

## 1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a NESHAP chlorine emission compliance test program for Verso Corporation at the Quinnesec Mill on the Bleach Plant D100 and D1D2 ClO<sub>2</sub> Scrubber Systems on July 28 and 29, 2020. This report summarizes the results of the test program and test methods used.

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

TEST INFORMATION		
Test Location	Test Date	Test Parameter
Bleach Plant D100 and D1D2 ClO <sub>2</sub> Scrubber Systems	July 28 and 29, 2020	Chlorine (Cl <sub>2</sub> )

The purpose of the test program was to demonstrate compliance with the NESHAP emission standard at 40 CFR 63.445(c)(2). Selected results of the test program are summarized below. A complete summary of test results including scrubber inlet and outlet data follows the narrative portion of this report.

TEST RESULTS			
Test Location	Test Parameter	NESHAP Emission Standards	Emission Rates
Bleach Plant D100 Scrubber Outlet	Cl <sub>2</sub>	< 10 ppmvd at the control device outlet	0.00 ppmvd
Bleach Plant D1D2 Scrubber Outlet			0.00 ppmvd

Operating data as provided by Verso Corporation are 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 E. Platt, K. West, P. Coleman and M. Lipinski of Mostardi Platt. Mr Mark Dziadosz from the Michigan Department of Environment, Great Lakes , and Energy (EGLE) was onsite to observe the test.

## 2.0 TEST METHODOLOGY

Emissions testing were conducted following the methods specified in 40 CFR Part 60, Appendix A. Drawings depicting the test location and sampling trains are found in Appendices B and C, respectively. Explanations of nomenclature and calculations are found in Appendix D. Sample

analysis data are found in Appendix E. Reference method data and field data sheets for each run are found in Appendices 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 locations are summarized below.

TEST POINT INFORMATION						
Location	Diameter (Feet)	Area (Square Feet)	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
D100 Scrubber Stack	1.3	1.33	>0.5	>2.0	Volumetric Flow	16
D1D2 Scrubber Stack	2.0	3.14	>0.5	>2.0	Volumetric Flow	16

### Method 2 Volumetric Flow Rate Determination

Gas velocity was measured following Method 2, for purposes of calculating stack gas volumetric flow rate at the outlet of each scrubber. A standard pitot tube, differential pressure gauge, thermocouple and temperature readout were used to determine gas velocity at each sample point at each test location. Copies of field data sheets are included in Appendix G. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H. This testing met the performance specifications as outlined in the Method.

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

Stack gas molecular weight was determined in accordance with Method 3. A Fyrite gas 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.

### Moisture Determination

The moisture content of the flue gas was determined utilizing the Modified Method 26A sampling train. This was performed for the purposes of determining volumetric flow at the outlets. The impingers were placed in an ice bath to maintain the sampled gas passed through the silica gel impinger outlet below 68°F in order to increase the accuracy of the sampled dry gas volume measurement. The test train was weighed prior to and after each test run to determine the mass of moisture condensed.

After each run, a leak check of the sampling train was performed at a vacuum greater than the sampling vacuum to determine if any leakage had occurred during sampling. Following the leak check, the impingers were removed from the ice bath and weighed.

All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

### Method 26A Chlorine (Cl<sub>2</sub>) Determination

Cl<sub>2</sub> concentrations were determined in accordance with Method 26A, 40CFR60, Appendix A, with modifications from the Pulp and Paper NESHAP Subpart S. An Environmental Supply Company, Inc. sampling train was used to collect the sample. Each gas sample was extracted from a single

point in the gas stream. The samples were collected in a series of 30 ml Greenburg-Smith impingers containing potassium iodide (KI) and analyzed by an iodometric method. The first two impingers contained 20 mls each of potassium iodide. The pH of the KI was checked to verify it is 7.5 prior to sampling. Prior to and after sampling, each sample train was leak checked and weighed to determine the moisture content of the gas stream. The gas sample was extracted through a Teflon probe at a constant sampling rate of 0.2 liters per minute for 60 minutes or until the second impinger had a slight yellow color. After the leak check, the Teflon line was rinsed with deionized water into the impinger solutions. The combined contents of the first two impingers were then titrated immediately. Sample was performed by the test crew at the test site.

