



Title V Compliance Test Program Test Report

**Verso Corporation
Quinnesec Mill
Recovery Furnace Outlet, Smelt Dissolving Tank Outlet,
and Lime Kiln Stack
Quinnesec, Michigan
August 22 through 31, 2017**

**Report Submittal Date
September 25, 2017**

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Mostardi Platt

Project No. M173402A

1.0 EXECUTIVE SUMMARY AIR QUALITY DIVISION

MOSTARDI PLATT conducted a Title V compliance test program for Verso Corporation at the Quinnesec Mill on the Recovery Furnace Outlet, Smelt Dissolving Tank Outlet, and Lime Kiln Stack on August 22 through 31, 2017. This report summarizes the results of the test program and test methods used.

Test locations, test dates, and test parameters are summarized below.

TEST INFORMATION		
Test Locations	Test Dates	Test Parameters
Recovery Furnace Outlet	August 22 through 24, 2017	Filterable Particulate Matter (FPM), Condensable Particulate Matter (CPM), Total Particulate Matter (TPM), Hydrogen Chloride (HCl), Dioxin/Furan (D/F), Sulfuric Acid Mist (SO ₃ as H ₂ SO ₄), and Volatile Organic Compounds (VOC)
Smelt Dissolving Tank Stack	August 29 and 30, 2017	FPM, CPM, TPM, VOC, and Total Reduced Sulfur (TRS)
Lime Kiln Stack	August 31, 2017	FPM, Methanol, Nitrogen Oxides (NO _x), Sulfur Dioxide (SO ₂), Carbon Monoxide (CO), TRS, and VOC

The purpose of the test program was to demonstrate compliance of the above emissions 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
Recovery Furnace Outlet	8/24/17	FPM	0.044 grs/DSCF @ 8% O ₂	0.0097 grs/DSCF @ 8% O ₂
		TPM	0.027 grs/DSCF @ 8% O ₂ 51.1 lb/hr	0.0116 grs/DSCF @ 8% O ₂ 25.996 lb/hr
	8/22/17	HCl	2.8 lb/hr	≤ 0.1546 lb/hr
			3.4 mg/dscm @ 8% O ₂	≤ 0.17 mg/dscm @ 8% O ₂
	8/22 & 23/17	D/F	1.0 ng/DSCM @ 8% O ₂ (TEQ)	≤ 0.0009 ng/DSCM @ 8% O ₂ (TEQ)
	8/23/17	SO ₃ as H ₂ SO ₄	2.5 mg/DSCM @ 8% O ₂	0.00038 mg/DSCM @ 8% O ₂
			2.07 lb/hr	0.47 lb/hr
8/24/17	VOC (as CH ₄)	50 ppmvd @ 8% O ₂ 27.4 lb/hr	2.1 ppmvd @ 8% O ₂ 1.38 lb/hr	
Smelt Dissolving Tank Stack	8/29/17	FPM	0.20 lb/TBLS	0.072 lb/TBLS
	8/29/17	TPM	0.107 lb/TBLS	0.080 lb/TBLS
			8.5 lb/hr	6.76 lb/hr
	8/30/17	VOC (as CH ₄)	200 ppmvd	21.0 ppmvd
			6.5 lb/hr	0.76 lb/hr
8/29 & 30/17	TRS (as H ₂ S)	0.015 lb/ton TBLS	0.0036 lb/ton TBLS	
		1.19 lb/hr	0.31 lb/hr	

TEST RESULTS				
Test Location	Test Date	Test Parameter	Emission Limit	Emission Rate
Lime Kiln Stack	8/31/17	FPM	0.064 grs/DSCF @ 10% O ₂	0.0158 grs/DSCF @ 10% O ₂
			16.9 lb/hr	5.045 lb/hr
		TPM	16.9 lb/hr	5.184 lb/hr
	8/31/17	Methanol	8.0 mg/DSCM	≤ 2.60 mg/DSCM
			0.89 lb/hr	≤ 0.22 lb/hr
	8/31/17	NO _x	0.3 lb/MMBtu	0.11 lb/MMBtu
			29 lb/hr	10.81 lb/hr
	8/31/17	SO ₂	1.7 lb/MMBtu	0.0004 lb/MMBtu
			120 lb/hr	0.04 lb/hr
	8/31/17	CO	0.36 lb/MMBtu	0.029 lb/MMBtu
	8/31/17	TRS (as H ₂ S)	10.0 ppmvd @10% O ₂ (12-hr)	0.88 ppmvd @10% O ₂ (12-hr)
			1.56 lb/hr (12-hr)	0.18 lb/hr (12-hr)
8/31/17	VOC (as CH ₄)	68 ppmvd @10% O ₂	28.2 ppmvd @10% O ₂	
		5 lb/hr	2.61 lb/hr	

