VERSO ESCANABA LLC

Continuous Monitoring System Quality Assurance Plan

3/26/2020

1 INTRODUCTION

It is the policy of the Verso Escanaba LLC (VE) - Escanaba, MI pulp and paper mill (Mill) to efficiently operate and maintain its facility in accordance with good operating practices (GOP) and applicable environmental regulations. VE is committed to ensuring that all environmental systems are operating within acceptable limits and that its operations are in compliance with environmental permits. VE recognizes that the reliability and acceptability of the continuous emission monitoring system (CEMS) and continuous opacity monitoring system (COMS) data depend on completion of all activities stipulated in a well-defined quality assurance and quality control plan (QA/QC Plan or Plan). The objective of this QA/QC Plan is to define the necessary activities to ensure that the CMS data quality is maintained at acceptable levels and regulatory requirements.

QA and QC procedures serve independent functions. QC is the series of activities performed to ensure that a quality product or service is produced. QA involves those activities undertaken to determine that the QC functions are effective in maintaining the minimum quality of the product (i.e., CEMS/COMS data). QC functions often comprise a series of frequent internal checks, such as system inspections, periodic calibrations, and routine maintenance. QA involves external checks to confirm that the quality control procedures are adequate to meet the level of precision required for the system. External quality assurance evaluations may include independent system audits, third party sampling and analysis, and/or comparisons to known calibration standards. This Plan encompasses both QA and QC functions and identifies which function is fulfilled by the specific activity.

2 NITROGEN OXIDES (NO_X)

The nitrogen oxides (NO_X) continuous emission rate monitoring system (CERMS) consists of a sampling and conditioning system, NO_X analyzer, oxygen (O_2) analyzer, and a data acquisition and handling system (DAHS). All of these components are necessary to determine an NO_X emission rate in terms of lbs NO_X/MMBtu. This section of the QAP addresses the quality assurance requirements for the NO_X concentration monitoring system. Information regarding the ancillary monitoring systems used to determine lbs NO_X/MMBtu can be found elsewhere in this QAP as noted in Table 2-1.

Table 2-1
NO_X Monitoring System Summary
Verso Escanaba LLC - Escanaba, MI Mill

Monitoring System	Component(s)	QAP Reference
lbs NO_X/MMBtu	NO_X	Section 2
	O_2	Section 4

2.1 *AFFECTED SOURCES*

NO_X CEMS are installed, operated, and maintained on the sources listed in Table 2-2.

Table 2-2
NO_X CEMS Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit ID	Emission Unit Description
EG8B13	B8 – No. 8 Boiler
EU11B68	B11 – No. 11 Boiler

2.2 *EMISSION LIMITATIONS*

NO_X CEMS are operated to demonstrate compliance with the emission limitations summarized in Table 2-3.

Table 2-3
NO_X Emission Limitation Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Emission Limitation	Units	Averaging Period
B8 **[Natural Gas]**	0.20	lbs/MMBtu	Ozone Season[(a)]
B8 **[Residual Oil]**	0.40	lbs/MMBtu	Ozone Season[(a)]
B8 **[All Fuels]**	0.35	lbs/MMBtu	30-day rolling average
B11 **[Coal, Wood Residue, and/or Paper Mill Sludge]**	0.70	lbs/MMBtu	30-day rolling average
B11 **[Fossil Fuels]**	Fuel Based[(b)]	lbs/MMBtu	Ozone Season[(a)]

(a) Compliance with the applicable NO_X emission rate (i.e., lbs/MMBtu) is averaged over the ozone season starting on May 1 and ending on September 30 on each calendar year.
(b) During years the boiler meets the definition of a fossil fuel-fired unit at §R336.1801(1)(b), the emission limitation is determined based on the percentage of heat input each fuel supplied to B11 during the ozone season and the applicable emission limits specified in §R336.1801(13) Table 81.

2.3 *MONITORING REQUIREMENTS*

NO_X CEMS are required pursuant to the applicable monitoring regulations summarized in Table 2-4.

Table 2-4
Applicable NO_X Monitoring Requirements
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Applicable Monitoring Regulation	Quality Assurance Activity Basis
B8	R336.1801(11)	40 CFR 60 Appendix F, P1 ***OR*** 40 CFR 75[a]
B8	40 CFR 52.1183(i)	40 CFR 60 Appendix F, P1
B11	40 CFR 60 Subpart D	40 CFR 60 Appendix F, P1

[a] VE elected to comply with the quality assurance procedures in 40 CFR 60 Appendix F, P1 for the B8 NO_X CEMS.

2.3.1 Monitoring System Description

2.3.1.1 Sampling and Conditioning System

Stack gas is delivered to the NO_X analyzer via an extractive sampling and conditioning system. The heated sample probe is installed at a specific location in the stack to collect the most representative stack gas samples. The probe, filter, and sample line are heated to prevent water condensation in the sampling system. The moisture in the stack gas is removed prior to the sample pump and analyzer using a condenser type moisture removal system. The condensers cool the gas below the dew point (using refrigerated coils), and then remove the condensed liquid water from the gas stream. Water removal is performed automatically to prevent filling the condensate trap and flooding the sampling line. The conditioned stack gas is passed through a particulate filter and a diaphragm sample pumps prior to being delivered to the analyzer rack. The sampling system is designed in a manner not to pressurize the analyzer during normal sampling or routine calibrations.

2.3.1.2 NO_X Analyzer

The concentration of nitrogen oxides (NO_X) is measured by using a chemiluminescence NO_X analyzer. Chemiluminescence is the emission of light produced as a result of a chemical reaction. A chemiluminescence nitrogen oxide (NO) and NO_X monitor measures the amount of light generated by the reaction of NO present in the stack gas with ozone (O_3). This monitor uses an ozone generator and a heated converter to reduce the nitrogen dioxide (NO_2) present in the stack gas to NO before reacting with O_3.

The monitor can measure both NO or NO_X by sequencing the NO and O_3 reaction. NO present in the stack gas is measured by bypassing the converter and going directly to the reaction chamber. NO_X (i.e., NO and NO_2) is measured by using the converter to reduce NO_2 to NO prior to the reaction chamber. NO_2 can be determined by subtracting the NO measured by the first sequence from the total NO_X (i.e., NO and NO_2) measured in the sequence.

2.3.1.3 Data Acquisition and Handling Systems

The data acquisition and handling system (DAHS) includes the CEMS hardware and software components that take the output from the analyzers, combine it with other information, store the necessary data, and compute emissions.

Table 2-5
NO_X CEMS Major Component Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Analyzer Information			Measurement Parameters					Comment
	Manufacturer	Model No.	Serial No.	Span	Range	Units	Dilution Ratio	Basis	
No. 8 Boiler									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
NO_X Analyzer	Thermo Environmental Instruments, Inc.	42Iq-ANMSPCB	1181030037	1000	1000	ppmv		dry	Span defined in 40 CFR §60.45(c)(3)(i) is not applicable to B8. Span is not defined in the applicable standard for B8 (i.e., R336.1801 or 40 CFR 52.1183(i)). As such, VE has selected the span noted of 1000 ppm.
DAHS	Foxboro I/A								
No. 11 Boiler									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
NO_X Analyzer	Thermo Environmental Instruments	42I-ANMSPCB	1308857366	1000	1000	ppmv		dry	Span defined in 40 CFR §60.45(c)(3)(i).
DAHS	Foxboro I/A								

2.4 Installation and Initial Certification

The installation and initial certification of the NO_X concentration monitoring system was completed in accordance with applicable Performance Specification (PS) in 40 CFR 60 Appendix B. Documentation of the certification is located in Section 8.9.4 of the Environmental Files. Initial certification of the NO_X concentration monitoring system will only be required upon the installation of a new NO_X monitoring system. The applicable PS is summarized in Table 2-6.

Table 2-6
Applicable Performance Specification
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Applicable Performance Specification (PS)	Reference
NO_X	PS2	40 CFR 60 Appendix B

2.5 Ongoing Quality Assurance Activities

The quality of the data collected by the NO_X concentration monitoring system is assessed by the completion of ongoing quality assurance (QA) procedures. The QA procedures for the NO_X concentration monitoring system are summarized in Table 2-7.

Table 2-7
Ongoing Quality Assurance Frequency
Verso Escanaba LLC - Escanaba, MI Mill

Monitoring System	Daily	Weekly	Monthly	Quarterly	Semi-annually	Annual
NO_X	CDT [a] Section 2.5.1.1			CGA [b] Section 2.5.2.1		RATA [c] Section 2.5.3.1

[a] Calibration Drift Test (CDT)
[b] Cylinder Gas Audit (CGA)
[c] Relative Accuracy Test Audit (RATA)

2.5.1 Daily

The following QA activities are completed at least once daily (i.e., every 24 hours) on the NO_X concentration monitoring system. The daily QA activities performed on the NO_X concentration monitoring system include a calibration drift test (CDT).

2.5.1.1 Calibration Drift Test (CDT)

A calibration drift test (CDT) is completed by the Mill pursuant to 40 CFR 60 Appendix F, P1 §4.1 at least once every 24 hours in accordance with the procedures described herein. A CDT is automatically initiated every 24 hours by the Programmable Logic Controller (PLC). The PLC energizes normally closed solenoid valves to allow the reference gas to be introduced to the sample probe. The reference gas is transported from the gas cylinder up to the sample probe and then travels down to the analyzer rack through the stack sample lines. This includes all of the sample line filters, dilution systems (as applicable), scrubbers, conditioners, and other sampling system components. The solenoid valve is energized introducing the reference gas for a pre-determined time interval adequate for the CEMS to measure and record a stable response. A zero and span gas check are run at least every 24-hours. Additional CDT, if required, may be initiated by the Mill manually throughout the 24 hour period.

2.5.1.1.1 Span Value

Span is defined in 40 CFR 60 Appendix B Performance Specification 2 §3.11 as the concentration specified for the affected source category in an applicable subpart of the regulations that is used to set the calibration gas concentration and in determining calibration drift. The span values for the NO_X monitoring systems are summarized in Table 2-8.

