DEPARTMENT ORDER

| | |
|---|---|
| **Sappi North America, Inc.**<br>**Somerset County**<br>**Skowhegan, Maine**<br>**A-19-77-15-A** | **Departmental**<br>**Findings of Fact and Order**<br>**New Source Review**<br>**NSR #15** |

## FINDINGS OF FACT

After review of the air emission license application, staff investigation reports, and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 Maine Revised Statutes (M.R.S.) § 344 and § 590, the Maine Department of Environmental Protection (the Department) finds the following facts:

## I. REGISTRATION

### A. Introduction

| | |
|---|---|
| FACILITY | Sappi North America, Inc. |
| LICENSE TYPE | 06-096 C.M.R. ch. 115, Major Modification |
| NAICS CODES | 322121 |
| NATURE OF BUSINESS | Pulp and Paper Mill |
| FACILITY LOCATION | 1329 Waterville Road, U.S. Route 201<br>Skowhegan, Maine |

### B. NSR License Description

Sappi North America, Inc. (Sappi) has requested a New Source Review (NSR) license to implement physical and operational changes to modify Paper Machine #2 to produce higher basis-weight paper products and increase the production capacity of the machine. This project is referred to as the 2023 PM#2 Rebuild Project.

Additionally, as part of this licensing action, Sappi has proposed to revise the treatment strategy for low volume high concentration (LVHC) gases, high volume low concentration (HVLC) gases, and kraft condensates to reduce emissions of sulfur dioxide ($SO_2$). Sappi has also proposed augmenting the emission limits for $PM_{10}$ for some emission units to include condensable particulate matter and to establish emission limits for $PM_{2.5}$ where none previously existed. These changes are unrelated to the 2023 PM#2 Rebuild Project other than the new emission rates are reflected in the Ambient Air Quality Impact Analysis. Although these changes are described in this licensing action for completeness, they are not considered a modification because these changes are not expected to result in any increase in actual emissions.

C. Emission Equipment

The following existing equipment is **modified** by this project:

**Process Equipment**

| Equipment | Description | Install Date | Stack ID |
|---|---|---|---|
| Paper Machine #2 | Paper machine with aqueous on-machine coater and steam drum dryers | 1985 | Multiple/ Fugitive |

The following **new** equipment is addressed in this NSR license:

**Fuel Burning Equipment**

| Equipment | Maximum Capacity | Fuel Type | Stack ID |
|---|---|---|---|
| Paper Machine #2 Coating Air Dryers (PM2 Coating Dryers) | 56.4 MMBtu/hr (combined) | natural gas | Multiple |

The following existing equipment is **affected**, but not modified, by this project:

**Fuel Burning Equipment**

| Equipment | Maximum Capacity | Fuel Type | Install. Date | Stack ID |
|---|---|---|---|---|
| Power Boiler #1 | 848 MMBtu/hr | residual fuel, distillate fuel, used oil, tire derived fuel, biomass, wood pellets, waste paper, sludge, LVHC gases, HVLC gases, solid oily waste, and kraft condensates | 1977 | Main Stack |
| Power Boiler #2 | 1,300 MMBtu/hr | residual fuel, distillate fuel, natural gas, used oil, tire derived fuel, biomass, waste paper, sludge, LVHC gases, HVLC gases, solid oily waste, and kraft condensates | 1989 | Power Boiler #2 Stack |

Unrelated to the 2023 PM#2 Rebuild Project, Sappi has requested to establish $PM_{2.5}$ emission standards and/or revisions to the $PM_{10}$ emission standards for the following existing equipment:

| Equipment | Maximum Capacity | Fuel Type | Install. Date | Stack ID |
|---|---|---|---|---|
| Power Boiler #1 | 848 MMBtu/hr | residual fuel, distillate fuel, used oil, tire derived fuel, biomass, wood pellets, waste paper, sludge, LVHC gases, HVLC gases, solid oily waste, and kraft condensates | 1977 | Main Stack |
| Power Boiler #2 | 1,300 MMBtu/hr | residual fuel, distillate fuel, natural gas, used oil, tire derived fuel, biomass, waste paper, sludge, LVHC gases, HVLC gases, solid oily waste, and kraft condensates | 1989 | Power Boiler #2 Stack |
| Recovery Boiler | 5.5 MMlbs BLS/day | black liquor, residual fuel, distillate fuel, used oil, LVHC gases, HVLC gases | 1976 | Main Stack |
| Smelt Dissolving Tanks #1 & #2 | N/A | N/A | 1976 | Main Stack |
| Lime Kiln | 125 MMBtu/hr | residual fuel, distillate fuel, natural gas, used oil, propane, LVHC gases, and kraft condensates | 1976 | Main Stack |

D. Definitions

*Particulate matter (PM, $PM_{10}$, $PM_{2.5}$)* mean the same as they are defined in *Definitions Regulation*, 06-096 C.M.R. ch. 100.

*Records* or *Logs* mean either hardcopy or electronic records.

E. Project Description

Sappi is proposing to modify Paper Machine #2 to produce higher basis-weight paper products and increase the machine's production capacity. Paper Machine #2's current production capacity is approximately 250,000 finished tons per year (finished TPY). The changes proposed as part of this modification will allow Paper Machine #2 to double its capacity to approximately 520,000 finished TPY. The 2023 PM#2 Rebuild Project includes the following proposed physical and operational changes:

1. Modifications to Stock Preparation and Wet End

   Sappi will increase the capacity of Paper Machine #2's stock preparation and wet end areas through installation of larger pumps and save-all tanks, upgrades to cleaners and screens, reconfiguration of hardwood pulp refiners, and installation of one additional hardwood pulp refiner.

2. Modifications to Headbox, Former, and Press

   Sappi will complete an extensive maintenance overhaul of the existing Paper Machine #2 headbox, installation of a new and larger forming section with higher drainage capacity to allow for increased production capacity, and installation of a new press section.

3. Modifications to the Steam-Heated Dryer Section

   The capacity of the main dryer section will double from 32 steam-heated dryer cans, each rated at 75 pounds per square inch (psi), to 64 dryer cans each rated at 150 psi. The dryer hood will be extended and additional heat recovery systems constructed. This change will result in an increase in steam demand from Sappi's existing boilers, Power Boiler #1 and Power Boiler #2.

4. Removal of Existing Turbine

   The existing Paper Machine #2 line-shaft drive turbine will be removed. This turbine currently exhausts to the 60-lb steam header that supplies the existing dryers on Paper Machines #1 and #2. With this steam source removed, additional steam will be required from the steam turbine generators increasing the demand on Sappi's existing boilers, Power Boiler #1 and Power Boiler #2.

5. New Blade Coating Air Dryers

   Sappi will install two new blade coaters on Paper Machine #2 that use five new natural gas-fired dryers (PM2 Coating Dryers).

6. Modifications to Dry End

   Sappi will install new starch sizers, calendaring activities, reel winder, roll wrapping, and core cutting areas to support the 2023 PM#2 Rebuild Project.

7. Warehouse Expansion

   Sappi intends to expand the existing storage warehouse and will utilize steam from the power boilers to heat the additional space. This will result in an increase in steam demand from Sappi's existing boilers, Power Boiler #1 and Power Boiler #2.

F. Application Classification

All rules, regulations, or statutes referenced in this air emission license refer to the amended version in effect as of the issued date of this license.

The application for Sappi does not violate any applicable federal or state requirements and does not reduce monitoring, reporting, testing, or recordkeeping requirements. However, this application does seek to modify a Best Available Control Technology (BACT) analysis performed in accordance with New Source Review.

The modification of a major source is considered a major or minor modification based on whether or not expected emissions increases exceed the "Significant Emission Increase" levels as given in *Definitions Regulation*, 06-096 Code of Maine Rules (C.M.R.) ch. 100. For a major stationary source, the expected emissions increase from each new, modified, or affected unit may be calculated as equal to the difference between the post-modification projected actual emissions and the baseline actual emissions for each NSR regulated pollutant.

1. Baseline Actual Emissions

   Baseline actual emissions (BAE) are equal to the average annual emissions from any consecutive 24-month period within the ten years prior to submittal of a complete license application. The selected 24-month period can differ on a pollutant-by-pollutant basis but must remain consistent across all emission units. Sappi has proposed using January 2018 through December 2019 as the 24-month baseline period from which to determine baseline actual emissions for all pollutants except for $SO_2$ for which January 2019 through December 2020 was used.

   BAE for new equipment are considered to be zero for all pollutants.

   BAE for existing modified and affected equipment are based on actual annual emissions reported to the Department through *Emissions Statements*, 06-096 C.M.R. ch. 137 with the following exceptions:

   a. Emissions of PM are not reported in the annual emissions statement. Emissions of PM for Power Boilers #1 and #2 were based on contemporaneous stack tests under representative load conditions and fuel ratios. Emissions of PM for Paper

Machine #2 were based on emission factors from National Council for Air and Stream Improvement (NCASI) TB 942[1] Table 5.2 for coated fine paper.

b. Emissions of $PM_{10}$ and $PM_{2.5}$ reported in the annual emissions statement do not include emissions of condensable particulate matter (CPM). Emissions of $PM_{10}$ and $PM_{2.5}$ for Power Boilers #1 and #2 were recalculated based on a combination of stack tests from 2013 for both filterable and condensable particulate matter and AP-42 emission factors for natural gas and #6 fuel oil combustion. Tests were conducted under representative load conditions and fuel ratios.

c. Emissions of $PM_{10}$ and $PM_{2.5}$ were not previously reported for Paper Machine #2. Emissions of $PM_{10}$ and $PM_{2.5}$ were based on emission factors from NCASI TB 942, Table 5.2 for coated fine paper.

d. Emissions of $SO_2$ from Power Boilers #1 and #2 were recalculated based on the same emission factor used in the annual emissions statement but with an updated estimate of heat input to each boiler.

e. VOC emissions from Paper Machine #2 were recalculated based on updated information on the VOC content of the coatings and additives used and inclusion of wet end chemicals.

The results of this baseline analysis are presented in the table below.

**Baseline Actual Emissions***

| Equipment | PM (tpy) | $PM_{10}$ (tpy) | $PM_{2.5}$ (tpy) | $SO_2$ (tpy) | $NO_x$ (tpy) | CO (tpy) | VOC (tpy) | GHG (tpy) |
|---|---|---|---|---|---|---|---|---|
| Power Boiler #1 | 93.2 | 133.4 | 71.9 | 858.5 | 666.4 | 731.0 | 4.8 | 439,223 |
| Power Boiler #2 | 39.2 | 56.6 | 56.6 | 9.4 | 405.5 | 425.0 | 4.5 | 442,282 |
| Paper Machine #2 | 5.3 | 12.0 | 12.0 | – | – | – | 122.0 | – |
| **Total** | **137.7** | **202.0** | **140.5** | **867.9** | **1,071.9** | **1,156.0** | **131.3** | **881,505** |

* As stated previously, BAE for all pollutants except $SO_2$ is based on average annual emissions from January 2018 through December 2019. For $SO_2$, BAE is based on average annual emissions from January 2019 through December 2020.

2. Projected Actual Emissions

Projected actual emissions (PAE) are the maximum actual annual emissions anticipated to occur in any one of the five years (12-month periods) following the date existing

[1] *Measurement of PM, $PM_{10}$, and $PM_{2.5}$ From Paper Machine Sources* (November 2007)

units resume regular operation after the project or any one 12-month period in the ten years following if the project involves increasing the unit's design capacity or its potential to emit of a regulated pollutant.