Run 1 at the Recovery Furnace Outlet was not included in the average since the samples were recovered with incorrect chemicals. The average emissions consist of Runs 2, 3, and 4. Emissions on lb/mmBtu or lb/Btu basis were calculated heat input supplied by Verso Corporation. 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 U.S. Highway 2 Quinnesec, Michigan 49876	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. Tim Mei Project Manager (630) 993-2100 (phone) tmei@mp-mail.com

The test crew consisted of Messrs. D. Jacobsen, L. Mazza, J. Kukla, S. McGough, C. Eldridge, and T. Mei of Mostardi Platt. Mr. Mark Dziadosz of the Michigan Department of Quality (MDEQ) observed portions of the test program.

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
Recovery Furnace Outlet	8 x 12.25	98.00	>0.5	>2.0	FPM, CPM, TPM, HCl, D/F	27
Smelt Dissolving Tank Stack	4.0 (Diameter)	12.566	>0.5	>2.0	FPM, CPM, TPM	24
Lime Kiln Stack	8.0 (Diameter)	50.27	>0.5	2.0	FPM, CPM, TPM	24

Gaseous Sampling Plan

Three test points spanning 17%, 50%, and 83% of the diameter were used to sample NO_x, SO₂, CO, and VOC at the Lime Kiln Stack. A single test point was used to sample SO₃ as H₂SO₄ and VOC at the Recovery Furnace Outlet, TRS at the Smelt Dissolving Tank Stack and Lime Kiln Stack, and methanol at the Lime Kiln Stack.

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 (O₂)/Carbon Dioxide (CO₂) Determination

Stack gas molecular weight was determined in accordance with Method 3A, 40 CFR, Part 60, Appendix A at all test locations. Servomex 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 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 6C Sulfur Dioxide (SO₂) Determination

Stack gas sulfur dioxide concentrations and emission rates were determined in accordance with Method 6C at the Lime Kiln Stack. A Thermo Scientific sulfur dioxide analyzer was used to determine sulfur dioxide 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.

Method 7E Nitrogen Oxides (NO_x) Determination

Stack gas nitrogen oxides concentrations and emission rates were determined in accordance with Method 7E at the Lime Kiln Stack. A Thermo Scientific nitrogen oxides analyzer was used to determine nitrogen oxides 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.

Method 10 Carbon Monoxide (CO) Determination

Stack gas carbon monoxide concentrations and emission rates were determined in accordance with Method 10 at the Lime Kiln Stack. A Thermo Scientific 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.

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.

Method 16A Total Reduced Sulfur (TRS) Determination

Integrated gas samples were extracted in accordance with Method 16A (impinger technique), 40CFR60, Appendix A, for the determination of total reduced sulfur (TRS) emissions from stationary sources at the Smelt Dissolving Tank Stack. This method selectively removed sulfur dioxide (SO₂) by bubbling the gas sample through a citrate buffer solution, then thermally oxidizing TRS compounds present to SO₂. The SO₂ was then collected in hydrogen peroxide as sulfate and analyzed by the Method 6 barium-thorin titration procedure, 40CFR60.

Interferences caused by particulate matter entering the sampling train were eliminated by the use of a heated filter medium placed at the end of the heated Teflon®-lined (or glass-lined) probe.

System validations were performed following each set of one-hour tests in the manner described as follows.

A 30-minute system validation test was performed to validate the sampling train components and procedure. The checks involved sampling a known concentration of hydrogen sulfide (H₂S) and comparing the analyzed concentration with the known concentration. The H₂S recovery gas was mixed with combustion gas in a dilution system. The samples were collected and analyzed in the same manner as a normal stack test. The sample was collected through the end of the probe to ensure extraction of a representative sample.