Table 2-8
NO_X Span Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Span [(a)]	Reference
B8	1000 ppm[(b)]	40 CFR §60.45(c)(3)(i)
B11	1000 ppm	40 CFR §60.45(c)(3)(i)

[(a)] Span is defined in 40 CFR 60 Appendix F §2.3 as the upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable subpart of the regulation. Span is defined in 40 CFR 60 Appendix B Performance Specification 2 §3.11 as the concentration specified for the affected source category in an applicable subpart of the regulations that is used to set the calibration gas concentration and in determining calibration drift.

[(b)] Span is not defined in the applicable standards for B8 (i.e., R336.1801 and 40 CFR 52.1183(i)). As such, VE has selected the span of 1000 ppm.

2.5.1.1.2 CDT Reference Gas Concentrations

Two (2) reference gas concentrations are utilized for the CDT. The two (2) reference gas concentrations are determined based on the applicable span value as defined in Section 2.5.1.1.1. The reference gas concentrations are zero or low (e.g., between 0 and 20% of span value) and upscale (e.g., 50 to 100% of span value). The low and upscale audit gases are U.S. EPA Protocol grade calibration gases. The reference gas concentrations that are used in the CDT are summarized in Table 2-9.

Table 2-9
NO_X CDT Reference Gas Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Zero or Low [(a),(c)]	Upscale [(b),(c)]
B8	0 – 200 ppm	500 – 1000 ppm
B11	0 – 200 ppm	500 – 1000 ppm

[(a)] Zero or low level reference gas is defined in 40 CFR §60.13(d)(1) as between 0 and 20% of the span value.
[(b)] Upscale level reference gas is defined in 40 CFR §60.13(d)(1) as between 50 and 100% of the span value.
[(c)] 40 CFR §60.13(d) is included by reference in 40 CFR 60 Subpart D and in 40 CFR 60 Appendix F, P1 §4.1.

2.5.1.1.3 CDT Calculation

The calibration drift for the NO_X analyzers are computed by the DAHS for each reference gas level as described in Equation 2-1.

Equation 2-1 $$CD = \frac{|R-A|}{SPAN} \text{ x } 100$$

Where:

CD = Calibration Drift as a percentage of the SPAN.
R = Reference value of zero or upscale concentration introduced into the monitoring system.
A = Actual monitoring system response to the reference value (R).
SPAN = Highest concentration monitor component is required to be capable of measuring as defined in Section 2.5.1.1.1.

2.5.1.1.4 CDT Pass/Fail Tolerance

Pursuant to 40 CFR §60.13(d)(1), the NO_X concentration monitors are adjusted whenever the zero CDT or the upscale CDT exceeds two (2) times the limit of the applicable performance specification listed in Section 2.4 and summarized listed in Table 2-10. Pursuant to 40 CFR 60 Appendix F, P1 §4.3, if the zero CDT or the upscale CDT exceeds twice (i.e., 2x) the applicable performance specification listed in listed in Table 2-10 for five (5), consecutive, daily periods, the CEMS is out-of-control (OOC). If either the zero (or low-level) or upscale-level CD result exceeds four times (i.e., 4x) the applicable drift specification in applicable performance specification listed in Section 2.4, the CEMS is OOC.

If the calibration drift exceeds the specification limits listed in Table 2-10 for the appropriate monitor, the failure is indicated on the maintenance calibration report generated by the DAHS.

Table 2-10
NO_X CDT Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

<table>
<tr><th>Emission Unit</th><th>Analyzer</th><th>Adjustment Limit [a]
(Data Valid)</th><th>Out-of-Control Limit [a]
(Data Invalid)</th></tr>
<tr><td rowspan="3">B8</td><td rowspan="3">NO_X</td><td rowspan="3">± 5.0% of Span
OR
± 100.0 ppm NO_X</td><td>± 5.0% of Span
OR
± 50.0 ppm NO_X for five (5) consecutive days</td></tr>
<tr><td>OR</td></tr>
<tr><td>± 10.0% of Span
OR
± 100.0 ppm NO_X at any time</td></tr>
<tr><td rowspan="3">B11</td><td rowspan="3">NO_X</td><td rowspan="3">± 5.0% of Span
OR
± 100.0 ppm NO_X</td><td>± 5.0% of Span
OR
± 50.0 ppm NO_X for five (5) consecutive days</td></tr>
<tr><td>OR</td></tr>
<tr><td>± 10.0% of Span
OR
± 100.0 ppm NO_X at any time</td></tr>
</table>

[a] Adjustments must be made to the monitoring system if the zero or upscale drift exceeds the drift tolerance by more than the listed value. Data is considered invalid and the CEMS is out-of-control (OOC) if the zero CDT or the upscale CDT exceeds twice the applicable performance specification listed in listed in Table 2-10 for five (5) consecutive, daily periods. If either the zero (or low-level) or upscale-level CD result exceeds four times the applicable drift specification in applicable performance specification listed in Section 2.4, the CEMS is also OOC.

2.5.1.1.5 CDT Failure Procedures

If the calibration drift exceeds the specification limits listed in Table 2-10 the following procedures are recommended, but not limited to:

(1) Initiation of corrective maintenance procedures to repair the CEMS.
(2) Completion of a successful CDT.

2.5.1.1.6 CDT Data Validation

Data is considered invalid and out-of-control (OOC) beginning the time corresponding to the completion of the fifth (5), consecutive, daily CDT where the zero or the upscale CDT exceeds twice (i.e., 2x) the applicable performance specification as summarized in Table 2-10 for five (5), consecutive, daily periods, or the time corresponding to the completion of the last successful CDT ***preceding*** the daily CDT check that results in a CDT in excess of four times (i.e., 4x) the allowable limit.

The end of the OOC period is the time corresponding to the completion of the CDT following corrective action (if necessary) that results in successful CDT at both the zero (or low-level) and high-level measurement points.

2.5.2 Quarterly

The following QA activities are completed at least in three (3) of four (4) calendar quarters, but in no more than three quarters in succession, on the NO_X concentration monitoring system. The quarterly QA activities performed on the NO_X concentration monitoring system include a cylinder gas audit (CGA).

2.5.2.1 Cylinder Gas Audit (CGA)

A cylinder gas audit (CGA) is completed on the NO_X concentration monitoring system in three (3) of four (4) calendar quarters, but in no more than three (3) quarters in succession. A CGA is not required during the quarter in which the relative accuracy test audit (RATA) is completed. Successive CGAs will not occur closer than 2 months.

The CGA is conducted consistent with the procedures in 40 CFR 60 Appendix F § 5.1.2. A CGA is conducted while the monitoring systems are not operating out-of-control (OOC) with respect to any required quality assurance assessments. A CGA may be done "cold" with no corrective maintenance, repair, calibration adjustments, re-linearization, or reprogramming of the monitor prior to the test. The CGA may be done after repair, corrective maintenance or reprogramming of the monitor. Once a CGA has started, no adjustments to the monitoring system will be made.

Documentation of the results of the CGAs is located in Section 8.9.2 or 8.9.6 of the Environmental Files.

The steps for conducting a CGA are as follows:

(1) The monitors are challenged with audit gases of known concentrations at two (2) points within the concentration ranges shown in Table 2-11. Audit gases are injected at the same point that the calibration gases are administered. This includes as much of the sampling system as possible (sample lines, filters, scrubbers, components exposed to the sample gas, and as much of the probe as practicable).

(2) The monitors are challenged three (3) times at each audit point. The sample line is purged in between each run at each audit point. The average of the three (3) responses for each audit point is used in determining accuracy. The monitor is challenged at each audit point for a sufficient period of time to assure that any sample gas in the lines is flushed out and the calibration gas flow has stabilized. The injection time also take into account the response time of the analyzers and sample system. The difference between the actual concentration of the audit gas and the concentration indicated by the monitor determines the accuracy of the monitor.

2.5.2.1.1 CGA Reference Gas Concentrations

Two (2) reference gas concentrations are utilized for the CGA. The two (2) reference gas concentrations are determined based on the applicable span value as defined in Section 2.5.1.1.1 or the reference gas concentrations defined in 40 CFR 60 Appendix F § 5.1.2. The reference gas concentrations for NO_X are presented in Table 2-11. The audit gases are U.S. EPA Protocol grade calibration gases and are different then the audit gases used in the CDT.

Table 2-11
NO_X CGA Reference Gas Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Analyzer	Audit Point 1 [(a)]	Audit Point 2 [(b)]
B8	NO_X	200.0 – 300.0 ppm	500.0 – 600.0 ppm
B11	NO_X	200.0 – 300.0 ppm	500.0 – 600.0 ppm

[(a)] The audit point 1 reference gas is defined in 40 CFR 60 Appendix F § 5.1.2 as between 20 and 30% of the span value.
[(b)] Upscale level reference gas is defined in 40 CFR 60 Appendix F § 5.1.2 as between 50 and 60% of the span value.

2.5.2.1.2 CGA Accuracy Calculation

The CGA accuracy for the NO_X concentration monitoring system is calculated for each reference gas level as described in Equation 2-2.

Equation 2-2 $$A = \frac{(C_M - C_A)}{C_A} \times 100$$

Where:

A = Percent accuracy of the CEMS.

CM = Average CEMS response during audit in units of applicable standard or appropriate concentration.

CA = Average audit value in units of applicable standard or appropriate concentration.

2.5.2.1.3 CGA Pass/Fail Tolerance

The NO_X concentration monitoring system is out-of-control (OOC) and the measured data is invalid when the CGA exceeds the tolerances in Table 2-12 at any audit point. The CEMS is deemed OOC the hour in which the CGA was completed or aborted in anticipation of a CGA failure. The measured data from NO_X concentration monitoring system is considered valid the hour that a successful CGA is completed.

Table 2-12
NO_X CGA Accuracy Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Out-of-Control Limit [a] (Data Invalid)
NO_X	± 15.0% of Average Audit Value [b]

[a] Data is considered invalid or out-of-control (OOC) and adjustments must be made to the monitoring system if the CGA accuracy tolerance is more than the listed tolerance.
[b] As determined by Equation 2-2 in Section 2.5.2.1.2.

2.5.2.1.4 CGA Failure Procedures

If the calibration drift exceeds the specification limits listed in Table 2-12 the following procedures are recommended, but not limited to:

(1) Initiation of corrective maintenance procedures to repair the CEMS.
(2) Completion of a successful CDT as described in Section 2.5.1.1.
(3) Completion of a successful CGA.

