Preventive Maintenance and Startup/Shutdown/Malfunction Plan EU05 (Boiler 1) Baghouse Dust Collector and Spray Dryer Absorber

Neenah Paper, Inc. Munising, Michigan

Version 7

December 6, 2019

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List of Abbreviations/Acronyms

Btu	British thermal unit
Btu/hr	Btus per hour
CAM	compliance assurance monitoring (as required by 40 CFR 64)
CFR	Code of Federal Regulations
COMS	continuous opacity monitoring system
°F	degrees Fahrenheit
EU	emission unit
EU05	Boiler 1, a coal- and natural gas-fired 202 MMBtu/hr heat input boiler
HAP	hazardous air pollutant(s)
HCl	hydrochloric acid (a HAP)
I&M	inspection and maintenance
IB GACT	National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Area Source Boilers
Neenah	Neenah Paper Michigan, Inc.
lb	pound(s)
MDEQ	Michigan Department of Environmental Quality
MMBtu/hr	million British thermal units per hour
NaOH	sodium hydroxide or caustic
O_2	oxygen
PM	particulate matter
$PM_{2.5}$	fine particulate matter less than 2.5 microns
PM_{10}	fine particulate matter less than 10 microns
ppm	parts per million
PTI	Permit to Install 24-15
ROP	Renewable Operating Permit MI-ROP-B1470-2013a
SDA	spray dryer absorber
SO_2	sulfur dioxide
TAC	toxic air contaminant
VE	visible emissions

1.0 Introduction

This Preventive Maintenance and Malfunction Abatement Plan (MAP) has been prepared for Neenah Paper Michigan, Inc. to comply with Sections III.2 and IV.2 of PTI 108-16A (for EU05) and with Michigan Air Pollution Control Rules R 336.1910 (Rule 910) and R 336.1911 (Rule 911). The purpose of this Preventive Maintenance and Malfunction Abatement Plan is to describe actions that will be taken to minimize the frequency and extent of any malfunction event(s), and how Neenah will manage any malfunction of equipment related to EU05 and its air pollution control technology (baghouse dust collector and Spray Dry Absorber [SDA]). Figure 1 presents a flow diagram of the SDA and Appendix 1 contains a flow diagram of the baghouse dust collector.

Neenah currently implements a comprehensive Inspection and Maintenance (I&M) Program for EU05 and its associated baghouse and Spray Dry Absorber (SDA). Records of the maintenance and repairs performed for EU05, baghouse dust collector (baghouse), and SDA are kept in Neenah's Oracle tracking system.

Rule 910 states:

> *An air-cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with these rules and existing law.*

Rule 911 states:

(1) Upon request of the department, a person responsible for the operation of a source of an air contaminant shall prepare a malfunction abatement plan to prevent, detect, and correct malfunctions or equipment failures resulting in emissions exceeding any applicable emission limitation.

(2) A malfunction abatement plan required by subrule (1) of this rule shall be in writing and shall, at a minimum, specify all of the following:

(a) A complete preventative maintenance program, including identification of the supervisory personnel responsible for overseeing the inspection, maintenance, and repair of air-cleaning devices, a description of the items or conditions that shall be inspected, the frequency of the inspections or repairs, and an identification of the major replacement parts that shall be maintained in inventory for quick replacement.

(b) An identification of the source and air-cleaning device operating variables that shall be monitored to detect a malfunction or failure, the normal operating range of these variables, and a description of the method of monitoring or surveillance procedures.

(c) A description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

(3) A malfunction abatement plan required by subrule (1) of this rule shall be submitted to the department and shall be subject to review and approval by the department. If, in the opinion of the commission, the plan does not adequately carry out the objectives as set forth in subrules (1) and (2) of this rule, then the department may disapprove the plan, state its reasons for disapproval, and order the preparation of an amended plan within the time period specified in the order. If, within the time period specified in the order, an amended plan is submitted which, in the opinion of the department, fails to meet the objective, then the department, on its own initiative, may amend the plan to cause it to meet the objective.

(4) Within 180 days after the department approves a malfunction abatement plan, a person responsible for the preparation of a malfunction abatement plan shall implement the malfunction abatement plan required by subrule (1) of this rule.

2.0 Defining Malfunctions

Michigan Air Pollution Control Rule R 336.1113(a) (Rule 113(a)) defines a malfunction as:

> *…any sudden, infrequent and not reasonably preventable failure of a source, process, process equipment, or air pollution control equipment to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

A true malfunction must have a reasonable potential to cause:

- An operating parameter to stray from an acceptable range or value that has been established to indicate compliance with an emission limit or
- An exceedance in an established emission rate

The following emission limits apply to EU05:

Pollutant	Emissions Limit (with averaging time)	Underlying Applicable Requirement	Comments
Carbon monoxide	420 ppm (@ 3% O_2)	IB GACT	Stack test
Particulate matter	0.03 lb/1,000 lb exhaust (adjusted to 50% excess air)	PTI/ROP Rule 331(a)	Stack test
Mercury	2.2 x 10^{-6}	IB GACT	Compliance demonstrated through fuel monitoring
Sulfur dioxide	1.5% S in fuel by weight (adjusted to 12,000 Btu/lb)	Rule 401	Compliance demonstrated through fuel monitoring
Individual HAPs (most notably HCl)	9 tons/12 month rolling total	PTI/ROP – Rule 205(3)	Emission factors developed through stack testing, performance testing and manufacturer's recommendations
Total HAPs	22.5 tons/12 month rolling total	PTI/ROP – Rule 205(3)	Emission factors developed through stack testing, performance testing and manufacturer's recommendations
Visible Emissions	20%, 6-minute average with one 6-minute average of no more than 27% per hour/10% block daily average	Rule 301 and IB GACT	Continuous Opacity Monitoring System

Most malfunctions of the control equipment will not result in emissions exceedances. However, the systems must be returned to service as soon as possible in order to maintain maximum emission control. If a malfunction or failure occurs that cannot be corrected by an operator, then a Work Order will be issued to repair the system

Following is a list of malfunction events covered by this Plan.

- Failure of EU05 that results in emissions exceeding the allowed rate contained in Neenah's PTI and ROP. With the air pollution control technology currently used for EU05, any malfunction of EU05 will be controlled by the baghouse. The only limit for EU05 contained in the PTI and ROP is PM and, to a lesser extent, HAP emissions (primarily HCl) as contained in FGFACILITY of the PTI. HCl is a byproduct of combusting coal that contains available chloride, as coal fuel use will be reduced or completely stopped during a malfunction of EU05, a malfunction of EU05 is not likely to result in any exceedance of HCl emissions.

- Failure of emission control system components, e.g. broken bags, monitoring equipment (such as equipment used for measuring the pressure drop across the baghouse filters) and data acquisition equipment to demonstrate compliance with emission limits.
- Sudden and unavoidable failure of EU05 and/or control equipment, not due to poor operation or maintenance.

3.0 Emission Control Devices

The PTI/ROP requires the at minimum the following information to be included in the Preventive Maintenance and Malfunction Abatement Plan:

- Operation and maintenance criteria for EU05, add-on control devices and for process and control device(s) monitoring equipment, and a standardized checklist to document the operation and maintenance of control equipment.
- Work practice standards for the add-on control device(s) and monitoring equipment.
- Procedures to be followed to ensure that the equipment or process malfunctions due to poor maintenance or other preventable conditions do not occur.
- A systematic procedure for identifying process equipment, add-on control device(s) and monitoring equipment malfunctions and for implementing corrective actions to address such malfunctions.

The air pollution control devices for EU05 consist of the following:

- An SDA, which was installed to reduce emissions of HCl.
- A baghouse, which reduces emissions that consist of solid (or filterable) portions of PM (as well as filterable PM_{10} and $PM_{2.5}$). The only pollutants with emission limits are PM and SO_2 (SO_2 is limited via a maximum sulfur content in coal fuel used in EU05). There are no emission limits for PM_{10} and $PM_{2.5}$, although PM_{10} is the regulated pollutant for CAM purposes.

Table 1 summarizes the control devices with targeted, and collaterally controlled, pollutants for EU05.