Sampling included a three one-hour test followed by a 30-minute system validation to be completed as one test run. Sampling train preparation was in accordance with Method 16A, 40CFR60, and included the following:

1. All probes, filter holders, and sampling lines were cleaned prior to each test.
2. The SO₂ scrubber was charged with 100 mls of citrate buffer solution into each of the first two impingers prior to each test. Citrate buffer solution was prepared by dissolving 300 g of potassium citrate (or 284 g of sodium citrate) and 41 g of anhydrous citric acid in one liter of water. The pH of the solution was then adjusted to between 5.4 and 5.6 with potassium citrate or citric acid, as required.
3. The probe and heated filter media were maintained at approximately 250°F to prevent moisture condensation.
4. The thermal oxidation furnace was maintained at 800°C±100°C during the test time.
5. The SO₂ portion of the train was prepared and analyzed in accordance with the methods described for sulfur dioxide testing listed previously.

Laboratory 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.

Lime Kiln Stack TRS was determined using Verso's certified TRS/O₂ Continuous Emissions Monitoring System (CEMS) and Method 2 flow measurements. This was approved in advance by Mr. Tom Gasloli of the MDEQ.

Method 23 Dioxin/Furan Determination

Stack gas dioxin/furan (D/F) concentrations and emission rates were determined in accordance with Method 23, 40 CFR, Part 60, Appendix A, with a spiked trap at the Recovery Furnace Outlet. An Environmental Supply Company sampling train was used to sample for concentrations of each of the constituents in the manner specified in the Method.

After recovery, samples are analyzed by an approved laboratory following the procedures specified in the Method. Analyses of the samples collected were conducted by SGS of Wilmington, North Carolina. Sample analysis data are found in Appendix F. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix I.

Method 25A Volatile Organic Concentration Determination

The Method 25A sampling and measurement system meets the requirements for sampling of VOCs set forth by the United States Environmental Protection Agency (USEPA). In particular, it meets the requirements of USEPA Reference Method 25A, "Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer," 40CFR60, Appendix A. This method applies to the measurement of total gaseous organic concentration of hydrocarbons. With this method, gas samples are extracted from the sample locations through heated Teflon sample lines to the analyzers. A Thermo Scientific 51i analyzer was used to perform sampling.

The flame ionization detector (FID) used during this program was a Thermo Scientific 51i High-Temperature Total Hydrocarbon Analyzer. It is a highly sensitive FID that provides a direct reading of total organic vapor concentrations with linear ranges of 0-10, 100, 1000, and 10,000 ppm by volume. The instrument was calibrated using ultra-zero air and propane in air EPA Protocol standards. The calibrations were performed before and after sampling with calibration checks performed between each test run. Sampling was conducted continuously for three one-hour periods. Sample times and locations are logged simultaneously on data loggers.

All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H. The gas cylinder certifications are found in Appendix I.

Method 26A Hydrogen Chloride (HCl) Determination

Stack gas hydrogen chloride concentrations and emission rates were determined in accordance with Method 26A, 40CFR60, Appendix A at the Recovery Furnace Outlet. An Environmental Supply Company sampling train was used to sample stack gas, in the manner specified in the Method utilizing Pallflex TX40HI45 filters. Analyses of the samples collected were conducted by Mostardi Platt in Elmhurst, Illinois. Sample analysis data are found in Appendix F. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix I.

Method 202 Condensable Particulate Determination

Stack gas condensable particulate concentrations and emission rates were determined in accordance with the Method 202, in conjunction with Method 5 filterable particulate sampling.

Condensable particulate matter was collected in the impinger portion of the Method 5 sampling trains.

The condensable particulate matter (CPM) was collected in impingers, after filterable particulate material was collected, using Method 5. The organic and aqueous fractions were then taken to dryness and weighed. The total of all fractions represents the CPM. Compared to the December 17, 1991 promulgated Method 202, this Method includes the addition of a condenser, followed by a water dropout impinger immediately after the final heated filter. One modified Greenburg Smith impinger and an ambient temperature filter follow the water dropout impinger.

CPM was collected in the water dropout, modified Greenburg Smith impinger and ambient filter portion of the sampling train as described in this Method. The impinger contents were purged with nitrogen (N_2) immediately after sample collection to remove dissolved sulfur dioxide (SO_2) gases from the impingers. The impinger solution was then extracted with DI water, acetone, and hexane. The organic and aqueous fractions were dried and the residues weighed. The total of the aqueous, organic, and ambient filter fractions represents the CPM. Laboratory 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.