2.5.2.1.5 CGA Data Validation

The NO_X concentration monitoring system is out-of-control (OOC) and the measured data is invalid when the CGA exceeds the tolerances in Table 2-12 at any audit point. The CEMS is deemed OOC the hour in which the CGA was completed or aborted in anticipation of a CGA failure. The measured data from NO_X concentration monitoring system is considered valid the hour that a successful CGA is completed.

2.5.3 Annually

The following QA activities are completed at least once annually (i.e., every four (4) calendar quarters) on the NO_X CEMS and include a relative accuracy test audit (RATA).

2.5.3.1 Relative Accuracy Test Audit (RATA)

RATAs consist of a minimum of nine (9) comparative runs between the Mill CEMS and the U.S. EPA RM. If more than nine (9) are conducted, a maximum of three (3) may be excluded but nine (9) runs will be utilized to calculate the relative accuracy. Relative accuracy is calculated for the NO_X emission rate in terms of lbs NO_X/MMBtu. Once a RATA has started, no adjustments to the monitoring system will be made other than routine calibration adjustments following the daily CDT.

RATAs are conducted once every four (4) calendar quarters to assess the accuracy of the CEMS relative to the appropriate U.S. EPA Reference Methods (RM). RATAs are conducted in accordance with the procedures contained in the applicable PS and RM summarized in Table 2-6 and Table 2-13 respectively.

Table 2-13
NO_X RATA Reference Method Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	U.S. EPA Reference Method	Reference
NO_X	7E	40 CFR 60 Appendix A
O_2	3A	40 CFR 60 Appendix A

2.5.3.1.1 RATA Unit Operating Conditions

RATAs are conducted while the sources listed in Table 2-2 are operated greater than 50% of normal load pursuant to 40 CFR Part 60 Appendix B PS-2 §8.4.1.

2.5.3.1.2 RATA Calculation

RATA results are calculated by the contracted emission test firm in accordance with the calculations in 40 CFR 60 Appendix B PS-2 §12.

2.5.3.1.3 RATA Pass/Fail Tolerance

A RATA is "failed" if the results do not meet the acceptable criteria listed in Table 2-14. If a RATA is aborted in anticipation of unacceptable results, the RATA is considered to have failed.

Table 2-14
NO_X RATA Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Parameter	Units	Acceptable Performance Criteria	
		Average Reference Method	Applicable Emission Standard
NO_X Emission Rate	lbs/MMBtu	20%	10%

2.5.3.1.4 RATA Failure Procedures

If the RATA exceeds the tolerances listed in Table 2-14 the following procedures are recommended but not limited to:

(1) Initiation of corrective maintenance procedures to repair the CEMS.
(2) Completion of a successful CDT as described in Section 2.5.1.1.
(3) Completion of a successful RATA.

2.5.3.1.5 RATA Data Validation

Data collected the hour after the completion of the RATA that exceeds the tolerances in Table 2-14 is considered to be out-of-control (OOC). The beginning of the OOC period is the hour after the completion of the unsuccessful RATA. The end of the OOC period is the hour after the completion of a successful RATA.

The OOC period described above is consistent with the OOC periods defined in 40 CFR 60 Appendix F §5.2.1.

3 TOTAL REDUCED SULFUR (TRS)

The total reduced sulfur (TRS) continuous emission monitoring system (CEMS) consists of a sampling and conditioning system, TRS monitoring system, oxygen (O_2) analyzer, and a data acquisition and handling system (DAHS). All of these components are necessary to determine an O_2 corrected TRS concentration (i.e., TRS ppmvd @ 8% O_2 or TRS ppmvd @ 10% O_2).

3.1 *AFFECTED SOURCES*

TRS CEMS are installed, operated, and maintained on the sources listed in Table 3-1.

Table 3-1
TRS CEMS Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit ID	Emission Unit Description
EURF15	RF10 – No. 10 Chemical Recovery Furnace
EULK29	LK – Lime Kiln

3.2 *EMISSION LIMITATIONS*

TRS CEMS are operated to demonstrate compliance with the emission limitations summarized in Table 3-2.

Table 3-2
TRS Emission Limitation Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Emission Limitation	Units	Averaging Period
RF10	5	ppmvd @ 8% O_2	12-hr
LK	20	ppmvd @ 10% O_2	12-hr

3.3 *MONITORING REQUIREMENTS*

TRS CEMS are required pursuant to the applicable monitoring regulations summarized in Table 3-3.

Table 3-3
Applicable Monitoring Requirements
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Applicable Monitoring Regulation	Quality Assurance Activity Basis
RF10	40 CFR 60 Subpart BB	40 CFR §60.13(d)(1) 40 CFR 60 Appendix F, P1, §4 (CDT) 40 CFR 60 Appendix F, P1, §5.1.2 (CGA)
LK	R 336.1201	40 CFR §60.13(d)(1) 40 CFR 60 Appendix F, P1, §4 (CDT) 40 CFR 60 Appendix F, P1, §5.1.2 (CGA)

3.3.1 40 CFR 60 Subpart BB

40 CFR 60 Subpart BB requires that a TRS CEMS be installed, operated, and maintained. U.S. EPA corrected language in September 21, 2006 [FR 71 (183) 55119-55128] and subsequent correspondence from the National Council of Air and Stream Improvement, Inc. (NCASI) on October 06, 2006 which clarified that 40 CFR 60 Appendix F does not apply to TRS and O_2 CEMS used to demonstrate compliance with 40 CFR 60 Subpart BB. ***The Mill has included the daily CDT and quarterly CGA as part of this QAP; however does not consider 40 CFR 60 Appendix F applicable to the TRS CEMS used to demonstrate compliance with 40 CFR 60 Subpart BB.*** Any additional QA activities noted herein for the TRS CEMS were based on operational history of the TRS CEMS and engineering judgment. These procedures may, or may not, be consistent with 40 CFR 60 Appendix F.

In an email correspondence from Mr. Tom Gasloli of the Michigan Department of Environment, Great Lakes, and Energy (EGLE), formerly the Michigan Department of Environmental Quality (MDEQ) to Mr. Bill Racine of Verso Escanaba LLC (VE) on September 20, 2012 at 09:11 AM, EGLE and VE agreed to the following ongoing QA activities for the TRS and O_2 CEMS:

1. VE will complete daily CDT per 40 CFR 60 Appendix F, Procedure 1 (P1), §4 as described in Section 2.5.1.1.
2. VE will conduct quarterly CGAs per 40 CFR 60 Appendix F, P1, §5.1.2 in all four (4) calendar quarters as described in Section 2.5.2.1.
3. VE will submit quarterly excess emissions and monitor downtime reports.
4. VE will conduct compliance stack testing for TRS and O_2 on the RF10 and LK once per permit cycle.
5. No Relative Accuracy Test Audits (RATA) are required.

3.3.2 Monitoring System Description

3.3.2.1 Sampling and Conditioning System

Stack gas is delivered to the TRS and O_2 analyzers via an extractive sampling and conditioning system. The heated sample probe is installed at a specific location in the stack to collect the most representative stack gas samples. The probe, filter, and sample line are heated to prevent water condensation in the sampling system. The moisture in the stack gas is removed prior to the sample pump and analyzer using a condenser type moisture removal system. The condensers cool the gas below the dew point (using refrigerated coils), and then remove the condensed liquid water from the gas stream. Water removal is performed automatically to prevent filling the condensate trap and flooding the sampling line. The conditioned stack gas is passed through a particulate filter and a diaphragm sample pump prior to being delivered to the analyzer rack. The sampling system is designed in a manner not to pressurize the analyzer during normal sampling or routine calibrations.

3.3.2.2 TRS Analyzer

A sulfur dioxide (SO_2) analyzer functions as the TRS detector. A dry-base SO_2 regenerative scrubber removes only the SO_2 present in the sample stream. The TRS compounds present in the sample stream are then converted to SO_2 by a thermal oxidizer. To ensure that all of the TRS compounds are converted, a thermal oxidizer is maintained at approximately 1500 °F. The analyzer measures SO_2 concentrations using the fluorescent property of the SO_2 molecules. Fluorescence occurs when a molecule absorbs light at one wavelength; as a result of the absorbed energy, the molecule emits light at a different wavelength. The analyzer uses light (from a pulsed infrared light source) to irradiate the gas sample. The light radiated back from the sample is measured by the sensor, after filtering to select a narrow bandwidth of the fluorescent radiation. This secondary emission light output is proportional to the concentration of SO_2 in the stack gas.

3.3.2.3 O_2 Analyzer

Oxygen (O_2) concentration in the stack gas is measured using a paramagnetic O_2 analyzer. A paramagnetic analyzer quantifies O_2 based on the magnetic properties of O_2. Molecules that are attracted by a magnetic field are described as paramagnetic, while those repelled are called diamagnetic. Most molecules are diamagnetic. O_2 , however, is paramagnetic and is strongly attracted to magnetic fields compared to most other gases. The attraction of O_2 to a magnetic field is directly proportional to the O_2 concentration in the stack gas.

3.3.2.4 Data Acquisition and Handling Systems

The data acquisition and handling system (DAHS) includes the CEMS hardware and software components that take the output from the analyzers, combine it with other information, store the necessary data, and compute emissions.

Table 3-4
TRS and O_2 CEMS Major Component Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Analyzer Information			Measurement Parameters					Comment
	Manufacturer	Model No.	Serial No.	Span	Range	Units	Dilution Ratio	Basis	
No. 10 Recovery Furnace									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
SO_2 Scrubber									Dry-base SO_2 regenerative scrubber removes the SO_2 present in the sample stream.
Thermal Oxidizer	Graesby STI	T01000							TRS compounds present in the sample stream are converted to SO_2 by a thermal oxidizer maintained at approximately 1500 °F.
TRS	Thermo Environmental Instruments, Inc.	43I-ANSCB	1236656185	30	0 – 30	ppmv		dry	Span defined in §60.284(a)(2)(i).
O_2	Thermo Environmental Instruments	25595003	CC0227158	25	0 – 25	%		dry	Span defined in §60.284(a)(2)(ii).
DAHS	Foxboro I/A								
Lime Kiln									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
SO_2 Scrubber									Dry-base SO_2 regenerative scrubber removes the SO_2 present in the sample stream.
Thermal Oxidizer	Graesby STI	T01000							TRS compounds present in the sample stream are converted to SO_2 by a thermal oxidizer maintained at approximately 1500 °F.
TRS	Thermo Environmental Instruments	43I-ANSCB	708221178	30	0 – 30	ppmv		dry	Span defined in §60.284(a)(2)(i).
O_2	Thermo Environmental Instruments	25595003	CC031506-3	25	0 – 25	%		dry	Span defined in §60.284(a)(2)(ii).
DAHS	Foxboro I/A								

3.4 Installation and Initial Certification

The installation and initial certification of the TRS CEMS was completed in accordance with applicable Performance Specification (PS) in 40 CFR 60 Appendix B. Documentation of the certification is located in section 8.9.4 of the environmental files. Initial certification of the TRS CEMS will only be required upon the installation of a new TRS or O_2 monitoring system. The applicable PS are summarized in Table 3-5.

