

CAM Plans

No. 9 Boiler

No. 11 Boiler

Thermal Oxidizer

Lime Slaker

Lime Storage

Verso Escanaba LLC
CAM Plan
No. 9 Boiler
Wet Scrubber for Particulate Matter Control
May 2020

I. **BACKGROUND**

A. **Emissions Unit**

Description: No. 9 Boiler System – No. 9 Boiler
Identification: EU9B03
Facility: Escanaba Facility

B. **Applicable Regulations, Emission Limit, and Monitoring Requirements**

Regulation No.: R336.1201, R336.1331
Uncontrolled Emission Limit: No limit, but would be >100 tpy PM
Controlled Emission Limit: PM \leq 0.50 lb/1000 lbs exhaust gas, at 50% excess air if wood residue is >75% of the total heat input.
If wood residue is \leq 75% of the total heat input, then PM shall not exceed the fraction of total heat input from the wood residue times 0.67 lb/1000 lbs exhaust gas, at 50% excess air.
Monitoring Requirements: Pressure drop (dP)
Scrubber liquid flow rate

Control Technology

Wet Scrubber

II. **MONITORING APPROACH**

The key elements of the monitoring approach are presented below:

A. **Indicators**

Pressure drop
Scrubber liquid flow rate

B. **Measurement Approach**

Analytical Devices:

Pressure drop indicator: (2) Rosemount 115HP4S22 dP Transmitter
Water supply pressure gauge: (2) Yokogawa – Integral type magnetic flow AE215MG-AA1-PSA-AIDH/BR/HAL

Monitoring Locations:

Pressure drop indicator: Inlet and outlet of the scrubber
Scrubber liquid flow meter: Pump discharge

- C. **Indicator Range**
Pressure drop: Minimum of 3 inches of water column (3" W.C.) on both the North and South Scrubbers based on a 3-hour averaging time.
- Scrubber liquid flow rate: Minimum of 900 gallons per minute (GPM) on both the North and South Scrubbers, based on a 3-hour averaging time.
- D. **Performance Criteria**
Data Representativeness: The pressure is measured at the inlet and outlet of the scrubbers. Scrubber liquid flow rates are measured at the pump discharge.
- QA/QC Procedures: The air cleaning devices are maintained and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control Rules and existing law. There is an Inspection and Maintenance Program which documents records of inspections, problems found, repairs done, and/or corrective action taken. Indicators are calibrated and maintained according to manufacturer's specifications and/or good engineering practice.
- Monitoring Frequency: Continuous
- Reporting Units: " W.C. and GPM
- Recording Process: Continuously monitored and recorded on 3-hour averages
- Data Requirements: The measurements are compared to manufacturer's specifications.

III. **JUSTIFICATION**

A. **Background**

The emission unit is the No. 9 Boiler which burns primarily wood residue, but may also burn natural gas, and paper cores. Particulate emissions are currently controlled by two wet scrubbers, operating in parallel, with approximately 50% of the exhaust gas flow rate going through each scrubber body. Particulate is removed by physical contact with the scrubbing medium.

B. **Rationale for Selection of Performance Indicators**

Use of a pressure drop and water flow are good indicators of scrubber performance to ensure proper liquid to particulate matter contact for effective removal of the particulate matter from the air stream. If the scrubber pressure drop or water flow falls below the indicator levels, optimum contact between scrubber liquid and particulate matter in the air stream may not be achieved.

C. **Rationale for Selection of Indicator Levels**

The selected indicator ranges are a minimum scrubber pressure drop of 3" W.C. and a minimum water flow of 900 GPM to each control device. These indicator ranges are based on manufacturer's recommendations and historic stack testing results that demonstrate compliance with the requirements of the Title V Permit. Corrective actions are taken following any excursion from these indicators.

Verso Escanaba LLC
CAM Plan
No. 11 Boiler
ESP for Particulate Matter Control
May 2020

I. **BACKGROUND**

A. **Emissions Unit**

Description: No. 11 Boiler System – No. 11 Boiler
Identification: EU11B68
Facility: Escanaba Facility

B. **Applicable Regulations, Emission Limit, and Monitoring Requirements**

Regulation No.: R336.1201, 40 CFR 52.21, 40 CFR Part 60 Subpart D
Uncontrolled Emission Limit: No limit, but would be >100 tpy PM
Controlled Emission Limit: PM <= 0.06 lb/MMBtu
Monitoring Requirements: Opacity as monitored by a Continuous Opacity Monitoring System (COMS)

Control Technology

Dry Electrostatic Precipitator

II. **MONITORING APPROACH**

The key elements of the monitoring approach are presented below:

A. **Indicators**

Opacity

B. **Measurement Approach**

Analytical Devices: Sick Optics – Dusthunter T200

Monitoring Locations: Flue gas duct

C. **Indicator Range**

Opacity 0-100%

D.	<u>Performance Criteria</u>	
	Data Representativeness:	The COMS continuously monitors and records opacity in the duct.
	QA/QC Procedures:	The air cleaning devices are maintained and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control Rules and existing law. The source is subject to an Inspection and Maintenance Program, which includes keeping of records of inspections done, problems found, repairs done and/or corrective action taken. Additionally, the COMS is operated and maintained in accordance with 40 CFR Part 60, Appendix F and MDEQ standards.
	Monitoring Frequency:	Continuous
	Reporting Units:	% Opacity
	Recording Process:	Continuously monitored and recorded on 6 minute averages.
	Data Requirements:	A comparison of COMS readings taken during PM emission tests shows that compliance was demonstrated at opacity levels <20%.