Conditional Test Method 013 Sulfuric Acid Mist Determination

Stack gas sulfuric acid mist (SO_3 as H_2SO_4) concentrations and emission rates were determined in accordance with USEPA Conditional Test Method 013 (CTM-013) at the Recovery Furnace Outlet. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at a constant rate of approximately 0.3 cubic feet per minute.

The flue gas was extracted through a heated quartz-lined probe with a heated quartz thimble for removal of particulate matter. Probe and thimble housing temperatures were maintained at approximately 500°F. SO_3 was then collected as the sample gas passed through a hot water condenser that was loosely packed with quartz wool. The condenser water was maintained at a temperature range of 167°F-185°F. The sample was then passed through impingers to remove any excess moisture. The impingers were placed in an ice bath to maintain the exit gas from the last impinger containing silica gel below 68°F. Maintaining the temperature increases the efficiency of the silica gel in drying the metered gas. A leak check of the entire sample train was performed at a vacuum greater than the sampling vacuum after each sampling run in order to determine if any leakage had occurred during the test run. A leakage rate not in excess of 2% of the average sampling rate is considered acceptable.

Laboratory 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.

NCASI Method CI/SG/Pulp-94.02 (Method 308 Methanol)

Stack gas methanol concentrations and emission rates were determined in accordance with NCASI Method CI/SG/Pulp-94.02 at the Lime Kiln Stack. An air sample was collected by drawing it through a midget impinger which was filled with water, and then through two 2-section silica gel absorbent tubes. The impinger was kept in an ice water bath during sampling to enhance collection efficiency. The impinger catch was analyzed for methanol by direct injection into a gas chromatograph equipped with a flame ionization detector (GC/FID). The silica gel sorbent was desorbed with a 3% (v/v) solution of n-propanol. The desorbent is injected directly into the GC/FID for analysis of methanol. Analyses of the samples collected were conducted by Maxxam Analytics, Inc. of Novi, Michigan. Sample analysis data are found in Appendix F. All of

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

3.0 TEST RESULTS SUMMARIES

Client: Verso Corporation
Facility: Quinnesec Mill
Test Location: Recovery Furnace Outlet
Test Method: 5/202

	Source Condition	Normal	Normal	Normal	Normal	
	Date	8/24/17	8/24/17	8/24/17	8/24/17	
	Start Time	8:15	10:33	12:49	14:52	
	End Time	9:23	11:47	13:57	16:00	
	Run 1	Run 2	Run 3	Run 4	Average	
Stack Conditions						
Average Gas Temperature, °F	389.2	391.1	396.5	395.3	394.3	
Flue Gas Moisture, percent by volume	27.3%	27.0%	28.4%	27.6%	27.7%	
Average Flue Pressure, in. Hg	28.98	28.98	28.98	28.98	28.98	
Gas Sample Volume, dscf	40.757	40.330	39.675	39.864	39.956	
Average Gas Velocity, ft/sec	80.746	79.932	79.207	79.269	79.469	
Gas Volumetric Flow Rate, acfm	474,786	469,998	465,738	466,103	467,280	
Gas Volumetric Flow Rate, dscfm	207,782	206,162	199,200	201,681	202,348	
Gas Volumetric Flow Rate, scfm	285,940	282,414	278,089	278,719	279,741	
Average %CO ₂ by volume, dry basis	15.0	15.1	15.1	15.1	15.1	
Average %O ₂ by volume, dry basis	4.4	4.3	4.3	4.3	4.3	
Isokinetic Variance	102.9	102.6	104.5	103.7	103.6	
Filterable Particulate Matter (Method 5)						
grams collected	0.03702	0.03361	0.03298	0.03078	0.03246	
mg/dscm	32.077	29.430	29.355	27.267	28.6843	
grains/acf	0.0061	0.0056	0.0055	0.0052	0.0054	
grains/dscf	0.0140	0.0129	0.0128	0.0119	0.0125	
grains/dscf @ 8% O ₂	0.0109	0.0100	0.0099	0.0092	0.0097	
lb/hr	24.961	22.723	21.900	20.595	21.739	
Condensable Particulate Matter (Method 202)						
grams collected	0.00431	0.01306	0.00289	0.00302	0.00632	
grains/acf	0.0007	0.0022	0.0005	0.0005	0.0011	
grains/dscf	0.0016	0.0050	0.0011	0.0012	0.0024	
grains/dscf @ 8% O ₂	0.0013	0.0039	0.0009	0.0009	0.0019	
lb/hr	2.906	8.830	1.919	2.020	4.256	
Total Particulate Matter (5/202)						
grams collected	0.04133	0.04667	0.03587	0.03380	0.03878	
grains/acf	0.0068	0.0078	0.0060	0.0057	0.0065	
grains/dscf	0.0156	0.0179	0.0139	0.0131	0.0150	
grains/dscf @ 8% O ₂	0.0122	0.0139	0.0108	0.0102	0.0116	
lb/hr	27.867	31.553	23.819	22.615	25.996	