Table 3-5
Applicable Performance Specification
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Applicable Performance Specification (PS)	Reference
TRS	PS5	40 CFR 60 Appendix B
O_2	PS3	40 CFR 60 Appendix B

3.5 Ongoing Quality Assurance Activities

The quality of the data collected by the TRS CEMS is assessed by the completion of ongoing quality assurance (QA) procedures. The QA procedures for the TRS CEMS are summarized in Table 3-6.

Table 3-6
Ongoing Quality Assurance Frequency
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Daily	Weekly	Monthly	Quarterly	Semi-annually	Annual
TRS	CDT [(a)] Section 2.5.1.1			CGA [(b)] Section 2.5.2.1		
O_2	CDT [(a)] Section 2.5.1.1			CGA [(b)] Section 2.5.2.1		

[(a)] Calibration Drift Test (CDT)
[(b)] Cylinder Gas Audit (CGA)

3.5.1 Daily

The following QA activities are completed at least once daily (i.e., every 24 hours) on the TRS and O_2 CEMS. The daily QA activities performed on the TRS and O_2 CEMS include a calibration drift test (CDT).

3.5.1.1 Calibration Drift Test (CDT)

A calibration drift test (CDT) is completed by the Mill pursuant to 40 CFR §60.13(d)(1) at least once every 24 hours in accordance with the procedures described herein. A CDT is automatically initiated every 24 hours by the Programmable Logic Controller (PLC). The PLC energizes normally closed solenoid valves to allow the reference gas to be introduced to the sample probe. The reference gas is transported from the gas cylinder up to the sample probe and then travels down to the analyzer rack through the stack sample lines. This includes all of the sample line filters, dilution systems (as applicable), scrubbers, conditioners, and other sampling system components. The solenoid valve is energized introducing the reference gas for a pre-determined time interval adequate for the CEMS to measure and record a stable response. A zero and span gas check are run at least every 24-hours. Additional CDT, if required, may be initiated by the Mill manually throughout the 24 hour period.

3.5.1.1.1 Span Value

Span is defined in 40 CFR 60 Appendix B Performance Specification 2 §3.11 as the concentration specified for the affected source category in an applicable subpart of the regulations that is used to set the calibration gas concentration and in determining calibration drift. 40 CFR 60 Subpart BB is applicable to the TRS and O_2 monitoring systems. The span values for the TRS and O_2 monitoring systems are summarized in Table 3-7.

Table 3-7
TRS & O_2 Span Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Span [(a)]	Reference
TRS	30 ppm	40 CFR §60.284 (a)(2)(i)
O_2	25 %	40 CFR §60.284 (a)(2)(ii)

[(a)] Span is defined in 40 CFR 60 Appendix F §2.3 as the upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable subpart of the regulation. Span is defined in 40 CFR 60 Appendix B Performance Specification 2 §3.11 as the concentration specified for the affected source category in an applicable subpart of the regulations that is used to set the calibration gas concentration and in determining calibration drift.

3.5.1.1.2 CDT Reference Gas Concentrations

Two (2) reference gas concentrations are utilized for the CDT. The two (2) reference gas concentrations are determined based on the applicable span value as defined in Section 2.5.1.1.1. The reference gas concentrations are zero or low (e.g., between 0 and 20% of span value) and upscale (e.g., 50 to 100% of span value). The low and upscale audit gases are U.S. EPA Protocol grade calibration gases. The reference gas concentrations that are used in the CDT are summarized in Table 3-8.

Table 3-8
CDT Reference Gas Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Zero or Low [(a),(c)]	Upscale [(b),(c)]
TRS	0 – 6.0 ppm	15.0 – 30.0 ppm
O_2	0 – 5.0 %	12.5 – 25.0 %

[(a)] Zero or low level reference gas is defined in 40 CFR §60.13(d)(1) as between 0 and 20% of the span value.
[(b)] Upscale level reference gas is defined in 40 CFR §60.13(d)(1) as between 50 and 100% of the span value.
[(c)] 40 CFR §60.13(d)(1) is included by reference in 40 CFR 60 Subpart BB which is applicable to the TRS and O_2 monitoring systems.

3.5.1.1.3 CDT Calculation

The calibration drift for the TRS analyzers are computed by the DAHS for each reference gas level as described in Equation 3-1.

Equation 3-1 $$CD = \frac{|R-A|}{SPAN} \times 100$$

Where:

CD = Calibration Drift as a percentage of the SPAN.
R = Reference value of zero or upscale concentration introduced into the monitoring system.
A = Actual monitoring system response to the reference value (R).
SPAN = Highest concentration monitor component is required to be capable of measuring as defined in Section 2.5.1.1.1.

The calibration drift for the O_2 analyzers are computed by the DAHS for each reference gas level as described in Equation 3-2.

Equation 3-2 $$CD = |R - A|$$

Where:

CD = Calibration Drift as a percentage of the SPAN.
R = Reference value of zero or upscale concentration introduced into the monitoring system.
A = Actual monitoring system response to the reference value (R).

3.5.1.1.4 CDT Pass/Fail Tolerance

Pursuant to 40 CFR §60.13(d)(1), the TRS and/or O_2 monitors are adjusted whenever the zero CDT or the upscale CDT exceeds two (2) times the limit of the applicable performance specification listed in Section 2.4 and summarized listed in Table 3-9. If the zero CDT or the upscale CDT exceeds twice the applicable performance specification listed in listed in Table 3-9 for five (5), consecutive, daily periods, the CEMS is out-of-control (OOC). If either the zero (or low-level) or upscale-level CD result exceeds four times the applicable drift specification in applicable performance specification listed in Section 2.4, the CEMS is OOC.

If the calibration drift exceeds the specification limits listed in Table 3-9 for the appropriate monitor, the failure is indicated on the calibration report generated by the DAHS.

Table 3-9
TRS CDT Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Analyzer	Adjustment Limit [a] (Data Valid)	Out-of-Control Limit [a] (Data Invalid)
RF10 LK	TRS	± 10.0% of Span OR ± 3.0 ppm TRS	± 10.0% of Span OR ± 3.0 ppm TRS for five (5) consecutive days OR ± 20.0% of Span OR ± 6.0 ppm TRS at any time

[a] Although 40 CFR 60 Appendix F does not specifically apply to 40 CFR 60 Subpart BB, VE does follow the CD Assessment requirements of Appendix F §4.Adjustments must be made to the monitoring system if the zero or upscale drift exceeds the drift tolerance by more than the listed value. Data is considered invalid and the CEMS is out-of-control (OOC) if the zero CDT or the upscale CDT exceeds twice (i.e., 2x) the applicable performance specification listed in listed in Table 3-9 for five (5), consecutive, daily periods. If either the zero (or low-level) or upscale-level CD result exceeds four times (i.e., 4x) the applicable drift specification in applicable performance specification listed in Section 4.4, the CEMS is also OOC.

3.5.1.1.5 CDT Failure Procedures

If the calibration drift exceeds the specification limits listed in Table 3-9 the following procedures are recommended, but not limited to:

(1) Initiation of corrective maintenance procedures to repair the CEMS.
(2) Completion of a successful CDT.

3.5.1.1.6 CDT Data Validation

Data is considered invalid and out-of-control (OOC) beginning the time corresponding to the completion of the fifth (5), consecutive, daily CDT where the zero or the upscale CDT exceeds twice (i.e., 2x) the applicable performance specification as summarized in Table 3-9 for five (5), consecutive, daily periods, or the time corresponding to the completion of the last successful CDT ***preceding*** the daily CDT check that results in a CDT in excess of four times (i.e., 4x) the allowable limit.

The end of the OOC period is the time corresponding to the completion of the CDT following corrective action (if necessary) that results in successful CDT at both the zero (or low-level) and high-level measurement points.

3.5.2 Quarterly

The following QA activities are completed at least once in each of the four (4) calendar quarters on the TRS and O_2 CEMS. The quarterly QA activities performed on the TRS and O_2 CEMS include a cylinder gas audit (CGA).

3.5.2.1 Cylinder Gas Audit (CGA)

A cylinder gas audit (CGA) is completed on the TRS and O2 monitoring systems. The CGA is conducted at least once every calendar quarter. Successive quarterly audits shall occur no closer than 2 months.

Documentation of the results of the CGAs are located in environmental files 8.9.2 and 8.9.6. The CGA is conducted consistent with the procedures in 40 CFR 60 Appendix F §5.1.2. As discussed in Section 2.3, 40 CFR 60 Appendix F is used by the Mill as "guidelines" for the development of the QA activities associated with the TRS and O_2 monitoring systems. ***40 CFR 60 Appendix F is not applicable to the TRS and O_2 monitoring systems located at the Mill.***

A CGA is conducted while the monitoring systems are not operating out-of-control (OOC) with respect to any required quality assurance assessments. A CGA may be done "cold" with no corrective maintenance, repair, calibration adjustments, re-linearization, or reprogramming of the monitor prior to the test. The CGA may be done after repair, corrective maintenance or reprogramming of the monitor. Once a CGA has started, no adjustments to the monitoring system will be made.

The steps for conducting a CGA are as follows:

(1) The TRS and O_2 monitors are challenged with audit gases of known concentrations at two (2) points within the concentration ranges shown in Table 3-10. Audit gases are injected at the same point that the calibration gases are administered. This includes as much of the sampling system as possible (sample lines, filters, scrubbers, components exposed to the sample gas, and as much of the probe as practicable).

