



**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
October 1, 2019**

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Project No. M194004

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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 October 1, 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	October 1, 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	0.0037 lb/mmBtu
	HCl	≤0.002 lb/mmBtu	≤0.001 lb/mmBtu	0.0009 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 Stationary Source Audit Sample Program audit sample was obtained from ERA and analyzed by Mostardi Platt. The results of the audit sample were 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 (517) 490-3069 (cell 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. Christopher Eldridge Project Manager (630) 993-2100 (phone) rsollars@mp-mail.com

The test crew consisted of Messrs. J. Kukla, B. Garcia, C. Buglio, J. Priesz, and C. Eldridge 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 Station
Test Location: Unit 1 Stack
Test Method: 5 MATS

	Source Condition	Normal	Normal	Normal	
	Date	10/1/19	10/1/19	10/1/19	
	Start Time	8:20	11:08	13:51	
	End Time	10:34	13:20	16:02	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	339.4	341.3	342.0	340.9	
Flue Gas Moisture, percent by volume	12.8%	13.6%	13.5%	13.3%	
Average Flue Pressure, in. Hg	28.70	28.70	28.70	28.70	
Gas Sample Volume, dscf	90.797	89.942	89.498	90.079	
Average Gas Velocity, ft/sec	48.800	48.541	48.300	48.547	
Gas Volumetric Flow Rate, acfm	664,597	661,068	657,789	661,151	
Gas Volumetric Flow Rate, dscfm	367,259	360,818	359,184	362,420	
Gas Volumetric Flow Rate, scfm	421,002	417,787	415,326	418,038	
Average %CO ₂ by volume, dry basis	14.6	14.7	14.7	14.7	
Average %O ₂ by volume, dry basis	5.2	5.3	5.2	5.2	
Isokinetic Variance	104.2	105.0	105.0	104.7	
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	0.01106	0.01279	0.01122	0.01169	
grains/acf	0.0010	0.0012	0.0011	0.0011	
grains/dscf	0.0019	0.0022	0.0019	0.0020	
lb/hr	5.917	6.786	5.955	6.219	
lb/mmBtu (Standard Fd Factor)	0.0035	0.0041	0.0036	0.0037	

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

	Source Condition	Normal	Normal	Normal	
	Date	10/1/19	10/1/19	10/1/19	
	Start Time	8:20	11:08	13:51	
	End Time	10:09	12:56	15:39	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	339.9	342.8	342.6	341.8	
Flue Gas Moisture, percent by volume	12.5%	13.4%	13.7%	13.2%	
Average Flue Pressure, in. Hg	28.70	28.70	28.70	28.70	
Gas Sample Volume, dscf	77.747	79.005	78.213	78.322	
Average Gas Velocity, ft/sec	50.003	50.476	50.210	50.230	
Gas Volumetric Flow Rate, acfm	680,984	687,423	683,798	684,068	
Gas Volumetric Flow Rate, dscfm	377,327	375,573	372,504	375,135	
Gas Volumetric Flow Rate, scfm	431,114	433,609	431,457	432,060	
Average %CO ₂ by volume, dry basis	14.6	14.7	14.7	14.7	
Average %O ₂ by volume, dry basis	5.2	5.3	5.2	5.2	
Isokinetic Variance	102.0	104.1	103.9	103.3	
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	1118.00	3332.00	3075.00	2508.33	
ppm	0.34	0.98	0.92	0.74	
lb/hr	0.7177	2.0952	1.9372	1.5834	
lb/mmBtu (Standard Fd Factor)	0.0004	0.0012	0.0011	0.0009	

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



Christopher S. Eldridge

Program Manager



Jeffrey M. Crivlare

Quality Assurance

APPENDICES

Appendix A - Plant Operating Data

Average Data

Plant: Erickson Station

Interval: 1 Hour

Type: Roll

Report Period: 10/01/2019 07:00 Through 10/01/2019 18:59

Time Online Criteria: 1 minute(s)

