



**Mercury and Air Toxics Standard Particulate Matter and
Hydrogen Chloride Emissions Test Report**

**Lansing Board of Water and Light
Erickson Station
Unit 1 Stack
Lansing, Michigan
August 15, 2019**

**Report Submittal Date
September 16, 2019**

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Project No. M193209A

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1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a Mercury and Air Toxics Standards (MATS) filterable particulate matter and hydrogen chloride emissions test program for the Lansing Board of Water and Light at the Erickson Station on the Unit 1 Stack in Lansing, Michigan on August 15, 2019. This report summarizes the results of the test program and test methods used.

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

TEST INFORMATION		
Test Location	Test Date	Test Parameters
Unit 1 Stack	August 15, 2019	Filterable Particulate Matter (FPM) and Hydrogen Chloride (HCl)

The purpose of the test program was to document FPM and HCl emissions to qualify for the LEE designation as required by 40 CFR Part 63, Subpart UUUUU. Selected results of the test program are summarized below. A complete summary of emission test results follows the narrative portion of this report.

TEST RESULTS				
Test Location	Test Parameter	Emission Limits	LEE Emission Limits	Emission Rates
Unit 1 Stack	FPM	≤0.030 lb/mmBtu	≤0.015 lb/mmBtu	0.0034lb/mmBtu
	HCl	≤0.002 lb/mmBtu	≤0.001 lb/mmBtu	0.0011 lb/mmBtu

Emissions on lb/mmBtu basis were determined using a standard F_d-Factor of 9,820 dscf/mmBtu for sub-bituminous coal. Plant operating data as provided by Lansing Board of Water and Light is included in Appendix A. The reference method test run times are on local time and one hour different than the DAHS.

The Stationary Source Audit Sample Program audit sample was obtained from ERA and analyzed by Mostardi Platt. The results of the audit sample was compared to the assigned value by ERA and found to be acceptable. The audit sample result and evaluation are appended to this report.

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

TEST PERSONNEL INFORMATION		
Location	Address	Contact
Test Coordinator	Lansing Board of Water and Light 1232 Haco Drive P.O. Box 13007 Lansing, Michigan 48912	Mr. Nathan Hude Environmental Regulatory Compliance – Air (517) 490-3069 (phone) Nathan.hude@lbwl.com
Test Facility	Lansing Board of Water and Light Erickson Station 3725 South Canal Road Lansing, Michigan 48917	
Testing Company Representative	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Michal Lipinski Project Manager (630) 993-2100 (phone) mlipinski@mp-mail.com

The test crew consisted of Messrs. B. Garcia, E. Chan, J. Carlson, L. Sorce, and M. Lipinski of Mostardi Platt.

2.0 TEST METHODOLOGY

Emissions testing was conducted following the methods specified in 40CFR60, Appendix A. A schematic of the test section diagram is found in Appendix B and schematics of the sampling trains used are included in Appendix C. Calculation nomenclature and sample calculations are included in Appendix D. Laboratory analysis data are found in Appendix E. Copies of analyzer print-outs for each test run are included in Appendix F and field data sheets are found in Appendix G.

The following methodologies were used during the test program:

Method 1 Traverse Point Determination

Test measurement points were selected in accordance with Method 1. The characteristics of the measurement location are summarized below.

TEST POINT INFORMATION				
Location	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
Unit 1 Stack	7.9	11.3	FPM, HCl	12

Method 2 Volumetric Flowrate Determination

Gas velocity was measured following Method 2, for purposes of calculating stack gas volumetric flow rate. An S-type pitot tube, differential pressure gauge, 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. Calibration data are presented in Appendix H.

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

Stack gas molecular weight was determined in accordance with Method 3A. An ECOM analyzer was used to determine stack gas oxygen and carbon dioxide content and, by difference, nitrogen content. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H and copies of the gas cylinder certifications are found in Appendix I.

