



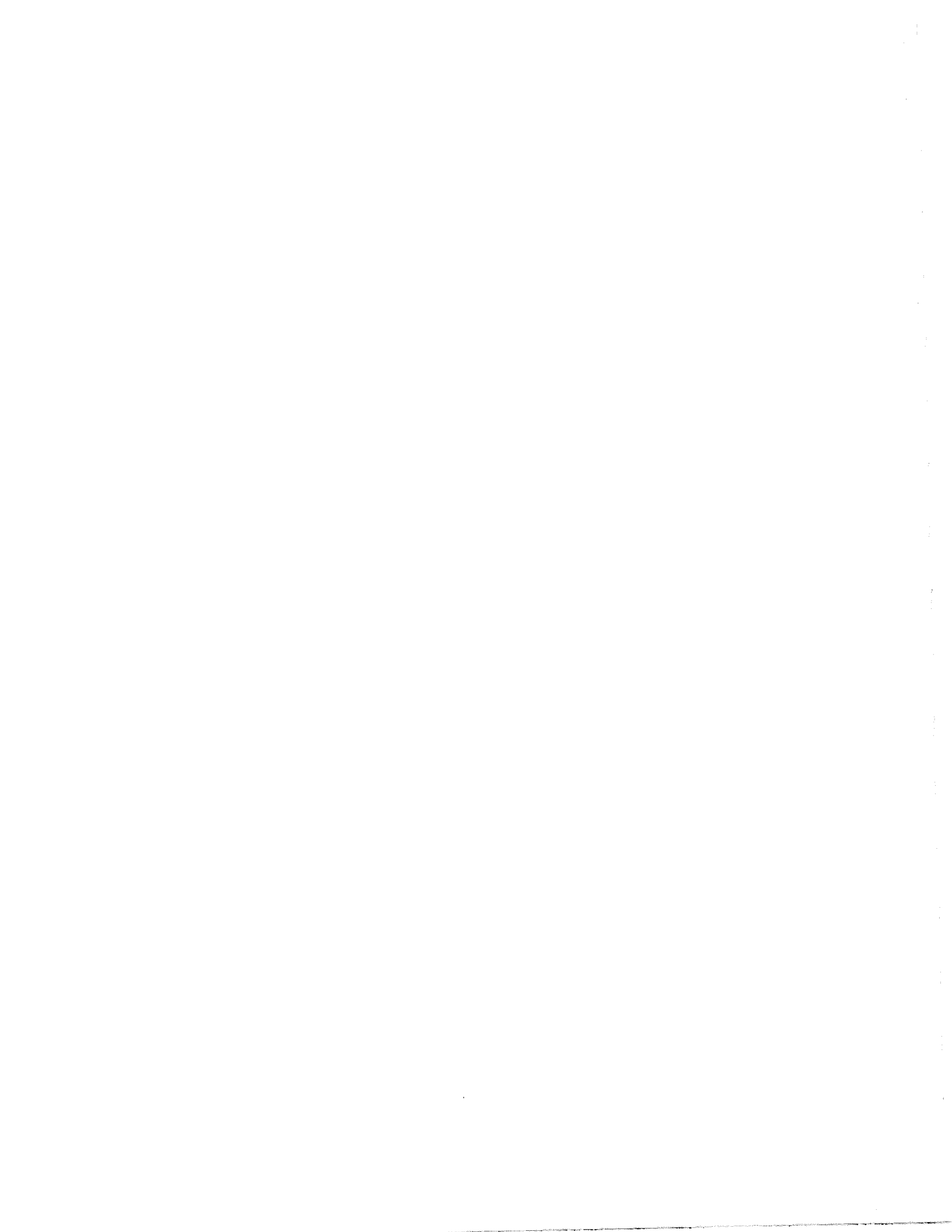
## **Filterable Particulate Matter Compliance Test Report**