* Run 1 from 8:15-9:23 is not included in the average

Client: Verso Corporation
Facility: Quinnesec Mill
Test Location: Recovery Furnace Outlet
Test Method: 26A

	Source Condition	Normal	Normal	Normal	
	Date	8/22/17	8/22/17	8/22/17	
	Start Time	7:55	9:52	11:26	
	End Time	9:26	11:00	12:34	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	400.7	400.4	399.7	400.3	
Flue Gas Moisture, percent by volume	25.8%	25.4%	27.3%	26.2%	
Average Flue Pressure, in. Hg	28.61	28.61	28.61	28.61	
Gas Sample Volume, dscf	51.594	51.956	52.731	52.094	
Average Gas Velocity, ft/sec	73.889	74.367	75.726	74.661	
Gas Volumetric Flow Rate, acfm	434,468	437,275	445,271	439,005	
Gas Volumetric Flow Rate, dscfm	189,046	191,497	190,169	190,237	
Gas Volumetric Flow Rate, scfm	254,833	256,579	261,494	257,635	
Average %CO ₂ by volume, dry basis	15.2	15.1	15.2	15.2	
Average %O ₂ by volume, dry basis	4.1	4.2	4.1	4.1	
Isokinetic Variance	101.4	100.8	103.0	101.7	
Hydrogen Chloride (HCl) Emissions					
ug of sample collected	658.48	≤ 150.00	≤ 150.00	≤ 319.49	
ppm	0.30	≤ 0.07	≤ 0.07	≤ 0.14	
mg/dscm	0.45	≤ 0.10	≤ 0.10	≤ 0.22	
mg/dscm @ 8% O ₂	0.35	≤ 0.08	≤ 0.08	≤ 0.17	
lb/hr	0.3192	≤ 0.0731	≤ 0.0716	≤ 0.1546	

Company: Verso Corporation
Plant: Quinnesec Mill
Test Location: Recovery Furnace Outlet
Test Method: M173402

Source Condition	Normal	Normal	Normal	
Date	8/22/17	8/22/17	8/23/17	
Start Time	9:15	14:15	7:30	
End Time	13:28	18:25	11:40	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	388.0	388.7	388.3	388.3
Flue Gas Moisture, percent by volume	22.4%	24.9%	25.9%	24.4%
Average Flue Pressure, in. Hg	28.60	28.60	28.79	28.66
Gas Sample Volume, dscf	218.412	219.529	212.795	216.912
Average Gas Velocity, ft/sec	80.566	81.489	77.832	79.962
Gas Volumetric Flow Rate, acfm	473,731	479,158	457,650	470,180
Gas Volumetric Flow Rate, dscfm	218,731	214,111	203,229	212,024
Gas Volumetric Flow Rate, scfm	281,956	284,951	274,103	280,337
Average %CO ₂ by volume, dry basis	15.2	15.2	15.2	15.2
Average %O ₂ by volume, dry basis	4.1	4.1	4.2	4.1
Isokinetic Variance	96.8	99.4	101.5	99.2
PCDD/PCDF Emissions				
ng/dscm	< 0.06	< 0.10	< 0.03	< 0.06
Total ng/dscm (TEQ)	< 0.0017	< 0.0017	< 0.0002	< 0.0012
Total ng/dscm @ 8% O ₂ Dry (TEQ)	< 0.0013	< 0.0013	< 0.0001	< 0.0009