Method 5 Filterable Particulate Matter (FPM) Determination

Stack gas FPM concentrations and emission rates were determined in accordance with USEPA Method 5, 40CFR60, Appendix A. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method. Filter and probe temperatures were elevated to 320° Fahrenheit as described in 40CFR63, Subpart UUUUU. Particulate matter in the sample probe was recovered using an acetone rinse. The probe wash and filter catch were analyzed by Mostardi Platt in accordance with the Method in the Elmhurst, Illinois laboratory. Sample analysis data are found in Appendix E. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

Method 26A Hydrogen Chloride (HCl) Determination

Stack gas HCl concentrations and emission rates were determined in accordance with Method 26A, 40CFR60, Appendix A. An Environmental Supply Company sampling train was used to sample stack gas, in the manner specified in the Method. Analyses of the samples collected were conducted at the Elmhurst, Illinois laboratory of Mostardi Platt. Sample analysis data are found in Appendix E. 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 RESULT SUMMARIES

Client: Lansing Board of Water and Light
Facility: Erickson Sttion
Test Location: Unit 1 Stck
Test Method: 5 MATS

	Source Condition	Normal	Normal	Normal	
	Date	8/15/19	8/15/19	8/15/19	
	Start Time	8:45	11:30	14:00	
	End Time	11:02	13:42	16:10	
		Run 1	Run 2	Run 3	Average
Stack Conditions					
Average Gas Temperature, °F		326.0	329.1	329.3	328.1
Flue Gas Moisture, percent by volume		11.6%	11.5%	11.2%	11.4%
Average Flue Pressure, in. Hg		28.73	28.73	28.73	28.73
Gas Sample Volume, dscf		75.292	78.03	80.058	77.793
Average Gas Velocity, ft/sec		48.648	50.109	51.123	49.960
Gas Volumetric Flow Rate, acfm		662,522	682,431	696,235	680,396
Gas Volumetric Flow Rate, dscfm		377,619	387,934	397,290	387,614
Gas Volumetric Flow Rate, scfm		427,321	438,419	447,193	437,644
Average %CO ₂ by volume, dry basis		14.4	14.2	14.5	14.4
Average %O ₂ by volume, dry basis		5.4	5.4	5.3	5.4
Isokinetic Variance		99.3	100.1	100.3	99.9
Standard Fuel Factor Fd, dscf/mmBtu		9,820.0	9,820.0	9,820.0	9,820.0
Filterable Particulate Matter (Method 5 MATS)					
grams collected		0.00947	0.00694	0.01061	0.00901
mg/dscm		4.442	3.141	4.680	4.0876
grains/acf		0.0011	0.0008	0.0012	0.0010
grains/dscf		0.0019	0.0014	0.0020	0.0018
lb/hr		6.282	4.563	6.964	5.936
lb/mmBtu (Standard Fd Factor)		0.0037	0.0026	0.0038	0.0034

Client: Lansing Board of Water and Light
 Facility: Erickson Generating Station
 Test Location: Unit 1 Stack
 Test Method: 26A

	Source Condition	Normal	Normal	Normal	
	Date	8/15/19	8/15/19	8/15/19	
	Start Time	8:45	11:00	14:00	
	End Time	10:32	12:50	15:48	
		Run 1	Run 2	Run 3	Average
Stack Conditions					
Average Gas Temperature, °F		322.2	325.9	327.3	325.1
Flue Gas Moisture, percent by volume		12.6%	12.0%	12.5%	12.4%
Average Flue Pressure, in. Hg		28.73	28.73	28.73	28.73
Gas Sample Volume, dscf		72.890	68.731	71.568	71.063
Average Gas Velocity, ft/sec		53.495	50.669	50.830	51.665
Gas Volumetric Flow Rate, acfm		728,542	690,045	692,240	703,609
Gas Volumetric Flow Rate, dscfm		412,549	391,845	389,809	398,068
Gas Volumetric Flow Rate, scfm		472,156	445,120	445,709	454,328
Average %CO ₂ by volume, dry basis		14.4	14.2	14.5	14.4
Average %O ₂ by volume, dry basis		5.4	5.4	5.3	5.4
Isokinetic Variance		101.3	100.6	105.3	102.4
Standard Fuel Factor Fd, dscf/mmBtu		9,820.0	9,820.0	9,820.0	9,820.0
Hydrogen Chloride (HCl) Emissions					
ug of sample collected		3211.00	2510.00	2402.00	2707.67
ppm		1.03	0.85	0.78	0.89
mg/dscm		1.56	1.29	1.19	1.35
lb/hr		2.404	1.893	1.731	2.009
lb/mmBtu (Standard Fd Factor)		0.0013	0.0011	0.0010	0.0011

4.0 CERTIFICATION

MOSTARDI PLATT is pleased to have been of service to Lansing Board of Water and Light. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

CERTIFICATION

As project 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, and the test program was performed in accordance with the methods specified in this test report.