**Verso Corporation  
Quinnesec Mill  
Lime Kiln Stack  
Quinnesec, Michigan  
June 2, 2021**

**Report Submittal Date  
June 28, 2021**

© Copyright 2020  
All rights reserved in  
Mostardi Platt

**Project No. M211507**



---

# TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY .....	1
2.0 TEST METHODOLOGY .....	2
Method 1 Traverse Point Determination.....	2
Method 2 Volumetric Flowrate Determination .....	2
Method 3A Oxygen (O <sub>2</sub> )/Carbon Dioxide (CO <sub>2</sub> ) Determination.....	2
Method 5 Filterable Particulate Matter (FPM) Determination.....	3
3.0 TEST RESULTS SUMMARIES.....	4
4.0 CERTIFICATION.....	5
APPENDICES	
Appendix A - Plant Operating Data .....	7
Appendix B - Test Section Diagrams .....	9
Appendix C - Sample Train Diagrams.....	11
Appendix D - Calculation Nomenclature and Formulas .....	15
Appendix E - Laboratory Sample Analysis .....	24
Appendix F - Reference Method Test Data (Computerized Sheets).....	27
Appendix G - Field Data Sheets.....	38
Appendix H - Calibration Data .....	46
Appendix I - Gas Cylinder Certifications.....	59



## 1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a Title V compliance test program for Verso Corporation at the Quinnesec Mill on the Lime Kiln Stack on June 2, 2021. This report summarizes the results of the test program and test methods used.

Test locations, test date, and test parameter are summarized below.

TEST INFORMATION		
Test Locations	Test Dates	Test Parameters
Lime Kiln Stack	June 2, 2021	Filterable Particulate Matter (FPM)

The purpose of the test program was to demonstrate FPM compliance with the permitted limits. 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 Date	Test Parameter	Emission Limit	Emission Rate
Lime Kiln Stack	6/2/2021	FPM	0.064 grs/dscf @ 10% O <sub>2</sub>	0.012 gr/dscf @ 10% O <sub>2</sub>
			16.9 lb/hr	3.4 lb/hr

Run 2 was paused from 11:03 to 11:55 to change a probe liner which was cracked during a port change. The probe wash from both liners was included in the test results. Plant operating data as provided by Verso Corporation is included in Appendix A.

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

TEST PERSONNEL INFORMATION		
Location	Address	Contact
Test Facility	Verso Corporation W-6791 U.S. Highway 2 Quinnesec, Michigan 49870	Ms. Paula LaFleur Environmental Engineer (906) 779-3494 (phone) paula.lafleur@versoco.com
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. C. Reice, M. Szumowicz, and M. Lipinski of Mostardi Platt.

Mr. Mark Dziadosz of EGLE was on site to observe testing.



## 2.0 TEST METHODOLOGY

Emissions testing were conducted following the methods specified in 40 CFR, Part 60, Appendix A. Schematics of the test section diagrams and sampling trains used are found in Appendix B and C, respectively. Calculation nomenclature and sample calculations are found in Appendix D. Sample analysis data are found in Appendix E. Copies of reference method data and field data sheets for each test run are included in Appendix F and G, respectively.

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.

