

1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a compliance test program 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
Kiln 19 Breaching Duct	August 23, 2021	Filterable Particulate Matter (FPM)
Clinker Cooler 23 Stack	August 25, 2021	

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	Emission Limit	CPMS SSOL
Kiln 19 Breaching Duct	FPM	0.024 lb/ton	0.07 lb/ton	4.95
Clinker Cooler 23	FPM	0.008 lb/ton	0.07 lb/ton	4.94

Run 1 was not used in the average emissions for the Kiln 19 Breaching Duct testing as the results indicate that the reference method sample train collected particulate matter from the bottom of the duct. All emissions for Kiln 19 Breaching Duct are based on Runs 2, 3, and 4.

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. Daniel J. Kossack Project Manager 630-993-2100 (phone) dkossack@mp-mail.com

The test crew consisted of Messrs. M. Friduss, C. Reice, and D. Kossack.

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
Kiln 19 Breaching Duct	8' x 9.91667'	3	3.25	77 inches	84 inches	FPM	27
Clinker Cooler 23 Stack	85" x 66"	4	4.25	>0.5	>2.0	FPM	24

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 3 Oxygen (O₂)/Carbon Dioxide (CO₂) Determination

Stack gas O₂ and CO₂ gas contents are determined in accordance with Method 3, 40CFR60, during each test at the Clinker Cooler 23 Stack to calculate the molecular weight of the exhaust gas. This method analyzes samples collected in a grab manner using a Fyrite gas analyzer. Several gas extractions are performed during each test run to ensure a stable reading. Mandatory leak checks are performed prior to and following each use. Chemicals are changed frequently and inspected for reactivity prior to each use. This testing will meet the performance specifications as outlined in the Method.

Method 3A Oxygen (O₂)/Carbon Dioxide (CO₂) Determination

Flue gas O₂ and CO₂ concentrations for the Kiln 19 Breaching Duct were determined in accordance with USEPA Method 3A. An ECOM analyzer was used to determine the O₂ and CO₂ concentrations by connecting the analyzer to the exit of the dry gas meter. 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. Copies of the gas cylinder certifications are found in Appendix H. Per section 8.6 of USEPA Method 2, Clinker Cooler 23 is considered ambient and therefore 0.0% CO₂ and 20.9% O₂ concentrations were used for molecular weight determination at this test location.

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 were 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 is 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 Cement Plant
Test Location: Kiln 19 Breaching Duct
Test Method: 5

Source Condition	Normal	Normal	Normal	Normal	
Date	8/23/21	8/23/21	8/23/21	8/23/21	
Start Time	8:25	13:31	15:07	16:48	
End Time	9:46	14:44	16:22	18:03	Runs 2, 3, and 4
	Run 1	Run 2	Run 3	Run 4	Average
Stack Conditions					
Average Gas Temperature, °F	415.3	407.3	405.0	411.9	408.1
Flue Gas Moisture, percent by volume	8.1%	8.8%	7.9%	7.9%	8.2%
Average Flue Pressure, in. Hg	29.13	29.13	29.13	29.13	29.13
Gas Sample Volume, dscf	45.461	40.574	41.348	42.018	41.313
Average Gas Velocity, ft/sec	36.917	33.678	34.010	35.055	34.248
Gas Volumetric Flow Rate, acfm	175,725	160,309	161,888	166,861	163,019
Gas Volumetric Flow Rate, dscfm	94,817	86,697	88,595	90,593	88,628
Gas Volumetric Flow Rate, scfm	103,216	95,030	96,225	98,392	96,549
Average %CO ₂ by volume, dry basis	15.7	15.4	16.3	15.7	15.8
Average %O ₂ by volume, dry basis	9.4	10.2	9.5	9.1	9.6
Isokinetic Variance	104.2	101.7	101.4	100.8	101.3
Clinker Production Rate, ton/hr	49.7	47.7	50.1	50.8	49.5
CPMS Response, mA	4.37	4.47	4.45	4.36	4.43
Filterable Particulate Matter (Method 5)					
grams collected	0.29483	0.00508	0.00515	0.00202	0.00408
grains/acf	0.0540	0.0010	0.0011	0.0004	0.0008
grains/dscf	0.1001	0.0019	0.0019	0.0007	0.0015
lb/hr	81.327	1.436	1.459	0.576	1.157
lb/ton of clinker	1.636	0.030	0.029	0.011	0.024
Site Specific Operating Limit (SSOL) Determination					
Source Emissions Limit, lb/ton			0.07		
CPMS Zero, mA			4.00		
Filterable Particulate Matter, % of Emissions Limit			33.6%		
SSOL			4.95		