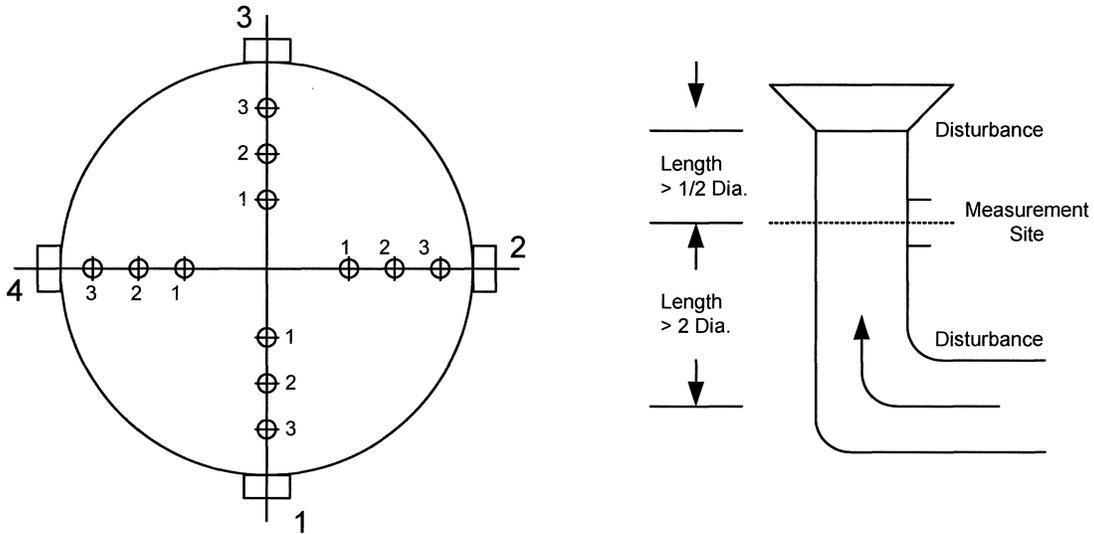
Source	UNIT01	
Parameter Unit	MW (MW)	
10/01/19 07:00		159
10/01/19 08:00		159
10/01/19 09:00		159
10/01/19 10:00		159
10/01/19 11:00		159
10/01/19 12:00		159
10/01/19 13:00		159
10/01/19 14:00		159
10/01/19 15:00		159
10/01/19 16:00		159
10/01/19 17:00		159
10/01/19 18:00		159

Average	159
Minimum	159
Maximum	159
Summation	1,908
Geometric Mean	159
Included Data Points	12
Total number of Data Points	12

