1.0 EXECUTIVE SUMMARY

Mostardi Platt conducted a particulate and gaseous test program for Verso Corporation at the Escanaba Mill on the Recovery Furnace Stack (EURF15) on March 22, 2022. This report summarizes the results of the test program and test methods used.

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

TEST INFORMATION		
Test Locations	**Test Date**	**Test Parameters**
Recovery Furnace Stack (EURF15)	March 22, 2022	Filterable Particulate Matter (FPM), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), and Nitrogen Oxides (NO_X)

TEST RESULTS				
Test Location	**Test Date**	**Test Parameter**	**Emission Limit**	**Emission Rate**
Recovery Furnace Stack (EURF15)	3/22/2022	FPM	0.033 grs/dscf @ 8% O_2 and 60.5 lb/hr	0.0039 gr/dscf @ 8% O_2 and 8.733 lb/hr
		NO_X	400 ppm and 468 lb/hr	103.9 ppm and 149.22 lb/hr
		SO_2	250 ppm and 407lb/hr	2.6 ppm and 5.13 lb/hr
		CO	2000 ppm and 1424 lb/hr	214.1 ppm and 187.68 lb/hr

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 Escanaba Mill 7100 County Road 426 M.5 Rd Escanaba, MI 49829	Mr. Adam Becker Environmental Engineer (906) 323-6411 (phone) Adam.Becker@versoco.com
Testing Company Representative	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Jacob Howe Project Manager (630) 993-2100 (phone) jhowe@mp-mail.com

The test crew consisted of Messrs. D. Panek, K. West and, Jacob Howe of Mostardi Platt.

2.0 TEST METHODOLOGY

Emissions testing was 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 Diameter (Feet)**	**Stack Area (Square Feet)**	**Upstream Diameters**	**Downstream Diameters**	**Test Parameter**	**Number of Sampling Points**	**Run Times (minutes)**
Recovery Furnace Stack (EURF15)	13.0	132.732	>0.5	>2.0	FPM	24	60

Method 2 Volumetric Flowrate Determination

Gas velocity was measured following USEPA Method 2, 40CFR60, Appendix A, for purposes of calculating stack gas volumetric flow rate. An S-type Pitot tube, 0-10 inch 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. Calibration data are presented in Appendix H.

Method 3A Oxygen (O_2)/Carbon Dioxide (CO_2) Determination

Stack gas molecular weight was determined in accordance with Method 3A, 40 CFR, Part 60, Appendix A. A Servomex 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 G and gas cylinder certifications are presented in Appendix H.

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. Particulate matter in the sample probe was recovered using an acetone 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 G.

Method 6C Sulfur Dioxide (SO_2) Determination

Stack gas SO_2 concentrations and emission rates were determined in accordance with USEPA Method 6C, 40CFR60, Appendix A, at the test location. A Fischer Scientific Model 43i Pulsed Fluorescence Sulfur Dioxide Analyzer was used to determine sulfur dioxide concentrations, in the manner specified in the Method. The instrument operated in a range of 0 ppm to 500 ppm with the specific range determined by the high-level span calibration gas of 485.2 ppm.

The Model 43i operates on the principle that SO_2 molecules absorb ultraviolet (UV) light and become excited at one wavelength, then decay to a lower energy state emitting UV light at a different wavelength. Specifically,

$$SO_2 + hv_1 \rightarrow SO_2^* \rightarrow SO_2 + hv_2$$

The sample is drawn into the Model 43*i* through the sample bulkhead. The sample flows through a hydrocarbon "kicker", which removes hydrocarbons from the sample by forcing the hydrocarbon molecules to permeate through the tube wall. The SO_2 molecules pass through the hydrocarbon "kicker" unaffected.

The sample flows into the fluorescence chamber, where pulsating UV light excites the SO_2 molecules. The condensing lens focuses the pulsating UV light into the mirror assembly. The mirror assembly contains four selective mirrors that reflect only the wavelengths which excite SO_2 molecules.

As the excited SO_2 molecules decay to lower energy states, they emit UV light that is proportional to the SO_2 concentration. The bandpass filter allows only the wavelengths emitted by the excited SO_2 molecules to reach the photomultiplier tube (PMT). The PMT detects the UV light emission from the decaying SO_2 molecules. The photodetector, located at the back of the fluorescence chamber, continuously monitors the pulsating UV light source and is connected to a circuit that compensates for fluctuations in the lamp intensity.

As the sample leaves the optical chamber, it passes through a flow sensor, a capillary, and the "shell" side of the hydrocarbon kicker. The Model 43*i* outputs the SO_2 concentration to the front panel display, the analog outputs, and also makes the data available over the serial or Ethernet connection.

Stack gas was delivered to the analyzer via a Teflon® sampling line, heated to a minimum temperature of 250°F. Excess moisture in the stack gas was removed using a refrigerated condenser. The entire system was calibrated in accordance with the Method, using certified calibration gases introduced at the probe, before and after each test run.