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

	Source Condition	Normal	Normal	Normal	
	Date	8/25/21	8/25/21	8/25/21	
	Start Time	10:35	12:50	14:13	
	End Time	11:38	13:53	15:16	
		Run 1	Run 2	Run 3	Average
Stack Conditions					
Average Gas Temperature, °F		240.8	247.8	240.8	243.1
Flue Gas Moisture, percent by volume		3.4%	2.3%	1.5%	2.4%
Average Flue Pressure, in. Hg		29.30	29.30	29.30	29.30
Gas Sample Volume, dscf		35.163	33.967	33.331	34.154
Average Gas Velocity, ft/sec		12.434	12.083	11.735	12.084
Gas Volumetric Flow Rate, acfm		29,065	28,243	27,430	28,246
Gas Volumetric Flow Rate, dscfm		20,712	20,165	19,926	20,268
Gas Volumetric Flow Rate, scfm		21,444	20,632	20,238	20,771
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		103.1	102.2	101.5	102.3
Clinker Production Rate, ton/hr		78.7	79.3	79.1	79.0
CPMS Response, mA		4.16	4.12	4.15	4.14
Filterable Particulate Matter (Method 5)					
grams collected		0.00827	0.00643	0.00958	0.00809
grains/acf		0.0026	0.0021	0.0032	0.0026
grains/dscf		0.0036	0.0029	0.0044	0.0036
lb/hr		0.644	0.505	0.757	0.635
lb/ton of clinker		0.008	0.006	0.010	0.008
Site Specific Operating Limit (SSOL) Determination					
Source Emissions Limit, lb/ton				0.07	
CPMS Zero, mA				4.00	
Filterable Particulate Matter, % of Emissions Limit				11.5%	
SSOL				4.94	

