5.5%	5.7%
Average Flue Pressure, in. Hg	29.42	29.42	29.42	29.42
Gas Sample Volume, dscf	35.540	35.353	35.481	35.458
Average Gas Velocity, ft/sec	85.428	84.449	84.361	84.746
Gas Volumetric Flow Rate, acfm	37,245	36,818	36,780	36,948
Gas Volumetric Flow Rate, dscfm	29,550	29,269	29,358	29,392
Gas Volumetric Flow Rate, scfm	31,442	31,040	31,054	31,179
Isokinetic Variance	100.7	101.1	101.2	101.0
Filterable <PM10 (Method 201A)				
grams collected	0.02389	0.00756	0.01090	0.01412
grains/dscf	0.0104	0.0033	0.0047	0.0061
lb/hr	2.6	0.8	1.2	1.5
lb/1000 lb of stack gas	0.020	0.006	0.009	0.012
Condensable PM (Method 202)				
grams collected	0.00558	0.00195	0.00581	0.00445
grains/acf	0.0019	0.0007	0.0020	0.0015
grains/dscf	0.0024	0.0009	0.0025	0.0019
lb/hr	0.6	0.2	0.6	0.5
Total PM<10 (Method 201A/202)				
grams collected	0.02947	0.00951	0.01671	0.01856
grains/acf	0.0102	0.0033	0.0058	0.0064
grains/dscf	0.0128	0.0042	0.0073	0.0081
lb/hr	3.2	1.0	1.8	2.0

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.

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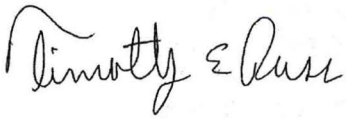
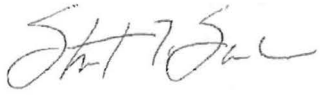