After sampling the solution, was titrated on site with a standardized 0.01 N solution of sodium thiosulfate until the pale yellow color disappears. This endpoint was the neutral endpoint and was recorded. Ten ml of 10% sulfuric acid was then added. The solution was mixed and allowed to sit for one minute. The titration was then continued until the yellow color disappeared again. Several drops of starch solution were added for the first two runs on the D100 testing and then discontinued because it was not specified in the method. The titrations were then continued until the blue color disappeared. The total volume of titrant required to achieve the second endpoint plus the first endpoint was recorded. This was the total acid endpoint. All of the equipment used was calibrated in accordance with the specifications of the method. Calibration data are found in Appendix H.

## 3.0 TEST RESULTS SUMMARIES

Chlorine (Cl<sub>2</sub>) & Chlorine Dioxide (ClO<sub>2</sub>) Test Results Summary  
 Verso Corporation  
 Quinnesec, MI Facility  
 D100 Inlet & Outlet Ducts

Run No.	Location	Date	Time		Meter Volume, dscf	ClO <sub>2</sub> ppm	Cl <sub>2</sub> ppm If ClO <sub>2</sub> ppm is not Zero (6a)	DSCFM	ClO <sub>2</sub> lbs/hr	Cl <sub>2</sub> lbs/hr
1	D100 Inlet Duct	7/28/2020	11:25:00 AM	12:25:00 PM	0.43	2.44	0.00	3478	0.09	0.00
2	D100 Inlet Duct	7/28/2020	12:50:00 PM	1:50:00 AM	0.39	2.19	0.00	3927	0.09	0.00
3	D100 Inlet Duct	7/28/2020	3:00:00 PM	4:00:00 PM	0.40	0.53	0.80	3821	0.02	0.03
<b>Average</b>						<b>1.72</b>	<b>0.27</b>	<b>3742</b>	<b>0.07</b>	<b>0.01</b>

Run No.	Location	Date	Time		Meter Volume, dscf	ClO <sub>2</sub> ppm	Cl <sub>2</sub> ppm If ClO <sub>2</sub> ppm is not Zero (6a)	DSCFM	ClO <sub>2</sub> lbs/hr	Cl <sub>2</sub> lbs/hr
1	D100 Outlet Duct	7/28/2020	11:25:00 AM	12:25:00 PM	0.42	1.02	0.00	3478	0.04	0.00
2	D100 Outlet Duct	7/28/2020	12:50:00 PM	1:50:00 AM	0.39	1.10	0.00	3927	0.05	0.00
3	D100 Outlet Duct	7/28/2020	3:00:00 PM	4:00:00 PM	0.39	0.00	0.00	3821	0.00	0.00
<b>Average</b>						<b>0.71</b>	<b>0.00</b>	<b>3742</b>	<b>0.03</b>	<b>0.00</b>

**Chlorine (Cl<sub>2</sub>) & Chlorine Dioxide (ClO<sub>2</sub>) Test Results Summary**  
**Verso Corporation**  
**Quinnesec, MI Facility**  
**D1D2 Inlet Ducts**

Run No.	Location	Date	Time		Meter Volume, dscf	ClO <sub>2</sub> ppm	Cl <sub>2</sub> ppm If ClO <sub>2</sub> ppm is not Zero (6a)	DSCFM	ClO <sub>2</sub> lbs/hr	Cl <sub>2</sub> lbs/hr
1A	D1D2 Inlet Duct	7/29/2020	11:15:00 AM	11:25:00 AM	0.09	149.89	0.00	3491	5.55	0.00
2A	D1D2 Inlet Duct	7/29/2020	12:43:00 PM	12:53:00 PM	0.07	201.99	0.00	3437	7.36	0.00
3A	D1D2 Inlet Duct	7/29/2020	2:10:00 PM	2:20:00 PM	0.07	72.17	622.86	3611	2.76	24.89
<b>Average</b>						<b>141.35</b>	<b>207.62</b>	<b>3513</b>	<b>5.22</b>	<b>8.30</b>