(2) The TRS and O_2 monitors are challenged three (3) times at each audit point. The sample line is purged in between each run at each audit point. The average of the three (3) responses for each audit point is used in determining accuracy. The monitor is challenged at each audit point for a sufficient period of time to assure that any sample gas in the lines is flushed out and the calibration gas flow has stabilized. The injection time also takes into account the response time of the analyzers and the sample system. The difference between the actual concentration of the audit gas and the concentration indicated by the monitor determines the accuracy of the monitor.

3.5.2.1.1 CGA Reference Gas Concentrations

Two (2) reference gas concentrations are utilized for the CGA. The two (2) reference gas concentrations are determined based on the applicable span value as defined in Section 2.5.1.1.1 or the reference gas concentrations defined in 40 CFR 60 Appendix F § 5.1.2. The reference gas concentrations for TRS and O_2 are presented in Table 3-10. The audit gases are U.S. EPA Protocol grade calibration gases and are different then the audit gases used in the CDT.

Table 3-10
CGA Reference Gas Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Audit Point 1 [(a)]	Audit Point 2 [(b)]
TRS	6.0 – 9.0 ppm	15.0 – 18.0 ppm
O_2	4.0 – 6.0 %	8.0 – 12.0 %

[(a)] The audit point 1 reference gas is defined in 40 CFR 60 Appendix F § 5.1.2 as between 20 and 30% of the span value for TRS and between 4.0 and 6.0% O_2.
[(b)] Upscale level reference gas is defined in 40 CFR 60 Appendix F § 5.1.2 as between 50 and 60% of the span value for TRS and between 8.0 and 12.0% O_2.

3.5.2.1.2 CGA Accuracy Calculation

The CGA accuracy for the TRS and O_2 analyzers are calculated for each reference gas level as described in Equation 3-3.

Equation 3-3 $$A = \frac{(C_M - C_A)}{C_A} \times 100$$

Where:

A = Percent accuracy of the CEMS.
CM = Average CEMS response during audit in units of applicable standard or appropriate concentration.
CA = Average audit value in units of applicable standard or appropriate concentration.

3.5.2.1.3 CGA Pass/Fail Tolerance

The TRS and/or O_2 monitors are out-of-control (OOC) and the measured data is invalid when the CGA exceeds the tolerances in Table 3-11 at any audit point. The CEMS is deemed OOC the hour in which the CGA was completed or aborted in anticipation of a CGA failure. The measured data from TRS and/or O_2 monitors is considered valid the hour that a successful CGA is completed.

Table 3-11
CGA Accuracy Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Out-of-Control Limit [a] (Data Invalid)
TRS	± 15.0% of Average Audit Value [b] OR ± 5.0 ppm TRS
O_2	± 15.0% of Average Audit Value [b]

[a] Data is considered invalid or out-of-control (OOC) and adjustments must be made to the monitoring system if the CGA accuracy tolerance is more than the listed tolerance.
[b] As determined by Equation 2-2 in Section 2.5.2.1.2.

3.5.2.1.4 CGA Failure Procedures

If the calibration drift exceeds the specification limits listed in Table 3-11 the following procedures are recommended, but not limited to:

(1) Initiation of corrective maintenance procedures to repair the CEMS.
(2) Completion of a successful CDT as described in Section 2.5.1.1.
(3) Completion of a successful CGA.

3.5.2.1.5 CGA Data Validation

The TRS and/or O_2 monitors are out-of-control (OOC) and the measured data is invalid when the CGA exceeds the tolerances in Table 3-11 at any audit point. The CEMS is deemed OOC the hour in which the CGA was completed or aborted in anticipation of a CGA failure. The measured data from TRS and/or O_2 monitors is considered valid the hour that a successful CGA is completed.

4 OXYGEN (O_2)

The oxygen (O_2) concentration monitoring system is an ancillary monitoring system to the continuous emission monitoring systems (CEMS) and continuous emission rate monitoring systems (CERMS) listed in Table 4-1. This section of the QAP addresses the quality assurance requirements for the O_2 concentration monitoring system. Information regarding the monitoring systems that depend on O_2 concentration to express emissions in terms of an applicable emission standard can be found elsewhere in this QAP as noted in Table 4-1.

Table 4-1
O_2 Concentration Monitoring System Dependents
Verso Escanaba LLC - Escanaba, MI Mill

Monitoring System	Units	Component(s)	QAP Reference
NO_X Emission Rate	lbs NO_X/MMBtu	NO_X	Section 1
		O_2	Section 4
O_2 Corrected TRS Concentration	ppmvd TRS @ 8% O_2 or ppmvd TRS @ 10% O_2	TRS	Section 3
		O_2	Section 4

4.1 *AFFECTED SOURCES*

O_2 concentration monitoring system are installed, operated, and maintained on the sources listed in Table 4-2.

Table 4-2
O_2 Concentration Monitoring System Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit ID	Emission Unit Description
EG8B13	B8 – No. 8 Boiler
EU11B68	B11 – No. 11 Boiler
EURF15	RF10 – No. 10 Chemical Recovery Furnace
EULK29	LK – Lime Kiln

4.2 *EMISSION LIMITATIONS*

The O_2 concentration monitoring system is utilized as part of the CEMS and CERMS listed in Table 4-1. There are no direct O_2 concentration emission limitations.

4.3 *MONITORING REQUIREMENTS*

O_2 concentration monitoring system is required pursuant to the applicable monitoring regulations summarized in Table 4-3.

Table 4-3
O_2 Applicable Monitoring Requirements
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Applicable Monitoring Regulation	Quality Assurance Activity Basis
RF10	40 CFR 60 Subpart BB	40 CFR §60.13(d)(1) 40 CFR 60 Appendix F, P1, §4 (CDT) 40 CFR 60 Appendix F, P1, §5.1.2 (CGA)
LK	R336.1201	40 CFR §60.13(d)(1) 40 CFR 60 Appendix F, P1, §4 (CDT) 40 CFR 60 Appendix F, P1, §5.1.2 (CGA)
B8	R336.1801(11)	40 CFR 60 Appendix F, P1 *OR* 40 CFR 75[a]
B11	40 CFR 60 Subpart D	40 CFR 60 Appendix F, P1

[a] VE elected to comply with the quality assurance procedures in 40 CFR 60 Appendix F, P1 for the B8 O_2 concentration monitoring system.

4.3.1 Monitoring System Description

The O_2 concentration monitoring system major components are described below and summarized in Table 4-4.

4.3.1.1 Sampling and Conditioning System

Stack gas is delivered to the O_2 analyzer via an extractive sampling and conditioning system. The heated sample probe is installed at a specific location in the stack to collect the most representative stack gas samples. The probe, filter, and sample line are heated to prevent water condensation in the sampling system. The moisture in the stack gas is removed prior to the sample pump and analyzer using a condenser type moisture removal system. The condensers cool the gas below the dew point (using refrigerated coils), and then remove the condensed liquid water from the gas stream. Water removal is performed automatically to prevent filling the condensate trap and flooding the sampling line. The conditioned stack gas is passed through a particulate filter and a diaphragm sample pump prior to being delivered to the analyzer rack. The sampling system is designed in a manner not to pressurize the analyzer during normal sampling or routine calibrations.

4.3.1.2 O_2 Analyzer

Oxygen (O_2) concentration in the stack gas is measured using a paramagnetic O_2 analyzer. A paramagnetic analyzer quantifies O_2 based on the magnetic properties of O_2. Molecules that are attracted by a magnetic field are described as paramagnetic, while those repelled are called diamagnetic. Most molecules are diamagnetic. O_2 , however, is paramagnetic and is strongly attracted to magnetic fields compared to most other gases. The attraction of O_2 to a magnetic field is directly proportional to the O_2 concentration in the stack gas.

4.3.1.3 Data Acquisition and Handling Systems

The data acquisition and handling system (DAHS) includes the CEMS hardware and software components that take the output from the analyzers, combine it with other information, store the necessary data, and compute emissions.

Table 4-4
O_2 Concentration Monitoring System Major Component Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Analyzer Information			Measurement Parameters					Comment
	Manufacturer	Model No.	Serial No.	Span	Range	Units	Dilution Ratio	Basis	
No. 10 Recovery Furnace									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
O_2	Thermo Environmental Instruments	25595003	CC0227158	25	0 – 25	%		dry	Span defined in §60.284(a)(2)(ii).
DAHS	VIM								
Lime Kiln									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
O_2	Thermo Environmental Instruments	25595003	CC031506-3	25	0 – 25	%		dry	Span defined in §60.284(a)(2)(ii).
DAHS	VIM								
No. 8 Boiler									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
O_2	Thermo Environmental Instruments	25595003	CC111105-5	25	0 – 25	%		dry	Span not defined.
DAHS	VIM								
No. 11 Boiler									
Probe & Umbilical									
Sample Conditioning System									Removes moisture from stack gas prior to analysis.
O_2	Thermo Environmental Instruments	25595003	CC0227157	25	0 – 25	%		dry	Span not defined.
DAHS	VIM								

4.4 Installation and Initial Certification

The installation and initial certification of the O_2 concentration monitoring system was completed in accordance with applicable Performance Specification (PS) in 40 CFR 60 Appendix B. Documentation of the certification is located in Section 8.9.4 of the Environmental Files. Initial certification of the O_2 concentration monitoring system will only be required upon the installation of a new O_2 concentration monitoring system. The applicable PS is summarized in Table 4-5.

Table 4-5
Applicable Performance Specification
Verso Escanaba LLC - Escanaba, MI Mill

Monitoring System	Applicable Performance Specification (PS)	Reference
O_2	PS3	40 CFR 60 Appendix B

4.5 Ongoing Quality Assurance Activities

The quality of the data collected by the O_2 concentration monitoring system is assessed by the completion of ongoing quality assurance (QA) procedures. The QA procedures for the O_2 concentration monitoring system are summarized in Table 4-6.