Project Manager

Timothy E. Russ



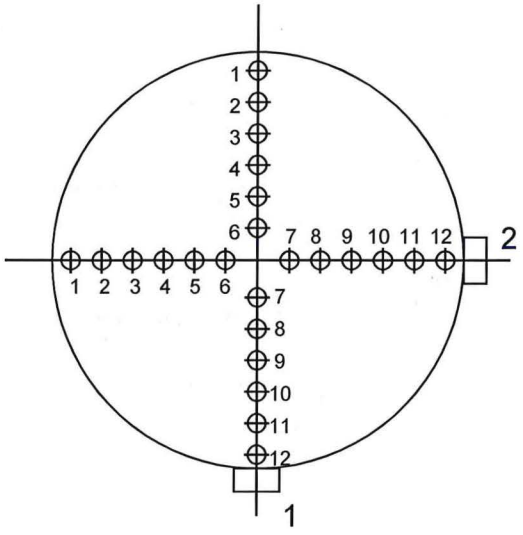
Quality Assurance

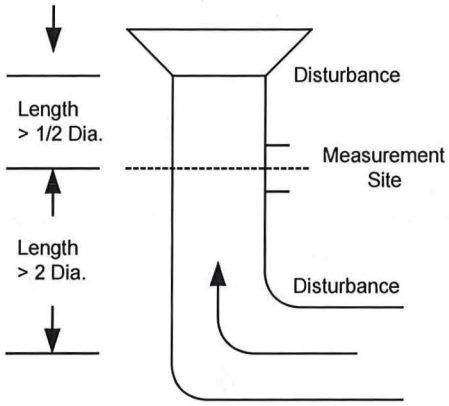
Stuart T. Sands

APPENDICES

Appendix A - Test Section Diagrams

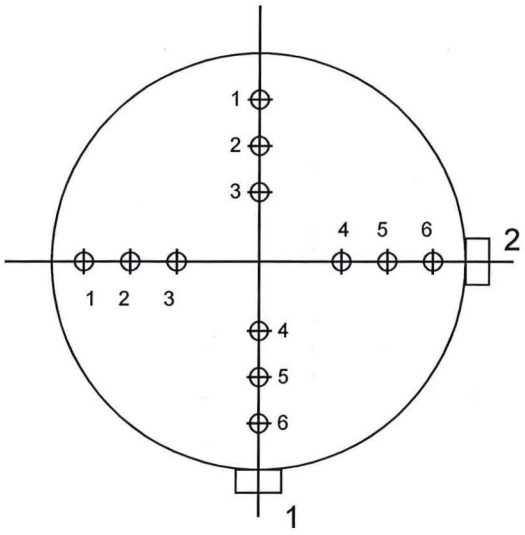
EQUAL AREA TRAVERSE FOR ROUND DUCTS

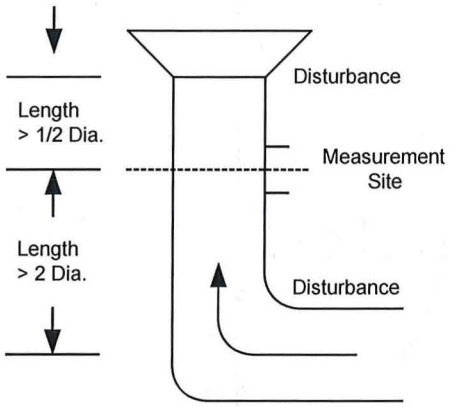




Job:	Holcim (US) Inc. Alpena Cement Plant Alpena, Michigan
Test Location:	Kiln 20 Indirect Firing Baghouse
Duct Diameter:	2.33 Feet
Duct Area:	4.276 Square Feet
No. Points Across Diameter:	12
No. of Ports:	2
Port Length:	6.0”

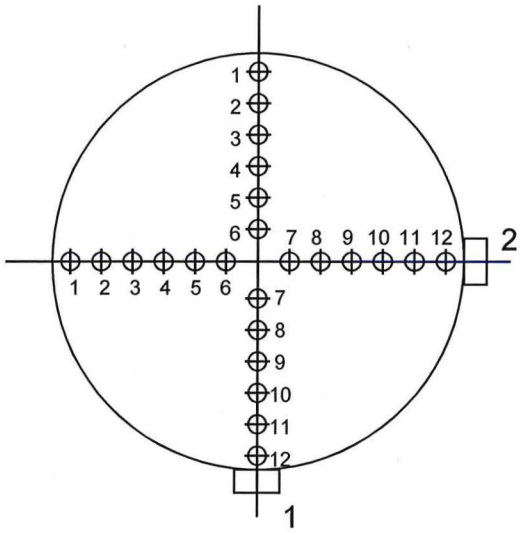
EQUAL AREA TRAVERSE FOR ROUND DUCTS

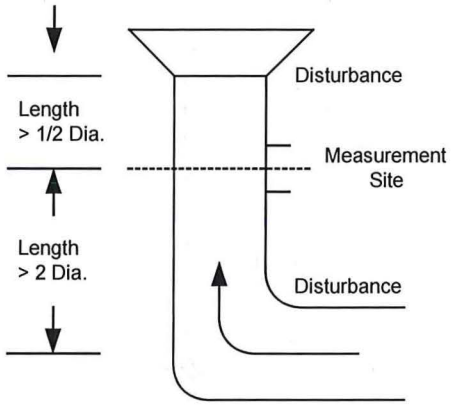




Job:	Holcim (US) Inc. Alpena Cement Plant Alpena, Michigan
Test Location:	Kiln 21 Indirect Firing Baghouse
Duct Diameter:	2.25 Feet
Duct Area:	3.976 Square Feet
No. Points Across Diameter:	6
No. of Ports:	2
Port Length:	6.0”