Table 1 – Control Devices Description

Control Equipment	Emissions Controlled
SDA	HCl (targeted pollutant)
	SO_2 (collaterally controlled)
	Condensable PM (collaterally controlled)
Baghouse (Filterable Portions Only)	PM
	PM_{10} (collaterally controlled)
	$PM_{2.5}$ (collaterally controlled)

3.1 Spray Dry Absorber

The **SDA** is a caustic system containing a co-current reaction tower between the boiler and the baghouse. Incoming hot flue gas is sprayed with a dilute solution of water and NaOH using dual atomizing nozzles. Atomizing nozzles produce a fine mist of droplets, the contact between the fine mist and air results in adiabatic cooling of the hot flue gas. The chemical reaction that occurs between caustic and gaseous components results in removal of pollutants. The NaOH reacts with HCl in the exhaust gases to produce sodium chloride, which is a solid at the exhaust gas temperature of EU05, and is subsequently captured in the baghouse as a dry, filterable PM. The chemical reaction between HCl and caustic is:

$$HCl + NaOH \rightarrow NaCl + H_2O$$

Figure 1 identifies a typical SDA control technology injection system as it would be applied to a boiler's exhaust gas system.

The SDA system includes caustic receiving tanks, caustic storage tanks, piping, injectors, tanks for combining concentrated caustic with water, pumps, and metering devices. The SDA system injectors are placed at a point inside the exhaust gas ductwork downstream of EU05 and before the baghouse, which provides for adequate residence time for acid gases to react with the caustic. The SDA uses a specific gravity setpoint to control the concentration of water and sodium hydroxide which in turn correlates to a HCl removal efficiency and emission factor. The specific gravity setpoint can be increased, increasing the concentration of caustic being sprayed into the tower, which increases the removal of HCl from the flue gas, to a point. The CAM Plan (included as Appendix 5) further describes operation of the SDA and its control of HCl emissions.

The Reagent Specific Gravity and SDA Outlet Temperature were selected as performance indicators because they are indicative of operation of the SDA system in a manner necessary to remove HCl as intended and to comply with the HAP emission limit. When the SDA system is operating properly, the Reagent Specific Gravity will be greater than (or equal to) 1.010 and the SDA Outlet Temperature will be greater than (or equal to) 220°F. Parameter values outside of the specified ranges will indicate a malfunctioning control device as described as follows.

The caustic solution application rate is held constant, therefore specific gravity is varied to ensure the appropriate amount of absorbent is applied to neutralize the HCl in the flue gas. Reagent Specific Gravity is a direct indication of the concentration, therefore, the greater the specific gravity, the greater the NaOH concentration in the absorbent. For a malfunction in which the specific gravity is below the specified range, there will not be enough base present to neutralize the HCl in the flue gas, which will result in elevated HCl emissions.

The absorption process requires intimate contact between the sorbent and flue gas. The SDA Outlet Temperature must be above 220°F to prevent condensation in the control equipment and associated exhaust system.

There is duplicative backup support equipment, such as additional tanks and pumps, should some of the equipment be taken out of service for any reason, including a malfunction. The SDA backup equipment reduces the possibility for exceeding the single HAP limit contained in SC I.1 for FGFACILITY due to failure of some of the equipment associated with the SDA. The SDA is designed to reduce uncontrolled HCl such that Neenah qualifies as a minor (area) source of HAP emissions.

3.2 Baghouse Dust Collector

Baghouse or fabric filter dust collectors are used to remove particulate matter (PM) from the coal-fired boiler exhaust gas. Generally, all fabric filters have: a tube sheet to which the bags are attached, an inlet for drum exhaust air, an outlet for filtered air, and an opening at the bottom through which the collected dust can drop out. Fabric filter dust collectors are very effective in ensuring compliance and are considered the best available control technology (BACT) for PM control. Additional information on baghouse dust collectors is included in Attachment 2, including a diagram illustrating how the system operates. In a reverse air baghouse dust collector, exhaust gas containing PM enters the lower section of the collector where it is evenly distributed, maintaining a consistent flow through the collector as well as a consistent pressure drop.

As presented in Attachment 2, PM collects on the 'dirty side' (or exterior) of the bag as the exhaust air travels through the bags. The collector operates on a pre-programmed cleaning cycle during which two rotating distributors allow air to flow to the clean side of the bags in one compartment at a time; this releases the dust cake from the filter bags. Clean filtered air is routed to the clean air plenum and into the exhaust stack. This baghouse dust collector has five separate modules and is required to operate at least three baghouse modules at any one time. If less than three modules are in operation while firing coal, the plant is required to take corrective action.

Because modules can be taken out of service for cleaning, smooth uninterrupted operation of the fabric filter dust collector at constant operating pressure is possible. Neenah monitors baghouse pressure drop to ensure that bags in service are not blindered nor leaking. Bag leaks can be caused by many things including: torn bags, worn bags, improperly fitting bags, and dislodged bags. Fabric filter leaks can be very small or large; they can occur instantaneously or progress over time, depending on the failure mode. However, leaks do not always result in an exceedance of observed opacity which is measured using a continuous opacity monitor.

To ensure proper operation of the baghouse dust collector, differential pressure drop, and inlet temperature of the fabric filter dust collector is monitored continuously and maintained in ranges identified by the manufacturer as acceptable. The monitoring results are continuously monitored and recorded; any out of range values are addressed and corrective actions are logged. The **baghouse** uses a dry filtering mechanism (woven bags) which control solid PM emissions from EU05 while combusting coal fuel. Coal contains inert material (ash) that remains after combustion. A portion of the ash is retained inside the boiler and is removed from the stoker grates. The rest of the ash becomes fly ash, which is entrained in the exhaust gas stream exiting the boiler. The dry filter bags in the baghouse capture the fly ash, which is then removed from each internal bag via compressed air pulsing. The fly ash is deposited in the bottom hoppers of the baghouse; these hoppers are regularly emptied to ensure proper functioning of the baghouse. After the fly ash is removed from the baghouse, it is transported to a landfill for permanent disposal. A small portion of the collected material in the baghouse consists of sodium chloride as a result of the reaction between caustic and HCl in the exhaust gas stream.

3.3 Monitoring Operating Parameters

While EU05 does not directly monitoring emissions, it does monitor control equipment operating parameters to ensure compliance with its emission limits; as described in the CAM Plan (Appendix 5), these include:

- Baghouse: Opacity (using a COMS)
- SDA: Reagent Specific Gravity (which indicates solution concentration) and SDA Outlet Temperature

4.0 Source Description

EU05 is a stoker coal-fired and natural gas-fired boiler with a design heat input of 202 MMBtu/hr. Coal is the primary fuel during normal operation. EU05 is currently capable of accommodating natural gas fuel up to approximately 35% of EU05's heat input.

The steam from EU05 is used for generating electricity for use by Neenah's Mill as well as for various other Mill needs.

5.0 Minimizing Emissions During Startup and Shutdown

Boiler emissions during start-up and shutdown are minimized primarily by following proper procedures. Boiler start-up is governed by an internal procedure for start-up (PH-OPER-100-NO.1 BOILER START-UP), while boiler shutdown is governed by a separate internal procedure (PH-OPER-101-NO.1 BOILER SHUTDOWN). Neenah has other procedures in place to ensure boiler and control equipment proper operation. The boiler is started on natural gas and natural gas is fired at low loads and during a controlled shutdown to ensure exhaust gases are compliant are compliant with emission limits. In most cases, boiler load (measured by steam pressure) must be above 30% to operate control equipment, because low exhaust temperatures would allow condensation of water and would form acid in the exhaust system. Though Neenah will not begin firing coal unless the baghouse dust collector and SDA are in operation. As a result, both the baghouse dust collector and SDA will be bypassed until the exhaust gas temperature is high enough to avoid condensing acid within the control equipment exhaust system. The baghouse dust collector is bypassed until the exhaust gas temperature is at least 220°F while the SDA is disabled until the SDA Inlet Temperature is above 220°F.