Verso Corporation
 Guinneseec Mill
 Recovery Furnace Outlet
 Normal
 August 23, 2017

Gaseous Phase SO ₃ as H ₂ SO ₄ , 80% IPA Condenser Coil (analyzed by titration)														
Test	Start Time	End Time	Vi-Vtb	N	Vsoln	Va	Vm(std) ft ³	CO ₂ % dry	O ₂ % dry	Volumetric Flow Rate, dscfm	lb/dscf SO ₃ as H ₂ SO ₄	ppm SO ₃ as H ₂ SO ₄	mg/dscm @ 8% O ₂ SO ₃ as H ₂ SO ₄	lb/hr SO ₃ as H ₂ SO ₄
1	7:45	8:45	0.10	0.00959	100	10	43.480	15.1	4.2	203,229	2.38E-08	0.09	2.36E-04	0.29
2	9:55	10:55	0.10	0.00959	100	10	19.818	15.2	4.2	203,229	5.23E-08	0.21	5.19E-04	0.64
3	11:45	12:45	0.08	0.00959	100	10	19.720	15.2	4.0	203,229	3.94E-08	0.15	3.86E-04	0.48
Average			0.09	0.00959	100	10	27.673	15.2	4.1	203,229	3.85E-08	0.15	3.80E-04	0.47

Verso Corporation Quinneseec Mill Recovery Furnace Outlet Gaseous Summary												
Test No.	Date	Start Time	End Time	CO ₂ % (dry)	O ₂ % (dry)	Moisture (Bws)	Flowrate, SCFM	THC ppm as C ₂ H ₆ (wet)	VOC as CH ₄ lbs/hr	THC ppmvd at 8% O ₂	VOC as CH ₄ ppmvd at 8% O ₂	VOC as CH ₄ lbs/hr
1	08/24/17	08:15	09:14	15.0	4.4	0.273	285,940	1.6	3.4	1.7	5.2	3.42
2	08/24/17	10:33	11:32	15.1	4.3	0.270	282,414	0.3	0.6	0.3	1.0	0.63
3	08/24/17	12:49	13:48	15.1	4.3	0.284	278,089	0.4	0.8	0.4	1.3	0.83
4	08/24/17	14:52	15:51	15.1	4.3	0.276	278,719	0.3	0.6	0.3	1.0	0.62
Average				15.1	4.3	0.276	281,291	0.7	1.4	0.7	2.1	1.38

Client: Verso Corporation
Facility: Quinnesec Mill
Test Location: Smelt Dissolving Tank Stack
Test Method: 5/202

	Source Condition	Normal	Normal	Normal	
	Date	8/29/17	8/29/17	8/29/17	
	Start Time	11:00	12:50	14:40	
	End Time	12:05	13:55	15:45	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	172.8	172.5	174.0	173.1	
Flue Gas Moisture, percent by volume	45.1%	44.8%	46.3%	45.4%	
Average Flue Pressure, in. Hg	28.85	28.85	28.85	28.85	
Gas Sample Volume, dscf	38.980	39.809	37.840	38.876	
Average Gas Velocity, ft/sec	46.156	46.985	45.413	46.185	
Gas Volumetric Flow Rate, acfm	34,801	35,426	34,241	34,823	
Gas Volumetric Flow Rate, dscfm	15,370	15,737	14,764	15,290	
Gas Volumetric Flow Rate, scfm	27,997	28,509	27,493	28,000	
Average %CO ₂ by volume, dry basis	0.1	0.1	0.2	0.1	
Average %O ₂ by volume, dry basis	19.8	19.7	20.2	19.9	
Isokinetic Variance	101.4	101.1	102.5	101.7	
BLS tons/hr	84.972	85.039	85.032	85.014	
Filterable Particulate Matter (Method 5)					
grams collected	0.09792	0.13450	0.12261	0.11834	
mg/dscm	88.713	119.317	114.429	107.4861	
grains/acf	0.0171	0.0232	0.0216	0.0206	
grains/dscf	0.0388	0.0521	0.0500	0.0470	
lb/hr	5.107	7.032	6.327	6.155	
lb/TBLS	0.060	0.083	0.074	0.072	
Condensable Particulate Matter (Method 202)					
grams collected	0.00950	0.01900	0.00630	0.01160	
grains/acf	0.0017	0.0033	0.0011	0.0020	
grains/dscf	0.0038	0.0074	0.0026	0.0046	
lb/hr	0.495	0.993	0.325	0.604	
lb/TBLS	0.006	0.012	0.004	0.007	
Total Particulate Matter (5/202)					
grams collected	0.10740	0.15350	0.12890	0.12993	
grains/acf	0.0188	0.0265	0.0227	0.0227	
grains/dscf	0.0426	0.0595	0.0526	0.0516	
lb/hr	5.602	8.025	6.652	6.760	
lb/ TBLS	0.066	0.095	0.078	0.080	

**Verso Corporation
Quinnesecc Mill
Smelt Dissolving Tank Stack
Gaseous Summary**

Test No.	Date	Start Time	End Time	Moisture, %	Flowrate, SCFM	THC ppm as C ₃ H ₈ (wet)	THC ppm as C ₃ H ₈ (dry)	VOC ppm as CH ₄ (dry)
1	08/30/17	08:55	09:54	49.3	26,833	4.6	9.1	27.2
2	08/30/17	10:30	11:29	50.0	26,870	1.5	3.0	9.0
3	08/30/17	11:55	12:54	45.4	28,000	4.9	9.0	26.9
Average				48.2	27,234	3.7	7.0	21.0

Emission Rate Summary

Test No.	Date	Start Time	End Time	VOC as CH ₄ lb/hr
1	08/30/17	08:55	09:54	0.92
2	08/30/17	10:30	11:29	0.32
3	08/30/17	11:55	12:54	1.03
Average				0.76

Verso Corporation
Quinnesec Mill
August 29 and 30, 2017
Smelt Dissolving Tank Stack

TRS Data Summary								
Run No.	Time	TRS PPM	Oxygen %	TRS ppm Corrected	Flowrate, dscfm	BLS tons/hr	TRS as SO ₂ lbs/hr	TRS as SO ₂ lbs/TBLS
1	11:00-14:00	3.97	19.70	36.06	15,730	85.0	0.33	0.0039
2	15:15-18:15	3.84	19.80	38.05	15,737	85.0	0.32	0.0038
3	8:55-13:40	3.62	20.20	56.37	14,764	85.0	0.28	0.0033
Average		3.81	19.90	43.49	15,410	85.0	0.31	0.0036

Client: Verso Corporation
Facility: Quinnesec Mill
Test Location: Lime Kiln Stack
Test Method: 5/202

	Source Condition	Normal	Normal	Normal	
	Date	8/31/17	8/31/17	8/31/17	
	Start Time	8:55	10:30	11:55	
	End Time	9:58	11:33	12:58	
	Run 1	Run 2	Run 3	Average	
Stack Conditions					
Average Gas Temperature, °F	160.3	160.1	160.1	160.2	
Flue Gas Moisture, percent by volume	33.5%	33.4%	33.4%	33.4%	
Average Flue Pressure, in. Hg	28.98	28.98	28.98	28.98	
Gas Sample Volume, dscf	35.338	35.737	39.090	36.722	
Average Gas Velocity, ft/sec	13.530	13.664	13.649	13.614	
Gas Volumetric Flow Rate, acfm	40,806	41,209	41,165	41,060	
Gas Volumetric Flow Rate, dscfm	22,370	22,630	22,608	22,536	
Gas Volumetric Flow Rate, scfm	33,639	33,980	33,946	33,855	
Average %CO ₂ by volume, dry basis	22.4	22.4	22.3	22.4	
Average %O ₂ by volume, dry basis	2.8	3.0	3.0	2.9	
Isokinetic Variance	94.8	94.8	103.8	97.8	
Filterable Particulate Matter (Method 5)					
grams collected	0.0555	0.0583	0.0733	0.0624	
mg/dscm	55.474	57.572	66.239	59.7619	
grains/acf	0.0133	0.0138	0.0159	0.0143	
grains/dscf	0.0242	0.0252	0.0289	0.0261	
grains/dscf @ 10% O ₂	0.0146	0.0153	0.0176	0.0158	
lb/hr	4.647	4.879	5.608	5.045	
Condensable Particulate Matter (Method 202)					
grams collected	0.0013	0.0017	0.0022	0.0017	
grains/acf	0.0003	0.0004	0.0005	0.0004	
grains/dscf	0.0006	0.0007	0.0009	0.0007	
lb/hr	0.109	0.142	0.168	0.140	
Total Particulate Matter (5/202)					
grams collected	0.0568	0.0600	0.0755	0.0641	
grains/acf	0.0136	0.0142	0.0164	0.0147	
grains/dscf	0.0248	0.0259	0.0298	0.0268	
lb/hr	4.756	5.021	5.776	5.184	