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



Project Manager

Daniel J. Kossack



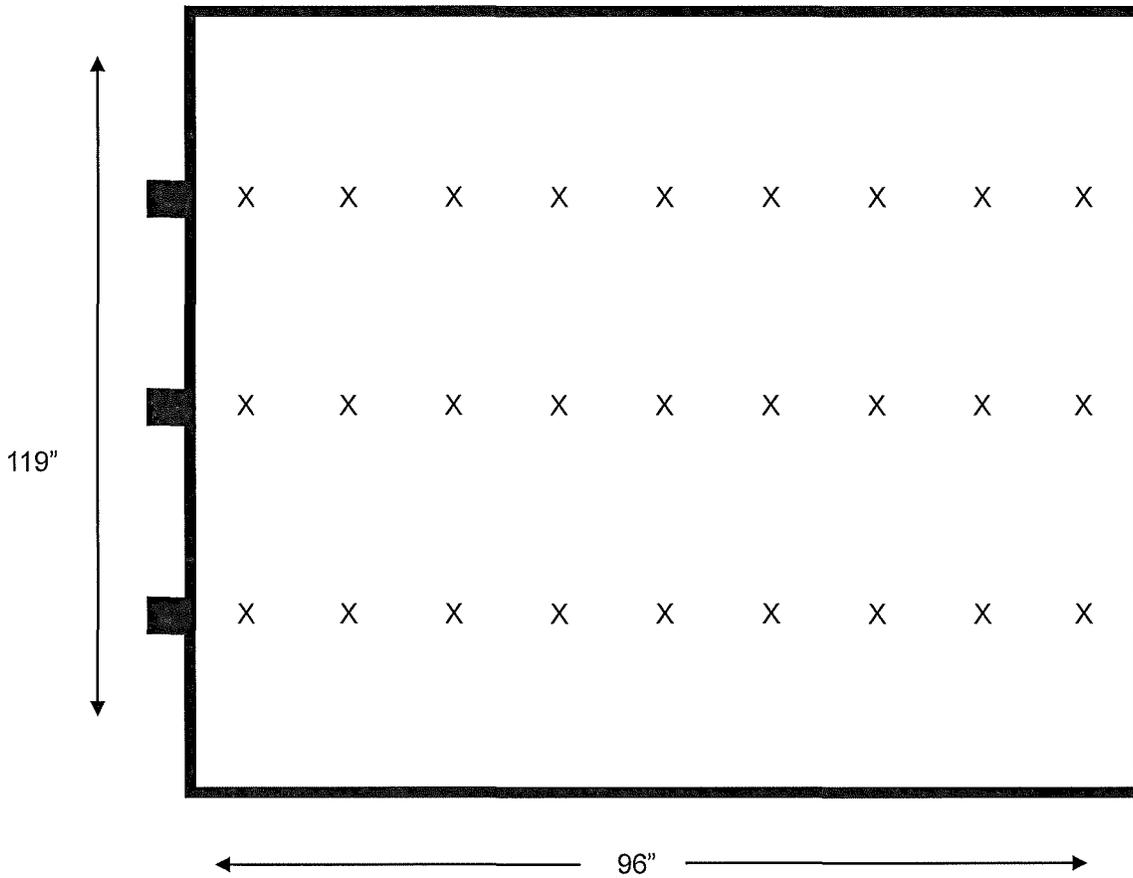
Quality Assurance

Jeffrey M. Crivlare

APPENDICES

Appendix A - Test Section Diagrams

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Job: Holcim (US) Inc.
Alpena Cement Plant
Alpena, Michigan

Test Date: August 23, 2021

Area: 79.33 square feet

Test Location: Kiln 19 Breaching Duct

No. Test Ports: 3

Length: 96 Inches

Tests Points per Port: 9

Width: 119 Inches

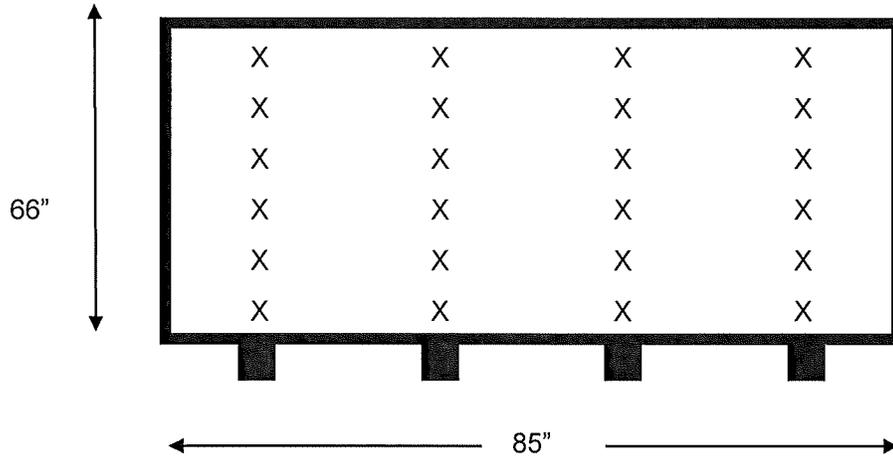
Upstream: 77.0 Inches

Downstream: 84.0 Inches

Equivalent Diameter: 106.3 Inches

Port Length: 3.25 Inches

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Project: Holcim (US) Inc.
Alpena, Michigan

Test Locations: Clinker Cooler 23 Stack

Test Date: August 25, 2021

Stack Dimensions: 66" x 85"

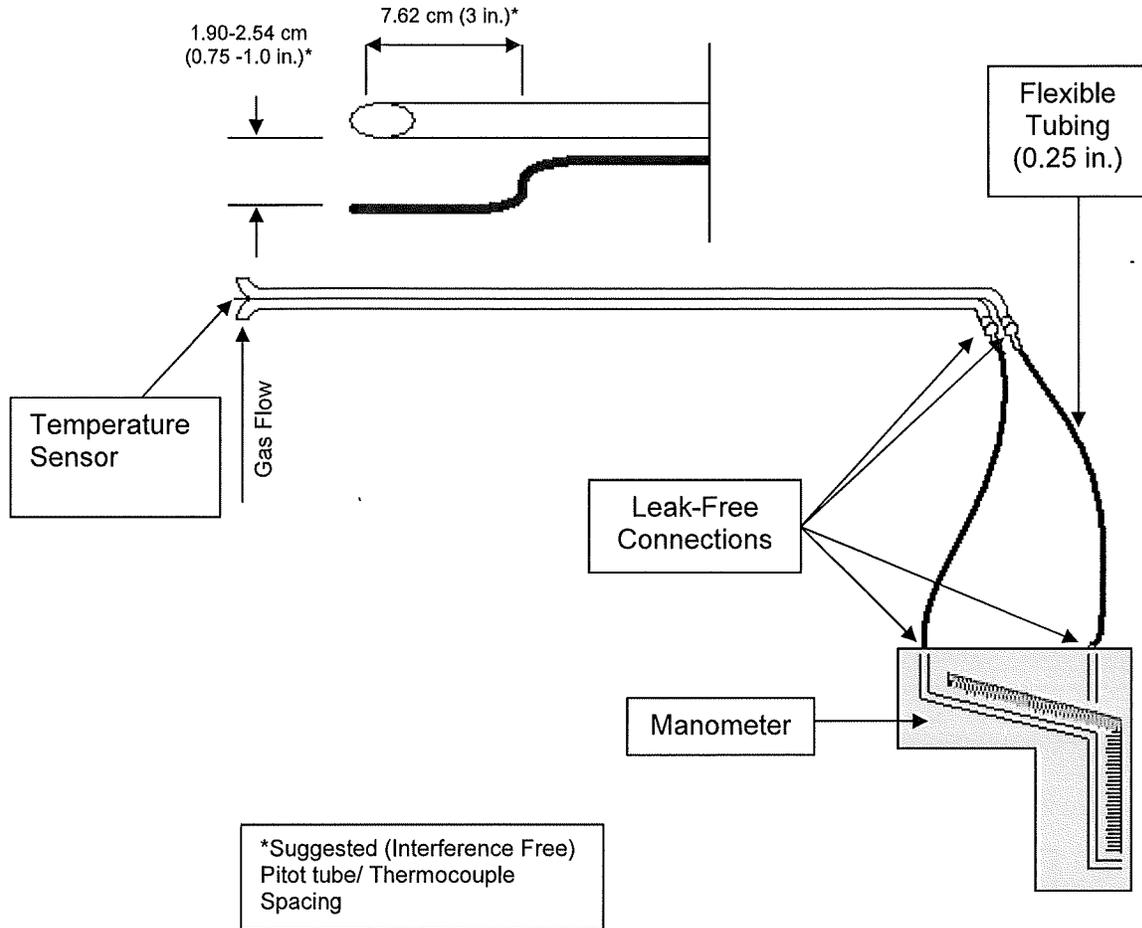
Stack Area: 38.96 Square Feet

No. Points Per Port: 6

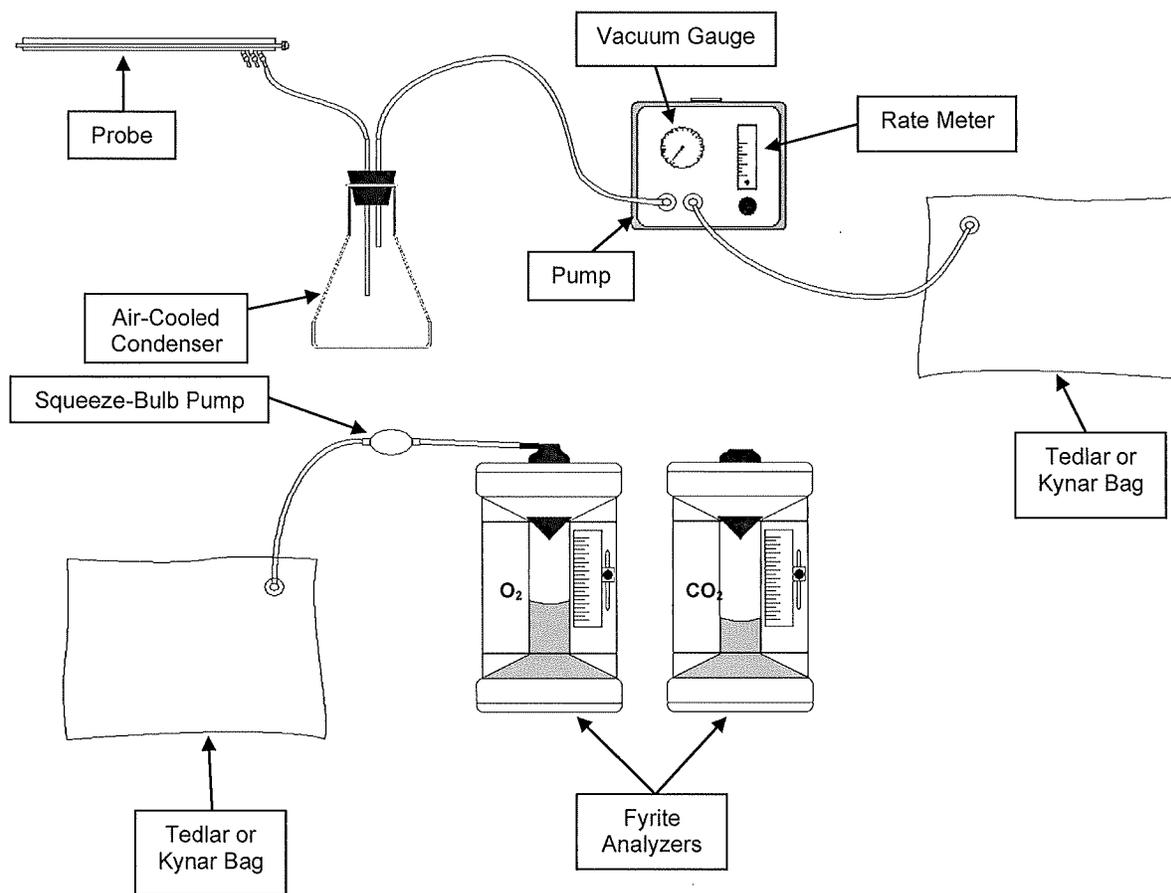
No. of Ports: 4

Appendix B - Sample Train Diagrams

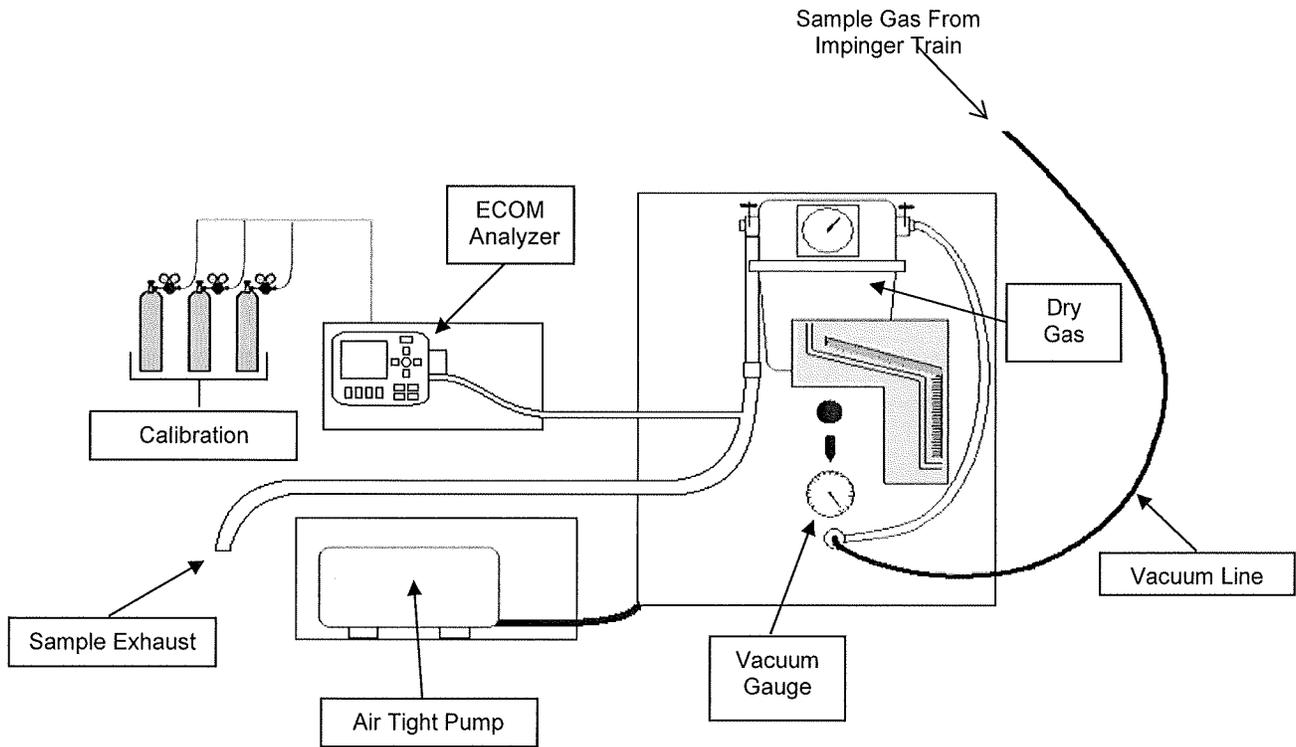
USEPA Method 2 – Type S Pitot Tube Manometer Assembly



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



USEPA Method 3A - Integrated Oxygen/Carbon Dioxide Sample Train Diagram Utilizing ECOM To Measure from Sample Exhaust



USEPA Method 5- Particulate Matter Sample Train Diagram