6.0 Responsible Personnel

The responsible personnel for purposes of this Preventive Maintenance and Malfunction Abatement Plan are as follows:

Table 2 – Responsible Personnel

Position	Responsibility
Mill Manager (or equivalent)	Total mill operations
Engineering Manager	Corrective actions, malfunction response, and routine inspections
Maintenance	Preventative maintenance inspections and repairs
Environmental Manager (or equivalent)	Pollution control equipment monitoring and oversight
Outside Contractors (as necessary)	Calibration, repairs, and maintenance of equipment instrumentation

7.0 Preventive Maintenance Program, Operational Variables, and Corrective Procedures

Preventive maintenance will include equipment inspections, scheduled replacement of parts, and maintaining an inventory of critical spare parts. The facility's I&M database system tracks and maintains records of each preventive maintenance action and/or repair completed and will track maintenance and repairs performed.

Equipment inspections generally fall under two categories:

- Inspections that take place while EU05 is operating.
- Less frequent inspections that take place while EU05 is not operating.

I&M that occurs during EU05 operation is typically on a more frequent basis than I&M that occurs when EU05 is not operating (shutdown). The frequency and scope of these inspections will depend on the manufacturer recommendations and operator experience.

A comprehensive preventive maintenance schedule is kept at Neenah's Mill in Munising and is incorporated by reference. A copy of the schedule is available to the MDEQ upon written request.

Neenah will utilize internal resources as well as outside vendors to conduct maintenance, repairs, and calibration, as necessary.

7.1 Items Inspected and Operational Variables

The following table provides general information regarding: 1) frequency of inspection, 2) normal operating ranges and monitoring of operational variables, and 3) corrective procedures for the air cleaning devices for EU05.

Table 3 – Inspection Procedures and Operational Variables

Description of Observation	Method of Observation	Normal Operating Range	Frequency of Observation	Comments
VE	COMS	Less than 20% opacity	Continuous	Opacity readings greater than 20% may indicate a potential issue with the EU05 baghouse.
Baghouse Pressure Differential	Pressure gauge	0.5 to 5.5 inches of water	Pressure drop across the baghouse is continuously monitored by gauges affixed to the equipment; readings are electronically recorded. If electronic recording becomes unavailable, the pressure drop readings will be manually recorded once per operating day.	When maximum allowable differential is exceeded, the baghouse will automatically start the cleaning cycle.
Reagent Specific Gravity	Metering equipment is used to measure NaOH and water to achieve a proper mix	Specific gravity set point is adjustable, typically it is between 1.030 and 1.040 with a minimum of 1.010	Continuous, recorded once per day	Drift from set point may indicate a potential issue with the SDA system.
SDA Outlet Temperature	A meter is used to monitor and control the SDA temperature	Temperature set point is adjustable, typically 265°F-290°F with a minimum of 220°F	Continuous, recorded once per day	Drift from set point may indicate a potential issue with the SDA system.
Monitoring Devices [1]	Calibration and Certification of Accuracy	According to manufacturer instructions	Annually	N/A

1 Monitoring Devices consist of: (a) baghouse differential pressure measuring devices, (b) COMS and (c) SDA metering equipment.

2 The control efficiency can be adjusted upward or downward as needed to meet its 12-month rolling total emission rate by adjusting the specific gravity (or concentration) of the reagent while keeping the flow rate constant

N/A not applicable

7.2 Weekly Maintenance Schedule

1. Inspect the tank levels, check for leaks and check temperatures.
2. Inspect air compressors and dryers.
3. Make sure the SDA ash cleanout is functioning properly and the tote is not over filling.
4. Clean all six SDA injector nozzle/lances twice per month (biweekly). These are the nozzles that inject the caustic solution into the exhaust gases from EU05.
5. Inspect Air Dryers No. 8 and 9.
6. Maintain a record of the observation(s) and service(s) performed.

7.3 Monthly Maintenance Schedule

1. Change the oil in the SDA rotary air lock.
2. Inspect paddle mixer paddles and pins, grease purge lines on shafts, grease stub shaft bearings, lubricate roller chain.
3. Change the filter on the fly ash vacuum blower.
4. Visually check equipment operation, as needed.
5. Maintain a record of the observation(s) and service(s) performed.

7.4 Quarterly Maintenance Schedule

1. Lubricate as necessary.
2. Change the oil in the fly ash vacuum blower.
3. Paddle Mixer -inspect roller chain and adjust as needed.
4. Change oil in gear box.
5. Grease idler sprocket shaft.
6. Change water filters on nozzle water supply and blend tank blow down line.
7. Change the oil in the gear box for the SDA screw conveyor.
8. Maintain a record of the observation(s) and service(s) performed.

7.5 Semiannual Routine Maintenance

1. Change the oil in the chemical pumps.
2. Change the oil or clean out the conveyor gear box.
3. Check the drive bolts on the conveyors and blowers.
4. Lubricate Paddle Mixer motor.
5. Maintain a record of the observation(s) and service(s) performed.

7.6 Annual Routine Maintenance

1. Inspect and clean the SDA tower.
2. Inspect the baghouse and SDA for any signs of needed maintenance.
3. Lubricate the compressor motor.
4. Calibrate all instruments.
5. Using a kit, conduct routine preventive maintenance for the NaOH pumps.
6. Inspect and change oil on the rotary air lock for the paddle mixer.
7. Inspect and lubricate the rotary air lock for the SDA scrubber tower.
8. Inspect and clean the motor control center. Check all terminals for secure connections.
9. Inspect the SDA screw conveyor and change out any worn parts.
10. Maintain a record of the observation(s) and service(s) performed.

7.7 Corrective Action

If a malfunction occurs which causes, or may cause, excess emissions during EU05 operations, the equipment causing the potential excess emission rate will be evaluated – as soon as practicable in accordance with safe operating procedures – to determine the proper procedure to correct the issue or determine that the malfunction will not cause excess emissions.

EU05 may continue to operate consistent with good air pollution control practices until the SDA and/or baghouse can be repaired and brought back on-line before resuming normal operation. EU05 can switch to natural gas firing; however, the unit cannot operate at loads higher than 35% of maximum capacity using only this fuel.

If a malfunction occurs, the Mill Manager, or designated representative, will determine whether EU05 can continue to operate consistent with the requirements of the PTI and ROP. If not, appropriate plant personnel will follow the procedure outlined below:

- Define and correct the issue, which may include investigating the following conditions:
  - Malfunction of the NaOH solution feed to the EU05 exhaust gases
  - Baghouse is plugged with solids
  - Baghouse bag(s) torn
  - Malfunction of baghouse exit gas fan to stack
  - Malfunction of baghouse differential pressure system
  - Pressure drop across the baghouse deviates from appropriate range
  - Malfunction of baghouse monitoring system
- Determine if EU05 can continue to operate within compliance of the limitations specified in the facility's PTI and/or ROP. If not, action shall be taken to correct the issue in accordance with safe operating procedures.
- Notify the appropriate staff of any issues that occur and/or if there are any questions regarding compliance or action(s) which should be taken to correct the issue.
- If the issue is one that calls for immediate corrective action, contact any one of the individuals listed in Section 5.0, Table 2.

7.8 Preventive Maintenance Records

The following records will be maintained:

1. Inspections and service of the baghouse and SDA. All records will include the date, findings, and corrective actions taken or repairs made, if necessary.
2. All significant unscheduled maintenance activities performed on the baghouse and/or SDA. Records will include the date, findings, and corrective actions taken or repairs made, if necessary.