Table 4-6
O_2 Ongoing Quality Assurance Frequency
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Daily	Weekly	Monthly	Quarterly	Semi-annually	Annual
O_2	CDT [a] Section 4.5.1.1			CGA [b] Section 4.5.2.1		RATA [c][d] Section 4.5.3.1

[a] Calibration Drift Test (CDT)
[b] Cylinder Gas Audit (CGA)
[c] Relative Accuracy Test Audit (RATA)
[d] RATAs are not required on the Lime Kiln or the Recovery Furnace

4.5.1 Daily

The following QA activities are completed at least once daily (i.e., every 24 hours) on the O_2 concentration monitoring system. The daily QA activities performed on the O_2 concentration monitoring system include a calibration drift test (CDT).

4.5.1.1 Calibration Drift Test (CDT)

A calibration drift test (CDT) is completed by the Mill pursuant to 40 CFR §60.13(d)(1) at least once every 24 hours in accordance with the procedures described herein. A CDT is automatically initiated every 24 hours by the Programmable Logic Controller (PLC). The PLC energizes normally closed solenoid valves to allow the reference gas to be introduced to the sample probe. The reference gas is transported from the gas cylinder up to the sample probe and then travels down to the analyzer rack through the stack sample lines. This includes all of the sample line filters, dilution systems (as applicable), scrubbers, conditioners, and other sampling system components. The solenoid valve is energized introducing the reference gas for a pre-determined time interval adequate for the monitoring system to measure and record a stable response. A zero and span gas check are run at least every 24-hours. Additional CDT, if required, may be initiated by the Mill manually throughout the 24 hour period.

4.5.1.1.1 Span Value

Span is defined in 40 CFR 60 Appendix B Performance Specification 2 §3.11 as the concentration specified for the affected source category in an applicable subpart of the regulations that is used to set the calibration gas concentration and in determining calibration drift. The applicable subparts for the O_2 concentration monitoring system are listed in Table 4-3. The span values for the O_2 concentration monitoring systems are summarized in Table 4-7.

Table 4-7
O_2 Span Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Span [a]	Reference
O_2	25 %	40 CFR §60.284 (a)(2)(ii) - RF10 & LK [Not defined for B8 & B11] [b]

[a] Span is defined in 40 CFR 60 Appendix F §2.3 as the upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable subpart of the regulation. Span is defined in 40 CFR 60 Appendix B Performance Specification 2 §3.11 as the concentration specified for the affected source category in an applicable subpart of the regulations that is used to set the calibration gas concentration and in determining calibration drift.

[b] The span for the O_2 concentration monitoring system installed on B8 and B11 is not defined in the applicable subpart listed in Section 4.3. VE has elected to use a span of 25% for the O_2 concentration monitoring system installed on B8 and B11.

4.5.1.1.2 CDT Reference Gas Concentrations

Two (2) reference gas concentrations are utilized for the CDT. The two (2) reference gas concentrations are determined based on the applicable span value as defined in Section 4.5.1.1.1. The reference gas concentrations are zero or low (e.g., between 0 and 20% of span value) and upscale (e.g., 50 to 100% of span value). The low and upscale audit gases are U.S. EPA Protocol grade calibration gases. The reference gas concentrations that are used in the CDT are summarized in Table 4-8.

Table 4-8
O_2 CDT Reference Gas Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Zero or Low [(a),(c)]	Upscale [(b),(c)]
O_2	0 – 5.0 %	12.5 – 25.0 %

[(a)] Zero or low level reference gas is defined in 40 CFR §60.13(d)(1) as between 0 and 20% of the span value.
[(b)] Upscale level reference gas is defined in 40 CFR §60.13(d)(1) as between 50 and 100% of the span value.
[(c)] 40 CFR §60.13(d)(1) is included by reference in applicable subpart listed in Section 4.3.

4.5.1.1.3 CDT Calculation

The calibration drift for the O_2 analyzers are computed by the DAHS for each reference gas level as described in Equation 4-1.

Equation 4-1 $$CD = |R - A|$$

Where:

CD = Calibration Drift as a percentage of the SPAN.
R = Reference value of zero or upscale concentration introduced into the monitoring system.
A = Actual monitoring system response to the reference value (R).

4.5.1.1.4 CDT Pass/Fail Tolerance

Pursuant to 40 CFR §60.13(d)(1), the O_2 monitors are adjusted whenever the zero CDT or the upscale CDT exceeds two (2) times the limit of the applicable performance specification listed in Section 4.4 and summarized listed in Table 4-9. If the zero CDT or the upscale CDT exceeds twice (i.e., 2x) the applicable performance specification listed in listed in Table 4-9 for five (5), consecutive, daily periods, the CEMS is out-of-control (OOC). If either the zero (or low-level) or upscale-level CD result exceeds four times (i.e., 4x) the applicable drift specification in applicable performance specification listed in Section 4.4, the CEMS is OOC.

If the calibration drift exceeds the specification limits listed in Table 4-9 for the appropriate monitor, the failure is indicated on the calibration report generated by the DAHS.

Table 4-9
O_2 CDT Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Analyzer	Adjustment Limit [(a)] (Data Valid)	Out-of-Control Limit [(a)] (Data Invalid)
RF10 **LK** **B8** **B11**	O_2	± 1.0 % O_2	± 1.0 % O_2 for five (5) consecutive days OR ± 2.0% O_2 at any time

[(a)] Adjustments must be made to the monitoring system if the zero or upscale drift exceeds the drift tolerance by more than the listed value. Data is considered invalid and the CEMS is out-of-control (OOC) if the zero CDT or the upscale CDT exceeds twice (i.e., 2x) the applicable performance specification listed in listed in Table 4-10 for five (5), consecutive, daily periods. If either the zero (or low-level) or upscale-level CD result exceeds four times (i.e., 4x) the applicable drift specification in applicable performance specification listed in Section 4.4, the CEMS is also OOC.

4.5.1.1.5 CDT Failure Procedures

If the CDT exceeds the specification limits listed in Table 4-9 the following procedures are recommended, but not limited to:

(1) Initiation of corrective maintenance procedures to repair the monitoring system.
(2) Completion of a successful CDT.

4.5.1.1.6 CDT Data Validation

Data is considered invalid and out-of-control (OOC) beginning the time corresponding to the completion of the fifth (5), consecutive, daily CDT where the zero or the upscale CDT exceeds twice (i.e., 2x) the applicable performance specification as summarized in Table 4-9 for five (5), consecutive, daily periods, or the time corresponding to the completion of the last successful CDT ***preceding*** the daily CDT check that results in a CDT in excess of four times (i.e., 4x) the allowable limit.

The end of the OOC period is the time corresponding to the completion of the CDT following corrective action (if necessary) that results in successful CDT at both the zero (or low-level) and high-level measurement points.

4.5.2 Quarterly

The following QA activities are completed at least once in each of the four (4) calendar quarters on the O_2 concentration monitoring system unless otherwise noted in section 4.5.2.1. The quarterly QA activities performed on the O_2 concentration monitoring system include a cylinder gas audit (CGA).

4.5.2.1 Cylinder Gas Audit (CGA)

A cylinder gas audit (CGA) is completed on the O_2 concentration monitoring systems. The CGA is conducted at least once every calendar quarter on the Lime Kiln and the Recovery Furnace. A cylinder gas audit (CGA) is completed on the O_2 concentration monitoring system in three (3) of four (4) calendar quarters, but in no more than three (3) quarters in succession on No. 8 and No. 11 Boilers. A CGA is not required during the quarter in which the relative accuracy test audit (RATA) is completed. Successive quarterly audits shall occur no closer than 2 months.

Documentation of the certification is located in Section 8.9.2 and 8.9.6 of the Environmental Files. The CGA is conducted consistent with the procedures in 40 CFR 60 Appendix F §5.1.2.

A CGA is conducted while the monitoring systems are not operating out-of-control (OOC) with respect to any required quality assurance assessments. A CGA may be done “cold” with no corrective maintenance, repair, calibration adjustments, re-linearization, or reprogramming of the monitor prior to the test. The CGA may be done after repair, corrective maintenance or reprogramming of the monitor. Once a CGA has started, no adjustments to the monitoring system will be made.

The steps for conducting a CGA are as follows:

(1) The O_2 concentration monitoring system is challenged with audit gases of known concentrations at two (2) points within the concentration ranges shown in Table 4-10. Audit gases are injected at the same point that the calibration gases are administered. This includes as much of the sampling system as possible (sample lines, filters, scrubbers, components exposed to the sample gas, and as much of the probe as practicable).

(2) The O_2 concentration monitoring system is challenged three (3) times at each audit point. The sample line is purged in between each run at each audit point. The average of the three (3) responses for each audit point is used in determining accuracy. The monitor is challenged at each audit point for a sufficient period of time to assure that any sample gas in the lines is flushed out and the calibration gas flow has stabilized. The injection time also takes into account the response time of the analyzers and the sample system. The difference between the actual concentration of the audit gas and the concentration indicated by the monitor determines the accuracy of the monitor.

4.5.2.1.1 CGA Reference Gas Concentrations

Two (2) reference gas concentrations are utilized for the CGA. The two (2) reference gas concentrations are determined based on the applicable span value as defined in Section 4.5.1.1.1 or the reference gas concentrations defined in 40 CFR 60 Appendix F § 5.1.2. The reference gas concentrations for O_2 are presented in Table 4-10. The audit gases are U.S. EPA Protocol grade calibration gases and are different then the audit gases used in the CDT.

Table 4-10
O_2 CGA Reference Gas Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Audit Point 1 [(a)]	Audit Point 2 [(b)]
O_2	4.0 – 6.0 %	8.0 – 12.0 %

[(a)] The audit point 1 reference gas is defined in 40 CFR 60 Appendix F § 5.1.2 as between 20 and 30% of the span value for TRS and between 4.0 and 6.0% O_2.
[(b)] Upscale level reference gas is defined in 40 CFR 60 Appendix F § 5.1.2 as between 50 and 60% of the span value for TRS and between 8.0 and 12.0% O_2.

4.5.2.1.2 CGA Accuracy Calculation

The CGA accuracy for the O_2 concentration monitoring system is calculated for each reference gas level as described in Equation 4-2.

Equation 4-2 $$A = \frac{(C_M - C_A)}{C_A} x\ 100$$

Where:

A = Percent accuracy of the CEMS.

CM = Average CEMS response during audit in units of applicable standard or appropriate concentration.

CA = Average audit value in units of applicable standard or appropriate concentration.