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

Appendix B - Test Section Diagram

EQUAL AREA TRAVERSE FOR ROUND DUCTS



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

Date: October 1, 2019

Test Location: Unit 1 Stack

Stack Diameter: 17.0 feet

Stack Area: 226.980 feet squared

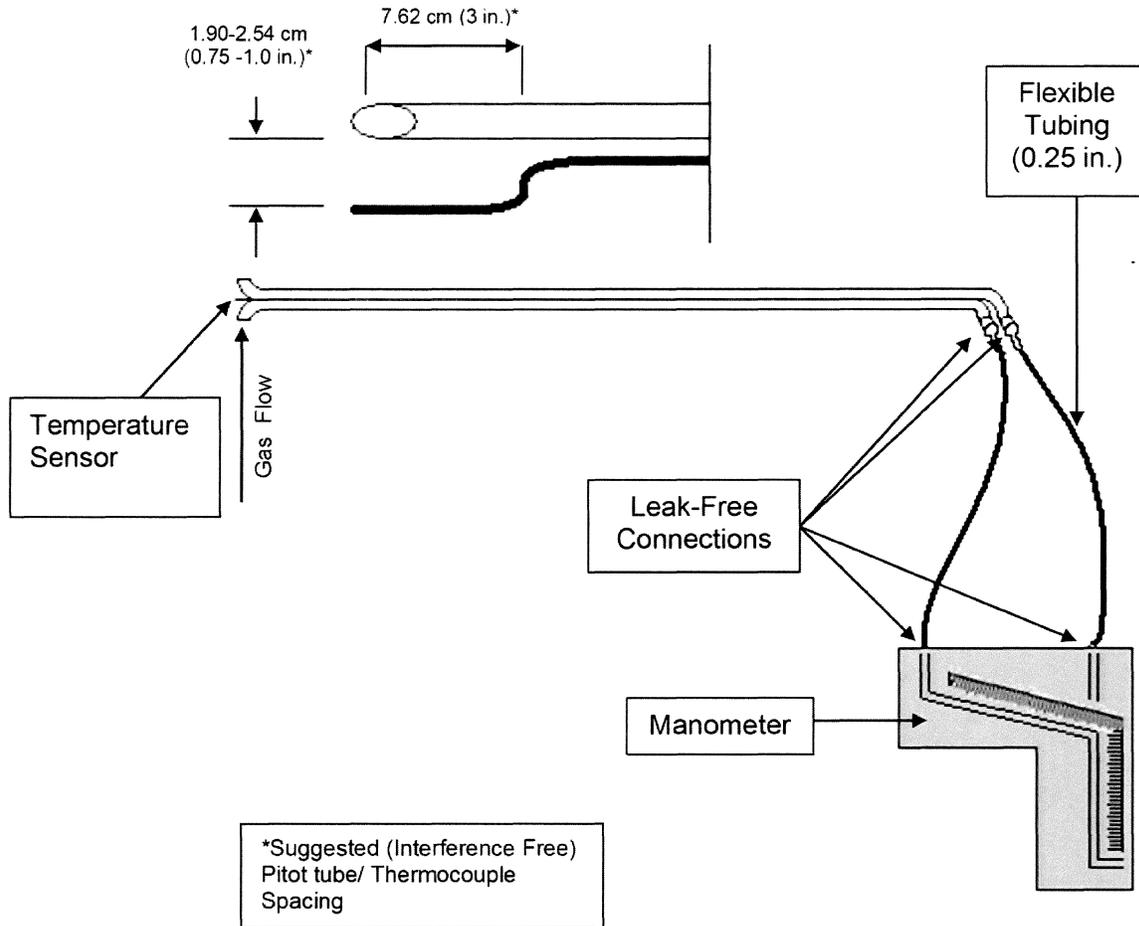
No. Points Across Diameter: 3

No. of Ports: 4

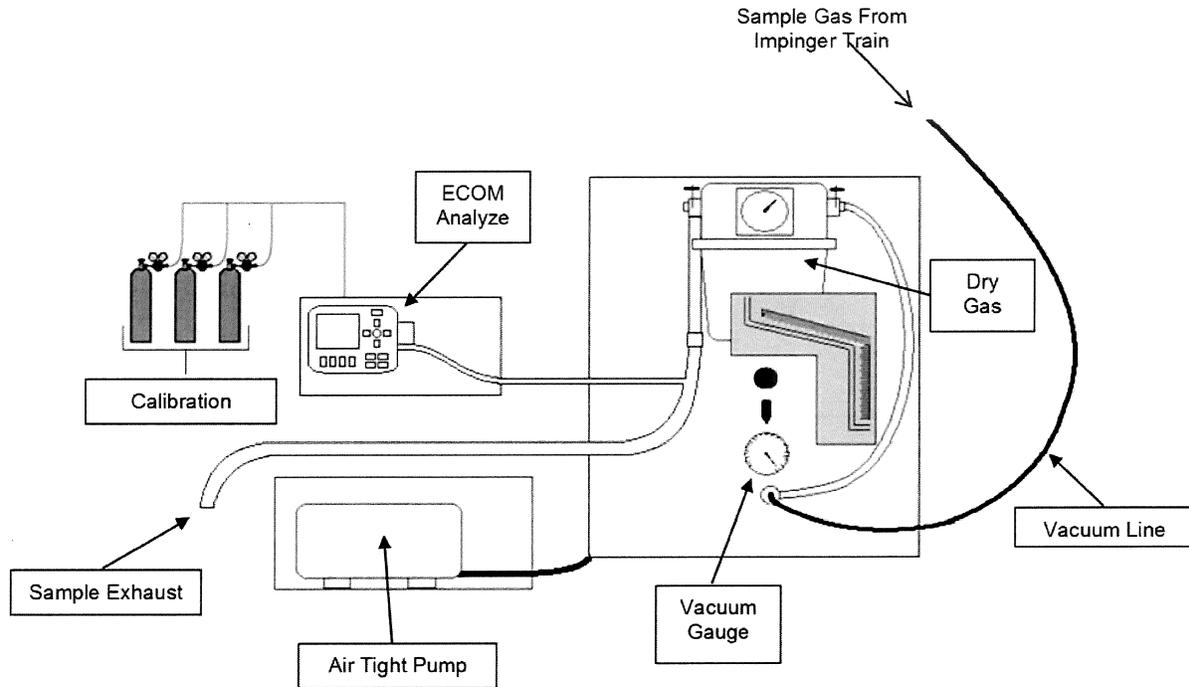
Port Length: 78 inches

Appendix C - Sample Train Diagrams

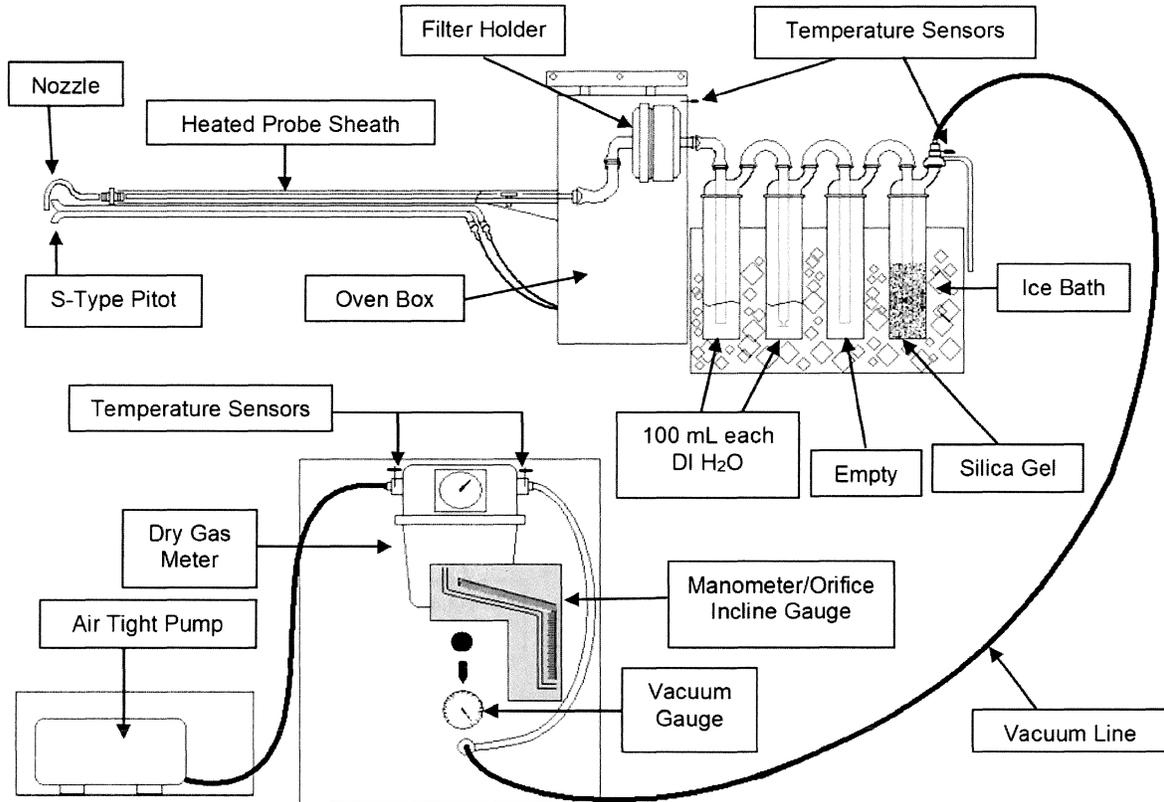
USEPA Method 2- Type S Pitot Tube Manometer Assembly