USEPA METHOD 308 RESULTS SUMMARY
Verso Corporation
Quinnesec Mill
Lime Kiln Stack

Run No.	Date	Time	Meter Volume, standard liters	DSCFM	Methanol detected, ug	Methanol Concentration, ppmvd	Methanol, mg/dscm	Methanol, lb/hr
1A	8/31/2017	8:55-9:55	23.355	22370	≤ 60.0	≤ 1.93	≤ 2.57	≤ 0.22
2A	8/31/2017	10:30-11:30	22.940	22630	≤ 60.0	≤ 1.96	≤ 2.62	≤ 0.22
3A	8/31/2017	11:55-12:55	22.933	22608	≤ 60.0	≤ 1.96	≤ 2.62	≤ 0.22
Overall Average			23.076	22536	≤ 60.0	≤ 1.95	≤ 2.60	≤ 0.22

Verso Corporation Quinnsec Mill Lime Kiln Stack Gaseous Summary															
Test No.	Date	Start Time	End Time	NO _x ppmvd	CO ppmvd	SO ₂ ppmvd	CO ₂ % (dry)	O ₂ % (dry)	Moisture, %	Flowrate, DSCFM	Flowrate, SCFM	THC ppm as C ₃ H ₈ (wet)	THC ppm as C ₃ H ₈ (dry)	VOC ppm as CH ₄ (dry)	VOC ppm as CH ₄ (dry)@ 10% O ₂
1	08/31/17	08:55	09:54	66.0	27.8	0.2	22.4	2.8	33.5	22,370	33,639	10.7	16.1	48.3	29.1
2	08/31/17	10:30	11:29	66.4	27.9	0.1	22.2	3.0	33.4	22,630	33,980	10.0	15.0	45.0	27.4
3	08/31/17	11:55	12:54	68.4	27.7	0.2	22.3	3.0	33.4	22,608	33,946	10.2	15.3	45.9	28.0
Average				66.9	27.8	0.2	22.3	2.9	33.4	22,536	33,855	10.3	15.5	46.4	28.2

Emission Rate Summary											
Test No.	Date	Start Time	End Time	NO _x lb/hr	SO ₂ lb/hr	CO lb/hr	VOC as CH ₄ lb/hr (wet)	NO _x lb/MMBtu (Heat Input)	SO ₂ lb/MMBtu (Heat Input)	CO lb/MMBtu (Heat Input)	Heat Input, MMBtu/hr
1	08/31/17	08:55	09:54	10.58	0.04	2.71	2.69	0.11	0.0004	0.029	94.2
2	08/31/17	10:30	11:29	10.76	0.02	2.75	2.54	0.11	0.0002	0.029	94.0
3	08/31/17	11:55	12:54	11.08	0.05	2.73	2.59	0.12	0.0005	0.029	94.0
Average				10.81	0.04	2.73	2.61	0.11	0.0004	0.029	94.1

Verso Corporation
Quinnesec, MI
August 31, 2017
Lime Kiln Stack

TRS Data Summary						
Run No.	Time	TRS PPM	Oxygen %	TRS ppm Corrected	Flowrate, dscfm	TRS as H2S lbs/hr
1	8:55-9:55	1.57	2.78	0.95	22370	0.20
2	10:30-11:30	1.39	2.81	0.84	22630	0.18
3	11:55-12:55	1.39	2.80	0.84	22608	0.18
Average		1.45	2.80	0.88	22536	0.18

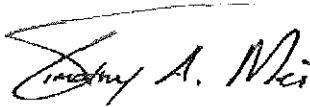
4.0 CERTIFICATION

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 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

Tim Mei



Quality Assurance

Jeffrey M. Crivlare