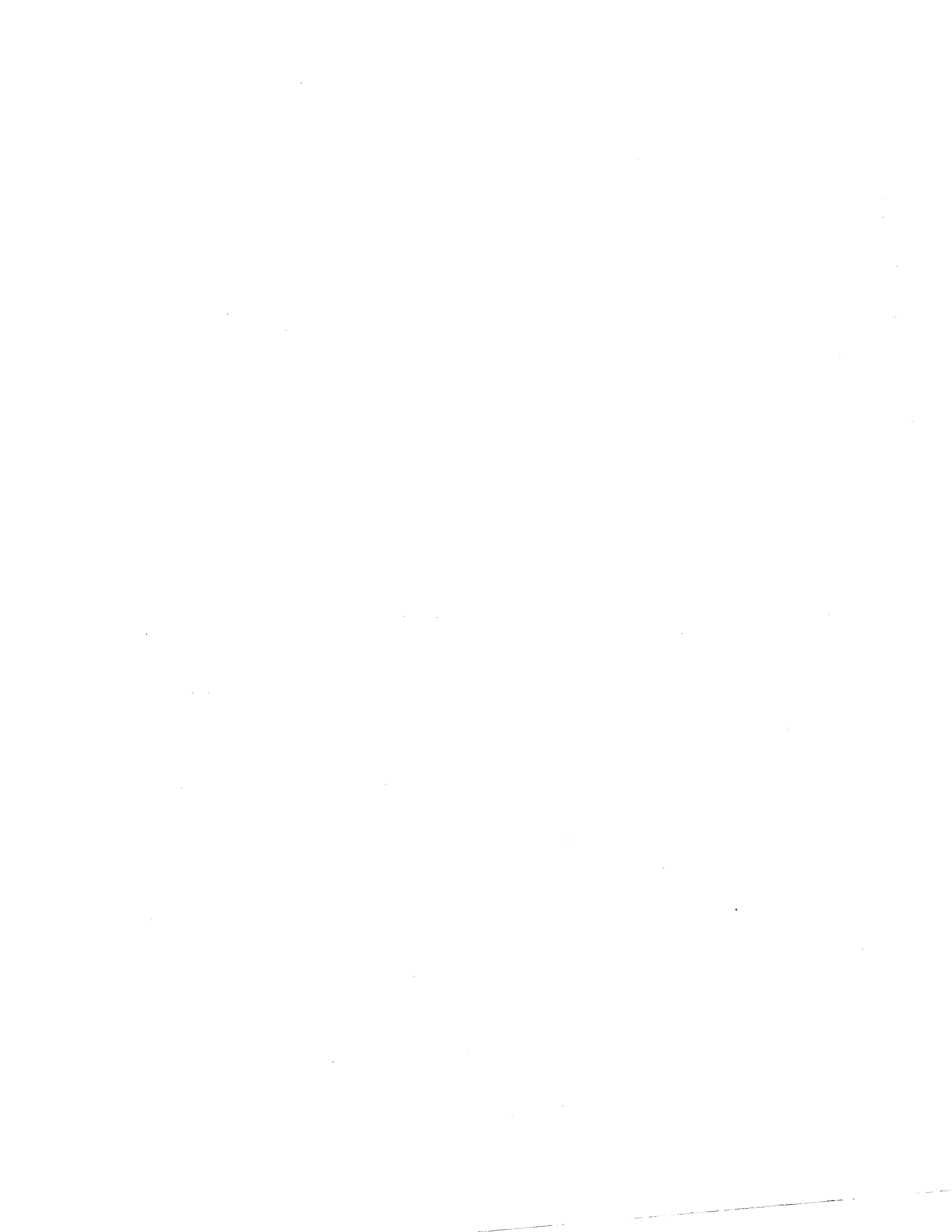
TEST POINT INFORMATION							
Location	Stack Dimensions (Feet)	Stack Area (Square Feet)	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points	Run Times (minutes)
Lime Kiln Stack	8	50.265	9.4	5	FPM	24	72

### Method 2 Volumetric Flowrate Determination

Gas velocity was measured following Method 2, for purposes of calculating stack gas volumetric flow rate at all test locations. 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. All locations have passed the null point pitot check and the results are on file.

### Method 3A Oxygen (O<sub>2</sub>)/Carbon Dioxide (CO<sub>2</sub>) Determination

Stack gas molecular weight was determined in accordance with Method 3A, 40 CFR, Part 60, Appendix A at all test locations. ECOM analyzers were 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 gas cylinder certifications are presented 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 at all test locations. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method utilizing Pallflex TX40HI45 filters. Particulate matter in the sample probe was recovered using a deionized water wash. 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.