Affected equipment includes any new or physically modified equipment as well as upstream or downstream activities such as the increased steam demand on Power Boilers #1 and #2.

a. Paper Machine #2

Paper Machine #2 will be physically modified as part of the 2023 PM#2 Rebuild Project. PAE was based on an expected future maximum annual production rate of 520,000 finished tons per year.

Emissions of VOC were calculated based on an emission factor of 0.5 lb VOC per ton of finished product. This emission factor was developed based on the anticipated quantities of paper machine wet-end additives and dry-end coatings that will be used when the machine is operating at its maximum annual production rate along with the VOC content of each material based on information supplied by vendors on safety data sheets (SDS).

Emissions of PM, $PM_{10}$, and $PM_{2.5}$ were based on emission factors from the NCASI TB 942. Although Paper Machine #2 currently produces a mix of coated paper and board grades, emission factors applicable to board grade machines were used since Paper Machine #2 will only produce board grades following the project.

b. PM2 Coating Dryers

The PM2 Coating Dryers are new emission units. New emission units or processes must use potential to emit (PTE) emissions for PAE.

Emissions from the PM2 Coating Dryers were calculated based on the maximum heat input capacity of all burners combined, manufacturer emission guarantees, AP-42 emission factors, a higher heating value for natural gas of 1,020 Btu/scf, and an assumption of continuous operation of the dryers for 8,760 hours per year.

c. Power Boilers #1 and #2

Power Boilers #1 and #2 are considered affected units because the physical and operational changes to Paper Machine #2 will result in increased steam demand from these boilers.

The PAE from each boiler was calculated based on increased steam demand from both this 2023 PM#2 Rebuild Project and the unrelated, previously permitted Paper

Machine #1 Dryer Capacity Project (see A-19-77-14-A, issued 2/4/2022). When determining PAE from each boiler, Sappi assumed that the increased use of biomass and #6 fuel oil would be split equally between the two boilers. However, the majority of the additional heat input is expected to be provided by increased firing of natural gas, which can only be fired in Power Boiler #2. The table below details the anticipated increase in annual heat input to each boiler by fuel type.

**Estimated Annual Heat Input Increase by Fuel Type**

| Fuel Type | Power Boiler #1 (MMBtu/year) | Power Boiler #2 (MMBtu/year) |
|---|---|---|
| Natural Gas | 0.0 | 1,452,600 |
| Biomass | 83,700 | 83,700 |
| #6 Fuel Oil | 271,100 | 271,100 |
| **Total** | **354,800** | **1,807,400** |

Estimates of emissions increases for each pollutant from each boiler were based on emission factors derived from source tests, industry standard emission factors, air emission license limits, and Continuous Emissions Monitoring System (CEMS) data. These emissions increases were then added to a representative five-year average of emissions. For all pollutants other than $SO_2$, the five-year average used was 2017-2021. For $SO_2$, the five-year average used was 2017-2020 and 2022.

Projected actual emissions from the affected equipment are shown below.

**Projected Actual Emissions**

| Equipment | PM (tpy) | $PM_{10}$ (tpy) | $PM_{2.5}$ (tpy) | $SO_2$ (tpy) | $NO_x$ (tpy) | CO (tpy) | VOC (tpy) | GHG (tpy) |
|---|---|---|---|---|---|---|---|---|
| Power Boiler #1 | 102.0 | 138.6 | 75.3 | 991.1 | 721.0 | 750.4 | 3.0 | 467,100 |
| Power Boiler #2 | 56.5 | 67.9 | 67.9 | 29.7 | 583.5 | 584.1 | 0.3 | 571,675 |
| Paper Machine #2 | 5.2 | 18.2 | 15.6 | – | – | – | 130.0 | – |
| PM Coating Dryers | 0.5 | 1.8 | 1.8 | 0.1 | 11.9 | 18.3 | 1.3 | 29,102 |
| **Total** | **164.2** | **226.5** | **160.6** | **1,020.9** | **1,316.4** | **1,352.8** | **134.6** | **1,067,877** |

3. Emissions Increases

Emissions increases are calculated by subtracting BAE from the PAE. The emission increase is then compared to the significant emissions increase levels.

| Pollutant | Baseline Actual Emissions (ton/year) | Projected Actual Emissions (ton/year) | Emissions Increase (ton/year) | Significant Emissions Increase Levels (ton/year) |
|---|---|---|---|---|
| PM | 137.7 | 164.2 | **26.5** | 25 |
| $PM_{10}$ | 202.0 | 226.5 | **24.5** | 15 |
| $PM_{2.5}$ | 140.5 | 160.6 | **20.1** | 10 |
| $SO_2$ | 867.9 | 1,020.9 | **153.0** | 40 |
| $NO_x$ | 1,071.9 | 1,316.4 | **244.5** | 40 |
| CO | 1,156.0 | 1,352.8 | **196.8** | 100 |
| VOC | 131.3 | 134.6 | 3.3 | 40 |
| GHG | 881,505 | 1,067,877 | 186,372 | 75,000 |

4. Classification

Since emissions increases exceed significant emissions increase levels, this NSR License is determined to be a major modification for PM, $PM_{10}$, $PM_{2.5}$, $NO_x$, $SO_2$, and CO under *Minor and Major Source Air Emission License Regulations,* 06-096 C.M.R. ch. 115. As an existing major stationary source proposing a major modification for an NSR pollutant, other than greenhouse gases (GHGs), resulting in an emissions increase of more than 75,000 tpy of carbon dioxide equivalent ($CO_2e$), this NSR License is also determined to be a major modification of GHGs pursuant to 40 C.F.R. § 51,166(b)(48)(iv)(b). Sappi has submitted an application to incorporate the requirements of this NSR license into the facility's Part 70 air emission license.

## II. BEST PRACTICAL TREATMENT (BPT)

### A. Introduction

In order to receive a license, the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in *Definitions Regulation*, 06-096 C.M.R. ch. 100. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in 06-096 C.M.R. ch. 100. BACT is a top-down approach to selecting air emission controls considering economic, environmental, and energy impacts.

B. Paper Machine #2

The 2023 PM#2 Rebuild Project includes physical and operational changes to Paper Machine #2 as described earlier including modifications to the stock preparation and wet end areas, headbox, former, press, steam-heated dryer section, and dry end, removal of the existing steam turbine, and installation of two new blade coaters with associated natural gas-fired dryers (discussed later).

Paper Machine #2 has the potential to emit quantifiable emissions of PM, $PM_{10}$, $PM_{2.5}$, and VOC.

1. BACT Findings

Sappi submitted a BACT analysis for control of emissions from Paper Machine #2.

a. Particulate Matter (PM, $PM_{10}$, $PM_{2.5}$)

The proposed capacity upgrades to Paper Machine #2 will result in an increase in process-related PM, $PM_{10}$, and $PM_{2.5}$ emissions from the paper web as it is formed and dried.

Particulate matter emissions are generated by the paper making process itself as dust particles are freed from the paper web as it passes through the machine. The paper machine room has multiple points venting to the atmosphere along the former and press sections and drying, coating, and winding sections. Paper Machine #2 is not a permanently enclosed structure, so particulate dust is considered to be emitted fugitively within the building and in very low concentrations from building vents.

(1) Control Options

A review of EPA's RACT/BACT/LAER Clearinghouse (RBLC) and licenses for similar projects did not yield any add-on control technologies applied to paper machines for control of particulate matter. However, Sappi did review and consider the use of add-on controls such as baghouses, wet electrostatic precipitators, multicyclones, and wet scrubbers.

Baghouses
Baghouses, sometimes referred to as fabric filter systems, consist of a number of fabric bags placed in parallel that collect particulate matter on the surface of the filter bags as the exhaust stream passes through the fabric membrane. The collected particulate is periodically dislodged from the bags' surface to collection hoppers via short blasts of high-pressure air, physical agitation of the bags, or by reversing the gas flow.

Due to the high moisture loading of the exhaust and ventilation streams, baghouses would be blinded and not effective in this application. Therefore, use of a baghouse is determined to not be technically feasible for control of particulate matter from Paper Machine #2.

ESPs/Wet ESPs

ESPs remove filterable PM from a gas stream through the use of electric fields. Particulate matter entrained in exhaust gases entering the ESP is ionized, which negatively charges the filterable PM and causes it to be attracted to and collected on positively charged plates. These plates are then mechanically rapped at preset intervals to dislodge the PM into a hopper for appropriate collection and disposal. Collection efficiency is affected by several factors, including particle resistivity, gas temperature, chemical composition (of both the particles and the gas), and particle size distribution. Removal efficiencies for ESPs are 99+ percent of total filterable PM and up to 98 percent for PM in the range of 0-5 microns.

Use of a dry ESP would not be technically feasible for the moist exhaust streams emitted from Paper Machine #2, but wet ESPs are specifically designed to collect PM from wet air streams and are thus considered technically feasible. However, paper machine vents operate at lower flow rates than typical wet ESP operations. Additionally, this equipment would be difficult to install at Sappi's site due to limited space and the relatively large size of the equipment leading to a high capital cost to install. Based on information contained in EPA Air Pollution Control Technology Fact Sheet E-452/F-03-030, it is estimated that installation and operation of a Wet ESP would result in an annualized control cost of at least $172,000 per ton of pollutant removed. A review of similar projects from the RBLC did not indicate that any paper machines currently employ the use of a wet ESP. Therefore, the use of a wet ESP for control of PM, $PM_{10}$, and $PM_{2.5}$ from Paper Machine #2 is determined not to be economically justifiable.

Wet Scrubbers

Wet scrubbers remove entrained particles from exhaust gases by impacting them with water droplets either through water spraying into the exhaust or through violent mixing of water with the exhaust stream. Entrained liquid droplets then pass through a mist eliminator (coalescing filter) which causes the droplets to fall out of the exhaust stream. The liquid containing the pollutants is then collected for disposal or treatment.

There are several types of wet scrubbers available. Venturi scrubbers use a "converging-diverging" flow channel. The converging section causes the exhaust stream velocity and turbulence to increase. The scrubbing liquid is added prior to the gas reaching the diverging section, improving gas-liquid contact.

Dynamic scrubbers pass the exhaust stream through a chamber (tower) where it is sprayed with water. A power-driven rotor is used to shear water into finely dispersed droplets, improving the gas-liquid contact.

Wet scrubbers typically have removal efficiencies of 90 to 99 percent for emissions of $PM_{10}$ and significantly lower efficiencies for $PM_{2.5}$. High-efficiency scrubbers such as venturi scrubbers can be used to achieve greater removal efficiencies of $PM_{2.5}$ due to the high velocities and pressure drops at which they operate.

Both venturi and dynamic scrubbers are considered technically feasible for control of particulate matter from Paper Machine #2. However, the capital cost required to duct each paper machine vent to a scrubbing system is prohibitively expensive. A review of similar projects in the RBLC showed that although some tissue machines are equipped with wet scrubbers, there were no paper machines with wet scrubbers. Tissue machines generate much higher levels of particulate matter than paper machines due to the release of dust as the web exits the large Yankee dryers via the doctor blade. Paper machines do not employ these same process units.

Based on information contained in EPA Air Pollution Control Technology Fact Sheet F-03-017, it is estimated that installation and operation of wet scrubbers would result in an annualized control cost of at least $109,000 per ton of pollutant removed. Therefore, the use of wet scrubbers for control of PM, $PM_{10}$, and $PM_{2.5}$ from Paper Machine #2 is determined not to be economically justifiable.

<u>Multicyclones</u>
Mechanical separators include cyclonic separators (multicyclones). In a multicyclone, centrifugal force separates larger filterable particulate matter from the gas stream. The exhaust gas enters a cylindrical chamber on a tangential path and is forced along the outside wall of the chamber at a high velocity, causing the particulate matter to impact collectors on the outer wall of the unit and fall into a hopper for collection. Multicyclones have typical removal efficiencies of 40 to 90 percent for $PM_{10}$ and zero to 40 percent for $PM_{2.5}$.

The use of multicyclones is considered a technically feasible option for the control of particulate matter from Paper Machine #2. However, the cost to duct each paper machine room vent to a multicyclone is prohibitively expensive. This is especially true given the relatively low levels of particulate matter emissions to be controlled. A review of similar projects in the RBLC showed that the only machines using multicyclones are tissue machines which generate much higher levels of particulate matter than paper machines due to the release of dust as the web exits the large Yankee dryers via the doctor blade. Paper machines do not employ these same process units.

Based on information contained in EPA Air Pollution Control Technology Fact Sheet F-03-005, it is estimated that installation and operation of multicyclones would result in an annualized control cost of at least $27,500 per ton of pollutant removed. Therefore, the use of multicyclones for control of PM, $PM_{10}$, and $PM_{2.5}$ from Paper Machine #2 is determined not to be economically justifiable.

(2) Determination

The Department agrees with Sappi's analysis and finds the following emission limits to represent BACT for particulate matter emissions from Paper Machine #2:

| Unit | PM (lb/ADT) | $PM_{10}$ (lb/ADT) | $PM_{2.5}$ (lb/ADT) |
|---|---|---|---|
| Paper Machine #2 | 0.02 | 0.07 | 0.06 |

These emission limits are based on emission factors for linerboard paper published in NCASI TB 942.

BACT also includes a visible emission limit from paper machine building vents of 10% opacity on a six-minute block average basis.

Due to the difficulty in conducting performance testing for fugitive sources, compliance with the PM, $PM_{10}$ and $PM_{2.5}$ emission limits shall be demonstrated by compliance with the visible emission limit. Compliance with the visible emission limit shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 9 upon request by the Department.

b. Volatile Organic Compounds (VOC)

VOC emissions from Paper Machine #2 are attributable to many different sources. Small amounts of VOC are present in the water carrying the pulp to the paper machines. The most often detected compound from this source is methanol, a byproduct of the chemical and mechanical pulping and bleaching processes. VOC are also present in papermaking additives (defoamers, slimicides, retention aids, wet strength agents, wire and felt cleaners, etc.) and may be released in the papermaking process.

(1) Control Options

Potential control technologies for VOC emissions include add-on pollution control equipment such as adsorption, biofiltration, thermal oxidation, and the use of low-VOC containing materials and additives.

Adsorption
With adsorption, VOC migrates from a gas stream to the surface of a solid material, usually activated carbon, where it is held by physical attraction. Periodically, the VOC is desorbed (usually through heating) as part of an adsorbent regeneration cycle. The VOC is then condensed and recovered or thermally destroyed. While adsorption is commonly used to treat high volume, low concentration VOC gas streams, there are no known applications on a paper machine. The large range of VOC contained in the exhaust prevent refinement and reuse as an option. In addition, the entrained particulate matter would result in the fouling of the activated carbon and heat exchanger used, preventing efficient operation of the unit. For all of these reasons, adsorption is not considered technically or economically feasible for control of VOC from Paper Machine #2.

Biofiltration Systems
Biofiltration is a VOC removal method that uses microorganisms to remove VOC from a gas stream. In a biofilter, the exhaust gas stream is humidified, then passed through a distribution system beneath a bed of compost, bark mulch, or soil. The media in the bed contains an active population of bacteria and other microbes. As the air stream flows upward through the media, pollutants are adsorbed into the media and converted by microbial metabolism to form carbon dioxide and water.

Biofilters work best at steady state conditions and cannot tolerate extended periods of downtime. They also typically require a very large footprint. Additionally, the microbes in the bioreactor are sensitive to temperature swings, loading levels, and changes in available moisture. For all of these reasons, biofiltration is not considered technically feasible for control of VOC from Paper Machine #2.

Thermal Oxidizers
A thermal oxidizer raises the temperature of the exhaust stream to oxidize (burn) or pyrolyze (thermally break down) the constituents. In the case of hydrocarbons (including VOC and volatile organic HAP), complete combustion produces carbon dioxide and water. Regenerative thermal oxidizers (RTOs) use heat exchangers to preheat the exhaust and/or recover waste heat from the treated air stream. The use of a thermal oxidizer of any type would require collection of a large volume of exhaust gases having very low VOC

concentration from various locations. Based on information contained in EPA Air Pollution Control Technology Fact Sheet EPA-452/F-03-021, this would lead to a prohibitively expensive annualized cost, estimated to be in excess of $21,000 per ton of pollutant removed and potentially as high as $88,000 per ton. A review of similar projects from the RBLC did not indicate that any paper machines currently employ the use of an RTO. Additionally, thermal oxidizers would require the burning of significant amounts of fuel to destroy the VOC, causing increased emissions of other pollutants such as $NO_x$ and CO. Therefore, thermal oxidation is not considered economically or environmentally feasible for control of VOC from Paper Machine #2.

<u>Use of Low-VOC Coatings and Additives</u>
The use of low-VOC coatings and additives involves selecting water-based alternatives whenever possible. The use of low-VOC coatings and additives is a technically feasible option for minimizing emissions of VOC from Paper Machine #2. All paper machines listed in the RBLC with BACT limits for VOC controlled emissions using this practice with emission rates that varied from 0.51 – 1.7 lb/air dried ton of finished product. Sappi has proposed using low-VOC coatings where possible to limit emissions of VOC from Paper Machine #2 to 130.0 tpy. This emission rate is equivalent to 0.50 lb/finished ton at projected actual production levels.

(2) Determination

The Department finds that the use of low-VOC coatings and additives to comply with an annual emission limit of 130.0 tpy (calendar year total basis) of VOC from Paper Machine #2 represents BACT for emissions of VOC.

Compliance shall be demonstrated by calculations of emissions based on actual chemical use assuming that 100% of the VOC is volatilized and emitted. This calculation method is considered conservative since many paper machine additives will react with the web substrate limiting VOC emissions to the unreacted portion only.

2. 40 C.F.R. Part 63, Subpart JJJJ

Federal regulation 40 C.F.R. Part 63, Subpart JJJJ, *National Emission Standards for Hazardous Air Pollutants: Paper and Other Web Coating*, applies to facilities that perform paper and other web coating operations. Sappi performs coating operations on Paper Machine #2. However, the coating is part of the sheet formation and on-machine operations. This is not expected to change with implementation of the 2023 PM#2 Rebuild Project. Pursuant to a letter dated November 19, 2003, from the U.S. EPA to Timothy Hunt of the American Forest and Paper Association, both size presses and on-machine coaters that function as part of the in-line papermaking system used to form the paper substrate are not subject to 40 C.F.R. Part 63, Subpart JJJJ requirements. Therefore, Subpart JJJJ does not apply to Paper Machine #2.

C. PM2 Coating Dryers

As part of the 2023 PM#2 Rebuild Project, Sappi proposes to install two new blade coaters that use five natural gas-fired burners as part of the coating air dryers (PM2 Coating Dryers). The dryers consist of one OptiDry double-sided air dryer with one (1) 16.8 MMBtu/hr burner, one OptiDry high-intensity air dryer with two (2) 10.5 MMBtu/hr burners, and one OptiDry coating air dryer with two (2) 9.3 MMBtu/hr burners. The PM#2 Coating Dryers therefore have a combined maximum design heat input of 56.4 MMBtu/hr.

1. BACT Findings

Following is a BACT analysis for control of emissions from the PM2 Coating Dryers.

a. Particulate Matter (PM, $PM_{10}$, $PM_{2.5}$)

Sappi has proposed to burn only a low-ash content fuel (natural gas) in the PM2 Coating Dryers. Additional add-on pollution controls are not economically feasible.

BACT for $PM/PM_{10}/PM_{2.5}$ emissions from the PM2 Coating Dryers is the use of natural gas as a fuel, the emission limits listed in the table below, and the following visible emissions limit.

Visible emissions from the PM2 Coating Dryers shall not exceed 10% opacity on a six-minute block average basis.

Sappi shall demonstrate compliance with the visible emission limit through performance testing upon request of the Department.

b. Sulfur Dioxide ($SO_2$)

Sappi has proposed to fire only natural gas, an inherently low-sulfur fuel. The use of this fuel results in minimal emissions of $SO_2$, and additional add-on pollution controls are not economically feasible.

BACT for $SO_2$ emissions from the PM2 Coating Dryers is the use of natural gas as a fuel and the emission limits listed in the table below.

c. Nitrogen Oxides ($NO_x$)

The PM2 Coating Dryers will be equipped with ultra-low-$NO_x$ burners (ULNBs) which minimize the formation of $NO_x$ by improving fuel/air mixing. The use of additional add-on control technologies for natural gas-fired units of such a small size is not economically feasible.

BACT for $NO_x$ emissions from the PM2 Coating Dryers is the use of natural gas, ULNBs, and the emission limits listed in the table below.

d. Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

Emissions of CO and VOC can be reduced by using oxidation catalysts or thermal oxidizers. Oxidation catalysts and thermal oxidizers both have high capital, maintenance, and operational costs considering the size of the emission unit in question. These controls were determined not to be economically feasible.

BACT for CO and VOC emissions from the PM2 Coating Dryers is the use of natural gas and the emission limits listed in the table below.

e. Greenhouse Gases (GHGs)

The natural gas-fired burners associated with PM2 Coating Dryers will emit GHG, most notably carbon dioxide ($CO_2$), but also methane ($CH_4$), and nitrous oxide ($N_2O$) as byproducts of combustion.

The primary strategies available to minimize the generation of GHG are burning clean fuel, such as natural gas or propane, and following good operating practices. Good operating practices include maintaining burners according to manufacturer recommendations, including conducting routine tune-ups, maintaining proper use of the burner management system, and conducting routine inspection and repair/replacement of key components. These practices will facilitate optimal performance of the burners and thereby minimize GHG emissions.

There are no add-on GHG emissions control technologies that may be considered technically feasible for application to these units. Carbon capture and sequestration would not be a viable technology to control GHG emissions from tissue machine burners due to the very low emission levels generated from the combustion of natural gas.

BACT for GHG emissions from PM2 Coating Dryers is the use of natural gas and employing good operating and maintenance practices as discussed in the paragraph above.

f. Emission Limits

The BACT emission limits for the PM2 Coating Dryers were based on the following:

| | | |
|---|---|---|
| PM | – | 1.9 lb/MMscf based on AP-42 Table 1.4-2 dated 7/98 |
| $PM_{10}$ / $PM_{2.5}$ | – | 7.6 lb/MMscf (filterable + condensable) based on AP-42 Table 1.4-2 dated 7/98 |
| $SO_2$ | – | 0.6 lb/MMscf based on AP-42 Table 1.4-2 dated 7/98 |
| $NO_x$ | – | 0.048 lb/MMBtu based on 06-096 C.M.R. ch. 115, BACT and manufacturer's specifications for ULNBs |
| CO | – | 0.074 lb/MMBtu based on manufacturer's guaranteed emissions |
| VOC | – | 5.5 lb/MMscf based on AP-42 Table 1.4-2 dated 7/98 |
| Visible Emissions | – | 06-096 C.M.R. ch. 115, BACT |

The BACT emission limits for the PM2 Coating Dryers (all burners combined) are the following:

| Unit | Pollutant | lb/MMBtu |
|---|---|---|
| PM2 Coating Dryers | PM | 0.002 |

| Unit | PM (lb/hr) | $PM_{10}$ (lb/hr) | $PM_{2.5}$ (lb/hr) | $SO_2$ (lb/hr) | $NO_x$ (lb/hr) | CO (lb/hr) | VOC (lb/hr) |
|---|---|---|---|---|---|---|---|
| PM2 Coating Dryers | 0.11 | 0.42 | 0.42 | 0.03 | 2.71 | 4.17 | 0.30 |

Sappi shall demonstrate compliance with the emission limits above through performance testing upon request of the Department.

2. 40 C.F.R. Part 60, Subpart Dc

Due to not being "steam generating units," the PM2 Coating Dryers are not subject to *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units* 40 C.F.R. Part 60, Subpart Dc for units greater than 10 MMBtu/hr manufactured after June 9, 1989. [40 C.F.R. § 60.40c]

3. 40 C.F.R. Part 63, Subpart DDDDD

The PM2 Coating Dryers do not meet the definition of either *boiler* or *process heater* in 40 C.F.R. § 63.7575 since they are direct-fired heating sources where the combustion gases come into direct contact with the process materials. Therefore, the PM2 Coating Dryers are not subject to *National Emission Standards for Hazardous Air Pollutants* *for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*, 40 C.F.R. Part 63, Subpart DDDDD.

D. Proposed Changes to Existing $SO_2$ Emission Limits

As part of this licensing action, Sappi was required to prepare and submit an Ambient Air Quality Impact Analysis. Based on preliminary results, Sappi determined that several changes to existing emission limits for $SO_2$ would be required. $SO_2$ emissions from the Lime Kiln, Recovery Boiler, and Power Boilers #1 and #2 are greatly influenced by the presence or absence of non-condensable pulp mill gases, including LVHC and HVLC gases, and the presence or absence of pulp mill kraft condensates (also known as turpentine).

Pursuant to *National Emission Standards for Hazardous Air Pollutants from the Pulp and Paper Industry*, 40 C.F.R. Part 63, Subpart S, the non-condensable gases and kraft condensates are required to be treated in control devices, which include boilers, lime kilns, and recovery boilers. Additionally, the LVHC gas collection system must have a primary and backup control strategy pursuant to *Total Reduced Sulfur Control from Kraft Pulp Mills*, 06-096 C.M.R. ch. 124.

Sappi proposes to change their control strategy for treatment of LVHC gases, HVLC gases, and kraft condensates as shown in Table II-1 below.

**Table II-1: Proposed Control Strategy for Kraft Condensates and LVHC and HVLC Gases**

| Emission Unit | Current Control Strategy | Proposed Control Strategy |
|---|---|---|
| Lime Kiln | LVHC (primary)<br>Kraft Condensates [a] | LVHC (primary)<br>Kraft Condensates [a] |
| Recovery Boiler | LVHC<br>HVLC | LVHC<br>HVLC |
| Power Boiler #1 | LVHC (secondary)<br>HVLC (secondary)<br>Kraft Condensates (primary) | LVHC (tertiary)<br>HVLC (secondary)<br>Kraft Condensates (secondary) |
| Power Boiler #2 | LVHC [a]<br>HVLC (primary)<br>Kraft Condensates [a] | LVHC (secondary)<br>HVLC (primary)<br>Kraft Condensates (primary) |

[a] This emission unit is a licensed treatment device, but the necessary infrastructure is not yet in place.

In making this control shift, Sappi is proposing a new, more stringent averaging period of a 3-hour block average basis rather than a 24-hour block average basis for the existing Power Boiler #1 $SO_2$ emission limit (744 lb/hr). Sappi is also proposing a more stringent 3-hour block average $SO_2$ emission limit of 440.0 lb/hr for Power Boiler #2 which is currently subject to a 3-hour block average emission limit of 975 lb/hr.

Additionally, Sappi wishes to maintain flexibility in utilizing Power Boiler #1 as a tertiary treatment option for LVHC gases and secondary treatment option for kraft condensates and HVLC gases. In such cases, Power Boiler #1 may exceed its proposed emission limit; however, a new proposed Main Stack emission limit of 1,230 lb/hr (3-hour block average basis) would apply and is the emission rate used to represent Power Boiler #1, Recovery Boiler, Lime Kiln, and Smelt Dissolving Tank emissions in the air dispersion model since each of these units exhausts through the Main Stack.

In rare instances, the Main Stack emissions rate could exceed 1,230 lb/hr (3-hour block average basis). For those instances, Sappi proposes to maintain the existing Main Stack $SO_2$ emission limit of 2,871 lb/hr but reduce the averaging time from a 24-hour block average basis to a 3-hour block average basis and also to limit the amount of time this alternative standard applies to no more than 500 hours/year. In accordance with EPA guidance[2], these intermittent emissions have been excluded from the air dispersion model.

The Department finds the following proposed emission limits are necessary to demonstrate compliance with ambient air quality standards for $SO_2$ from Power Boiler #2, Power Boiler #1, and the Main Stack. These limits are in addition to, not in place of, those established pursuant to a BACT analysis.

Power Boiler #1 shall not exceed an $SO_2$ emission rate of 744 lb/hr on a 3-hour block average basis, except when LVHC gases, HVLC gases, and/or kraft condensates are being fired in Power Boiler #1. During such periods, if the $SO_2$ emissions exceed 744 lb/hr on a 3-hour block average basis, Sappi shall report to the Department on a quarterly basis the $SO_2$ lb/hr 3-hour block emissions calculated as described below. During this period, the following Main Stack $SO_2$ lb/hr limits shall apply.

Emissions of $SO_2$ from the Main Stack shall not exceed 1,230 lb/hr on a 3-hour block average basis except for periods of time when all of the following are met:

1. LVHC gases, HVLC gases, and/or kraft condensates are fired in Power Boiler #1 during the 3-hour block; and

2. Emissions of $SO_2$ from the Main Stack shall not exceed 2,871 lb/hr on a 3-hour block average basis; and

3. The period of time $SO_2$ emissions exceed 1,230 lb/hr on a 3-hour block shall not exceed 500 hours/year on a 12-month rolling total basis.

---

[2] U.S. EPA, Memorandum: *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour $NO_2$ National Ambient Air Quality Standard*, March 1, 2011 https://www.epa.gov/sites/default/files/2015-07/documents/appwno2_2.pdf

Compliance with the $SO_2$ emission limits applicable to the Main Stack shall be demonstrated by the sum of the $SO_2$ lb/hr 3-hour block emissions from the Power Boiler #1, Recovery Boiler, Smelt Dissolving Tanks #1 & #2, Lime Kiln, and Package Boiler (when the Package Boiler is venting through the Main Stack). The Recovery Boiler operates an $SO_2$ CEMS. To calculate the total $SO_2$ lb/hr 3-hour block emissions, Sappi may utilize the $SO_2$ license limit for the Smelt Dissolving Tanks #1 & #2, Lime Kiln, and Package Boiler or may calculate $SO_2$ emissions from the average firing rate and the sulfur content of the fuel fired during the 3-hour block period.

Power Boiler #2 shall not exceed an $SO_2$ emission rate of 440.0 lb/hr on a 3-hour block average basis.

These limits are in addition to, not in place of, those established pursuant to a BACT analysis. However, these limits are determined to be more stringent than the existing BACT limits.

E. Proposed Changes to $PM_{10}$ and $PM_{2.5}$ Emission Limits

Several of Sappi's licensed emission units have $PM_{10}$ emission limits that are based on filterable particulate matter only. This is primarily due to the emission limits being established prior to the definition of $PM_{10}$ being revised to include condensable particulate matter (CPM). As part of this licensing action, Sappi has proposed augmenting the existing $PM_{10}$ emission limits established through BACT to include the expected CPM. This change does not represent any increase in actual emissions, but is only an update to the previously established BACT limits to include CPM.

Additionally, these emission units do not yet have established emission limits for $PM_{2.5}$. As part of this licensing action, Sappi has requested establishment of $PM_{2.5}$ emission limits where none had previously existed.

The following tables outline the proposed new and revised emission limits and the associated compliance methods.

**Table II-2: Existing $PM_{10}$ and $PM_{2.5}$ Emission Limits**

| Emission Unit | Pollutant | Current Limit | Origin & Authority | Compliance Method |
|---|---|---|---|---|
| Power Boiler #1 | $PM_{10}$ | 220 lb/hr | 06-096 C.M.R. ch. 115, BACT (A-19-71-K-A, 3/25/1994) (A-19-71-U-A, 6/7/1995) | Method 5 |
| | $PM_{2.5}$ | – | – | – |
| Power Boiler #2 | $PM_{10}$ | 0.03 lb/MMBtu | 06-096 C.M.R. ch. 115, BACT (A-19-71-K-A, 3/25/1994) (A-19-71-U-A, 6/7/1995) | Method 5 |
| | | 39 lb/hr | | |
| | $PM_{2.5}$ | – | – | – |
| Recovery Boiler | $PM_{10}$ | 207 lb/hr[a] | 06-096 C.M.R. ch. 115, BACT (A-19-77-2-A, 6/2/2008) | Method 5 |
| | | 283 lb/hr[b] | | |
| | $PM_{2.5}$ | – | – | – |
| Smelt Dissolving Tanks #1 & #2 | $PM_{10}$ | – | – | – |
| | $PM_{2.5}$ | – | – | – |
| Lime Kiln | $PM_{10}$ | 70 lb/hr[c] | 06-096 C.M.R. ch. 115, BACT (A-19-77-7-A, 7/8/2013) | Methods 202 and 201A |
| | $PM_{2.5}$ | 70 lb/hr[c] | | |

[a] When firing black liquor only.
[b] When any oil is being fired.
[c] When firing natural gas only.

**Table II-3: Proposed New and Updated $PM_{10}$ and $PM_{2.5}$ Emission Limits[d]**

| Emission Unit | Pollutant | Proposed Limit | Origin & Authority | Proposed Compliance Method |
|---|---|---|---|---|
| Power Boiler #1 | $PM_{10}$ | 234.5 lb/hr | 06-096 C.M.R. ch. 115, BACT | Methods 202 and 201A |
| | $PM_{2.5}$ | 157.5 lb/hr | 06-096 C.M.R. ch. 115, § 7 | |
| Power Boiler #2 | $PM_{10}$ | 0.047 lb/MMBtu | 06-096 C.M.R. ch. 115, BACT | Methods 202 and 201A |
| | | 61.1 lb/hr | | |
| | $PM_{2.5}$ | 60.4 | 06-096 C.M.R. ch. 115, § 7 | |
| Recovery Boiler | $PM_{10}$ | 216.2 lb/hr[a] | 06-096 C.M.R. ch. 115, BACT | Methods 202 and 201A |
| | | 296.3 lb/hr[b] | | |
| | $PM_{2.5}$ | 114.8 lb/hr[a] | 06-096 C.M.R. ch. 115, § 7 | |
| | | 129.4 lb/hr[b] | | |
| Smelt Dissolving Tanks #1 & #2 | $PM_{10}$ | 36.9 lb/hr | 06-096 C.M.R. ch. 115, § 7 | Methods 202 and 201A |
| | $PM_{2.5}$ | 26.9 lb/hr | | |
| Lime Kiln | $PM_{10}$ | 70 lb/hr[b] | 06-096 C.M.R. ch. 115, § 7 | Methods 202 and 201A |
| | | 70 lb/hr[c] | 06-096 C.M.R. ch. 115, BACT (A-19-77-7-A, 7/8/2013) | |
| | $PM_{2.5}$ | 70 lb/hr[b] | 06-096 C.M.R. ch. 115, § 7 | |
| | | 70 lb/hr[c] | 06-096 C.M.R. ch. 115, BACT (A-19-77-7-A, 7/8/2013) | |

[a] When firing black liquor only.
[b] When any oil is being fired.
[c] When firing natural gas only.
[d] Emission limits established pursuant to an ambient air quality analysis (06-096 C.M.R. ch. 115, § 7) are in addition to, not in place of, those established through BACT.