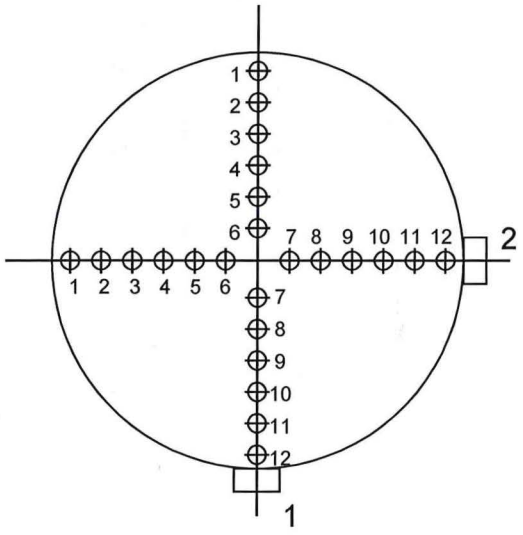
EQUAL AREA TRAVERSE FOR ROUND DUCTS

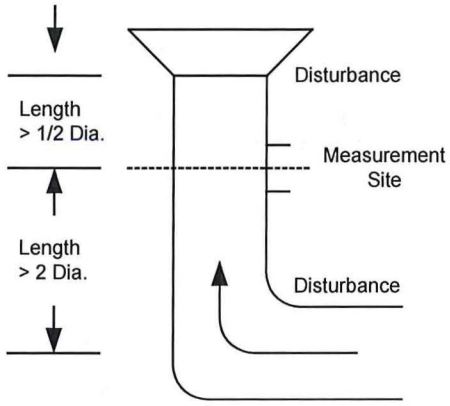




Job:	Holcim (US) Inc. Alpena Cement Plant Alpena, Michigan
Test Location:	Kiln 22 Indirect Firing Baghouse
Duct Diameter:	3.0 Feet
Duct Area:	7.069 Square Feet
No. Points Across Diameter:	6
No. of Ports:	2
Port Length:	6.5”