### 3.0 TEST RESULTS SUMMARIES

**Client:** Verso Corporation  
**Facility:** Quinnesec Paper Mill  
**Test Location:** Lime Kiln Stack  
**Test Method:** 5

	Source Condition	Normal	Normal	Normal	
	Date	6/2/21	6/2/21	6/2/21	
	Start Time	7:55	10:27	14:20	
	End Time	9:23	12:31	15:46	
	Run 1	Run 2	Run 3	Average	
<b>Stack Conditions</b>					
Average Gas Temperature, °F	163.8	163.3	163.9	163.7	
Flue Gas Moisture, percent by volume	36.6%	36.2%	36.7%	36.5%	
Average Flue Pressure, in. Hg	28.85	28.85	28.85	28.85	
Gas Sample Volume, dscf	41.071	41.779	40.707	41.186	
Average Gas Velocity, ft/sec	13.160	13.893	13.601	13.551	
Gas Volumetric Flow Rate, acfm	39,689	41,900	41,021	40,870	
Gas Volumetric Flow Rate, dscfm	20,536	21,834	21,190	21,187	
Gas Volumetric Flow Rate, scfm	32,391	34,223	33,475	33,363	
Average %CO <sub>2</sub> by volume, dry basis	20.1	21.6	20.2	20.6	
Average %O <sub>2</sub> by volume, dry basis	4.4	3.5	4.1	4.0	
Isokinetic Variance	105.0	100.4	100.8	102.1	
<b>Filterable Particulate Matter (Method 5)</b>					
grams collected	0.04808	0.04900	0.05122	0.04943	
grains/acf	0.0093	0.0094	0.0100	0.0096	
grains/dscf	0.0181	0.0181	0.0194	0.0185	
grains/dscf @ 10% O <sub>2</sub>	0.0120	0.0113	0.0126	0.0120	
lb/hr	3.180	3.387	3.526	3.364	



## 4.0 CERTIFICATION

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

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



\_\_\_\_\_  
Program Manager

Michal Lipinski



\_\_\_\_\_  
Quality Assurance

Scott W. Banach



---

# APPENDICES





## Appendix A – Plant Operating Data

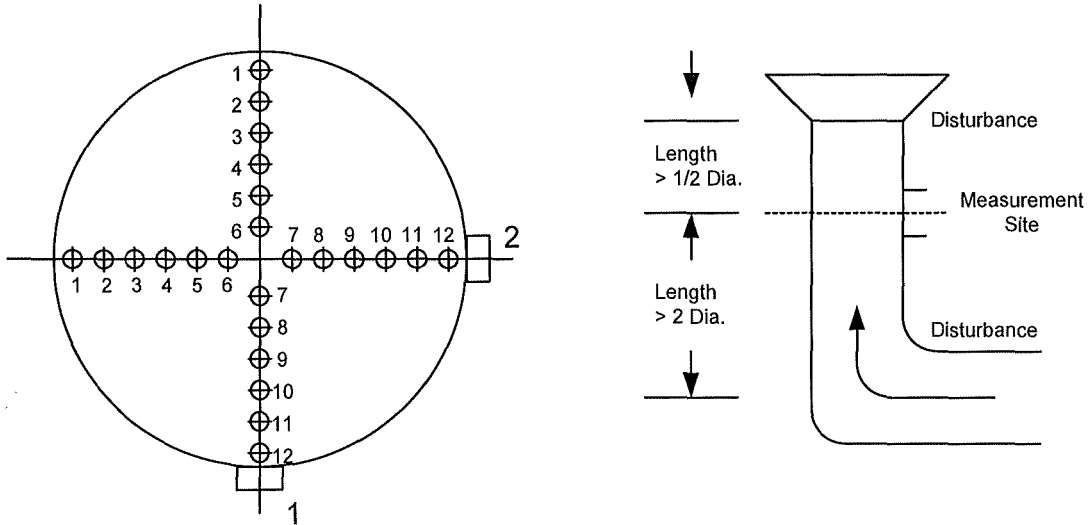
**Lime Kiln MACT II Method 5 Test Run Process Data**

Run	Start Time	End Time	Lime Mud Feed (tons/day)	CaO (tons/hour product)	Lime Kiln Scrubber		Green Liquor to Slaker (gpm)	Natural Gas (scfm)	Heat Input (MMBTU/hr)	Front End Temp (°F)
					Pressure Drop (psi)	Flow Rate (gpm)				
Run 1	6/2/21 7:55	6/2/21 9:23	685.4	14.0	30	277	810	1789	108	2248
Run 2*	6/2/21 10:27	6/2/21 12:31	673.7	14.0	31	317	810	1791	109	2269
Run 3	6/2/21 14:20	6/2/21 15:46	681.0	14.0	29	279	810	1793	109	2236