A list of calibration gases used and the results of all calibration and other required quality assurance checks are found in Appendix G. Copies of the gas cylinder certifications are found in Appendix H.

Method 7E Nitrogen Oxide (NO_X) Determination

Stack gas nitrogen oxide concentrations and emission rates were determined in accordance with Method 7E. A Thermo Scientific 42i nitrogen oxide analyzer was used to determine nitrogen oxide concentrations, in the manner specified in the Method.

Stack gas was delivered to the analyzer via a Teflon® sampling line, heated to a minimum temperature of 250°F. Excess moisture in the stack gas was removed using a refrigerated condenser. The entire system was calibrated in accordance with the Method, using certified calibration gases introduced at the probe, before and after each test run.

A list of calibration gases used and the results of all calibration and other required quality assurance checks can be found in Appendix G. Copies of calibration gas certifications can be found in Appendix H. The NO_2 to NO converter test can be found in Appendix I. This testing met the performance specifications as outlined in the Method.

Method 10 Carbon Monoxide (CO) Determination

Stack gas CO concentrations and emission rates were determined in accordance with USEPA Method 10, 40CFR60, Appendix A. A Thermo Scientific 48i Carbon Monoxide analyzer was used to determine carbon monoxide concentrations, in the manner specified in the Method.

Stack gas was delivered to the analyzer via a Teflon® sampling line, heated to a minimum temperature of 250°F. Excess moisture in the stack gas was removed using a refrigerated condenser. The entire system was calibrated in accordance with the Method, using certified calibration gases introduced at the probe, before and after each test run.

3.0 TEST RESULTS SUMMARIES

Client: Verso Corporation
Facility: Escanaba Mill
Test Location: Recovery Furance Stack (EURF15)
Test Method: 5

Source Condition	Normal	Normal	Normal	
Date	3/22/22	3/22/22	3/22/22	
Start Time	8:15	10:07	12:00	
End Time	9:33	11:19	13:15	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	491.0	472.2	451.7	471.6
Flue Gas Moisture, percent by volume	25.6%	25.7%	25.9%	25.7%
Average Flue Pressure, in. Hg	29.36	29.36	29.36	29.36
Gas Sample Volume, dscf	49.583	49.849	50.738	50.057
Average Gas Velocity, ft/sec	61.566	60.832	60.542	60.980
Gas Volumetric Flow Rate, acfm	490,309	484,459	482,151	485,640
Gas Volumetric Flow Rate, dscfm	198,632	199,972	202,889	200,498
Gas Volumetric Flow Rate, scfm	267,106	269,239	273,969	270,105
Average $\%CO_2$ by volume, dry basis	15.2	15.2	15.1	15.2
Average $\%O_2$ by volume, dry basis	4.3	4.2	4.4	4.3
Isokinetic Variance	100.2	100.0	100.4	100.2
Filterable Particulate Matter (Method 5)				
grams collected	0.01597	0.01759	0.01589	0.01648
grains/acf	0.0020	0.0022	0.0020	0.0021
grains/dscf	0.0050	0.0054	0.0048	0.0051
grains/dscf @ 8% O2	0.0039	0.0042	0.0038	0.0039
lb/hr	8.461	9.333	8.404	8.733

Verso Corporation Escanaba Mill Recovery Furnace Stack (EURF15) Gaseous Summary											
Test No.	Date	Start Time	End Time	NO_x ppmvd	SO_2 ppmvd	CO ppmvd	CO_2 % (dry)	O_2 % (dry)	Moisture, %	Flowrate, DSCFM	Flowrate, SCFM
1	03/22/22	08:15	09:40	106.0	2.1	103.7	15.2	4.3	25.6	198,632	267,106
2	03/22/22	10:07	11:31	103.0	2.1	249.3	15.2	4.2	25.7	199,972	269,239
3	03/22/22	12:00	13:23	102.7	3.5	289.3	15.1	4.4	25.9	202,889	273,969
Average				103.9	2.6	214.1	15.2	4.3	25.7	200,498	270,105

Emission Rate Summary										
Test No.	Date	Start Time	End Time	Fd Factor, dscf/MMBtu	SO_2 lb/MMBtu	NO_x lb/MMBtu	CO lb/MMBtu	NO_x lb/hr	CO lb/hr	SO_2 lb/hr
1	03/22/22	08:15	09:40	8,430.0	0.004	0.134	0.080	150.84	89.80	4.15
2	03/22/22	10:07	11:31	8,430.0	0.004	0.130	0.191	147.56	217.34	4.18
3	03/22/22	12:00	13:23	8,430.0	0.006	0.131	0.224	149.27	255.89	7.07
Average				8,430.0	0.005	0.132	0.165	149.22	187.68	5.13

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

Jacob Howe — Program Manager

Scott W. Banach — Quality Assurance