4.5.2.1.3 CGA Pass/Fail Tolerance

The O_2 concentration monitoring system is out-of-control (OOC) and the measured data is invalid when the CGA exceeds the tolerances in Table 4-11 at any audit point. The CEMS is deemed OOC the hour in which the CGA was completed or aborted in anticipation of a CGA failure. The measured data from O_2 concentration monitoring system is considered valid the hour that a successful CGA is completed.

Table 4-11
O_2 CGA Accuracy Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Out-of-Control Limit [a] (Data Invalid)
O_2	± 15.0% of Average Audit Value [b]

[a] Data is considered invalid or out-of-control (OOC) and adjustments must be made to the monitoring system if the CGA accuracy tolerance is more than the listed tolerance.
[b] As determined by Equation 4-2 in Section 4.5.2.1.2.

4.5.2.1.4 CGA Failure Procedures

If the calibration drift exceeds the specification limits listed in Table 4-11 the following procedures are recommended, but not limited to:

(1) Initiation of corrective maintenance procedures to repair the monitoring system.
(2) Completion of a successful CDT as described in Section 4.5.1.1.
(3) Completion of a successful CGA.

4.5.2.1.5 CGA Data Validation

The O_2 concentration monitoring system is out-of-control (OOC) and the measured data is invalid when the CGA exceeds the tolerances in Table 4-11 at any audit point. The CEMS is deemed OOC the hour in which the CGA was completed or aborted in anticipation of a CGA failure. The measured data from O_2 concentration monitoring system is considered valid the hour that a successful CGA is completed.

4.5.3 Annually

The following QA activities are completed at least once annually (i.e., every four (4) calendar quarters) on the NO_X CERMS (i.e., lbs NO_X/MMBtu). The NO_X CERMS is dependent on the O_2 concentration monitoring system to determine lbs NO_X/MMBtu. The annual QA activities performed on the NO_X CERMS includes a relative accuracy test audit (RATA). As mentioned in Section 3, annual RATAs are not required on the Lime Kiln and Recovery Furnace TRS/O_2 CEMS.

4.5.3.1 Relative Accuracy Test Audit (RATA)

The NO_X CERMS (i.e., lbs NO_X/MMBtu) RATAs is described in Section 2.5.3.1.

5 CONTINUOUS OPACITY MONITORING SYSTEM (COMS)

A continuous opacity monitoring system (COMS) consists of opacity monitor and a data acquisition and handling system (DAHS). These components are necessary to determine the percent opacity in an exhaust stack.

5.1 *AFFECTED SOURCES*

COMS are installed, operated, and maintained on the sources listed in Table 5-1.

Table 5-1
COMS Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit ID	Emission Unit Description
EURF15	RF10 – No. 10 Chemical Recovery Furnace
EU11B68	B11 – No. 11 Boiler

5.2 *EMISSION LIMITATIONS*

COMS are operated to demonstrate compliance with the emission limitations summarized in Table 5-2.

Table 5-2
COMS Emission Limitation Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Emission Limitation	Units	Averaging Period	Comments
RF10	20	%	6-min block average	>20 percent opacity except for one six-minute period per hour of not more than 27 percent opacity (R336.1301(1)(a)
	20	%	10-consecutive, 6-min block averages	Corrective action trigger only. (40 CFR 60 subpart MM)
	35	%	6-min block average	Violation under 40 CFR 63 Subpart MM only if > 35% opacity for > 2% of the semi-annual operating time. Excess emissions under 40 CFR 60 Subpart BB are defined as > 35% opacity.
B11	20	%	6-min block average	>20 percent opacity except for one six-minute period per hour of not more than 27 percent opacity R336.1301(1)(a)
	10	%	Daily block average	40 CFR 63 Subpart DDDDD[(a)]

[(a)]Emission limits pursuant to 40 CFR 63 Subpart DDDDD are effective as of January 31, 2016.

5.3 *MONITORING REQUIREMENTS*

COMS are required pursuant to the applicable monitoring regulations summarized in Table 5-3.

Table 5-3
Applicable Monitoring Requirements
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Applicable Monitoring Regulation	Quality Assurance Activity Basis
RF10	40 CFR 60 Subpart BB 40 CFR 63 Subpart MM R 336.1301(1)(a)	40 CFR 60, Appendix F, P3 40 CFR §60.13(d)(1) 40 CFR §63.8(c)(6)
B11	40 CFR 60 Subpart D R 336.1301(1)(a) 40 CFR 63 Subpart DDDDD[(a)]	40 CFR 60, Appendix F, P3 40 CFR §60.13(d)(1) 40 CFR §63.8(c)(6) 40 CFR §63.7525(c)[(a)]

[(a)]Monitoring requirements pursuant to 40 CFR 63 Subpart DDDDD are effective as of January 31, 2016.

5.3.1 Monitoring System Description

5.3.1.1 Opacity Analyzer

The opacity of particulate matter in stack emissions is continuously monitored by a measurement system based upon the principle of transmissometry. Light having specific spectral characteristics is projected from a lamp through the effluent in the stack or duct, and the intensity of the projected light is measured by a sensor. The projected light is attenuated because of absorption and scattered by the particulate matter in the effluent; the percentage of visible light attenuated is defined as the opacity of the emission. Transparent stack emissions that do not attenuate light will have a transmittance of 100% or an opacity of 0%. Opaque stack emissions that attenuate all of the visible light will have a transmittance 0% or an opacity of 100%.

5.3.1.2 Data Acquisition and Handling Systems

The data acquisition and handling system (DAHS) includes the COMS hardware and software components that take the output from the analyzers, combine it with other information, store the necessary data, and compute emissions.

Table 5-4
Opacity CEMS Major Component Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Analyzer Information			Measurement Parameters					Comment
	Manufacturer	Model No.	Serial No.	Span	Range	Units	Dilution Ratio	Basis	
No. 10 Recovery Furnace									
Opacity	SICK-Maihak	Dusthunter T200	17498236	70	0 – 100	%			Span defined in §60.284(a)(1).
DAHS	VIM								
No. 11 Boiler									
Opacity	SICK-Maihak	Dusthunter T200	17498235	80, 90, or 100	0 – 100	%			Span defined in §60.45(c)(3).
DAHS	VIM								

5.4 Installation and Initial Certification

The installation and initial certification of the COMS were completed in accordance with applicable Performance Specification (PS) in 40 CFR 60 Appendix B. The applicable PS are summarized in Table 5-5. Documentation of the COMS certification is located in the section 8.9.4 of the environmental files.

Table 5-5
Applicable Performance Specifications
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Analyzer	Applicable Performance Specification (PS)	Reference
RF10	Opacity	PS-1	40 CFR 60 Appendix B
B11	Opacity	PS-1	40 CFR 60 Appendix B

5.5 Ongoing Quality Assurance Activities

The quality of the data collected by the COMS is assessed by the completion of ongoing quality assurance (QA) procedures. Procedure 3, of 40 CFR 60 Appendix F, establishes QA procedures for COMS used to demonstrate continuous compliance with opacity standards specified in new source performance standards (NSPS) promulgated by EPA pursuant to section 111(b) of the Clean Air Act. The effective date of Procedure 3 is November 12th, 2014. Ongoing quality assurance requirements for COMS are also defined in the applicable standards requiring opacity monitoring. The QA procedures for the COMS are summarized in Table 5-6.

Table 5-6
Ongoing Quality Assurance Frequency
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Daily	Weekly	Monthly	Quarterly	Semi-annually	Annual
Opacity	CDT [(a)] Section 2.5.1.1 Status Indicator Check			Performance Audit[(b)]		Zero Alignment

[(a)] Calibration Drift Test (CDT)
[(b)] Performance audit consists of a calibration error test (CET), zero compensation check, and optical alignment check.

5.5.1 Daily

The following QA activities are completed at least once daily (i.e., every 24 hours) on the COMS. The daily QA activities performed on the COMS include a calibration drift test (CDT) and a status indicator check

5.5.1.1 Calibration Drift Test (CDT)

The COMS is designed to complete a zero and an upscale calibration drift test (CDT) in order to ensure that the transmitter/receiver is working correctly. A CDT is completed by the Mill pursuant to 40 CFR §60.13(d)(1), 60 Appendix F, P3 §10.1 and 40 CFR §63.8(c)(6) at least once every 24 hours in accordance with the procedures described herein. The CDT consists of an automatic simulated zero and upscale calibration device that allows the zero and upscale drifts to be determined. A CDT is automatically initiated every 24 hours by the COMS. Additional CDT, if required, may be initiated by the Mill manually throughout the 24 hour period.

All optical and instrumental surfaces exposed to the effluent gases must be cleaned prior to performing the zero (low-level) and high-level drift adjustments; the optical surfaces and instrumental surfaces must be cleaned when the cumulative automatic zero compensation, if applicable, exceeds 4 percent opacity.

5.5.1.1.1 Span Value

Span is defined in an applicable subpart of the regulations as summarized in Table 5-4. The span values for the COMS are summarized in Table 5-7.

Table 5-7
COMS Span Summary
Verso Escanaba LLC - Escanaba, MI Mill

Emission Unit	Analyzer	Span	Reference)
RF10	Opacity	70%	40 CFR §60.284(a)(1)
B11	Opacity	80, 90, or 100%	40 CFR §60.45(c)(3)

5.5.1.1.2 CDT Reference Values

Pursuant to 40 CFR §60.13(d)(1), the acceptable range of zero and upscale calibration materials for use in the CDT is defined in the applicable version of 40 CFR 60 Appendix B, Performance Specification 1 (PS-1) as described in Section 5.4. The zero and upscale calibration materials that are used in the CDT are summarized in Table 5-8.

Table 5-8
CDT Reference Gas Summary
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Zero	Upscale [(a)]
Opacity	0 %	10 – 60 %

[(a)] The upscale calibration level is defined in ASTM 6216-98 as: "between the energy levels corresponding to 10 % opacity and the highest level filter used to determine calibration error." Applies to the RF10 COMS only.

5.5.1.1.3 CDT Calculation

The calibration drift for the COMS are computed by the DAHS for each reference level as described in Equation 5-1.

Equation 5-1 $CD = |R - A|$

Where:

CD = Calibration Drift.
R = Reference value of zero or upscale level introduced into the monitoring system.
A = Actual monitoring system response to the reference value (R).