\*Testing paused 11:03 to 11:55 to change probe liner

## Appendix B – Test Section Diagrams

## EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: Verso Corporation  
Quinnesec Mill  
Quinnesec, Michigan

Date: June 2, 2021

Test Location: Lime Kiln Stack

Stack Diameter: 8.0 Feet

Stack Area: 50.27 Square Feet

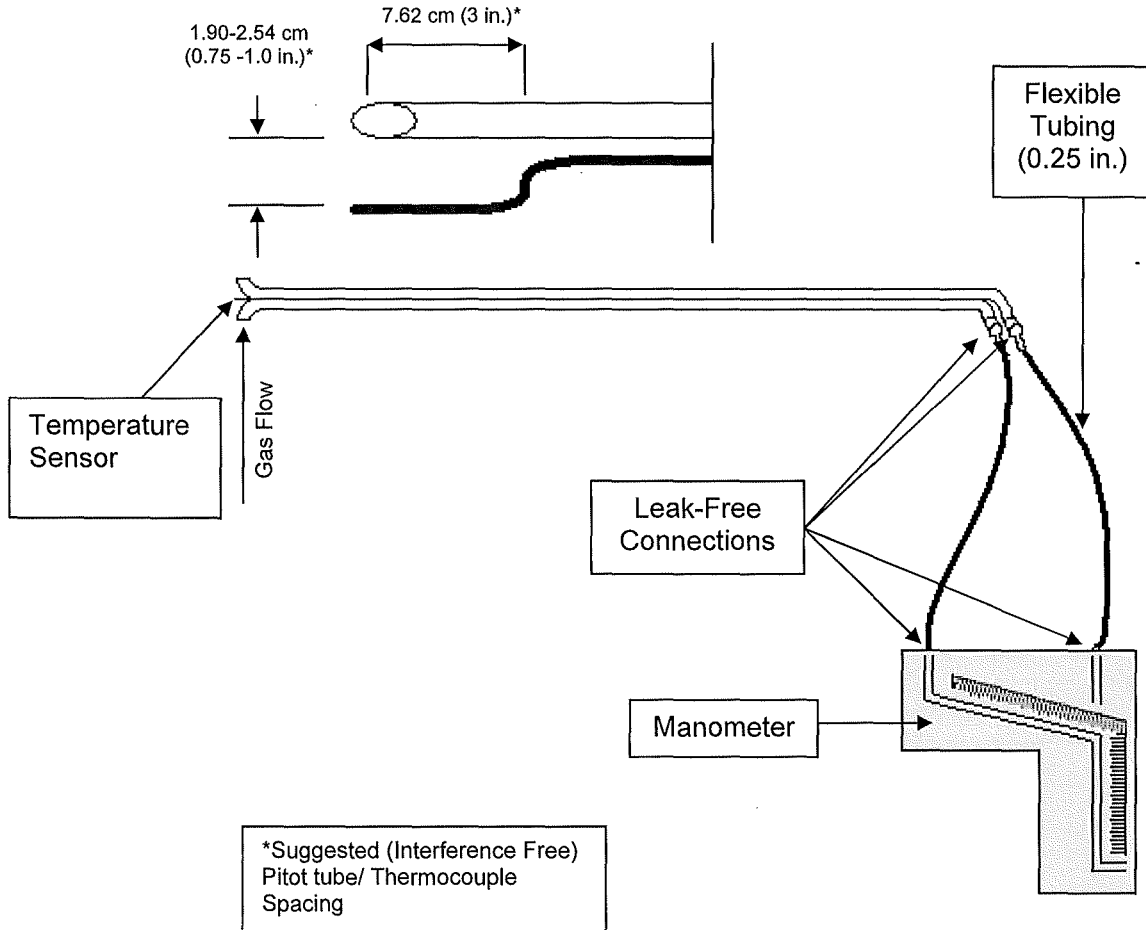
No. Points Across Diameter: 24

No. of Ports: 2

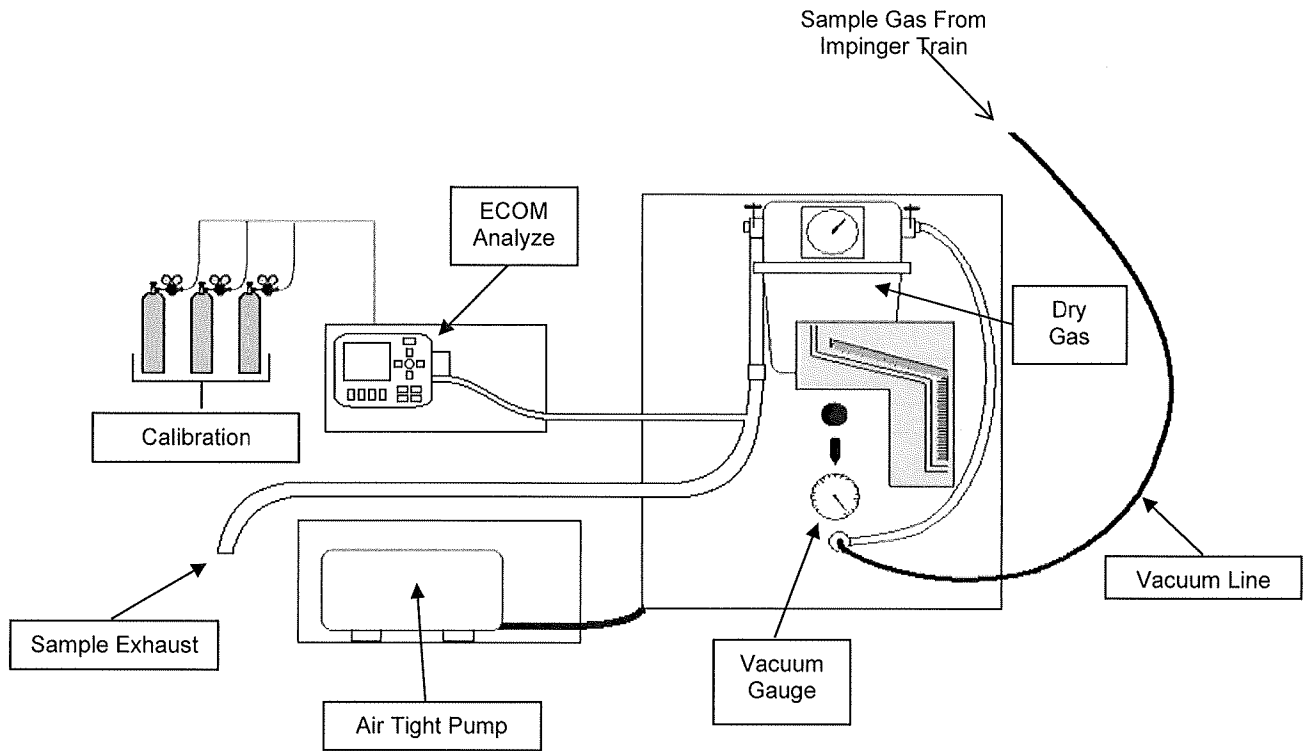
Port Length: 6 Inches

## Appendix C – Sample Train Diagram

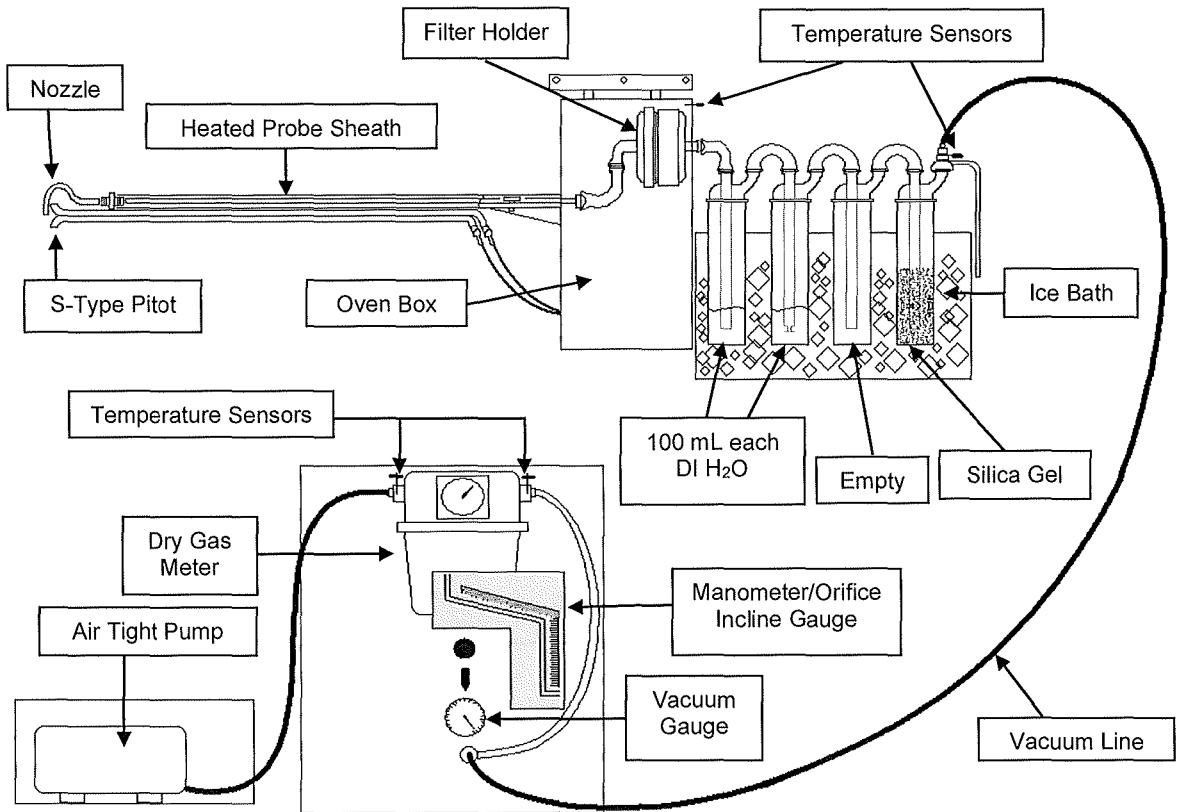