III. **JUSTIFICATION**

A. **Background**

The emission unit is the No. 11 Boiler. Particulate emissions are currently controlled by an electrostatic precipitator. Particulate is given an electrical charge and collected from the air stream as it passes through the high voltage area of the device.

B. **Rationale for Selection of Performance Indicators**

Opacity below 20%, based on a 6-minute averaging time, is a good indicator of ESP performance as long as proper maintenance is performed.

C. **Rationale for Selection of Indicator Levels**

The compliance stack test for the No. 11 Boiler in September 2010 indicated particulate emission rates of 0.0578 lb/MMBtu compared to the permit limitation of 0.06 lb/MMBtu. Opacity during the performance tests was less than 20%.

Verso Escanaba LLC
CAM Plan
Thermal Oxidizer System
Packed Scrubber for Sulfur Dioxide (SO₂) Control
May 2020

I. BACKGROUND

A. Emissions Unit

Description:	Thermal Oxidizer System
Identification:	EUOC33
Facility:	Escanaba Facility

B. Applicable Regulations, Emission Limit, and Monitoring Requirements

Regulation No.:	R336.1201
Uncontrolled Emission Limit:	No limit, but would be >100 tpy SO ₂
Controlled Emission Limit:	SO ₂ <= 55 ppm nor 12 lbs/hour, based on a 12-hour averaging time
Monitoring Requirements:	Scrubber liquid feed rate pH of scrubbing liquid Pressure drop

Control Technology

Packed Scrubber

II. MONITORING APPROACH

The key elements of the monitoring approach are presented below:

A. Indicators

Scrubber liquid feed rate (GPM)
 pH of scrubbing liquid (su)
 Pressure drop ("W.C.)

B. Measurement Approach

Analytical Devices:	
Scrubber Liquid Feed Rate:	(2) Rosemount 6"- 8701TSA060S1 - 8712CR12M4
pH of Scrubbing Liquid:	(2) Yokogawa FU20-10-T1-NPT/FS
Pressure Drop:	Moore 340DBBTTCB5N21

Monitoring Locations:	Scrubber liquid feed rate: inlet to scrubber pH of scrubbing liquid: inlet to scrubber Pressure drop: inlet and outlet of scrubber
-----------------------	--

C. Indicator Range

Scrubber Liquid Feed Rate:	Min. of 536 GPM (1 st Stage) – 122 GPM (2 nd Stage)
pH of Scrubbing Liquid:	Min. of 6.3 su (1 st Stage) – 7.8 su (2 nd Stage)
Pressure Drop:	Min. of 0.5" W.C.

D.	<u>Performance Criteria</u> QA/QC Procedures:	The air cleaning devices are maintained and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control Rules and existing law. There is an Inspection and Maintenance Program which documents records of inspections, problems found, repairs done, and/or corrective action taken. Indicators are calibrated and maintained according to manufacturer's specifications and/or good engineering practice.
	Monitoring Frequency:	Continuous
	Reporting Units:	GPM, pH, " W.C.
	Recording Process:	Continuously monitored and recorded on 3-hr averages
	Data Requirements:	The measurements are compared to manufacturer's specifications and compliance stack test results

III. JUSTIFICATION

A. Background

The emission unit is the Thermal Oxidizer. SO₂ emissions are currently controlled by a packed scrubber. SO₂ is removed by physical contact with the scrubbing liquid and medium.

B. Rationale for Selection of Performance Indicators

Use of scrubber liquid feed rate, pH of the scrubbing liquid, and scrubber pressure drop are good indicators of scrubber performance to ensure proper liquid supply, contact time, and chemical availability for effective removal of the SO₂ from the air stream.

C. Rationale for Selection of Indicator Levels

The selected indicator ranges of 536/122 GPM, 6.3/7.8 pH, and 0.5" W.C. are based on compliance stack testing completed in October 2010. The SO₂ emissions were 24.4 ppm and 1.27 lbs/hr during this testing versus the limit of 55 ppm and 12 lbs/hr. Corrective actions are taken following any excursion from these indicators.