EQUAL AREA TRAVERSE FOR ROUND DUCTS

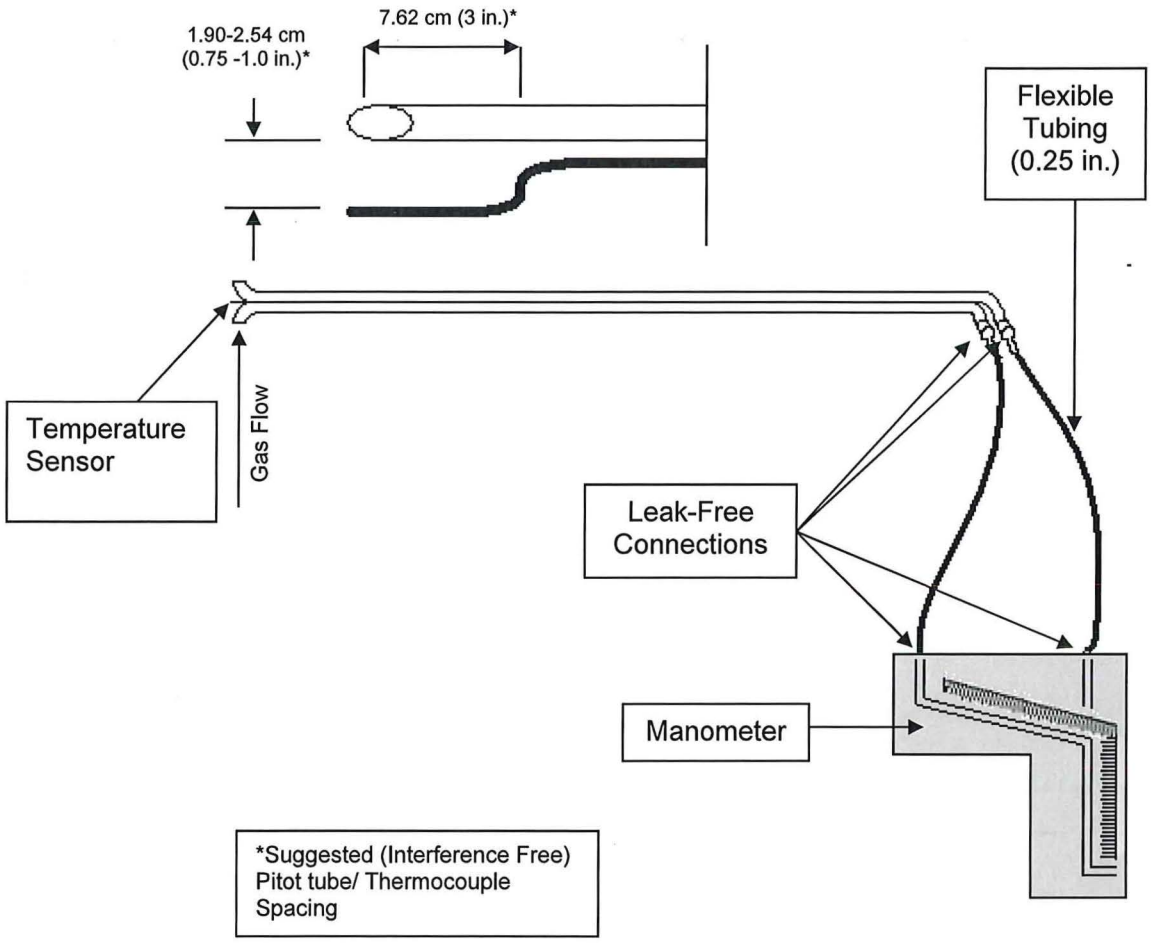




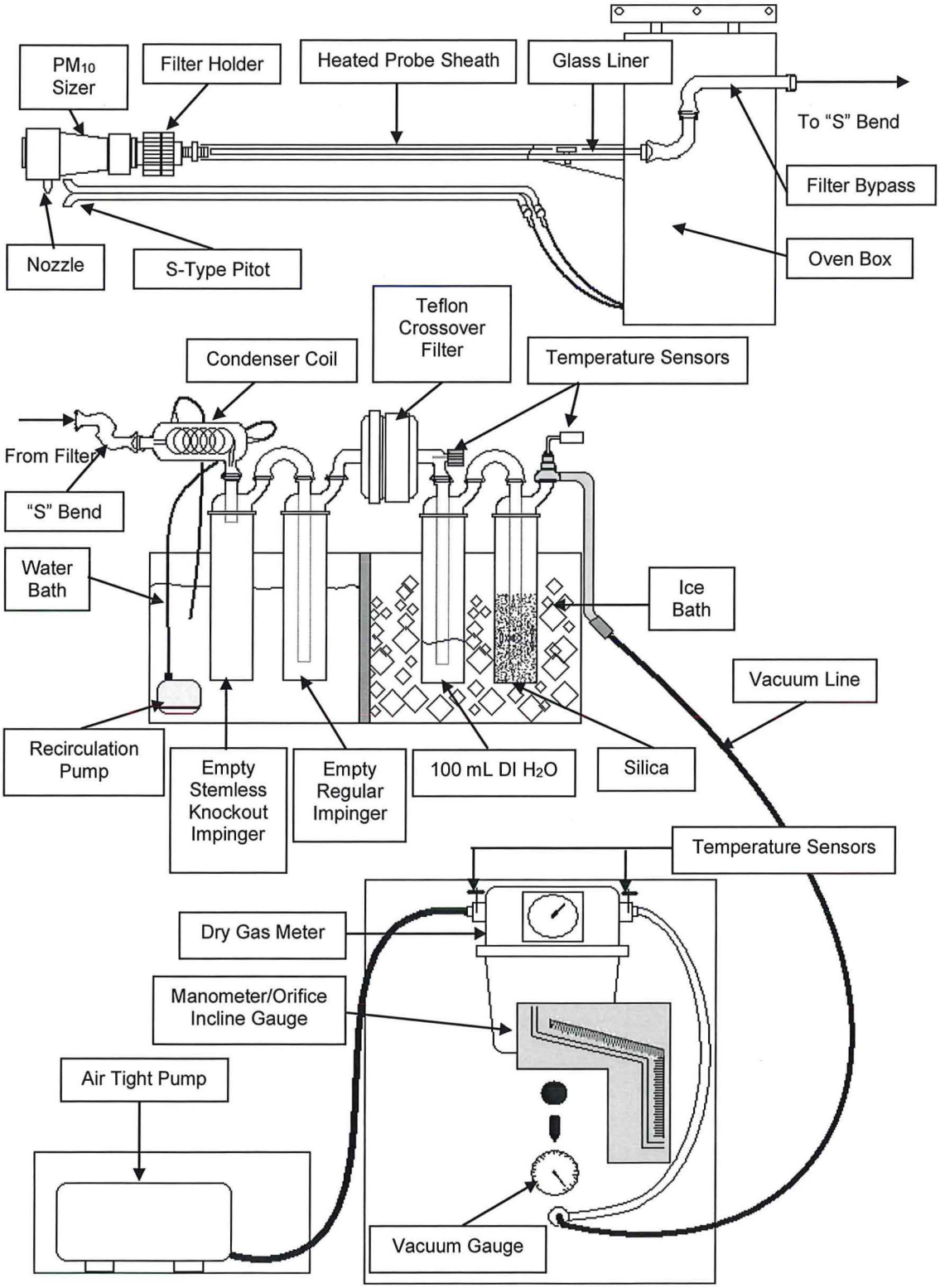
Job:	Holcim (US) Inc. Alpena Cement Plant
Test Location:	Kiln 23 Indirect Firing Baghouse
Duct Diameter:	3.0416 Feet
Duct Area:	7.266 Square Feet
No. Points Across Diameter:	12
No. of Ports:	2
Port Length:	5.5"

Appendix B - Sample Train Diagrams

USEPA Method 2 – Type S Pitot Tube Manometer Assembly



USEPA Method 201a/202- PM_{10} and Condensable Particulate Matter



Appendix C - Calculation Nomenclature and Formulas