5.5.1.1.4 CDT Pass/Fail Tolerance

Pursuant to 40 CFR §60.13(d)(1) and 40 CFR §63.8(c)(iii)(6) and 40 CFR 60 Appendix F, P3, the opacity monitors are adjusted whenever the zero CDT or the upscale CDT exceeds two (2) times the limit noted in the applicable performance specification listed in Section 5.4. Performance Specification 1 states that the COMS zero and upscale calibration drift error must not exceed 2% opacity over a 24 hour period. Pursuant to 40 CFR 60 Appendix F, P3 §10.4(1), if the zero or upscale drift check exceed twice the applicable drift specification in PS-1 for any one day, the COMS is out-of-control (OOC). A CDT is “failed” if the results do not meet the acceptable criteria listed in Table 5-9 for the appropriate monitor. The failure is indicated on the calibration report generated by the DAHS.

Table 5-9
CDT Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Adjustment Limit [a] (Data Valid)
Opacity	> 4.0 % Opacity
Opacity	Contamination > 4.0 % Opacity

[a] Data is considered invalid and out-of-control and adjustments must be made to the monitoring system if the zero or upscale drift exceeds the drift tolerance by more than the listed value and/or the contamination is greater than 4%.

5.5.1.1.5 CDT Failure Procedures

If the calibration drift or contamination exceeds the specification limits listed in Table 5-9 the following procedures are recommended, but not limited to:

(1) Initiation of corrective maintenance procedures to repair the COMS.
(2) Initiation of corrective maintenance procedures to reduce contamination.
(2) Completion of a successful CDT.

5.5.1.1.6 CDT Data Validation

COMS are required to be adjusted whenever the zero CDT or the upscale CDT exceeds two (2) times the limit noted in the applicable performance specification as summarized in table 7-9. The data collected after a failed CDT and prior to adjustments that result in a passing CDT is considered invalid data. Data is also considered invalid if the zero compensation (contamination) exceeds 4%.

5.5.1.2 Status Indicator Check

The COMS is designed to complete a status indicator check automatically at least once every 24 hours. A status indicator check is completed by the Mill pursuant to 40 CFR

Appendix F Procedure 3 §10.1(3). The status indicator check is a check of system self-diagnostics and status indicators. Error messages are communicated automatically from the monitor to the DAS via instrument output relays. In the event of a diagnostic parameter failure, the monitor will generate an alarm status. Appropriate corrective actions are implemented as required according to manufacturer's instructions. The Mill may opt to invalidate data based on the nature of the status alarm and required adjustments.

5.5.2 Quarterly

As required by 40 CFR 60 Appendix F Procedure 3, the Mill performs quarterly COMS performance audits. Audit results are submitted to the Michigan Department of Environmental Quality each quarter with the Quarterly CEMS Report. The quarterly COMS audits include a zero compensation check, optical alignment assessment, a calibration error check, a system response time check, and an averaging period calculation and recording check. Table 7-10 summarizes the pass/fail criteria for quarterly performance parameters.

Table 5-10
Performance Test Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Parameter	Adjustment Limit [(a)] (Data Valid)
Zero Compensation	> 4% Opacity
Audit Zero	> 1% Opacity
Audit Calibration Error	> 3% Opacity
Optical Alignment	Light beam outside of acceptable alignment area

[(a)] Adjustments must be made to the monitoring system if audit parameters exceed the tolerance limits by more than the listed values. The COMS is considered out-of-control and data is invalid until parameters are within acceptable ranges.

5.5.2.1 Zero Compensation Check

Zero compensation is checked quarterly as required by 40 CFR 60 Appendix F P3 §10.2(1). The value of the zero compensation (contamination correction) applied at the time of the audit must not exceed 4% opacity. **If zero compensation is greater than 4%, data is considered out-of-control and invalid until corrective actions are implemented which reduce the zero compensation to less than 4%.**

5.5.2.2 Optical Alignment Assessment

Optical alignment is checked quarterly as required by 40 CFR 60 Appendix F P3 §10.2(3) in accordance with the manufacturer's recommendations. The optical alignment indicator must show proper alignment (i.e., falls within a specified reference area) at the time of the audit. **If a condition of improper alignment is indicated, data is considered out-of-control and invalid until corrective actions are implemented which bring the alignment back into the acceptable range.**

5.5.2.3 Calibration Error Check

A three-point calibration error test of the COMS must be performed once each quarter as required by 40 CFR 60 Appendix F P3 §10.2(2). Three calibration attenuators (neutral density filters) meeting the requirements of PS-1 must be placed in the COMS light beam path for at least three nonconsecutive readings. All monitor responses must then be independently recorded from the COMS permanent data recorder. (Guidance for conducting this test is included in section 8.1(3)(ii) of PS-1). The low-, mid-, and high-range calibration error results must be computed as the mean difference and 95 percent confidence interval for the difference between the expected and actual responses of the monitor as corrected to stack exit conditions. The equations necessary to perform the calculations are found in section 12.0 of PS-

1. For the calibration error method, the external audit device is used. It must be confirmed that the external audit device produces a measurement less than or equal to one percent opacity. Attenuators must be recalibrated annually. If two annual calibrations agree within 0.5% opacity, the attenuators may then be recalibrated once every five (5) years.

Attenuators and external audit devices are stored in a manner which keeps them clean and protects them from damage. Only appropriate lens cleaning materials recommended by the manufacturer are used to clean attenuators. External audit devices are handled carefully to prevent jarring or damage which could affect the alignment. Filters are handled to prevent scratches and other damage. Any damaged equipment is sent to the manufacturer for repair and recalibration, or replaced.

The COMS is considered OOC and the measured data is invalid when COMS parameters exceed the tolerances in table 7-10.

5.5.2.4 System Response Time Check

Although not specifically required by the applicable standards, the Mill elects to check the COMS system response time quarterly according to the procedures specified in 40 CFR 60 Appendix B PS-1. A response time of <10 seconds is considered acceptable for upscale and downscale responses.

5.5.2.5 Averaging Period Calculation and Recording Check

Although not specifically required by the applicable standards, the Mill elects to check the COMS system averaging period calculation and data recording quarterly according to the procedures specified in 40 CFR 60 Appendix B PS-1. A calculated averaging period attenuator response within 2% of the certified attenuator value is considered acceptable.

5.5.3 Annually

As required by 40 CFR 60 Appendix F Procedure 3, the Mill performs an annual COMS zero alignment. The zero alignment is performed according to the manufacturer's recommendations and the requirements of Procedure 3. The COMS is removed from the stack and set up using the appropriate apparatus to allow clear path conditions. The COMS response to a clear condition and the COMS simulated zero response are recorded as percent opacity corrected to stack exit conditions. Zero compensation is disabled or recorded and applied to the COMS simulated zero condition. **The response difference in percent opacity to the clear path and simulated zero conditions is recorded as the zero alignment error.** The COMS is considered out-of-control if the zero alignment error does not meet the acceptable criteria listed in Table 7-11. The COMS simulated zero is then adjusted to provide the same response as the clear path condition, where the energy reaching the detector is between 90 and 110% of the energy reaching the detector under actual clear path conditions.

Table 5-11
Zero Alignment Pass/Fail Tolerance
Verso Escanaba LLC - Escanaba, MI Mill

Analyzer	Adjustment Limit [a] (Data Valid)
Opacity	> 2% Opacity

[a] Adjustments must be made to the monitoring system if the zero alignment exceeds the tolerance limit by more than the listed value. The COMS is considered out-of-control and data is invalid until corrective adjustments can be made to bring the analyzer zero alignment within tolerance limits.

6 PREVENTATIVE MAINTENANCE

The primary objective of a comprehensive preventative maintenance program is to help ensure the timely and effective completion of a measurement effort. VE's preventative maintenance program is designed to minimize the downtime of CEMS and COMS equipment due to component failures.

All maintenance performed on a CEMS and COMS is recorded in the maintenance log. The maintenance logs will be used to track the maintenance history of the equipment. The instrument electrician or mechanic shall complete a calibration/inspection form and note what (if any) *problems* were identified.

The maintenance frequency will be based on the manufacturer's recommendations, equipment history, or the industry standard. Adjustments in the frequency will be made as necessary. Mechanical problems identified during basic care routes will be identified in the work order system and repaired at the next available opportunity or during the next shutdown depending on the severity of the problem and the potential environmental impact.

6.1 *SPARE PARTS*

The maintenance activities described in this section and an adequate inventory of spare parts are required to minimize equipment downtime. The spare parts inventory targets those parts and supplies which:

- are subject to frequent failure;
- have limited useful lifetimes; or
- cannot be obtained in a timely manner should failure occur.

7 REVISIONS

Revisions to the Continuous Monitoring System Quality Assurance Plan are documented in Table 9-1.

Table 9-1
Continuous Monitoring System Quality Assurance Plan Revisions Log
Verso Escanaba LLC - Escanaba, MI Mill

Date	Authorized by	Revision Description *Document Section Number* *Regulatory Citation* *Brief Revision Description and Justification*
10/17/2014	Paula LaFleur	In Sections 2.2 and 2.3, updated table 2-3 and 2-4 to include the No. 8 Boiler emission limits and monitoring requirements resulting from the implementation of 40 CFR 52.1183(i) (BART FIP); Updated Table 2-5 with the currently certified NOx analyzer model and serial number for the No. 11 Boiler; Updated Table 3-3 by removing the LK regulation reference to 40 CFR 60 Subpart BB and adding R 336.1201; Updated tables 5-4 and 6-4 by changing the VFR model and serial numbers to those of the master control units instead of the probes; Updated Tables 7-2 and 7-3 to include the No. 11 Boiler emission limits and monitoring requirements resulting from the implementation of 40 CFR 63 Subpart DDDDD; Updated Section 7.4 and Table 7-5 to remove the references to the "old PS1" which no longer apply; Updated section 7.5 to include the new requirements of 40 CFR 60 Appendix F, Procedure 3

		for COMS; Other minor corrections and clarifications; Added this revisions table (Table 9-1)
7/26/16	Paula LaFleur	Reformatted document with Verso header
3/26/20	Adam Becker	Updated Serial numbers and deleted obsolete monitoring devices no longer applicable in the Mill.