7.9 Common Baghouse Malfunctions

Table 4 – Baghouse Operating Issues and Solutions

Symptom	Cause	Solution
High baghouse pressure drop	Bag cleaning mechanism not properly adjusted	Increase cleaning frequency
		Clean for longer duration
	Compressed air pressure too low	Increase pressure
		Decrease duration and frequency
		Check compressed air dryer and clean if necessary
		Check for obstructions in piping
	Pulsing valves failed	Check diaphragm
		Check pilot valves
	Cleaning timer failure	Check to see if timer is indexing to all contacts
		Check output on all terminals
	Not capable of removing dust from bags	Check for condensation on bags
		Analyze dust and bags to determine if there is an issue
		Dry clean or replace bags
		Reduce airflow
	Excessive re-entrainment of dust	Empty hopper continuously
		Clean rows of bags randomly, rather than sequentially
		Isolate suspect module
	Incorrect pressure drop reading	Clean out pressure taps
		Check hoses for leaks
		Check diaphragm in gauge
Dirty discharge at stack	Bags leaking	Replace bags
		Tie off leaking bags and replace them later
		Isolate leaking compartment or module
	Bag clamps not sealing	Check and tighten clamps
		Smooth out cloth under clamp and re-clamp
	Failure of seals in joints at clean/dirty air connection	Caulk or weld seams
	Insufficient filter cake	Allow more dust buildup on bags by cleaning less frequently
	Bags too porous	Send bag in for permeability test and review with manufacturer
	Cleaning cycle too frequent	Reduce cleaning cycle, if possible
Dirty discharge at stack	Pulse too long	Reduce pulsing duration

Table 4 – Baghouse Operating Issues and Solutions

Symptom	Cause	Solution
	Pressure too high	Reduce supply pressure, if possible
High compressed air consumption	Diaphragm valve failure	Check diaphragm and springs
		Check pilot valve
Reduced compressed air pressure	Compressed air consumption too high	See previous solutions
	Restrictions in compressed air piping	Check compressed air piping
	Compressed air dryer plugged	Bypass dryer temporarily, if possible
		Replace dryer
	Compressor worn out	Replace rings
		Check for worn components
		Rebuild compressor or consult manufacturer
	Pulsing valves not working	Check pilot valves, springs, and diaphragms
	Timer failed	Check terminal outputs or replace circuit board
	Insufficient preheating	Run the system with hot air only before process gas flow is introduced
Moisture in baghouse	Internal baghouse too cold	Insulate unit
		Lower dew point by keeping moisture out of system
	Cold spots through insulation	Eliminate cold spots via insulation
	Water/moisture in compressed air	Check automatic drains
		Install after cooler
		Install dryer
	Re-pressurizing air causing condensation	Preheat re-pressurizing air
Material bridging in hopper	Dust stored in hoppers	Remove dust continuously
	Hopper slope insufficient	Use vibrators
	Too much dust	Install primary collector
	Cleaning cycle too frequent	Slow down periodic cleaning
High rate of bag failure, bags wearing out	Inlet air improperly baffled from bags	Consult vendor
	Pulsing pressure too high	Reduce pressure
	Cages have barbs	Remove cages and smooth out barbs

7.10 Common SDA Malfunctions

Table 5 – SDA Operating Issues and Solutions

Symptom	Cause	Solution
SDA Reduced Injection Rate	Pump failure	Switch to backup pump
		Replace/fix pump motor
		Dismantle pump to remove any obstruction(s)
		Reset breaker
		Replace pump
	Plugged piping	Detect where plug is and clean out obstruction
	Plugged injector(s)	Detect injectors that may be plugged, and dismantle and remove any obstruction(s)
	Loss of compressed air	Replace compressor
		Replace/fix compressor motor
		Repair damaged air tank
Dilute Ratio of NaOH and Water	NaOH and water blending not working correctly	Evaluate reason and repair
		Replace recirculation pump/motor
	NaOH metering system not working	Evaluate reason and repair or replace
		Replace density meter.
	Ran out of NaOH	Obtain NaOH from supplier; preferably prior to running out
SDA clean out conveyor inoperable.	Broken belts	Replace belts.
	Material clog	Clean out bottom of SDA tower.
	Motor inoperable	Replace motor / reset breaker or overload.
	Speed sensor malfunction	Replace speed sensor.
Lance pressures not matching.	Check valve failure	Replace check valve.
Empty pump cavity fault.	Loss of prime on pump	Prime pump.
		Switch pumps.
Loss of compressed air pressure of flow	Leaks	Repair leaks.
	Air filter dirty	Replace Filter

8.0 Major Parts Kept Onsite for Quick Replacement

Following is a list of general spare parts kept onsite facilitating quick replacement for the SDA. A detailed list, which includes each part's description and part number, is kept at Neenah for ordering should some of the parts be depleted.

Quantity	Description
4	Various valves
8	Various transmitters
2	Various drives
4	Ethernet boards for drives
1	Fly ash vacuum blower
13	Various electrical motors
11	Various drive belts
2	Air filters for compressors
1	Compressor separator
1	Progressive cavity screw pump
6	Injection nozzles
3	Various filters
1	Flow regulator (lance assembly)
1	Separator (compressor)
1	Spare SDA injector lance
2	Manhole gaskets

9.0 HAP Emissions Tracking and Monitoring

Neenah Paper ensures compliance with the source-wide individual HAP emission limit of 9.5 tons per 12-month rolling total in ROP MI-ROP-B1470-2019 by closely tracking the HCl emissions from EU05. Emission factors are obtained by engineering testing, performance testing or compliance testing, with the use of Method 26A, Fourier-transform infrared spectroscopy or Tunable Diode Laser. An explanation of emission calculations is included as Appendix 2. A summary of the emission factors developed from the most recent testing is included as Appendix 3, which contains an emission factor summary table of controlled and uncontrolled emission factors used in the emission tracking spreadsheet. The current method was discussed with the air quality inspector and District Supervisor before being implemented. HCl emissions are calculated for reporting by using the coal throughput in EU05 and using HCl emission factors that have been determined by both compliance testing, performance and engineering testing. Different emission factors are generated based on the control efficiency of the SDA. The control efficiency of the SDA can be adjusted by adjusting the specific gravity setpoint which changes the concentration of NaOH being injected into the reaction tower. As additional information is collected from the SDA and additional testing is performed the emission factors will be updated accordingly and the Preventive Maintenance and Malfunction Abatement Plan will be revised.

Emissions are calculated using emission factors multiplied by the fuel throughput in conjunction with its heating value. Daily coal use is determined by using a gravimetric weigh belt feeder. The coal usage is shown in tons per hour and totalized on a daily and monthly basis.

SDA downtime logs are filled out by the Powerhouse crew and times are checked against records in the Process Information (PI) system to ensure accuracy. SDA downtimes greater than five minutes during EU05 operation are recorded and included in the emissions tracking spreadsheet.

Uncontrolled HCl emissions (tons/12 months) =

(coal burned without control equipment - tons/mo) x (heat input - MMBtu/ton) x (uncontrolled emission factor – lb/MMBtu) x (ton/2,000 lb)

Controlled HCl emissions (tons/12 months) =

(coal burned with control equipment - tons/mo) x (heat input - MMBtu/ton) x (controlled emission factor - lb/MMBtu) x (ton/2000 lbs)

Total HCl emissions (tons/12 months) =

Uncontrolled HCl emissions (tons/12 months) + Controlled HCl emissions (tons/12 months)

A detailed summary of the MS Excel® equations used in the emission tracking spreadsheet can be found in Appendix 2. Appendix 3 contains an emission factor summary table of controlled and uncontrolled emission factors used in the emission tracking spreadsheet. The emissions tracking spread sheets can be updated when additional information or stack testing becomes available.

10.0 Reporting Malfunctions and Abnormal Conditions

Michigan Rules 912(2)-(5) require facilities to report of certain abnormal conditions, start-up, shutdown, or malfunctions associated with process and/or emission control systems subject to air quality requirements.