# USEPA Method 2 – Type S Pitot Tube Manometer Assembly



# 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





## Appendix D – Calculation Nomenclature and Formulas

Client: Verso Corporation  
 Facility: Quinnesec Paper Mill  
 Test Location: Lime Kiln Stack  
 Run: 1  
 Date: 6/2/2021  
 Method: 5  
 Source Condition: Normal

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$\%CO_2 = \underline{20.1}$        $\%O_2 = \underline{4.4}$        $\%N_2 = \underline{75.5}$   
 $Md = \underline{31.392}$

Wet Molecular Weight

$$Ms = Md \times (1 - Bws) + (18.0 \times Bws)$$

$Md = \underline{31.392}$        $Bws = \underline{0.369}$   
 $Ms = \underline{26.491}$

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

$Y = \underline{1.001}$        $Vm = \underline{42.036}$        $Pbar = \underline{28.90}$   
 $DH = \underline{1.13}$        $Tm = \underline{524.0}$   
 $Vm(std) = \underline{41.071}$

Volume of Water Vapor Condensed

$Vw(std) = 0.0471 \times (\text{net } H_2O \text{ gain})$   
 $\text{Net } H_2O = \underline{509.6}$   
 $Vw(std) = \underline{24.002}$

Moisture Content

$Bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$   
 $Vw(std) = \underline{24.002}$        $Vm(std) = \underline{41.071}$   
 $Bws = \underline{0.369}$