

**International Paper Company Pensacola Mill
CAM Plan
Venturi Scrubber for Particulate Matter Control
October 2005**

I. BACKGROUND**A. Emissions Unit**

Description:	No. 3 Bark Boiler
Identification:	033
Facility:	Pensacola Mill

B. Applicable Regulations, Emission Limit, and Monitoring Requirements

Regulation No.:	FAC 62-296.405(1)(b), FAC 62-204.800(7)(b)1, PSD-FL-066
Uncontrolled Emission Limit:	PM <= 1,864 lb/hr
Controlled Emission Limit:	PM <= 0.1 lb/MMBtu, 118.3 tons/year
Monitoring Requirements:	Delta pressure (inches of water)

Control Technology

Neptune Airpol, Inc. Venturi Scrubber

II. MONITORING APPROACH

The key elements of the monitoring approach are presented below:

A. Indicators

Delta pressure
Scrubber liquid flow rate

B. Measurement Approach

Analytical Devices:	Pressure transducer
Monitoring Locations:	Inlet and outlet to the scrubber

C. Indicator Range

Delta pressure:	Minimum 9.1 inches of water, 3 hour average
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D. Performance Criteria

Data Representativeness:	The scrubber delta pressure is measured at Inlet and outlet to the scrubber
QA/QC Procedures:	Calibrate, maintain and operate the delta pressure monitor and flow meter using procedures that take into account manufacturer's specifications.
Monitoring Frequency:	Hourly
Reporting Units:	Delta pressure: inches of water

Recording Process: The pressure transducers are connected to the plant-wide process logic control (PLC) system. Instantaneous readings of the delta pressure measurements are available

Data Requirements: The delta pressure measurement is recorded hourly for comparison to the manufacturer's specifications and the three hour running average.

III. JUSTIFICATION

A. Background

The emission unit is the No. 3 Bark Boiler. Particulate emissions are currently controlled by a Neptune Airpol, Inc. Scrubber.

B. Rationale for Selection of Performance Indicators

A venturi scrubber removes particulate matter from an exhaust stream by accelerating the exhaust stream through a narrow throat, and injecting a scrubber liquid. The high velocity of the exhaust stream creates turbulent flow and causes the injected scrubber liquid to atomize into small droplets, thereby increasing the surface area for the particulate matter to contact. The use of a minimum scrubber pressure drop is a good indicator of scrubber performance, as it ensures that enough turbulent flow is present to atomize the scrubber liquid and provide effective removal of the particulate matter from the exhaust stream.

C. Rationale for Selection of Indicator Levels

The selected indicator range is a minimum delta pressure of 9.1 inches of water over a three hour average. This criterion is based on emission testing, practical experience, vendor information, and a limit in a PSD Permit dated May, 1980. Corrective action will immediately follow any excursion from this performance criterion. Such corrective action will be documented and reported to the Agency.

**International Paper Company Pensacola Mill
CAM Plan
Venturi Scrubber for Particulate Matter Control
November 2008**

I. BACKGROUND

A. Emissions Unit

Description:	No. 4 Boiler
Identification:	037
Facility:	Pensacola Mill

B. Applicable Regulations, Emission Limit, and Monitoring Requirements

Regulation No.:	FAC 62-296.405(1)(b), FAC 62-204.800(7)(b)1, PSD-FL-066
Uncontrolled Emission Limit:	PM <= 3,798 lb/hr
Controlled Emission Limit:	PM <= 0.1 lb/MMBtu, 240.9 tons/year
Monitoring Requirements:	Delta pressure (inches of water)

Control Technology

FMC Type TI280K Venturi Scrubber

II. MONITORING APPROACH

The key elements of the monitoring approach are presented below:

A. Indicators

Delta pressure
Scrubber liquid flow rate

B. Measurement Approach

Analytical Devices:	Pressure transducer
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Monitoring Locations:	Inlet and outlet of scrubber
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C. Indicator Range

Delta pressure:	Minimum 10 inches of water, 3 hour average
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D. Performance Criteria

Data Representativeness:

The scrubber delta pressure is measured at the inlet and outlet to the control device

QA/QC Procedures:

Calibrate, maintain and operate the delta pressure monitor and flow meter using procedures that take into account manufacturer's specifications

Monitoring Frequency:

Hourly

Reporting Units:	Delta pressure: inches of water Scrubber flow: gallons/minute
Recording Process:	The pressure transducers and flow meters are connected to the plant-wide process logic control (PLC) system. Instantaneous readings of the delta pressure and flow meter measurements are available
Data Requirements:	The delta pressure measurement is recorded hourly for comparison to the manufacturer's specifications and the three hour running average.