Michigan Rule 912(2) addresses reporting requirements for sources releasing emissions of HAPs and/or TACs in excess of applicable limitations for one hour or more. The requirement reads:

> *The owner or operator of a source, process, or process equipment shall provide notice of an abnormal condition, start-up, shutdown, or a malfunction that results in emissions of a hazardous air pollutant which continue for more than 1 hour in excess of any applicable standard or limitation established by the clean air act or the emissions of a toxic air contaminant which continue for more than 1 hour in excess of an emission standard established by a rule promulgated under the air pollution act or an emission limitation specified in a permit issued or order entered under the air pollution act.*

Michigan Rule 912(3) addresses reporting requirements for sources releasing emissions of any air contaminant in excess of allowable emission rates for two hours or more. The rule reads:

> *The owner or operator of a source, process, or process equipment shall provide notice and a written report of an abnormal condition, start-up, shutdown, or a malfunction that results in emissions of any air contaminant continuing for more than 2 hours in excess of a standard or limitation established by any applicable requirement.*

Rule 912(4) establishes the reporting timelines. The rule reads:

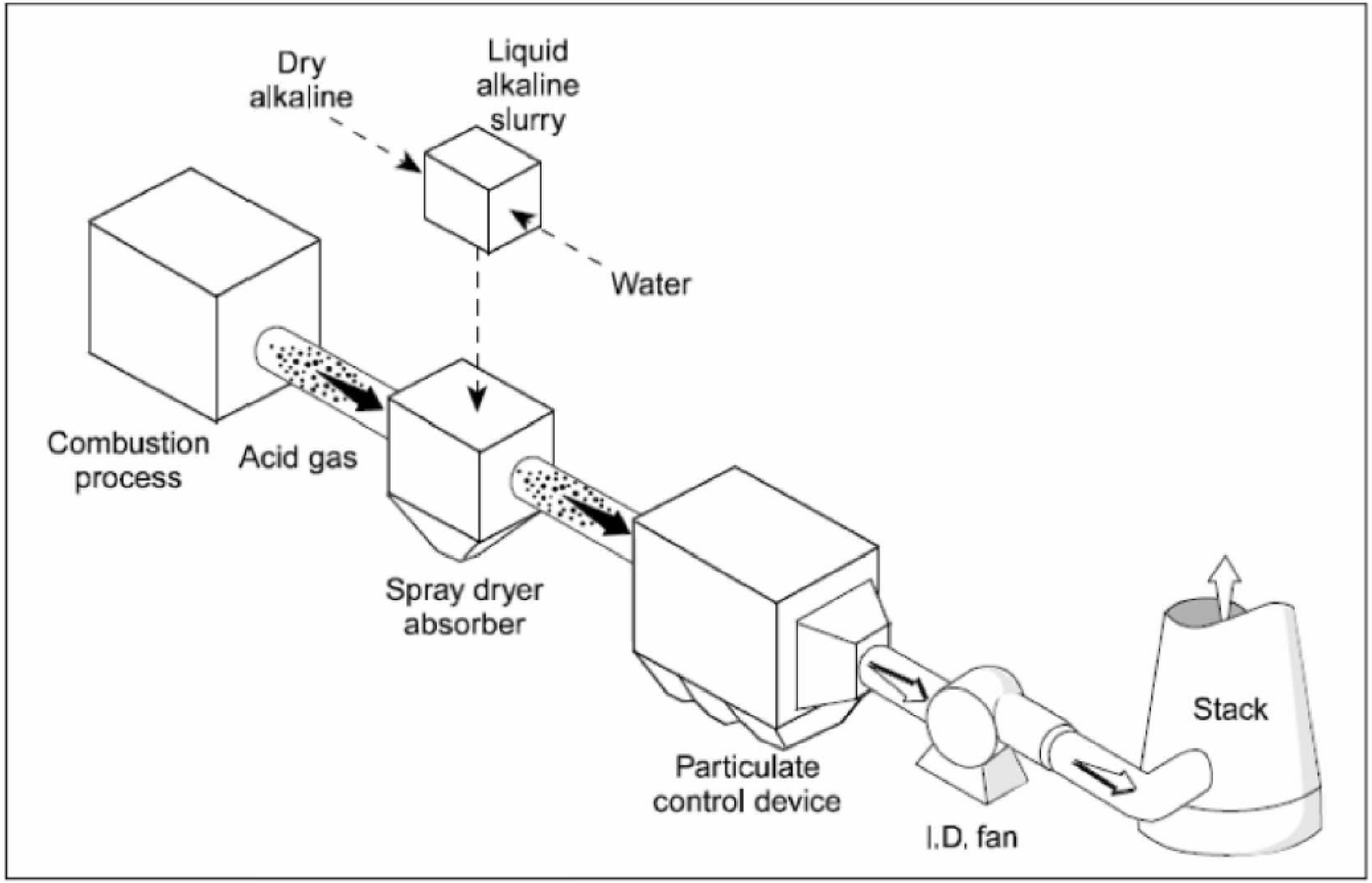
> *The notices required by this rule shall be provided to the department as soon as reasonably possible, but not later than 2 business days after the start-up or shutdown or after discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication.*

The content requirements for reports submitted under Rule 912 are specified in Rule 912(5). The Rule reads:

> *The written reports required under this rule shall be submitted within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the following information:*
>
> *(a) The time and date, the probable causes or reasons for, and the duration of the abnormal conditions, start-up, shutdown, or malfunction.*
> *(b) An identification of the source, process, or process equipment that experienced abnormal conditions, was started up or shut down, or which malfunctioned and all other affected process or process equipment that have emissions in excess of an applicable requirement, including a description of the type and, where known or where it is reasonably possible to estimate, the quantity or magnitude of emissions in excess of applicable requirements.*
> *(c) Information describing the measures taken and air pollution control practices followed to minimize emissions.*
> *(d) For abnormal conditions and malfunctions, the report shall also include a summary of the actions taken to correct and to prevent a reoccurrence of the abnormal conditions or malfunction and the time taken to correct the malfunction.*

Neenah will report abnormal conditions or malfunctions associated with process and/or emission control systems in accordance with the requirements of Rule 912. An example form is included as Appendix 4.

Figures



SPRAY DRY ABSORBER

ftc&h
engineers
scientists
architects
constructors
fishbeck, thompson, carr & huber, inc.

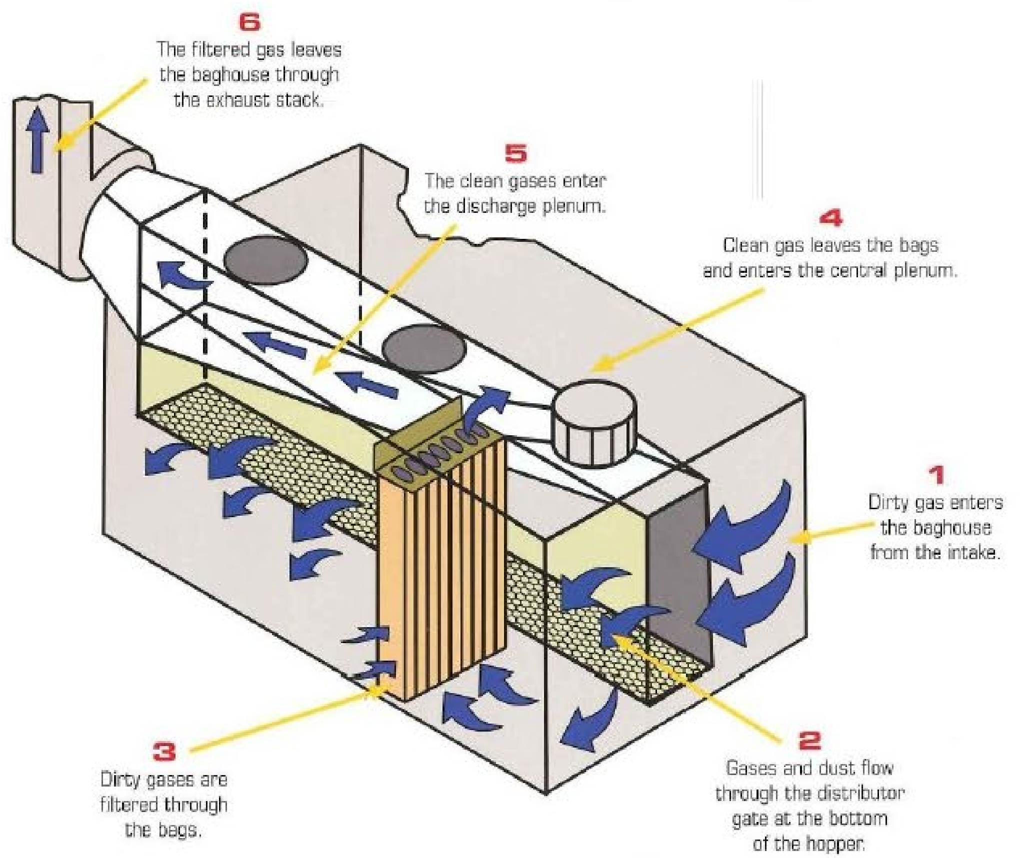
Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Neenah Paper
Munising, Michigan
PM and SSM Plan EU04 (Boiler 1) Baghouse and SDA