MOSTARDI PLATT



Michal Lipinski

Program Manager



Scott W. Banach

Quality Assurance

APPENDICES

Appendix A - Plant Operating Data

Average Data

Plant: Erickson Station

Interval: 15 Minute

Type: Block

Report Period: 08/15/2019 07:00 Through 08/15/2019 16:59

Time Online Criteria: 1 minute(s)

Source	UNIT01	
Parameter Unit	MW (MW)	
08/15/19 07:00		109
08/15/19 07:15		130
08/15/19 07:30		150
08/15/19 07:45		161
08/15/19 08:00		159
08/15/19 08:15		159
08/15/19 08:30		159
08/15/19 08:45		159
08/15/19 09:00		159
08/15/19 09:15		159
08/15/19 09:30		159
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08/15/19 15:00		159
08/15/19 15:15		159
08/15/19 15:30		159
08/15/19 15:45		159
08/15/19 16:00		158
08/15/19 16:15		137
08/15/19 16:30		129
08/15/19 16:45		129

Average	155
Minimum	109
Maximum	161
Summation	6,191
Geometric Mean	154
Included Data Points	40
Total number of Data Points	40

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Report Generated: 09/12/19 10:29

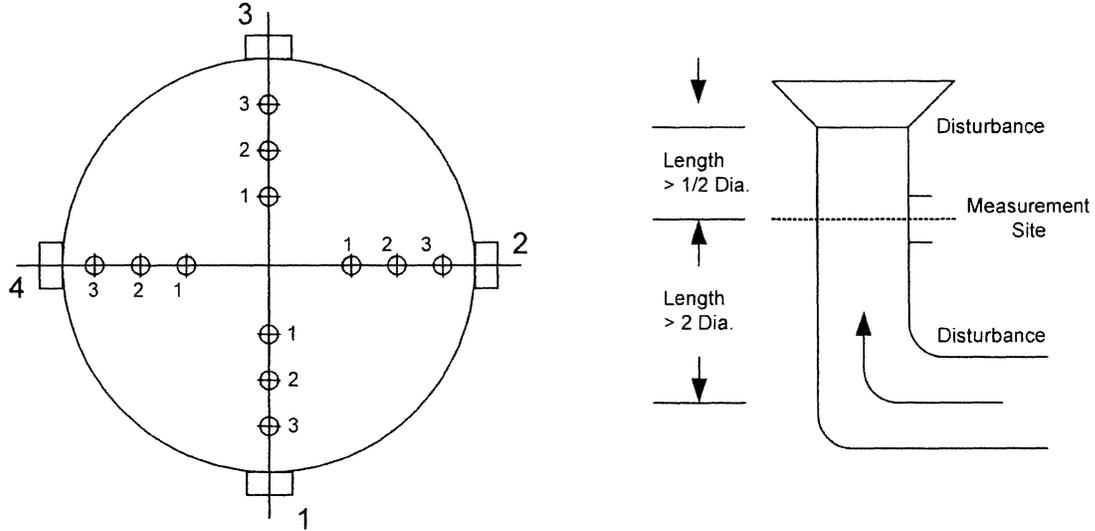
Report Version 6.0

BWL-DOMAIN1\nnh

1 of 1

Appendix B - Test Section Diagram

EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: Lansing Board of Water and Light
Erickson Station
Lansing, Michigan

Date: August 15, 2019

Test Location: Unit 1 Stack

Stack Diameter (Feet): 17.0

Stack Area (Square Feet): 226.980

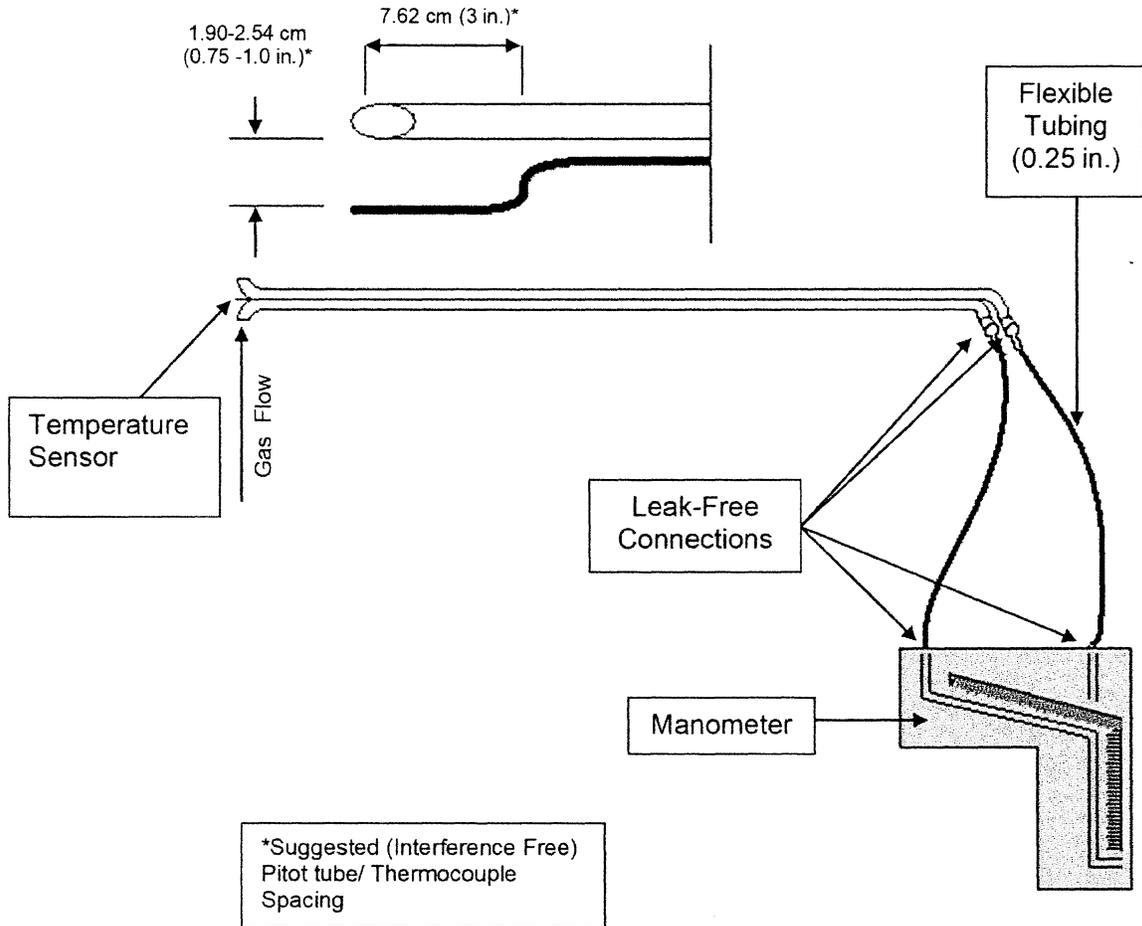
No. Sample Points Across Diameter: 63

No. of Ports 4

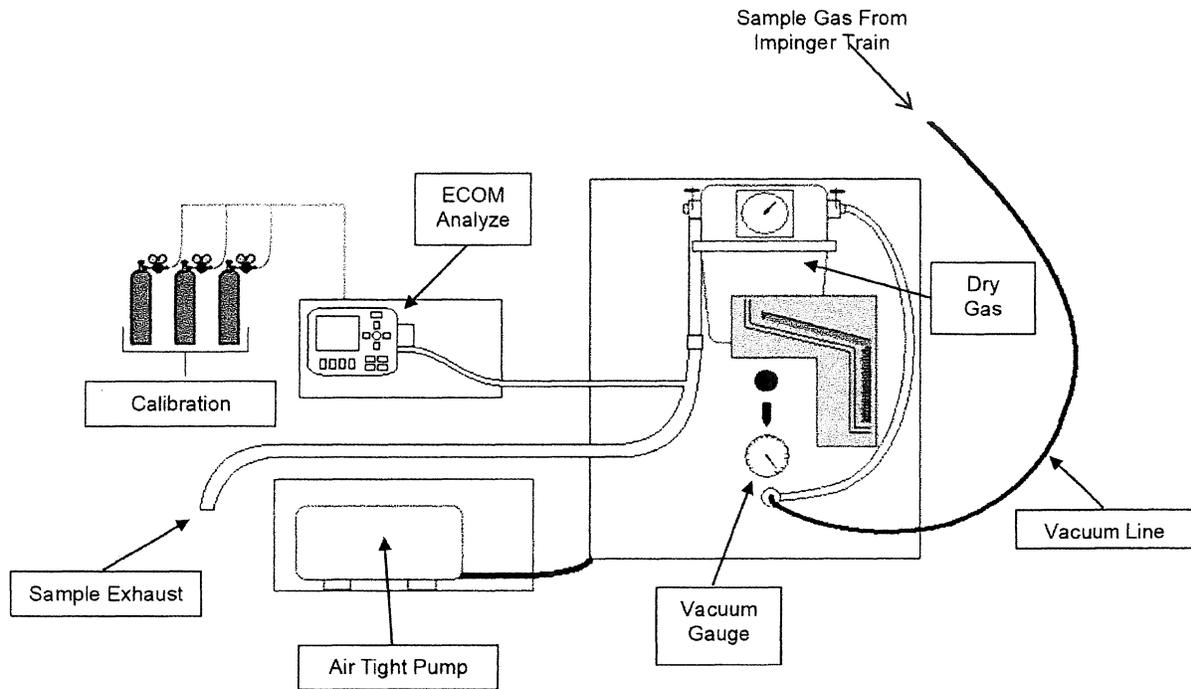
Port Length (Inches): 78.0

Appendix C - Sample Train Diagrams

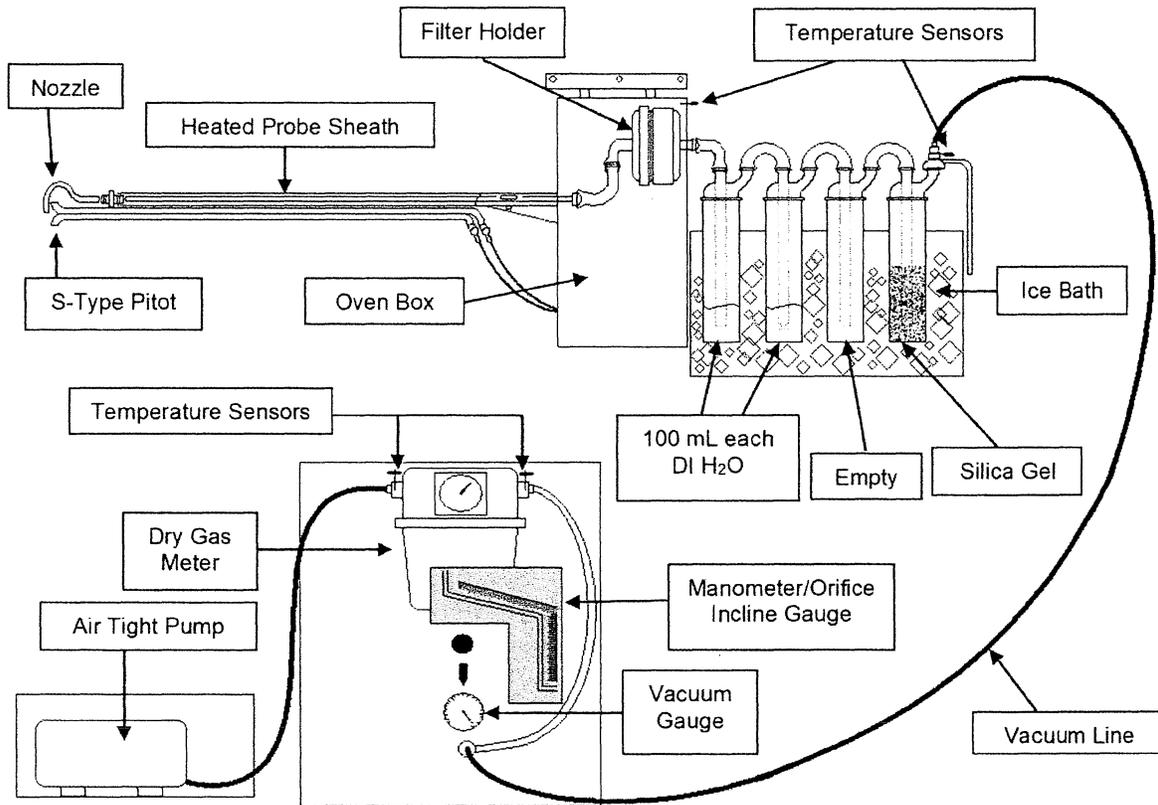
USEPA Method 2- Type S Pitot Tube Manometer Assembly



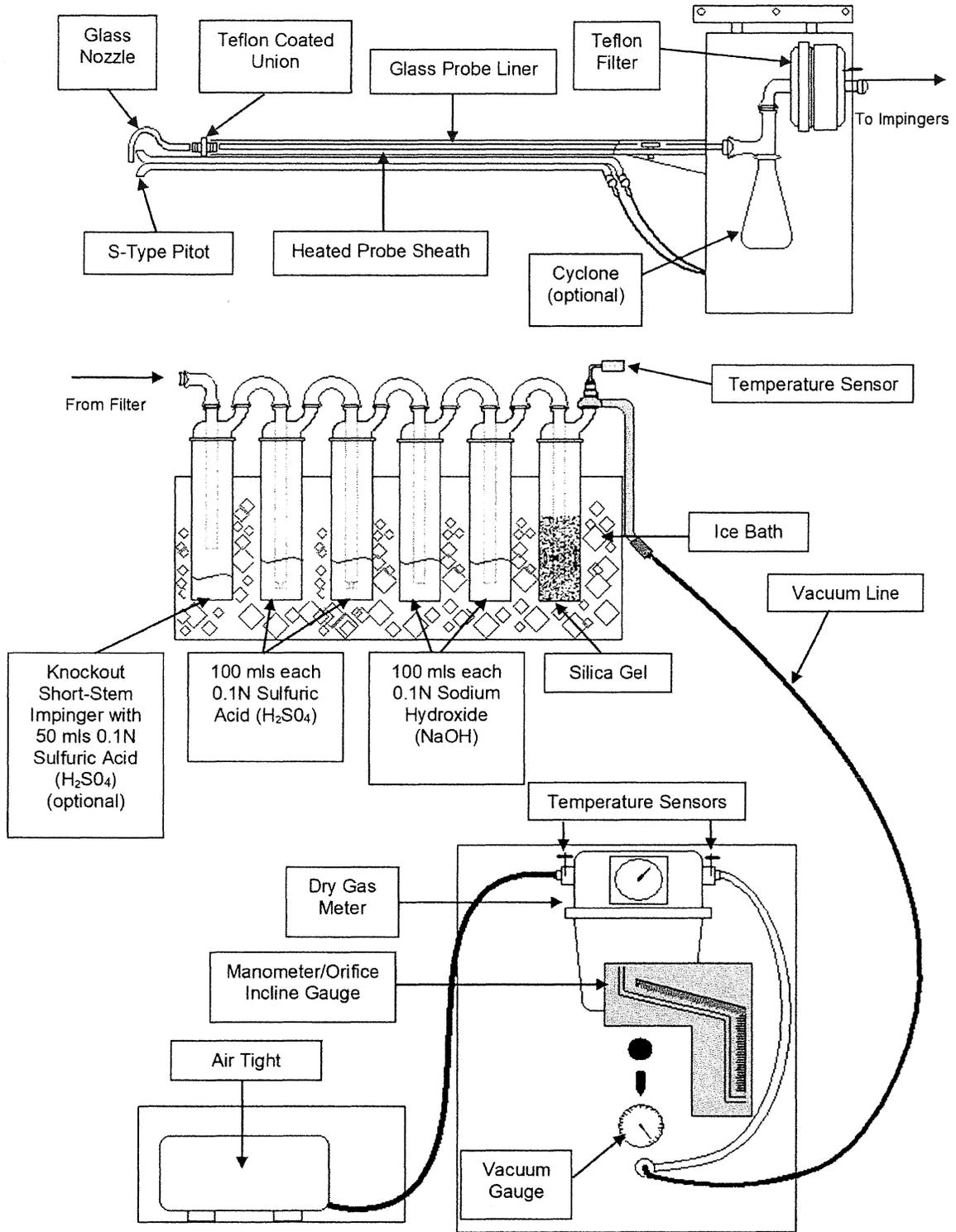
USEPA Method 3A - Integrated Oxygen/Carbon Dioxide Sample Train Diagram Utilizing ECOM To Measure from Sample Exhaust



USEPA Method 5- Particulate Matter Sample Train Diagram



USEPA Method 26A – HCl Sample Train Diagram



Appendix D - Calculation Nomenclature and Formulas