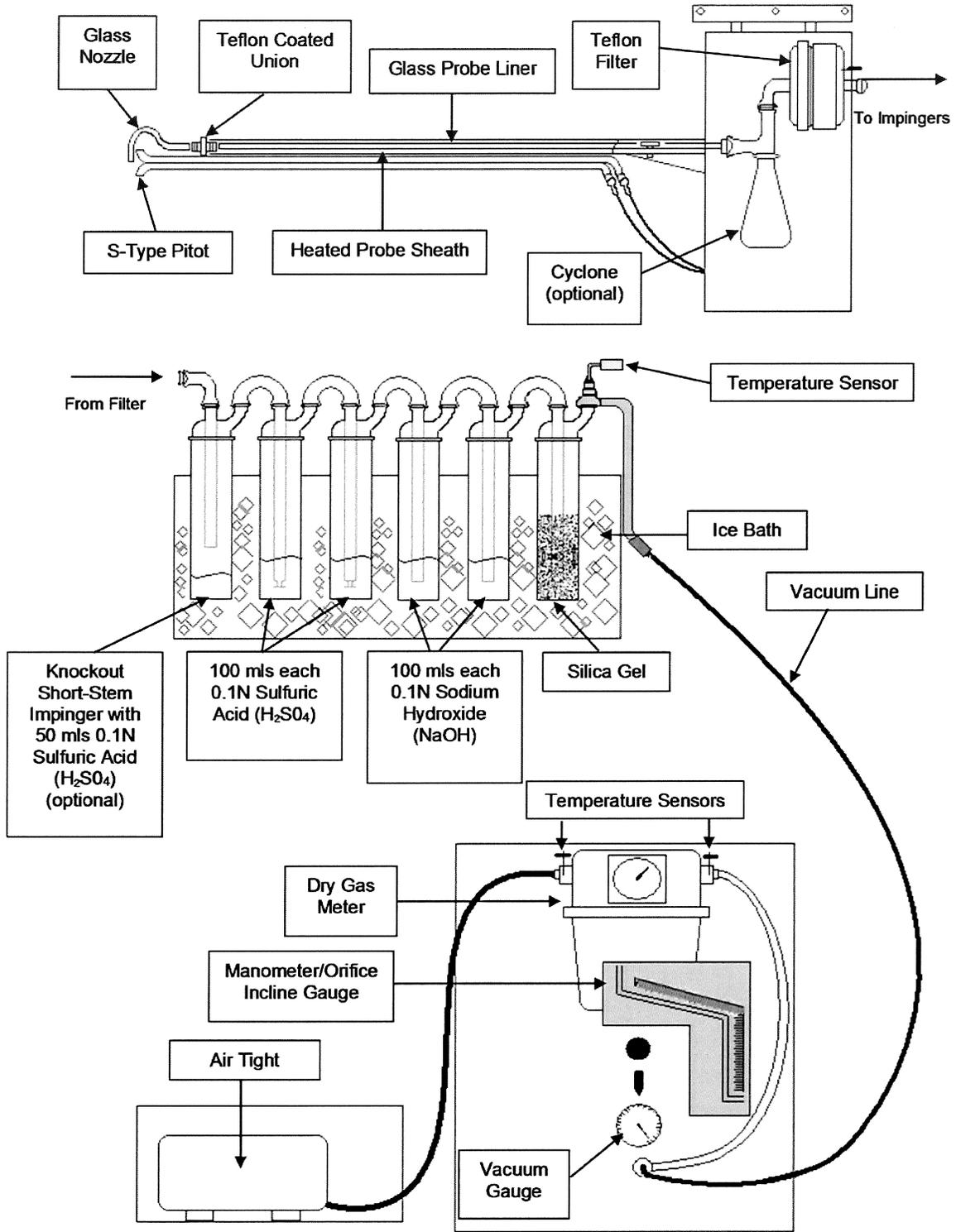
USEPA Method 3A - Integrated Oxygen/Carbon Dioxide Sample Train Diagram Utilizing ECOM To Measure from Sample Exhaust



USEPA Method 5- Particulate Matter Sample Train Diagram



USEPA Method 26A – HCl Sample Train Diagram



Appendix D - Calculation Nomenclature and Formulas