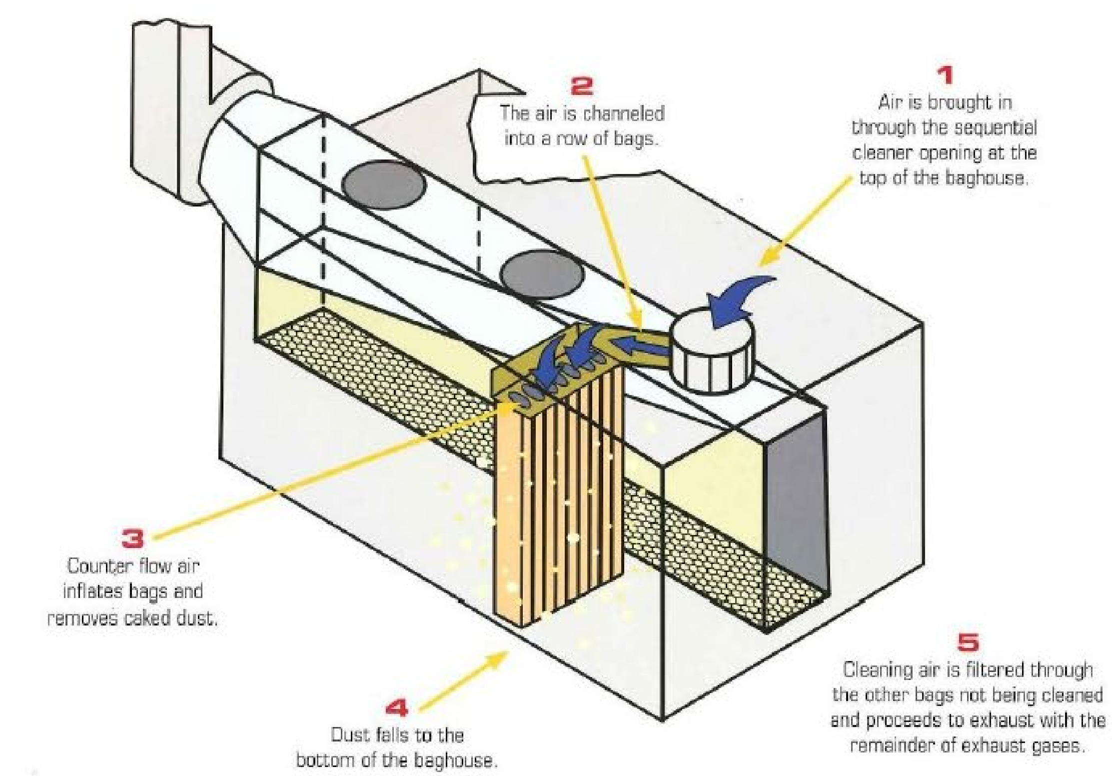
PROJECT NO. 190348
FIGURE NO. 1

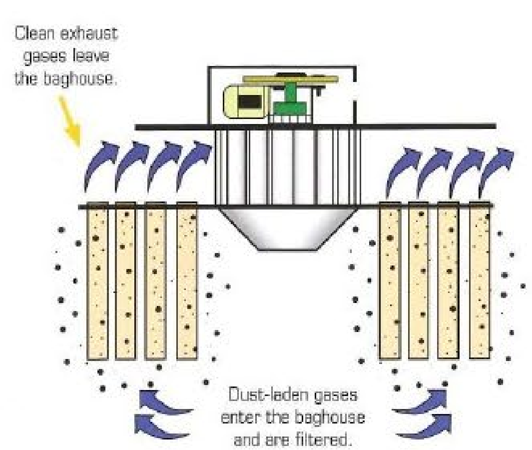
Appendix 1

AIR FLOW PROCESS



CLEANING CYCLE





AIR FLOW PROCESS

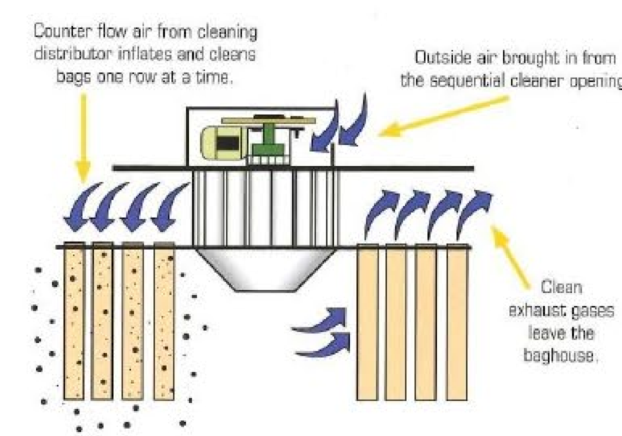
Particulate-laden exhaust gases enter the center of the lower baghouse section and are evenly distributed across the entire filtration medium through a specially designed gas plenum that maintains a consistent air flow and pressure across the full length of the baghouse. Each row of bags is isolated from the next to allow closer spacing of the bags, and each elliptical bag provides two times more filter cloth area per foot of bag.

A series of rotating cleaning distributors is located on top of the baghouse. Each cleaning distributor is responsible for approximately 18 isolated rows of bags. The cleaning distributor, while in the parked position, allows exhaust gases to pass through the bags. Dust particles are captured by the bag, and a dust cake layer is formed on the outside of the bag. Filtered exhaust air leaves the bag and passes through the parked cleaning distributor to the clean air plenum and exhaust system.

CLEANING CYCLE

When in the bag cleaning mode, the cleaning distributor rotates clockwise and stops in front of each row of bags, sending a quick burst of counter flow air into the bags. This gentle counter flow burst of air knocks the dust free from the bags and sends it to the bottom of the hopper, where it is removed by the dust auger.

Less than 5% of the total house filtration medium is cleaned at one time, allowing for smooth uninterrupted operation of the filter at constant operating pressure. The sequential cleaning distributor is controlled by means of a preset photohelic gauge, which maintains the house at optimum collection and production efficiency. Because of the smooth transfer of the sequential distributor, the continuous flow of production gases is uninterrupted during the cleaning cycle.



Appendix 2

HCl Actual Emissions (MS Excel Worksheet)

MS Excel® Workbook “Environmental & Emissions.xlsx”
Worksheet “Power House Daily Record”

<u>Column I:</u> Daily Coal Use (tons)

Input: Derived from the PI System as the flow of coal to the stocker in pounds per hour as measured by the gravimetric weigh belt feeder’s load cell and belt speed.

<u>Column J:</u> Hours EU05 Operated

Input: EU05 is the coal-fired boiler.

<u>Column K:</u> Hours EU05 Operated with SDA Offline

Input: These numbers are retrieved from the PI System as well as recorded by the boiler operator on the *SDA Shutdown Log*.

<u>Column L:</u> Controlled Emission Factor as derived from stack testing measurements. See Appendix 3

Input: Heat Value of the Coal (13,600 Btu/lb.) is derived from years of coal analytical data.