III. JUSTIFICATION

A. Background

The emission unit is the No. 4 Boiler. Particulate emissions are currently controlled by the FMC Type TI 280K Scrubber.

B. Rationale for Selection of Performance Indicators

A venturi scrubber removes particulate matter from an exhaust stream by accelerating the exhaust stream through a narrow throat, and injecting a scrubber liquid. The high velocity of the exhaust stream creates turbulent flow and causes the injected scrubber liquid to atomize into small droplets, thereby increasing the surface area for the particulate matter to contact. The use of a minimum scrubber pressure drop is a good indicator of scrubber performance, as it ensures that enough turbulent flow is present to atomize the scrubber liquid and provide effective removal of the particulate matter from the exhaust stream.

If the scrubber liquid flow rate falls below the indicator level, the droplet size will increase, and optimum contact between the scrubber liquid and particulate matter in the air stream may not be achieved, and the removal efficiency will decrease.

Secondarily, the Mill monitors scrubber flow to make certain that enough liquid is present to achieve the desired control efficiency.

C. Rationale for Selection of Indicator Levels

The selected indicator range is a minimum delta pressure of 10 inches of water over a three hour average. This criterion is based on emission testing, practical experience, vendor information, and a limit in a PSD Permit dated May, 1980. Corrective action will immediately follow any excursion from this performance criterion. Such corrective action will be documented and reported to the Agency.

The Mill has determined that a scrubber flow of 2000 gpm is typical for normal operation of the scrubber. Lower and higher scrubber liquid flow rates may also be acceptable for operation of the scrubber.

**International Paper Company Pensacola Mill
CAM Plan
Wet Scrubber for Particulate Matter Control
November 2008**

I. BACKGROUND

A. Emissions Unit

Description:	Lime Slaker
Identification:	G1035
Facility:	Pensacola Mill

B. Applicable Regulations, Emission Limit, and Monitoring Requirements

Regulation No.:	62-296.320(4)(a) FAC
Uncontrolled Emission Limit:	PM <=23.6 pounds/hour. 103.4 tons/year
Controlled Emission Limit:	PM<= 1.59 pounds/hour, 7.0 tons/year
Monitoring Requirements:	Scrubber liquid (mill water) flow rate

Control Technology

Ducor Type UW-4, Model IV 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:	Flow meter complete with flow rate monitor.
Monitoring Locations:	Scrubber liquid inlet pipe to the control device.

C. Indicator Range

Scrubber Liquid Flow rate:	Minimum 40 gallons/minute flow
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D. Performance Criteria

Data Representativeness:	The scrubber liquid flow rate is measured at the inlet to the control device.
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Verification of Operational Status: Not Applicable.

QA/QC Procedures:	Calibrate, maintain and operate the flow meter using procedures that take into account manufacturer's specifications.
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Monitoring Frequency:	Scrubber liquid flow rate-once per shift.
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Reporting Units:	Scrubber liquid flow rate – Gallons/minute
Recording Process:	Operators record data manually. Scrubber liquid flow rate is continuously recorded by the mills data accusation system.
Data Requirements:	Scrubber liquid flow rate – The measurement is recorded daily for comparison to manufacturer's specification.

III. **JUSTIFICATION**

A. **Background**

The emission unit is the Lime Slaker. Particulate emissions are currently controlled by the Ducon scrubber using mill water 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 40 gallons/minute to the control device. This criterion is based on a performance stack test. Corrective action will immediately follow any excursion from this performance criterion. Such corrective action will be documented and reported to the Agency.

**International Paper Company Pensacola Mill
CAM Plan
Wet Scrubber for Particulate Matter Control
Revised November 2008**

Lime Slaker: G1035	Indicator No. 1	Indicator No. 2
I. Indicator	Scrubber liquid flowrate (gallons per minute)	None
Measurement Approach	Flowrate monitoring system including a flowrate monitor and data acquisition system	None
II. Indicator Range	Minimum 40 gallons/minute flow	None
III. Performance Criteria		
A. Data Representativeness	The scrubber liquid flowrate is measured at the inlet to the control device.	None
B. Verification of Operational Status	Title V stack testing.	None.
C. QA/QC Practices and Criteria	Calibrate, maintain and operate the flow meter using procedures that take into account manufacturer's specifications.	None.
D. Monitoring Frequency	Scrubber liquid flowrate once per shift.	None.
Data Collection Procedures	Operators record data manually.	None.
Averaging Period	Not applicable.	None.

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Revised March 2006**

No. 3 Bark Boiler: 033	Indicator No. 1	Indicator No. 2
I. Indicator	Delta pressure (inches of water)	None.
Measurement Approach	There are two pressure transducers that are used to make a delta pressure measurement at the inlet and outlet to the scrubber.	None.
II. Indicator Range	Minimum of 9.1 inches of water, 3 hour average, typical delta pressure of 10.5 inches of water.	None
III. Performance Criteria		
B. Data Representativeness	By measuring the pressure at the inlet to the scrubber and at the outlet, a delta pressure reading is determined that can be used to provide a reliable indication of scrubber operation.	None
B. Verification of Operational Status	Title V stack testing.	None.
C. QA/QC Practices and Criteria	Calibrate, maintain and operate the delta pressure monitor using procedures that take into account manufacturer's specifications.	None.
D. Monitoring Frequency	Hourly.	None.
Data Collection Procedures	The pressure transducers are connected to the plant-wide process logic control (PLC) system. Instantaneous readings of the delta pressure measurements are available	None.
Averaging Period	Three hours.	None.

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Revised March 2006**

No. 4 Boiler: 037	Indicator No. 1	Indicator No. 2
I. Indicator	Delta pressure (inches of water)	Scrubber liquid flowrate (gallons per minute)
Measurement Approach	There are two pressure transducers that are used to make a delta pressure measurement at the inlet and outlet to the scrubber.	A flow meter is used to measure flow at the inlet to the nozzle of the scrubber.
II. Indicator Range	Minimum of 10 inches of water, 3 hour average, typical delta pressure of 11 inches of water.	Typical scrubber flow is 2,000 gallons per minute.
III. Performance Criteria	By measuring the delta pressure, readings can be used to provide a reliable indication of scrubber operation.	By measuring the scrubber flow rate, readings can be used to provide a reliable indication of scrubber operation.
C. Data Representativeness		
B. Verification of Operational Status	Title V stack testing.	None.
C. QA/QC Practices and Criteria	Calibrate, maintain and operate the delta pressure monitor using procedures that take into account manufacturer's specifications.	Calibrate, maintain and operate the flow meter using procedures that take into account manufacturer's specifications.
D. Monitoring Frequency	Hourly.	Hourly.
Data Collection Procedures	The pressure transducer is connected to the plant-wide process logic control (PLC) system. Instantaneous readings of the delta pressure are available.	The flow meter is connected to the plant-wide process logic control (PLC) system. Instantaneous readings of the scrubber flow rate are available.
Averaging Period	Three hours.	Three hours.

**International Paper Company Pensacola Mill
CAM Plan
Adsorption Tower for Sulfur Dioxide Control
Revised March 2006**

Thermal Oxidizer: 067	Indicator No. 1	Indicator No. 2
I. Indicator	Scrubber liquid pH	Adsorption Tower Recirculation Flow
Measurement Approach	Scrubber liquid pH is measured at the nozzles from the recirculation line where the line enters the adsorption tower.	None.
II. Indicator Range	pH range from minimum acceptable pH of 9.9 up to a pH of 14.	291 gallons per minute
III. Performance Criteria		
D. Data Representativeness	The scrubber liquid pH is measured at the inlet to the adsorption tower.	None.
B. Verification of Operational Status	Title V stack testing.	None.
C. QA/QC Practices and Criteria	Routine calibrations, maintenance, and proper operation of the pH meter using procedures that take into account manufacturer's specifications.	None.
D. Monitoring Frequency	Scrubber liquid pH is monitored continuously and reported on a 12-hour rolling average.	None.
Data Collection Procedures	Data are recorded continuously.	Data are recorded continuously.
Averaging Period	12 hours.	None.