Verso Escanaba LLC
CAM Plan
Lime Slaker
Wet Scrubber for Particulate Matter Control
May 2020

I. **BACKGROUND**

A. **Emissions Unit**

Description: Reausticizing System – Lime Slaker
Identification: EUS29
Facility: Escanaba Facility

B. **Applicable Regulations, Emission Limit, and Monitoring Requirements**

Regulation No.: R336.1331
Uncontrolled Emission Limit: No limit, but would be >100 tpy PM
Controlled Emission Limit: PM <= 0.10 lbs/1000 lbs exhaust gas
Monitoring Requirements: Scrubber liquid flow rate

Control Technology

Wet Scrubber

II. **MONITORING APPROACH**

The key elements of the monitoring approach are presented below:

A. **Indicators**

Scrubber liquid flow rate

B. **Measurement Approach**

Analytical Devices: Johnson-Yokogawa AE-ZIO MG-CB1 ESA-A1D4

Monitoring Locations: Scrubber liquid inlet pipe

C. **Indicator Range**

Scrubber Liquid Flow Rate: Minimum flow of 150 GPM, based on a 3-hour averaging time.

D.	<u>Performance Criteria</u>	
	Data Representativeness:	The scrubber liquid flow rate is measured at the inlet to the control device.
	QA/QC Procedures:	The air cleaning devices are maintained and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control Rules and existing law. There is an Inspection and Maintenance Program which documents records of inspections, problems found, repairs done, and/or corrective action taken. Indicators are calibrated and maintained according to manufacturer's specifications and/or good engineering practice.
	Monitoring Frequency:	Continuous
	Reporting Units:	Gallons per Minute (GPM)
	Recording Process:	Data is monitored continuously and recorded on 3-hour averages.
	Data Requirements:	The flow is monitored continuously and recorded on 3-hour averages to ensure compliance with manufacturer's specifications and compliance stack test results.

III. JUSTIFICATION

A. Background

The emission unit is the Lime Slaker. The Lime Slaker is considered running when the green liquor flow to the slaker is greater than 300 gpm. The particulate emissions are controlled by the scrubber using green liquor as the scrubbing medium.

B. Rationale for Selection of Performance Indicators

Use of a minimum scrubber liquid flow rate is a good indicator of scrubber performance to ensure proper liquid to particulate matter contact for effective removal of the particulate matter from the air stream. If the scrubber liquid flow rate falls below the indicator level, optimum contact between the scrubber liquid and particulate matter in the air stream may not be achieved.

C. Rationale for Selection of Indicator Levels

The selected indicator range is a minimum scrubber liquid flow rate of 150 GPM to the control device. This flow is based on a 2011 compliance stack test which demonstrated compliance with the emission limit. The emission rate was 0.0796 lbs/1000 lbs. exhaust at operating conditions versus a limit of 0.10 lbs/1000 lbs exhaust. The indicator range is also based on good engineering judgment. Corrective actions are taken following any excursion from this indicator.

Verso Escanaba LLC
CAM Plan
Lime Storage Bins
Baghouse for Particulate Matter Control
May 2020

I. BACKGROUND

A. Emissions Unit

Description: Lime Kiln System – Two Lime Storage Bins
Identification: EULKI29
Facility: Escanaba Facility

B. Applicable Regulations, Emission Limit, and Monitoring Requirements

Regulation No.: R336.1331
Uncontrolled Emission Limit: No limit, but would be >100 tpy PM
Controlled Emission Limit: PM <= 0.10 lbs/1000 lbs exhaust gas
Monitoring Requirements: Pressure Drop

Control Technology

Baghouse

II. MONITORING APPROACH

The key elements of the monitoring approach are presented below:

A. Indicators

Pressure Drop (Inches of water column)

B. Measurement Approach

Analytical Devices:
Pressure Gauges Rosemount Model
3051S1CD3A3F12A1AB3D2E5L4M5

Monitoring Locations: Measured across the baghouse

C. Indicator Range

Pressure Drop: Minimum pressure drop of 0.25 inches of water on a daily average.

D.	<u>Performance Criteria</u>	
	Data Representativeness:	The pressure drop is measured across the scrubber.
	QA/QC Procedures:	The air cleaning devices are maintained and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control Rules and existing law. There is an Inspection and Maintenance Program which documents records of inspections, problems found, repairs done, and/or corrective action taken. Indicators are calibrated and maintained according to manufacturer's specifications and/or good engineering practice.
	Monitoring Frequency:	Daily
	Reporting Units:	Inches of water
	Recording Process:	The data is monitored continuously and recorded on a daily average.
	Data Requirements:	The measurement is recorded daily for comparison to the operating limits.

III. JUSTIFICATION

A. Background

The emission unit is the Lime Handling System for the two Lime Storage Bins. Particulate emissions are currently controlled by a common baghouse. Particulate is removed from the air stream as it passes through tightly woven fabric.

B. Rationale for Selection of Performance Indicators

Use of a pressure drop range is a good indicator of baghouse performance to ensure effective removal of particulate matter from the air stream. If the pressure drop falls below the indicator level, the bags may be ripped and optimum removal of particulate matter in the air stream may not be achieved.

C. Rationale for Selection of Indicator Levels

The selected indicator range is based on historical operational performance, engineering judgment, and visual inspections of the baghouse to ensure optimum baghouse performance. In addition to monitoring the differential pressure continuously and recording the daily average, the exhaust of the baghouse is visually inspected on a weekly basis to ensure it is operating correctly. Corrective actions are taken if the differential pressure is low or if visible emissions are observed.