The proposed emission limits were developed as described below:

1. Power Boiler #1

   The existing $PM_{10}$ emission limit was augmented to include CPM based on an emission factor of 0.017 lb/MMBtu from AP-42 Table 1.6-1 for biomass boilers. This emission factor is conservatively high compared to emission factors for CPM from firing oil.

   The proposed $PM_{2.5}$ emission limit is based on assuming 65% of the filterable PM limit is filterable $PM_{2.5}$ (see AP-42 Table 1.6-5 for biomass boilers utilizing an ESP) and adding CPM based on an emission factor of 0.017 lb/MMBtu (AP–42 Table 1.6-1).

2. Power Boiler #2

   The existing $PM_{10}$ emission limits were augmented to include CPM based on an emission factor of 0.017 lb/MMBtu (for CPM) from AP-42 Table 1.6-1 for biomass boilers. This emission factor is conservatively high compared to emission factors for CPM from firing oil.

The proposed $PM_{2.5}$ emission limit is based on assuming 98% of the filterable PM limit is filterable $PM_{2.5}$ (see AP-42 Table 1.6-5 for biomass boilers utilizing a wet scrubber). This assumption is conservatively high because Power Boiler #2 is also controlled by an ESP. Emissions of CPM were then included based on an emission factor of 0.017 lb/MMBtu (AP–42 Table 1.6-1).

3. Recovery Boiler

The existing $PM_{10}$ emission limit when firing black liquor solids (BLS) was augmented to include CPM based on an emission factor of 0.08 lb/ton BLS from Table 4.12 of NCASI TB 884[3].

The existing $PM_{10}$ emission limit when firing fuel oil was augmented to include CPM based on an emission factor of 1.5 lb/1,000 gallons from AP-42 Table 1.3-2.

The proposed $PM_{2.5}$ emission limit when firing BLS is based on assuming 51% of the filterable PM limit is filterable $PM_{2.5}$ (see NCASI TB 884 Table 4.12). Emissions of CPM were then included based on an emission factor of 0.08 lb/ton BLS (see NCASI TB 884 Table 4.12).

The proposed $PM_{2.5}$ emission limit when firing fuel oil is based on assuming 41% of the filterable PM limit is filterable $PM_{2.5}$ (see AP-42 Table 1.3-4 for residual oil-fired boilers utilizing an ESP). Emissions of CPM were then included based on an emission factor of 1.5 lb/1,000 gallons from AP-42 Table 1.3-2.

4. Smelt Dissolving Tanks #1 & #2

The proposed $PM_{10}$ and $PM_{2.5}$ emission limits are conservatively based on adding emissions of CPM to the existing filterable PM emission limit. CPM emissions were based on an emission factor of 0.0073 lb/ton BLS developed by averaging all results in Tables 4.1 and 4.2 of NCASI TB 898[4].

5. Lime Kiln

The Lime Kiln has emission limits for $PM_{10}$ and $PM_{2.5}$ when firing natural gas that were established in 2013 and are inclusive of CPM. However, the Lime Kiln is also licensed to fire fuel oil. Sappi has proposed that the existing $PM_{10}$ and $PM_{2.5}$ emission limits also apply at all times regardless of whether natural gas or fuel oil is being fired.

[3] *Compilation of Criteria Air Pollutant Emissions Data for Sources at Pulp and Paper Mills Including Boilers* (August 2004)
[4] *Condensable Particulate Matter Emissions from Sources Equipped with Wet Scrubbers* (March 2005)

6. Determination

The Department finds the proposed new and updated emission limits in Table II-3 either represent an administrative revision of BACT or are necessary to demonstrate compliance with ambient air quality standards (as indicated in Table II-3 above) for emissions of $PM_{10}$ and $PM_{2.5}$ for the emission units listed.

Compliance shall be demonstrated pursuant to 40 C.F.R. Part 60, Appendix A, Methods 202 and 201A upon request by the Department.

F. Incorporation Into the Part 70 Air Emission License

Pursuant to *Part 70 Air Emission License Regulations*, 06-096 C.M.R. ch. 140 § 1(C)(8), for a modification at the facility that has undergone NSR requirements or been processed through 06-096 C.M.R. ch. 115, the source must apply for an amendment to their Part 70 license within one year of commencing the proposed operations, as provided in 40 C.F.R. Part 70.5. An application to incorporate the requirements of this NSR license into the Part 70 air emission license has been submitted to the Department.

G. Annual Emissions

The table below provides an estimate of facility-wide annual emissions for the purposes of calculating the facility's annual air license fee and establishing the facility's potential to emit (PTE). Only licensed equipment is included, i.e., emissions from insignificant activities are excluded. Similarly, unquantifiable fugitive particulate matter emissions are not included except when required by state or federal regulations. Maximum potential emissions were calculated based on the following assumptions:

- All equipment except the Recovery Boiler and the emergency diesel engines each operating at the maximum lb/hr emission rate for 8,760 hours/year;
- Recovery Boiler operating at the maximum lb/hr emission rate for firing of black liquor only for 8,760 hours/year;
- $SO_2$ emissions from Power Boiler #1, Recovery Boiler, Smelt Tanks #1 and #2, and Lime Kiln are based on maximum licensed emissions from the Main Stack; and
- The emergency diesel engines operated for 100 hr/yr.

This information does not represent a comprehensive list of license restrictions or permissions. That information is provided in the Order section of this license.

**Total Licensed Annual Emissions for the Facility**
**Tons/year**
(used to calculate the annual license fee)

| | PM | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_x$ | CO | VOC |
|---|---|---|---|---|---|---|---|
| Package Boiler | 0.5 | 0.5 | 0.5 | 0.6 | 4.5 | 1.2 | 0.1 |
| Power Boiler #1 | 963.6 | 1,027.1 | 689.9 | – | 1,309.6 | 9,942.6 | 60.0 |
| Power Boiler #2 | 170.8 | 267.6 | 264.6 | 1,537.4 | 1,138.8 | 2,277.6 | 39.9 |
| Recovery Boiler | 906.7 | 947.0 | 502.8 | – | 3,285.0 | 13,634.9 | 65.7 |
| Smelt Dissolving Tanks #1 & #2 | 113.9 | 161.6 | 117.8 | – | -- | -- | -- |
| Lime Kiln | 254.0 | 306.6 | 306.6 | – | 254.0 | 254.0 | 43.8 |
| Main Stack | – | – | – | 5,797.7 | – | – | – |
| Emergency Diesel Engines | – | – | – | – | 2.2 | 0.5 | 0.2 |
| Paper Machine #1 | 8.5 | 20.5 | 20.5 | 0.0 | 0.0 | 0.0 | 65.6 |
| Paper Machine #1 Natural Gas Dryers | 0.7 | 2.8 | 2.8 | 0.4 | 27.6 | 29.3 | 2.0 |
| Paper Machine #2 | 5.2 | 18.2 | 15.6 | – | – | – | 130.0 |
| Paper Machine #2 Coating Dryers | 0.5 | 1.8 | 1.8 | 0.2 | 11.9 | 18.3 | 1.3 |
| **Total TPY** | **2,424.4** | **2,753.7** | **1,922.9** | **7,336.3** | **6,033.6** | **26,158.4** | **408.6** |

## III. AMBIENT AIR QUALITY ANALYSIS

### A. Overview

A refined modeling analysis was performed to show that emissions from Sappi, in conjunction with other sources, will not cause or contribute to violations of National Ambient Air Quality Standards (NAAQS) for $SO_2$, $PM_{10}$, $PM_{2.5}$, $NO_2$, or CO.

It has been determined that Sappi does not consume $SO_2$ or $PM_{10}$ increment, therefore, Class II increment analyses were performed for only $PM_{2.5}$ and $NO_2$.

As required by 06-096 C.M.R. ch. 115, the Department notified Federal Land Managers (FLMs) representing the US Fish & Wildlife Service, the National Park Service, and the National Forest Service of the proposed Sappi major modification. The notification contained a detailed description of the proposed project, the proposed project-only TPY emissions increases of $SO_2$, $PM_{10}$, $PM_{2.5}$, and $NO_x$, and the distances to each of the Class I areas in or near Maine. Based upon the magnitude of proposed emissions increase and the distance from the source to each Class I area, the affected Federal Land Managers (FLMs) and MEDEP-BAQ have determined that an assessment of Class I Air Quality Related Values (AQRVs) is not required.

B. Model Inputs

The AERMOD refined dispersion model was used to address NAAQS and increment impacts in all areas. The modeling analysis accounted for the potential of building wake and cavity effects on emissions from all modeled stacks that are below their calculated formula GEP stack heights.

All modeling was performed in accordance with all applicable requirements of the Department and the USEPA. The most-recent regulatory version of the AERMOD model and its associated processors were used to conduct the analyses.

A valid, five-year, hourly, on-site, meteorological database was used in the analysis. Five years of wind data was collected at heights of 10 and 100 meters at the Sappi meteorological monitoring site during the following periods: 1991, 1993-1996. All missing data were interpolated or coded as missing, per USEPA guidance.

The on-site surface meteorological data was combined with concurrent hourly cloud cover and upper-air data obtained from the Caribou National Weather Service (NWS). Missing cloud cover and/or upper-air data values were interpolated or coded as missing, per USEPA guidance.

All necessary representative micrometeorological surface variables for inclusion into AERMET (surface roughness, Bowen ratio, and albedo) were calculated using the AERSURFACE utility program and from procedures recommended by USEPA.

Point-source parameters used in the NAAQS and Class II increment modeling for Sappi are listed in Table III-1.

**TABLE III-1: Sappi Point Source Stack Parameters**

| Sappi Stacks | Stack Base Elevation (m) | Stack Height (m) | GEP Stack Height (m) | Stack Diameter (m) | UTM Easting NAD83 (m) | UTM Northing NAD83 (m) |
|---|---|---|---|---|---|---|
| **PROPOSED/CURRENT** | | | | | | |
| ▪ Main Stack | 59.13 | 83.78 | 127.28 | 4.34 | 448,679 | 4,950,250 |
| ▪ PB #2 Stack | 59.13 | 88.08 | 127.28 | 3.35 | 448,768 | 4,950,236 |
| **2010 BASELINE ($PM_{2.5}$ INCREMENT)** | | | | | | |
| ▪ Main Stack | 59.13 | 83.78 | 127.28 | 4.34 | 448,679 | 4,950,250 |
| ▪ PB #2 Stack | 59.13 | 88.08 | 127.28 | 3.35 | 448,768 | 4,950,236 |
| **1987 BASELINE ($NO_2$ INCREMENT)** | | | | | | |
| ▪ Main Stack | 59.13 | 83.78 | 127.28 | 4.34 | 448,679 | 4,950,250 |

Emission parameters used in the NAAQS and Class II increment modeling for Sappi are listed in Table III-2.

**TABLE III-2: Sappi Stack Emission Parameters**

| Sappi Stacks | Averaging Periods | $SO_2$ (g/s) | $PM_{10}$ (g/s) | $PM_{2.5}$ (g/s) | $NO_x$ (g/s) | CO (g/s) | Stack Temp (K) | Stack Velocity (m/s) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM SCENARIO 1*** | | | | | | | | |
| ▪ Main Stack | All | 154.98 | 79.12 | 48.36 | 140.57 | 685.57 | 472.04 | 27.82 |
| ▪ PB #2 Stack | All | 55.44 | 7.70 | 7.61 | 37.67 | 65.52 | 326.48 | 19.51 |
| **MAXIMUM SCENARIO 2*** | | | | | | | | |
| ▪ Main Stack | All | 154.98 | 69.04 | 46.52 | 140.62 | 685.57 | 475.73 | 33.43 |
| ▪ PB #2 Stack | All | 55.44 | 7.70 | 7.61 | 37.67 | 65.52 | 340.59 | 28.96 |
| **2020/2021 CURRENT ACTUALS** | | | | | | | | |
| ▪ Main Stack | Short Term | - | - | 7.50 | - | - | 477.21 | 28.86 |
| | Annual | - | - | 6.50 | 36.10 | - | 477.82 | 27.10 |
| ▪ PB #2 Stack | Short Term | - | - | 2.90 | - | - | 340.59 | 19.50 |
| | Annual | - | - | 2.00 | 16.80 | - | 340.60 | 20.09 |
| **2010 BASELINE ($PM_{2.5}$ INCREMENT)** | | | | | | | | |
| ▪ Main Stack | Short Term | - | - | -7.82 | - | - | 467.26 | 26.89 |
| | Annual | - | - | -7.10 | - | - | 466.09 | 25.10 |
| ▪ PB #2 Stack | Short Term | - | - | -2.81 | - | - | 340.59 | 17.64 |
| | Annual | - | - | -2.48 | - | - | 340.60 | 21.01 |
| **1987 BASELINE ($NO_2$ INCREMENT)** | | | | | | | | |
| ▪ Main Stack | All | - | - | - | -44.65 | - | 444.00 | 19.99 |

* Modeling for maximum licensed allowed was performed under two different operating scenarios. Scenario 1 assumes all emission units fire only fuel oil at the maximum licensed heat input capacities. Scenario 2 assumes all emission units fire typical fuel mixes at the maximum heat input capacity.

C. Single Source Modeling Impacts – Significant Impact Analysis

AERMOD modeling was performed for a range of Sappi operating scenarios that represented a range of maximum, typical, and minimum boiler/equipment operations.

The AERMOD significant impact results are shown in Table III-3. Maximum predicted impacts that exceed their respective significance level are indicated in boldface type. For comparison to the Class II significance levels, the impacts for 1-hour $SO_2$, 1-hour $NO_2$, 24-hour $PM_{2.5}$, and annual $PM_{2.5}$ were conservatively based on the maximum High-$1^{st}$-High predicted values, averaged over all five years of meteorological data. All other pollutants/averaging periods were conservatively based on their maximum High-$1^{st}$-High predicted values.

For the purpose of determining maximum predicted impacts, the following assumptions were used:

- All $NO_x$ emissions were conservatively assumed to convert to $NO_2$ (USEPA Tier I Method),
- $PM_{2.5}$ emissions were explicitly modeled as $PM_{2.5}$.

**TABLE III-3: Maximum AERMOD Significant Impact Analysis Results from Sappi Alone**

| Pollutant | Averaging Period | Max Impact (μg/m³) | Receptor UTM E (m) | Receptor UTM N (m) | Receptor Elevation (m) | Scenario | Class II Significance Level (μg/m³) |
|---|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | **254.82** | 451,320 | 4,958,840 | 228.86 | 4 | **7.8** |
| | 3-hour | **209.16** | 451,520 | 4,958,640 | 225.69 | 1 | **25** |
| $PM_{10}$ | 24-hour | **20.04** | 449,088 | 4,949,451 | 51.40 | 1 | **5** |
| $PM_{2.5}$ | 24-hour | **9.37** | 449,094 | 4,949,359 | 50.94 | 1 | **1.2** |
| | Annual | **0.47** | 451,520 | 4,958,640 | 225.69 | 1 | **0.2** |
| $NO_2$ | 1-hour | **206.25** | 451,320 | 4,958,840 | 228.86 | 4 | **7.5** |
| | Annual | **1.78** | 451,520 | 4,958,640 | 225.69 | 1 | **1** |
| CO | 1-hour | 1,323.03 | 451,120 | 4,958,740 | 217.66 | 2 | **2,000** |
| | 8-hour | 444.69 | 449,087 | 4,949,282 | 49.80 | 1 | **500** |

D. Secondary Formation of $PM_{2.5}$

New major sources or existing sources undergoing a major modification must assess their potential impacts on the secondary formation of $PM_{2.5}$ in accordance with federal regulations. Emissions of $NO_x$ and $SO_2$ can react to form fine particulate matter ($PM_{2.5}$). Primary and secondary $PM_{2.5}$ in the atmosphere consists of a complex mixture of various components including sulfates ($SO_4$), nitrates ($NO_3$), and organic and elemental carbon as well as crustal material (dust, sea salt, metals, and trace elements).

The formation of secondary $PM_{2.5}$ is dependent on the concentrations of precursor and relative species, atmospheric conditions, and the interactions of those precursors with other entities, such as particles, rain, fog, or cloud droplets.

As such, $PM_{2.5}$ NAAQS and Class II increment compliance demonstrations must account for contributions due to primary $PM_{2.5}$ (from a source's direct $PM_{2.5}$ emissions) as well as secondarily formed $PM_{2.5}$ resulting from the source's precursor emissions.

Since Sappi's proposed $NO_x$ and $SO_2$ emissions for this modification are each greater than 40 TPY, a review of secondary impacts due to $PM_{2.5}$ precursor emissions (secondary $PM_{2.5}$) is required. Since the contribution from secondary formation of $PM_{2.5}$ cannot be explicitly accounted for in AERMOD, the impacts of secondarily formed $PM_{2.5}$ from Sappi was determined using a Tier I analysis following methodologies prescribed in USEPA's *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a*

*Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program (April 2019).*

For a Tier I secondary formation assessment, a source uses technically credible empirical relationships between precursor emissions and secondary impacts, based upon previously conducted USEPA modeling. Specifically, USEPA has performed single-source photochemical modeling to examine the range of modeled estimated impacts of secondary $PM_{2.5}$ formation for different theoretical source types (based on pollutant, magnitude of emissions, and stack height) for facilities in different geographical locations in the United States.

Sappi estimated the potential impact of its precursor emissions using Equation 2 from USEPA's MERPs guidance, in which a source's impacts are estimated as the product of the relevant hypothetical source air quality impacts relative to emissions, scaled either upward or downward to the emission rate of the project itself. Equation 2 is presented below:

$$\text{Project Impact} = \begin{matrix}\text{Project} \\ \text{Emission Rate}\end{matrix} \times \frac{\text{Modeled impact from hypothetical modeling}}{\text{Modeled emission rate from hypothetical modeling}}$$

This procedure was followed for both $NO_x$ and $SO_2$ precursors and the individual contributions summed to achieve a final estimated 24-hour and annual potential secondary $PM_{2.5}$ concentrations, as shown in Tables III-4 and III-5, respectively.

**TABLE III-4: 24-Hour Secondary $PM_{2.5}$ from $NO_x$ & $SO_2$ Precursors**

| Pollutant | Potential Increase of Precursors (TPY) | Impact/Emissions Ratio ($\mu g/m^3$ / TPY) | Estimated Secondary $PM_{2.5}$ Impacts ($\mu g/m^3$) |
|---|---|---|---|
| $NO_x$ | 244.6 | 0.000074 | 0.0181 |
| $SO_2$ | 153.0 | 0.000083 | 0.1269 |
| **Total Estimated 24-Hour Secondary $PM_{2.5}$ from $NO_x$ and $SO_2$ precursors** | | | **0.1451** |

**TABLE III-5: Annual Secondary $PM_{2.5}$ from $NO_x$ & $SO_2$ Precursors**

| Pollutant | Potential Increase of Precursors (TPY) | Impact/Emissions Ratio ($\mu g/m^3$ / TPY) | Estimated Secondary $PM_{2.5}$ Impacts ($\mu g/m^3$) |
|---|---|---|---|
| $NO_x$ | 244.6 | 0.000042 | 0.0010 |
| $SO_2$ | 153.0 | 0.000028 | 0.0428 |
| **Total Estimated Annual Secondary $PM_{2.5}$ from $NO_x$ and $SO_2$ precursors** | | | **0.0438** |

Using this methodology, the total estimated secondary 24-hour and annual $PM_{2.5}$ impacts due to Sappi's $NO_x$ and $SO_2$ precursor emissions were predicted to be extremely low

(~0.145 µg/m$^3$ and ~0.043 µg/m$^3$) and are not expected to contribute significantly to the $PM_{2.5}$ NAAQS or Class II increment impacts.

The total estimated secondary 24-hour and annual $PM_{2.5}$ impacts due to Sappi's $NO_x$ and $SO_2$ precursor emissions will be added to the final predicted NAAQS and Class II increment in Tables III-7 and III-8, respectively.

E. Combined Source Modeling Impacts

As indicated in boldface type in Table III-4, pollutants/averaging periods with predicted impacts greater than their respective significant impact levels must include all other facility-wide emissions as well as consider any local sources for inclusion in a combined-source analysis.

The Department examined other nearby sources to determine if any impacts would be significant in or near Sappi's significant impact area. Due to the location of Sappi, extent of the predicted significant impact area on a pollutant-by-pollutant basis, and other nearby source's current-actual emissions, the Department has determined that no other sources need to be explicitly included into a combined-source AERMOD modeling analysis.

In addition to the consideration of other sources, the modeling analysis must also account for the existing air quality background concentrations by using monitored data representative of the area.

Background concentrations, listed in Table III-6, are derived from representative rural background data for use in the Central Maine region.

**TABLE III-6: Background Concentrations**

| **Pollutant** | **Averaging Period** | **Background Concentration (µg/m$^3$)** | **Site Name, Location, Data Years** |
|---|---|---|---|
| $SO_2$ | 1-hour | 5 | Mic Mac Site, Presque Isle, 2016/2018/2019 |
| | 3-hour | 4 | |
| $PM_{10}$ | 24-hour | 37 | Lincoln School, Augusta, 2019 - 2021 |
| $PM_{2.5}$ | 24-hour | 12 | Presque Isle DEP Site, 2019 - 2021 |
| | Annual | 4 | |
| $NO_2$ | 1-hour | 40 | Mic Mac Site, Presque Isle, 2019 - 2021 |
| | Annual | 4 | |
| CO | 1-hour | 1,102 | Mic Mac Site, Presque Isle, 2021 |
| | 8-hour | 789 | |

For the purpose of determining maximum predicted impacts for comparison against NAAQS, the predicted impacts were explicitly normalized to the form of their respective NAAQS.

As shown in Table III-7, Sappi's maximum modeled impacts were added with conservative background concentrations to demonstrate compliance with NAAQS. Because all pollutant/averaging period impacts using this method meet their respective standards, no further NAAQS modeling analyses are required to be performed.

**TABLE III-7: Maximum Combined Source Impacts (µg/m³)**

| Pollutant | Averaging Period | Max Impact (µg/m³) | Receptor UTM E (m) | Receptor UTM N (m) | Receptor Elevation (m) | Back-Ground (µg/m³) | Total Impact (µg/m³) | NAAQS (µg/m³) |
|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 189.54 | 451,420 | 4,958,640 | 225.53 | 5 | 194.54 | 196 |
| | 3-hour | 144.56 | 451,120 | 4,959,540 | 227.76 | 4 | 148.56 | 1,300 |
| $PM_{10}$ | 24-hour | 19.14 | 449,320 | 4,949,540 | 48.01 | 58 | 77.14 | 150 |
| $PM_{2.5}$ | 24-hour | 3.52* | 451,520 | 4,958,640 | 225.69 | 12 | 15.52 | 35 |
| | Annual | 0.52* | 451,520 | 4,958,640 | 225.69 | 4 | 4.52 | 12 |
| $NO_2$ | 1-hour | 131.04 | 451,420 | 4,958,640 | 225.53 | 40 | 171.04 | 188 |
| | Annual | 1.69 | 451,520 | 4,958,640 | 225.68 | 4 | 5.69 | 100 |
| CO | 1-hour | 1,323.03 | 451,120 | 4,958,740 | 217.66 | 1,102 | 2,425.03 | 40,000 |
| | 8-hour | 444.69 | 449,087 | 4,949,282 | 49.80 | 789 | 1,233.69 | 10,000 |

* Final 24-Hour and Annual predicted impacts for $PM_{2.5}$ were adjusted by 0.15 µg/m³ and 0.04 µg/m³ respectively, to account for secondary formation of particulates, as calculated in Section D.

F. Secondary Formation of Ozone

USEPA's *New Source Review Workshop Manual (Draft, 1990)* requires that any major new source or source undergoing a major modification evaluate for the potential formation of ozone, which is a secondary pollutant formed through non-linear photochemical reactions, primarily driven by precursor emissions of $NO_x$ and VOC in the presence of sunlight.

$NO_x$ and VOC precursor contributions to the 8-hour daily maximum ozone are considered together to determine if a source's air-quality impact would exceed a prescribed critical threshold value. Since the chemical formation of ozone associated with precursor emissions cannot be explicitly accounted for in AERMOD, USEPA has developed a two-tiered approach for addressing single-source impacts of ozone formation.

Modeled Emission Rates for Precursors (MERPs) are expressed as an annual emissions rate (in TPY) of precursor emissions and relate maximum downwind impacts to a critical threshold value. A value less than 100% indicates that the USEPA's critical air-quality threshold ozone value of 1 part per billion (ppb) will not be exceeded.

Sappi estimated the potential impact of its precursor emissions using Equation 9-1 from USEPA's MERPs guidance, in which a source's impacts is estimated as the sum of the relevant hypothetical source air quality impacts relative to $NO_x$ and VOC emissions, scaled either upward or downward to the emission rate of the project itself. Equation 9-1 is presented below:

*Total Project Impact = (Project TPY $NO_x$ increase / TPY $NO_x$ 8-hour daily maximum $O_3$ MERP) +*

*(Project TPY VOC increase / TPY default VOC 8-hour daily maximum $O_3$ MERP)*

Using methodologies from USEPA's *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program (April 2019)* and data from MERP values representative of the Northeast climate zone from Table 4-1, the proposed emissions increase can be conservatively expressed as a percent of the MERP for each precursor. Those individual contributions are then summed to achieve a final estimated potential secondary ozone concentration, as shown in the calculation below:

**(244.6 TPY $NO_x$ increase / 617 TPY $NO_x$ 8-hour daily maximum $O_3$ MERP) +**

**(9.8 TPY VOC increase / 2,141 TPY default VOC 8-hour daily maximum $O_3$ MERP) =**

**0.396 + 0.004 = 0.400**

Since the final calculated value of 40% is less than 100%, USEPA's critical air-quality threshold value of 1 ppb will not be exceeded. Therefore, the proposed $NO_x$ and VOC emissions from Sappi are not expected to contribute to any new significant formation of ozone.

G. Class II Increment

AERMOD was used to predict maximum Class II increment impacts.

Sappi was in operation during the $SO_2$/$PM_{10}$ baseline year of 1977. After comparing annual baseline emissions of $SO_2$ and $PM_{10}$ from 1977 versus annual current actual 2021/2022 and annual future-anticipated emissions, it has been determined that Sappi does not or will not consume $SO_2$ or $PM_{10}$ increment. Therefore, Class II increment analyses were performed for only $PM_{2.5}$ and $NO_2$.

For the purposes of calculating Class II increment impacts, Sappi opted to use baseline credits for any emission sources that existed and operated during the 2010 ($PM_{2.5}$) and 1987 ($NO_2$) baseline years.

Results of the Class II increment analysis are shown in Table III-8. Because all predicted increment impacts meet increment standards, no additional Class II $PM_{2.5}$ and $NO_2$ increment modeling needed to be performed.

**TABLE III-8: Class II Increment Consumption**

| Pollutant | Averaging Period | Max Impact ($\mu g/m^3$) | Receptor UTM E (m) | Receptor UTM N (m) | Receptor Elevation (m) | Class II Increment ($\mu g/m^3$) |
|---|---|---|---|---|---|---|
| $PM_{2.5}$ | 24-Hour | 0.28* | 451,320 | 4,958,840 | 228.86 | 9 |
| | Annual | 0.05* | 449,220 | 4,949,740 | 50.19 | 4 |
| $NO_2$ | Annual | 0.18 | 451,020 | 4,958,540 | 200.09 | 25 |

* Final 24-Hour and Annual predicted increment impacts for $PM_{2.5}$ were adjusted by 0.15 $\mu g/m^3$ and 0.04 $\mu g/m^3$ respectively, to account for secondary formation of particulates, as calculated in Section D.

USEPA's *New Source Review Workshop Manual (Draft, 1990)* requires that any major new source or major source undergoing a major modification provide analyses of additional impacts that may occur as a direct result of the general, commercial, residential, industrial, and mobile-source growth associated with the construction and/or operation of that source.

**GENERAL GROWTH:** The proposed modification at Sappi is not expected to induce any secondary growth at the project site. Other than temporary construction-related activities, no general growth impacts are expected.

Some very minor increases in localized emissions due to modification-related activities may occur, with these possible emissions likely stemming from additional truck and contractor vehicle traffic. Any increase in potential emissions of $NO_x$ and $PM_{2.5}$ due to this vehicle traffic will be temporary and short-lived.

**AREA SOURCE GROWTH:** Population growth in the general area of Sappi can be used as a surrogate factor for the estimating growth in emissions from related residential, commercial, and industrial growth.

The population comparison between the baseline dates and current are show in Table III-9.

**TABLE III-9: Somerset County Population Growth**

| Pollutant | Baseline Year | Baseline Year Population | 2021 Population | Percent Change from Baseline Year |
|---|---|---|---|---|
| $SO_2$ / $PM_{10}$ | 1977 | 45,059 (1980) | 50,592 | +12.3% |
| $NO_2$ | 1988 | 49,767 (1990) | | +1.7% |
| $PM_{2.5}$ | 2010 | 52,228 (2010) | | -3.1% |

Since the 1977 ($SO_2$/$PM_{10}$) and 1988 ($NO_x$) baseline years, there has been a slight population increase in Somerset County, while there has been a slight decrease since the 2010 ($PM_{2.5}$) baseline date. Therefore, area source growth is not expected to have any significant impact on the available increment in or near Sappi.

Also, any additional manpower required for the construction and operation of the proposed project will be primarily available locally, or from the existing in-house workforce. Therefore, no new residential, commercial and/or industrial growth will follow from the modification associated with Sappi.

**MOBILE SOURCE GROWTH:** Since mobile sources are considered to be minor sources of $SO_2$, $PM_{10}$, $PM_{2.5}$, and $NO_x$, their contribution to increment consumption needs to be evaluated. USEPA's *New Source Review Workshop Manual (Draft, 1990)* points out that screening procedures can be used to determine whether additional detailed analyses of minor source emissions are required. Compiling a source inventory may not be required if it can be shown that little or no growth has taken place in the impact area of the proposed source since the pollutant baseline dates were initially established.

The Maine Department of Transportation has compiled Vehicle Miles Traveled (VMT) data for all counties in Maine from 1985 through 2021. As shown in Table III-10, the calculated growth of VMTs in Somerset County over the time period, combined with the increasingly stringent federal emission standards for mobile sources and the concurrent decrease in background concentrations, indicate that mobile sources are not expected to have any significant impact the available increment in or near Sappi.

**TABLE III-10: Somerset County Growth in Vehicle Miles Travelled**

| Pollutant | Baseline Year | Baseline Year VMTs | 2021 VMTs | Percent Change from Baseline Year |
|---|---|---|---|---|
| $SO_2$ / $PM_{10}$ | 1977 | 442,881,460 (1985) | 654,075,470 | +47.7% |
| $NO_2$ | 1988 | 532,261,246 (1988) | | +22.9% |
| $PM_{2.5}$ | 2010 | 672,395,704 (2010) | | -2.7% |

Therefore, no additional analyses of $SO_2$, $PM_{10}$, $PM_{2.5}$, and $NO_x$ from mobile sources are required to be performed.

H. Impacts on Plants, Soils, & Animals

In accordance with the *New Source Review Workshop Manual (Draft, 1990)*, Sappi evaluated the impacts of its emissions using procedures described in *A Screening Procedure for the Impacts of Air Pollution on Plants, Soils and Animals (USEPA, 1981)*.

AERMOD was used to predict maximum impacts in Class II areas. The overall maximum impacts were then compared to USEPA's screening concentrations values, which represent the minimum concentration at which adverse growth effects or tissue injury in sensitive vegetation can likely be anticipated.

As shown in Table III-11, the maximum Class II modeled impacts were added with conservative background concentrations to demonstrate compliance with the screening concentration values. Predicted and background concentrations for non-standard averaging times were scaled using default AERSCREEN scaling factors, except for 1-week CO which used the 8-hour CO background concentration. In addition, the scaled 24-hour $NO_2$ background concentration was conservatively used to represent the 1-month average background.

**TABLE III-11: Class II Maximum Impacts on Plants, Soils & Animals (μg/m³)**

| Pollutant | Averaging Period | Max Impact (μg/m³) | Receptor UTM E (m) | Receptor UTM N (m) | Receptor Elevation (m) | Back-Ground (μg/m³) | Total Impact (μg/m³) | Screening Concentration (μg/m³) |
|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 517.84 | 445,220 | 4,953,240 | 177.65 | 5 | 522.84 | 917 |
| | 3-hour | 209.15 | 451,520 | 4,958,640 | 225.69 | 4 | 213.15 | 786 |
| | Annual | 2.33 | 451,520 | 4,958,640 | 225.69 | 0.5 | 2.83 | 18 |
| $NO_2$ | 4-hour | 140.05 | 449,122 | 4,949,289 | 49.42 | 40 | 180.05 | 3,760 |
| | 8-hour | 106.86 | 449,087 | 4,949,282 | 49.80 | 36 | 142.86 | 3,760 |
| | Month | 3.46 | 451,320 | 4,958,840 | 228.60 | 24 | 27.45 | 564 |
| | Annual | 1.69 | 451,520 | 4,958,640 | 225.69 | 4 | 5.69 | 94 |
| CO | Week | 444.69 | 449,087 | 4,949,282 | 49.80 | 789 | 1,233.69 | 1,800,000 |

Because all predicted Class II impacts for all pollutants/averaging periods were below their respective screening concentrations, no further assessment of the impacts to plants, soils, and animals is required to be performed.

I. Impacts on Visibility

The *New Source Review Workshop Manual (Draft, 1990)* requires that any major new source or major source undergoing a major modification provide analyses of visibility impacts that may occur as a direct result of the construction and/or operation of that source.

A Class II Visibility Impairment Assessment requires that any Class II federal and state areas (e.g., potentially sensitive parks, forests, monuments, and recreational areas) within 50 km of the project site be identified. There are no such specifically designated Class II area(s) within 50 km of Sappi.

In 2007, MEDEP completed and published a comprehensive regional visibility modeling report as part of USEPA's *Regional Haze Regulations and Guidelines for Best Available Retrofit Technology (BART) Determinations (2004)* rule. This modeling captured emissions and proposed emission rate targets for qualifying sources in Maine, which included Sappi. As part of the initiative, on November 2, 2010, MEDEP issued Sappi a license amendment (A-19-77-5-M) to implement site-specific BART limits. Sappi continues to comply with these BART emission limits and has not and is not proposing emission increases to any of its BART-eligible sources.

In addition, MEDEP reviewed results from previous Visibility Impairment Assessments explicitly conducted for sources near Maine's identified Class I areas. Comparing the distances of these sources to the Class I area, the magnitudes of emissions, and the predicted modeling impacts, MEDEP has determined that Sappi will not likely cause or contribute to any Class II visibility impacts.

J. Class I Impacts

As required by 06-096 C.M.R. ch. 115, the Department notified Federal Land Managers (FLMs) representing the US Fish & Wildlife Service, the National Park Service, and the National Forest Service of the proposed Sappi major modification. The notification contained a detailed description of the proposed project, the proposed project-only TPY emissions increases of $SO_2$, $PM_{10}$, $PM_{2.5}$, and $NO_x$ and the distances to each of the Class I areas in or near Maine. Based upon the magnitude of proposed emissions increase and the distance from the source to each Class I area, the affected Federal Land Managers (FLMs) and MEDEP-BAQ have determined that an assessment of Class I Air Quality Related Values (AQRVs) is not required.

K. Summary

In summary, it has been demonstrated that Sappi in its proposed configuration will not cause or contribute to a violation of any $SO_2$, $PM_{10}$, $PM_{2.5}$, $NO_2$, or CO NAAQS or to Class II increments for $PM_{2.5}$ or $NO_2$.

This determination is based on information provided by the applicant regarding the expected construction and operation of the proposed emission units. If the Department determines that any parameter (e.g., stack size, configuration, flow rate, emission rates, nearby structures, etc.) deviates from what was included in the application, the Department may require Sappi to submit additional information and may require an ambient air quality impact analysis at that time.

## ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants New Source Review License A-19-77-15-A pursuant to the preconstruction licensing requirements of 06-096 C.M.R. ch. 115 and subject to the specific conditions below.

Severability. The invalidity or unenforceability of any provision of this License or part thereof shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

**SPECIFIC CONDITIONS**

**The following shall replace the $PM_{10}$ emission limit for Power Boiler #1 in Condition (cc)(1)(b) of Air Emission License A-19-71-K-A as amended by A-19-71-U-A:**

(1) **Power Boiler #1**

Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

| Pollutant | lb/hr |
|---|---|
| $PM_{10}$ | 234.5 |

Compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Methods 202 and 201A (or other methods approved by the Department) upon request by the Department.

**The following shall replace the $PM_{10}$ emission limits for Power Boiler #2 in Condition (aa)(4) of Air Emission License A-19-71-K-A as amended by A-19-71-U-A:**

(2) **Power Boiler #2**

Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

| Pollutant | lb/MMBtu | lb/hr |
|---|---|---|
| $PM_{10}$ | 0.047 | 61.1 |

Compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Methods 202 and 201A (or other methods approved by the Department) upon request by the Department.

**The following shall replace the $PM_{10}$ emission limits for the Recovery Boiler in Conditions (3)(D) and (E) of Air Emission License A-19-77-2-A:**

(3) **Recovery Boiler**

Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

| Pollutant | lb/hr |
|---|---|
| $PM_{10}$ | 216.2[a]<br>296.3[b] |

[a] When firing black liquor only.
[b] When any oil is being fired.

Compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Methods 202 and 201A (or other methods approved by the Department) upon request by the Department.

**The following are New Conditions that shall take effect following completion of the Paper Machine #2 Rebuild Project:**

(4) **Main Stack**

A. Emissions of $SO_2$ from the Main Stack shall not exceed 1,230 lb/hr on a 3-hour block average basis except for periods of time when all of the following are met:

1. LVHC gases, HVLC gases, and/or kraft condensates are fired in Power Boiler #1 during the 3-hour block; and

2. Emissions of $SO_2$ from the Main Stack shall not exceed 2,871 lb/hr on a 3-hour block average basis; and

3. The period of time $SO_2$ emissions exceed 1,230 lb/hr on a 3-hour block shall not exceed 500 hours/year on a 12-month rolling total basis.

B. Compliance with the $SO_2$ emission limit applicable to Power Boiler #1 shall be demonstrated through use of an $SO_2$ Continuous Emissions Monitoring System (CEMS).

C. Compliance with the $SO_2$ emission limits applicable to the Main Stack shall be demonstrated by the sum of the $SO_2$ lb/hr 3-hour block emissions from the Power Boiler #1, Recovery Boiler, Smelt Dissolving Tanks #1 & #2, Lime Kiln, and Package Boiler (when the Package Boiler is venting through the Main Stack). The Recovery Boiler operates an $SO_2$ CEMS. To calculate the total $SO_2$ lb/hr 3-hour block emissions, Sappi may utilize the $SO_2$ license limit for the Smelt Dissolving Tanks #1 & #2, Lime

Kiln, and Package Boiler or may calculate $SO_2$ emissions from the average firing rate and the sulfur content of the fuel fired during the 3-hour block period.

[06-096 C.M.R. ch. 115, § 7]

(5) **Limits Established Pursuant to Ambient Air Quality Analysis**

A. Emissions shall not exceed the following [06-096 C.M.R. ch. 115, § 7]:

| Unit | Pollutant | lb/hr |
|---|---|---|
| Power Boiler #1 | $PM_{2.5}$ | 157.5 |
| Power Boiler #2 | $PM_{2.5}$ | 60.4 |
| Recovery Boiler | $PM_{2.5}$ | 114.8[a]<br>129.4[b] |
| Smelt Dissolving Tanks #1 & #2 | $PM_{10}$ | 26.9 |
| | $PM_{2.5}$ | 26.9 |
| Lime Kiln | $PM_{10}$ | 70[b] |
| | $PM_{2.5}$ | 70[b] |

[a] When firing black liquor only.
[b] When any oil is being fired.

Compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Methods 202 and 201A (or other methods approved by the Department) upon request by the Department.

B. Power Boiler #1 shall not exceed an $SO_2$ emission rate of 744 lb/hr on a 3-hour block average basis, except when LVHC gases, HVLC gases, and/or kraft condensates are being fired in Power Boiler #1. During such periods, if the $SO_2$ emissions exceed 744 lb/hr on a 3-hour block average basis, Sappi shall report to the Department on a quarterly basis the $SO_2$ lb/hr 3-hour block emissions calculated according to Condition (4) of this license. During this period the Main Stack $SO_2$ lb/hr limits in Condition (4) shall apply. [06-096 C.M.R. ch. 115, § 7]

C. Power Boiler #2 shall not exceed an $SO_2$ emission rate of 440.0 lb/hr on a 3-hour block average basis. [06-096 C.M.R. ch. 115, § 7]

(6) **Paper Machine #2**

A. Sappi is licensed to implement the 2023 PM#2 Rebuild Project as described in this license. Sappi shall submit to the Department notification of the date of completion of the Paper Machine #2 Rebuild Project within 30 days of occurrence.
[06-096 C.M.R. ch. 115, BACT]

B. Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

| Unit | PM (lb/ADT) | $PM_{10}$ (lb/ADT) | $PM_{2.5}$ (lb/ADT) |
|---|---|---|---|
| Paper Machine #2 | 0.02 | 0.07 | 0.06 |

Compliance shall be demonstrated through compliance with the visible emission limit listed below.

C. Visible emissions from the paper machine building vents shall not exceed 10% opacity on a six-minute block average basis. Compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 9 upon request by the Department. [06-096 C.M.R. ch. 115, BACT]

D. Emissions of VOC from Paper Machine #2 shall not exceed 130.0 tpy (calendar year total basis). Compliance shall be demonstrated by calculations of emissions based on actual chemical use assuming that 100% of the VOC is volatilized and emitted. [06-096 C.M.R. ch. 115, BACT]

E. Sappi shall maintain records of production and additives and coatings used in the paper or substrate formation associated with Paper Machine #2. Annual production, PM, $PM_{10}$, $PM_{2.5}$, and VOC emissions based on site specific and industry emission factors are to be reported in the annual emissions reporting as required by 06-096 C.M.R. ch. 137, *Emission Statements*.

(7) **PM2 Coating Dryers**

A. The PM2 Coating Dryers shall each fire only natural gas. [06-096 C.M.R. ch. 115, BACT]

B. The PM2 Coating Dryers shall each be equipped with ultra-low-$NO_x$ burners. Sappi shall maintain the burners according to manufacturer recommendations, including conducting routine tune-ups, maintaining proper use of the burner management system, and conducting routine inspections and repair/replacement of key components. [06-096 C.M.R. ch. 115, BACT]

C. Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

| Unit | Pollutant | lb/MMBtu |
|---|---|---|
| PM2 Coating Dryers | PM | 0.002 |

Compliance shall be demonstrated through performance testing upon request by the Department.

D. Emissions from all PM2 Coating Dryer burners combined shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

| Unit | PM (lb/hr) | $PM_{10}$ (lb/hr) | $PM_{2.5}$ (lb/hr) | $SO_2$ (lb/hr) | $NO_x$ (lb/hr) | CO (lb/hr) | VOC (lb/hr) |
|---|---|---|---|---|---|---|---|
| PM2 Coating Dryers | 0.11 | 0.42 | 0.42 | 0.03 | 2.71 | 4.17 | 0.30 |

Compliance shall be demonstrated through performance testing upon request by the Department.

E. Visible emissions from the PM2 Coating Dryers shall not exceed 10% opacity on a six-minute block average basis. Compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 9 upon request by the Department. [06-096 C.M.R. ch. 115, BACT]

(8) If the Department determines that any parameter value pertaining to construction and operation of the proposed emissions units, including but not limited to stack size, configuration, flow rate, emission rates, nearby structures, etc., deviates from what was submitted in the application or ambient air quality impact analysis for this air emission license, Sappi may be required to submit additional information. Upon written request from the Department, Sappi shall provide information necessary to demonstrate AAQS will not be exceeded, potentially including submission of an ambient air quality impact analysis or an application to amend this air emission license to resolve any deficiencies and ensure compliance with AAQS. Submission of this information is due within 60 days of the Department's written request unless otherwise stated in the Department's letter.
[06-096 C.M.R. ch. 115, § 2(O)]

DONE AND DATED IN AUGUSTA, MAINE THIS 7th DAY OF SEPTEMBER, 2023.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: ______________________________ for
MELANIE LOYZIM, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 4/7/2023
Date of application acceptance: 4/10/2023

Date filed with the Board of Environmental Protection:

This Order prepared by Lynn Muzzey, Bureau of Air Quality.

**FILED**

SEP 07, 2023

**State of Maine**
**Board of Environmental Protection**