Run No.	Location	Date	Time		Meter Volume, dscf	ClO <sub>2</sub> ppm	Cl <sub>2</sub> ppm If ClO <sub>2</sub> ppm is not Zero (6a)	DSCFM	ClO <sub>2</sub> lbs/hr	Cl <sub>2</sub> lbs/hr
1B	D1D2 Inlet Duct	7/29/2020	11:45:00 AM	12:05:00 PM	0.14	104.90	0.00	3491	3.88	0.00
2B	D1D2 Inlet Duct	7/29/2020	1:18:00 PM	1:38:00 PM	0.18	78.74	0.00	3437	2.87	0.00
3B	D1D2 Inlet Duct	7/29/2020	2:42:00 PM	2:52:00 PM	0.07	47.33	405.47	3611	1.81	16.20
<b>Average</b>						<b>76.99</b>	<b>135.16</b>	<b>3513</b>	<b>2.85</b>	<b>5.40</b>

**Average Of A & B D1D2 Inlet Duct Runs**

Run No.	Location	Date	Time		Meter Volume, dscf	ClO <sub>2</sub> ppm	Cl <sub>2</sub> ppm If ClO <sub>2</sub> ppm is not Zero (6a)	DSCFM	ClO <sub>2</sub> lbs/hr	Cl <sub>2</sub> lbs/hr
1A + 1B	D1D2 Inlet Duct	7/29/2020	11:15:00 AM	12:05:00 PM	0.12	127.40	0.00	3491	4.71	0.00
2A + 2B	D1D2 Inlet Duct	7/29/2020	12:43:00 PM	1:38:00 PM	0.13	140.37	0.00	3437	5.11	0.00
3A + 3B	D1D2 Inlet Duct	7/29/2020	2:10:00 PM	2:52:00 PM	0.07	59.75	514.17	3611	2.29	20.54
<b>Average</b>						<b>109.17</b>	<b>171.39</b>	<b>3513</b>	<b>4.04</b>	<b>6.85</b>

**Chlorine (Cl<sub>2</sub>) & Chlorine Dioxide (ClO<sub>2</sub>) Test Results Summary**  
**Verso Paper**  
**Quinnesec, MI Facility**

**D1D2 Outlet Ducts**

Run No.	Location	Date	Time		Meter Volume, dscf	ClO <sub>2</sub> ppm	Cl <sub>2</sub> ppm If ClO <sub>2</sub> ppm is not Zero (6a)	DSCFM	ClO <sub>2</sub> lbs/hr	Cl <sub>2</sub> lbs/hr
1	D1D2 Outlet Duct	7/29/2020	11:15:00 AM	12:15:00 PM	0.39	0.00	0.00	3491	0.00	0.00
2	D1D2 Outlet Duct	7/29/2020	12:43:00 PM	1:43:00 PM	0.39	0.00	0.00	3437	0.00	0.00
3	D1D2 Outlet Duct	7/29/2020	2:10:00 PM	3:10:00 PM	0.39	0.00	0.00	3611	0.00	0.00
<b>Average</b>						<b>0.00</b>	<b>0.00</b>	<b>3513</b>	<b>0.00</b>	<b>0.00</b>

## 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.

### CERTIFICATION

As 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, 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

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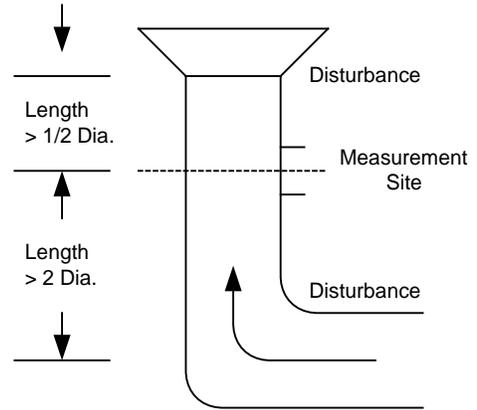
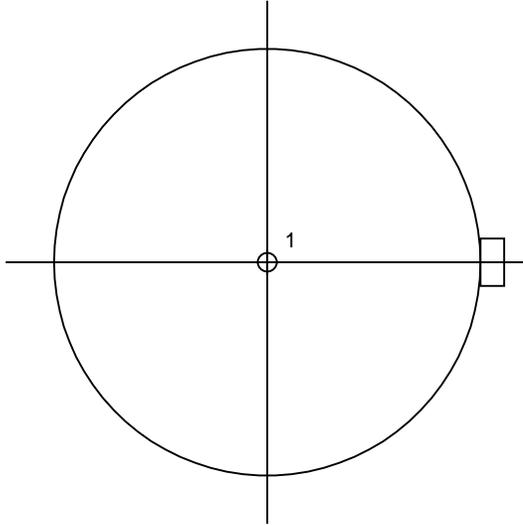
## APPENDICES