<u>Column M:</u> Daily Pounds of HCL emitted

Formula: `=IF(J1335=0,0,(I1335/J1335*(J1335-K1335)*0.0136*L1335)+(I1335*K1335/J1335*0.157*0.0136))*2000`

If Column J is blank or zero, return zero to prevent divide by zero errors. I.E. if EU05 did not operate, then no emission, else calculate emission as show below.
If there is a number in Column J, the following equation applies.

$$\frac{\text{Daily Coal Use (tons)}}{\text{Hours EU05 Operated}} \times \begin{matrix}2000\\ \text{(lb/ton)}\end{matrix} \times \text{(Hours Operated} - \text{Hours Operated with SDA Offline)} \times \frac{\text{Heat Value of Coal 13600 (BTU/lb)}}{\text{1,000,000 (BTU/MMBTU)}} \times \text{Controlled Emission Factor (\#HCL/MMBTU)}$$

+ PLUS

$$\frac{\text{Daily Coal Use (tons)}}{\text{Hours EU05 Operated}} \times \begin{matrix}2000\\ \text{(lb/ton)}\end{matrix} \times \text{Hours Operated with SDA Offline} \times \frac{\text{Heat Value of Coal 13600 (BTU/lb)}}{\text{1,000,000 (BTU/MMBTU)}} \times \text{0.157 Uncontrolled Emission Factor (\#HCL/MMBTU)}$$

EQUALS

Daily # HCL Emitted

HCl Actual Emissions (MS Excel Worksheet)

MS Excel® Workbook "Environmental & Emissions.xlsx"
Worksheet "Summary"

Column A: Repetitive cycle of all 12 months

Column B: 12 repetitive year values for each month

Column C: Month and Year for Cumulative HCL emissions

Formula: *=DATEVALUE(A22&B22)*

Converts **Column A** Month and **Column B** Year to format compatible with "SUMIFS" function below.

Column E: Cumulative sum of monthly HCL emissions in pounds.

Formula: ***=SUMIFS('Powerhouse Daily Record'!M:M,'Powerhouse Daily Record'!$A:$A,">="&Summary!$C28,'Powerhouse Daily Record'!$A:$A,"<="&EOMONTH(Summary!$C28,0))***.

Totals all HCL emission values calculated above in "Powerhouse Daily Record" worksheet Column M "Daily HCL Pounds" for the month requested in column "C"

Column G: 12 month Rolling HCL Emissions (Tons)

Formula: = IF(E28=0,"",SUM(E17:E28)/2000)

If there is nothing in Column E "Monthly HCL" emissions, leave cell blank.
If there is a number in Column E, SUM the last 12 rows and divide by 2000#/ton. This equation provides a running total of our yearly emissions.

Appendix 3

Appendix 3 2016 MAERS HCl Emission Factor Summary*

Emission Factor Type	HCl Emission Factor	Specific Gravity Setpoint	SDA Outlet Temperature °F	Test Report	Notes
Uncontrolled	0.1570 lb HCl/MMBtu	NA	NA	*Particulate Matter and Hydrochloric Acid Emissions Test Summary Report* (March 25, 2016)	Run #2 inlet lb/MMBTU.
Controlled	0.0110 lb HCl/MMBtu	1.067	265	Control factor from performance test February 2016. *Particulate Matter and Hydrochloric Acid Emissions Test Summary Report* (March 25, 2016, page 3)	Average of test results runs 3 &4. Method 26A used.
Controlled	0.0129 lb HCl/MMBtu	1.040	265	Based on compliance data *Test Report for the Verification of Air Pollutant Emissions From a Coal Fired Boiler and a Machine Coater* (December 22, 2016)	Method 26A compliance testing
Controlled	0.0139 lb HCl/MMBtu	1.034	265	Based on Compliance data from *TEST REPORT FOR THE VERIFICATION OF BOILER AIR CONTAMINANT EMISSION RATES NOVEMBER 5, 2019*	Method 26A compliance testing. Average of 3 replicate data points
Controlled	0.0219 lb HCl/MMBtu	1.034	290	Based on Engineering data from *TEST REPORT FOR THE VERIFICATION OF BOILER AIR CONTAMINANT EMISSION RATES NOVEMBER 5, 2019*	Average of test results runs 8 &9. Method 26A used. Boiler Limited to 110 KPPH when running these conditions
Controlled	0.0263 lb HCl/MMBtu	1.020	290	Based on Engineering data from *TEST REPORT FOR THE VERIFICATION OF BOILER AIR CONTAMINANT EMISSION RATES NOVEMBER 5, 2019*	Average of test results runs 10 & 11. Method 26A used. Boiler Limited to 110 KPPH when running these conditions

* HCl emission factors used in emission tracking spreadsheet as of December 1, 2019.
Includes testing through October 3, 2019.

Appendix 4

ENVIRONMENTAL RELEASE REPORTING FORM

For internal use only.

To be completed by the Environmental Engineer

Date__________________Time of Report_______________Reported By ____________________________

Location of Incident ____

Type of Incident ☐ Spill/Release ☐ Fire ☐ Explosion ☐ Other

Time Incident was Detected__________________a.m./p.m. Duration of Event ________________

Name of Material(s) Released ____

Regulatory Status of Released Material: ☐ Michigan Critical Material ☐ Act 451, Part 31 Polluting Material

☐ Oil ☐ RCRA ☐ CERCLA ☐ EPCRA/SARA

Amount Released_____________________(lbs) RQ? ☐ Yes ☐ No

Container Type ☐ Drum ☐ UST ☐ AST ☐ Other ______________________________

Release Characteristics Color_____________Odor__________________Other____________________

Release Entering ☐ Drains ☐ Soil ☐ Surface Water ☐ Air Other __________________

Weather Conditions Precipitation_____________Wind Direction/Speed ____________________

Company Response Personnel at Scene ____

Outside Response Personnel at Scene ☐ Spill Contractor(s) ☐ Fire Department

☐ Regulatory___________________ Governmental ______________________________

☐ Other____

Injuries? ☐ No ☐ Yes (type of injuries) ____

Site or Building Evacuation? ☐ No ☐ Yes

Agencies Notified

☐ MDEQ*	Date_______________	Time________________	Initials _______________
☐ Local Governmental Depts.	Date_______________	Time________________	Initials_______________
☐ PEAS Hotline	Date_______________	Time________________	Initials_______________
☐ EPA Response Center	Date_______________	Time________________	Initials _______________
☐ UST Release Hotline	Date_______________	Time________________	Initials _______________

**Written report must be filed with the MDEQ within ten (10) days.*

Appendix 5

Compliance Assurance Monitoring Plan
Boiler 1 (EU05)
Spray Dry Absorber and Baghouse Dust Collector

Neenah Paper, Inc.
Munising, Michigan

Version 6

December 6, 2019

Compliance Assurance Monitoring Plan
Boiler 1 (EU05)
Spray Dry Absorber and Baghouse Dust Collector

Prepared for:
Neenah Paper Michigan, Inc
Munising, Michigan

December 6, 2019

Version 6

Table of Contents

List of Abbreviations/Acronyms

AQD	Air Quality Division of the MDEQ	NaCl	sodium chloride
Btu	British thermal unit	NaOH	sodium hydroxide
COMS	continuous opacity monitoring system	O&M	Operations and Maintenance
°F	degrees Fahrenheit	PM	particulate matter
EU	emission unit	QIP	Quality Improvement Plan
HAP	hazardous air pollutant	ROP	Title V Renewable Operating Permit
HCl	hydrochloric acid	SDA	Spray Dry Absorber
MDEQ	Michigan Department of Environmental Quality	tpy	tons per year
MMBtu/hr	million Btus per hour		

Part 1 – HCl Emissions Monitoring Plan (SDA Control)

I. Background

A. Emissions Unit

Description:	Babcock & Wilcox Coal-Fired Spreader Stoker Boiler
Identification:	Boiler 1 (EU05)
Facility:	Neenah Paper Michigan, Inc – Munising, Michigan

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Permit No.:	ROP No. MI-ROP-B1470-2019
Emission Limits:	
Individual HAPs (Primarily HCl)	9.5 tpy, 12-month rolling time period as determined at the end of each calendar month
Aggregate HAPs (Primarily HCl)	23.5 tpy, 12-month rolling time period as determined at the end of each calendar month
Monitoring and Record Keeping Requirements:	Calculate the monthly quantity of HCl emitted using emission factors based on stack testing Record the individual and aggregate HAP emissions monthly and on a 12-month rolling time period

C. Control Technology

Spray Dry Absorber (SDA).