## Appendix A- Operating Data



## Appendix B - Test Section Diagrams

# EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: Verso Corporation  
Quinnesec Mill  
Quinnesec, Michigan

Date: July 28, 2020

Test Location: D100 Scrubber Stack

Stack Diameter (Feet): 1.3

Stack Area (Square Feet): 1.33

No. Sample Points Across  
Diameter: 1

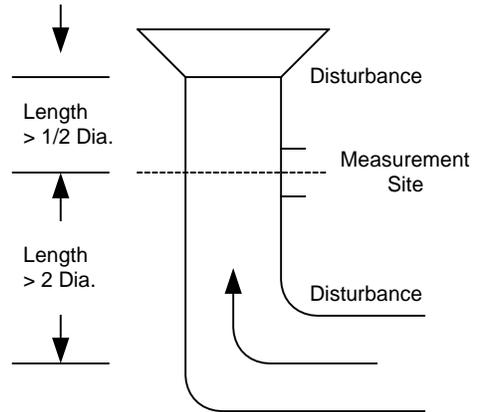
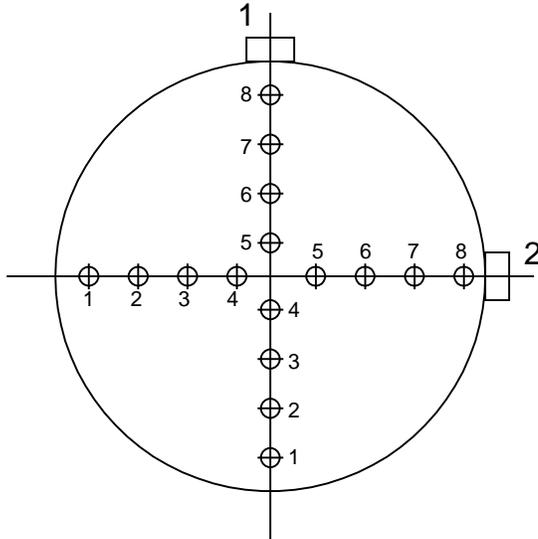
No. of Ports: 1

Port Length (Inches): 1.00

Distance from inside wall  
at port to traverse point:

1. 0.65 Feet (50.0 % of diameter)

# EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: Verso Corporation  
 Quinnesec Mill  
 Quinnesec, Michigan

Date: July 28, 2020

Test Location: D100 Scrubber Stack

Stack Diameter (Feet): 1.3

Stack Area (Square Feet): 1.33

No. Sample Points Across  
 Diameter: 8

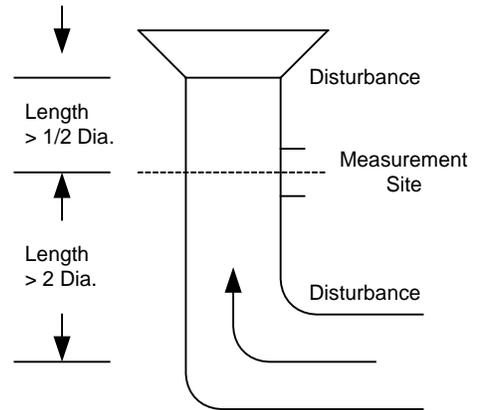
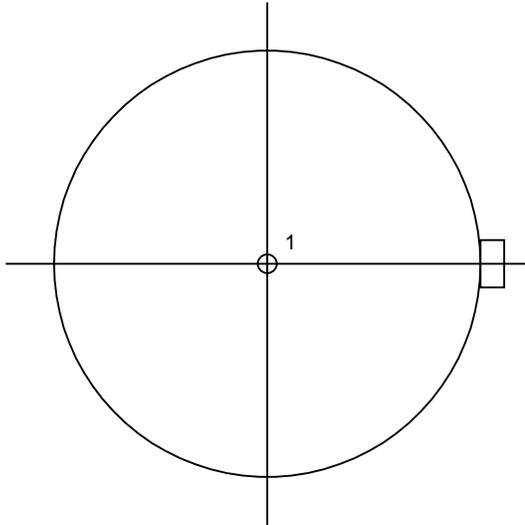
No. of Ports: 2

Port Length (Inches): 1.0

Distance from inside wall  
 at port to traverse point:

1. x Feet (96.8 % of diameter)
2. x Feet (89.5 % of diameter)
3. x Feet (80.6 % of diameter)
4. x Feet (67.7 % of diameter)
5. x Feet (32.3 % of diameter)
6. x Feet (19.4 % of diameter)
7. x Feet (10.5 % of diameter)
8. x Feet (3.2 % of diameter)

## EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: Verso Corporation  
Quinnesec Mill  
Quinnesec, Michigan

Date: July 29, 2020

Test Location: D1D2 Scrubber Stack

Duct Diameter: 2.0

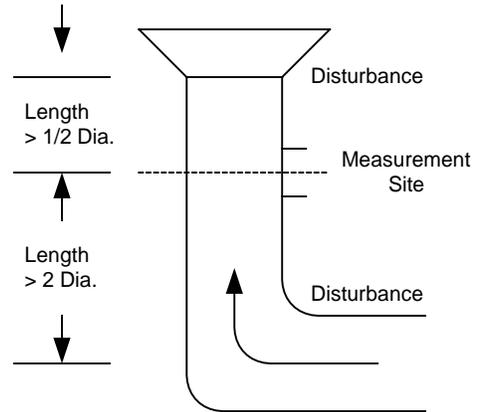
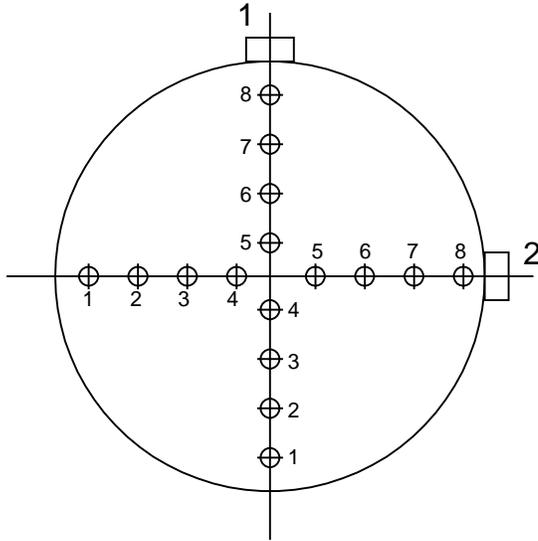
Duct Area: 3.14

No. Points Across Diameter: 1

No. of Ports: 1

Port Length: 1.00

# EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: Verso Corporation  
 Quinnesec Mill  
 Quinnesec, Michigan

Date: July 29, 2020

Test Location: D1D2 Scrubber Stack

Stack Diameter (Feet): 2.0

Stack Area (Square Feet): 3.14

No. Sample Points Across  
 Diameter: 8

No. of Ports: 2

Port Length (Inches): 1.0

Distance from inside wall  
 at port to traverse point:

1. x Feet (96.8 % of diameter)
2. x Feet (89.5 % of diameter)
3. x Feet (80.6 % of diameter)
4. x Feet (67.7 % of diameter)
5. x Feet (32.3 % of diameter)
6. x Feet (19.4 % of diameter)
7. x Feet (10.5 % of diameter)
8. x Feet (3.2 % of diameter)