II. Monitoring Approach

The key elements of the monitoring approach are presented below:

A. Indicator for Meeting Emission Limit

SDA Outlet Temperature and Reagent Specific Gravity.

Measurement Approach

The SDA Outlet Temperature and Reagent Specific Gravity will be monitored continuously and a representative reading (not start-up, shutdown, etc.) will be recorded once per day. Emissions limits are on an annual basis – 12-month rolling totals are calculated to demonstrate compliance with annual emission limits.

B. Indicator Range

SDA Outlet Temperature:	The SDA Outlet Temperature will be maintained above 220°F during normal operation, except during start-up and shutdown to reduce HCl emissions while firing coal. Typical SDA Outlet Temperature is between 265°F and 290°F.
Reagent Specific Gravity:	The Reagent Specific Gravity will be maintained above 1.010 during normal operation, except during start-up and shutdown, to reduce HCl emissions while firing coal. Typical operation is between 1.020 and 1.067.

C. Quality Improvement Plan Threshold

A QIP will be developed upon request of the MDEQ-AQD if an excessive number of excursions have been reported. An excursion is defined as a daily SDA Outlet Temperature below 220°F or a daily Reagent Specific Gravity below 1.010 while firing coal. The boiler starts up on natural gas and switches to coal when load reaches 35%.

D. Performance Criteria

Monitoring Data Representativeness:	The SDA Outlet Temperature, Reagent Specific Gravity, and Reagent Flow act as SDA performance indicators. • If the specific gravity is lower than 1.010 the sodium hydroxide content of the reagent is too low and HAP control has dropped below 80%. • If the SDA Outlet Temperature drops below 220°F has deviated, water may condense within the equipment which will eventually affect control equipment performance. • Data is not recorded during non-operation of monitoring equipment. All required system monitoring equipment will be maintained and calibrated per the manufacturer's recommendations. Calibration records will be maintained for future reference.
Verification of Monitoring Operational Status:	The measuring devices will be installed, calibrated, maintained, and operated in accordance with manufacturer's recommendations.
QA/QC Practices and Criteria:	At least once per 12-months, the internal condition of the SDA system will be evaluated, and required repairs made to the spray nozzles, inlet and outlet ducts, the pumping system, suction pipe, and pumping system valves. After corrective action has been taken, proper operation of the measuring devices will be verified.
Monitoring Frequency and Collection Procedure:	Monitoring data will be recorded continuously and recorded once per day.

III. Justification

A. Indicator for Meeting Emission Limit

The SDA is a caustic system containing a co-current reaction tower between the boiler and the baghouse. Incoming hot flue gas is sprayed with a diluted solution of water and NaOH using dual atomizing nozzles. Atomizing nozzles produce a fine mist of droplets; the contact between the fine mist and air results in adiabatic cooling of the hot flue gas. The chemical reaction that occurs between caustic and gaseous components results in removal of pollutants. The NaOH reacts with HCl in the exhaust gases to produce NaCl, which is a solid at the exhaust gas temperature of EU05, and is subsequently captured in the baghouse as a dry, filterable PM. The chemical reaction between HCl and caustic is:

$$HCl + NaOH \rightarrow NaCl + H_2O$$

B. Rationale for Selection of Performance Indicator

The SDA Outlet Temperature and Reagent Specific Gravity were selected as performance indicators because they are indicative of operation of the SDA system in a manner necessary to remove HCl as intended and to comply with the HAP emission limit. When the SDA system is operating properly, the Reagent Specific Gravity will not be below 1.010 and the SDA Outlet Temperature will not be below 220°F. Parameter values outside of the specified ranges will indicate a malfunctioning control device as described as follows.

The caustic solution application rate is held constant, therefore specific gravity is varied to ensure the appropriate amount of absorbent is applied to neutralize the HCl in the flue gas. Reagent Specific Gravity is a direct indication of the concentration, therefore, the greater the specific gravity, the greater the NaOH concentration in the absorbent. For a malfunction in which the Reagent Specific Gravity is below 1.010, there will not be enough base present to neutralize the HCl in the flue gas, which will result in elevated HCl emissions. It should be noted that the HCl emission limit is a 12-month rolling total, so even operation for extended periods of time at a Reagent Specific Gravity below 1.010 will not likely lead to excessive emissions. In addition, Neenah can account for operating hours when the SDA is not operating properly by estimating hourly or daily emissions as *uncontrolled* while firing coal.

The absorption process requires intimate contact between the sorbent and flue gas. This is accomplished as the hot exhaust gases travel through the SDA. When the SDA Outlet Temperature drops below 220°F, water can condense within the exhaust system and will compromise the control system integrity. The temperature of the flue gas must also be above the adiabatic saturation temperature of the flue gas so the water can evaporate. Water present in the system will react with acid gases to cause condensation of the acid gases in the exhaust system.

C. Rationale for Selection of Indicator Level

The performance indicators were selected because they are within the ranges demonstrated through stack testing and recommended by the manufacturer. When excursions outside the selected indicator ranges occur, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented.

Part 2 – Particulate CAM

I. Background

A. Emissions Unit

Description:	Babcock & Wilcox Coal-Fired Spreader Stoker Boiler
Identification:	Boiler 1 (EU05)
Facility:	Neenah Paper Michigan, Inc – Munising, Michigan

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Permit No.:	ROP No. MI-ROP-B1470-2019
Emission Limits:	
Particulate:	0.30 pounds per 1,000 pounds of exhaust gas, corrected to 50% excess air
Visible Emissions:	Maintain 6-minute average of less than (or equal to) 20% opacity, except up to one 6-minute average of more than 20% opacity but less than (or equal to) 27% opacity is allowed per hour. EU05 is also limited to 10% opacity as a daily block average.
Monitoring and Record Keeping Requirements:	A calibrated COMS must be in operation whenever the boiler is in operation.

C. Control Technology

Baghouse Dust Collector.

II. Monitoring Approach

The key elements of the monitoring approach are presented below:

A. Indicator for Meeting Emission Limit

Opacity monitor readings.

B. Measurement Approach

- Visible emissions will be measured continuously using an opacity monitor (COMS). The opacity readings will be rolled up and recorded as 6-minute averages.

C. Indicator Range

Opacity:	The visible emissions acceptable range will be 0% to 20% opacity.

D. Quality Improvement Plan Threshold

A QIP will be developed upon request of the MDEQ-AQD if an excessive number of excursions have been reported. An excursion is defined as two continuous hours over 20% opacity as measured by the COMS.

E. Performance Criteria

Monitoring Data Representativeness:	Opacity readings indicate performance of the baghouse dust collector. A properly operating baghouse will provide good control of particulate emissions. • High opacity indicates particulate emissions are increased
Verification of Monitoring Operational Status:	Data is not recorded during non-operation of monitoring equipment. • The COMS will be maintained in good working condition per the manufacturer's O&M procedures required by Appendix B of 40 CFR Part 60. • The pressure drop gauges (magnehelic gauges) will be maintained per the manufacturer's O&M procedures.
QA/QC Practices and Criteria:	• The COMS is calibrated daily; the monitor is manually calibrated on a quarterly basis with certified *high*, *medium*, and *low* opacity filters. Annual audits will also be performed as required by the MDEQ. • The pressure drop gauges will be calibrated as suggested by the manufacturer. • After corrective action is taken, the affected monitor • will be tracked to verify that the corrective action was effective.
Monitoring Frequency and Collection Procedure:	Monitoring data will be measured continuously. Excessive opacity triggers an alarm and corrective actions will be documented.

III. Justification

A. Background

The boiler is a Babcock and Wilcox spreader stoker that burns bituminous coal with a sulfur content less than 1.5% (normalized to 12,000 Btu/lb). The boiler is rated at 202 MMBtu/hour heat input.

Particulates are controlled by a five-module baghouse dust collector

B. Rationale for Selection of Performance Indicator

Opacity is a recognized indicator of particulate emissions; opacity and particulate emissions are directly related. Excessive opacity will indicate a malfunctioning control device.

C. Rationale for Selection of Indicator Level

Opacity was selected because it is an instantaneous indicator of baghouse dust collector performance. When high opacity is detected, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented.