STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

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| **Sappi North America, Inc.**<br>**Cumberland County**<br>**Westbrook, Maine**<br>**A-29-77-9-A** | **Departmental**<br>**Findings of Fact and Order**<br>**NOx RACT** |

## 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. 138, $NO_x$ RACT |
| NAICS CODES | 322220 |
| NATURE OF BUSINESS | Coated Paper Manufacturing |
| FACILITY LOCATION | 89 Cumberland Street, Westbrook, Maine |

### B. License Description

Sappi North America, Inc. (Sappi) has requested an amendment to its air emission license for the Westbrook operations to address new requirements contained in *Reasonably Available Control Technology for Facilities that Emit Nitrogen Oxides ($NO_x$ RACT)*, 06-096 Code of Maine Rules (C.M.R.) ch. 138.

C. Emission Equipment

The following equipment is addressed in this license:

**$NO_x$ Emitting Equipment**

| Equipment | Maximum Heat Input Capacity (MMBtu/hr) | Fuel | Manufacture Date | Install Date |
|---|---|---|---|---|
| Boiler #21 | 1,074[a]<br>397[b]<br>597[c] | biomass, CDD, sludge, coal, distillate fuel, #6 fuel oil | 1981 | 1981 |
| Boiler #22 | 99.9 | natural gas | 2019 | 2020 |
| Boiler #23 | 42.0 | natural gas | 2017 | 2020 |
| Technology Center Boiler | 8.4 | natural gas | 1969 | 1969 |
| MAU #1 | 2.75 | natural gas | 2020 | 2020 |
| Engine #1 (Treatment Plant) | 2.81 | distillate fuel | 1998 | 1998 |
| Engine #2 (Rotary Room) | 1.91 | distillate fuel | 1975 | 1975 |
| Engine #3 (MacIntosh) | 0.67 | distillate fuel | 1972 | 1972 |
| Engine #4 (Feedwater) | 0.49 | distillate fuel | 1987 | 1987 |
| Dryer (#35 Research Coater) | 7.0 | natural gas | 1985 | 1985 |
| 4th Zone Dryer (#2 Coater) | 6.0 | natural gas | 1971 | 1971 |
| Catalytic Incinerator (#20 Coater) | 5.0 | natural gas | 1990 | 1990 |
| 7th Zone Dryer (#20 Coater) | 4.0 | natural gas | 2010 | 2010 |
| Floatation Dryers (#20 Coater) | 2 @ 4.0 each (8.0 total) | natural gas | 2013 | 2013 |

[a] When firing biomass and coal together.
[b] When firing only coal.
[c] When firing only #6 fuel oil.

D. Definitions

*24-hr Daily Block Average* means the arithmetic average of 24 non-overlapping one-hour blocks starting at midnight each calendar day.

*Biomass* means any biomass-based solid fuel that is not a solid waste. This includes, but is not limited to, wood residue; wood products (*e.g.,* trees, tree stumps, tree limbs, bark, lumber, sawdust, sander dust, chips, scraps, slabs, millings, and shavings); animal manure, including litter and other bedding materials; vegetative agricultural and silvicultural materials, such as logging residues (slash), nut and grain hulls and chaff (*e.g.,* almond, walnut, peanut, rice, and wheat), bagasse, orchard prunings, corn stalks, coffee bean hulls and grounds. This definition also includes wood chips and processed pellets made from wood or other forest residues.

For the purposes of this license, biomass also includes waste paper, sludge, and wood from construction and demolition debris (CDD). Inclusion in this definition does not constitute a determination that the material is not considered a solid waste. Sappi shall consult with the Department before adding any new biomass type to its fuel mix.

*Distillate Fuel* means the following:

- Fuel oil that complies with the specifications for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials (ASTM) in ASTM D396;
- Diesel fuel oil numbers 1 or 2, as defined in ASTM D975;
- Kerosene, as defined in ASTM D3699;
- Biodiesel, as defined in ASTM D6751; or
- Biodiesel blends, as defined in ASTM D7467.

*Mid-size boiler* means a steam generating unit that has a heat input equal to or greater than 50 MMBtu/hr and less than 1,500 MMBtu/hr.

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

*Small boiler* means a steam generating unit that has a heat input equal to or greater than 20 MMBtu/hr and less than 50 MMBtu/hr.

E. 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 was submitted to comply with the requirements of 06-096 C.M.R. ch. 138, § 5(A) and has been processed pursuant to the requirements for minor modifications under *Minor and Major Source Air Emission License Regulations,* 06-096 C.M.R. ch. 115.

## II. $NO_x$ RACT Requirements

A. Introduction

Revisions to 06-096 C.M.R. ch. 138 went into effect May 7, 2025. These changes included the establishment of new standards for emission units located within the 2022 Ozone Transport Region, as defined in that chapter. Sappi's Westbrook facility is located within the 2022 Ozone Transport Region.

Sappi must either comply with the new applicable standards in 06-096 C.M.R. ch. 138, § 4 by May 1, 2026, or apply for and receive approval of an alternative RACT determination pursuant to 06-096 C.M.R. ch. 138, § 4(H).

B. Exempt Equipment

The Technology Center Boiler, Boiler #23, and the coating dryers (#35 Research Coater Dryer, #2 Coater 4th Zone Dryer, #20 Coater Catalytic Incinerator, #20 Coater 7th Zone Dryer, and #20 Coater Floatation Dryers) each have a potential to emit of $NO_x$ of less than 10 ton per year (tpy). This equipment is therefore exempt from the requirements of 06-096 C.M.R. ch. 138, pursuant to § 1(B)(1).

Engines #1 - #4 are emergency stationary internal combustion engines, which are exempt from the requirements of 06-096 C.M.R. ch. 138, pursuant to § 1(B)(2).

C. Boiler #22

Boiler #22 is a mid-size boiler with a heat input less than 100 MMBtu/hr and fires only natural gas. Pursuant to 06-096 C.M.R. ch. 138, § 4(B)(1), Boiler #22 is subject to the following work practice standards in section 4(C) of the rule. Sappi has elected to comply with the following requirements and is not seeking an alternative RACT determination for Boiler #22.

1. The boiler shall be equipped with an oxygen trim system that automatically maintains an optimum air-to-fuel ratio.

2. Sappi shall perform a boiler tune-up at least once every five years. The first boiler tune-up is due no later than May 1, 2031. A tune-up conducted to comply with 40 C.F.R. Part 63, Subpart DDDDD shall satisfy this requirement provided it complies with the requirements of the following paragraph.

3. Boiler tune-ups shall be performed as specified below:

    a. As applicable, inspect the burner, and clean or replace any component of the burner as necessary. Delay of the burner inspection until the next scheduled shutdown is permitted for up to 72 months from the previous inspection.

    b. Inspect the flame pattern, as applicable, and adjust the burner as necessary to optimize the flame pattern, consistent with the manufacturer's specifications.

    c. Inspect the system controlling the air-to-fuel ratio, as applicable, and ensure it is correctly calibrated and functioning properly. Delay of the inspection until the next scheduled shutdown is permitted for up to 72 months from the previous inspection.

    d. If the unit is not operating on the required date for a tune-up, the tune-up shall be conducted within 30 days of start-up.

4. Sappi shall keep the following records in a form suitable and readily available for expeditious review and made available to the Department upon request:

    a. Identification of the boiler, the date of tune-up, procedures followed for tune-up, and the manufacturer's specifications to which the boiler was tuned;

    b. Records of the occurrence and duration of each malfunction of the boiler; and

    c. Records of actions taken during periods of malfunction to minimize emissions, including corrective actions to restore operation of the malfunctioning boiler.

Sappi does not demonstrate compliance with $NO_x$ standards for Boiler #22 through use of a CEMS. Therefore, the alternative emission limits for startup and shutdown in 06-096 C.M.R. ch. 138, § 6 do not apply.

D. Boiler #21

Boiler #21 is a mid-size boiler with a heat input greater than 100 MMBtu/hr. Boiler #21 is licensed to combust biomass fuel, coal, #6 fuel oil, specification and non-specification waste oil, and oily secondary material. It may also utilize distillate fuel as an igniter fuel. Biomass fuel includes wood chips, bark, waste paper, wood waste, sludge, and wood from construction or demolition debris (CDD). Oily secondary material includes oily rags and oil-soaked absorbent materials that have been generated on-site from maintenance and spill cleanup activities.

Boiler #21 is subject to an emission limit of 0.38 lb/MMBtu on a 24-hour daily block average based on a previous $NO_x$ RACT established in 1995. This standard applies to

Boiler #21 in accordance with 06-096 C.M.R. ch. 138, § 3(B)(1)(d) until a different emission limit becomes effective in accordance with this $NO_x$ RACT amendment.

Beginning May 1, 2026, Boiler #21 becomes subject to $NO_x$ RACT standards for emission units located within the 2022 Ozone Transport Region. Pursuant to 06-096 C.M.R. ch. 138, § 4. Sappi must comply with one of the following for Boiler #21:

- A $NO_x$ emission limit of 0.20 lb/MMBtu demonstrated through use of a Continuous Emissions Monitoring System (CEMS) on a 24-hour daily block average. [06-096 C.M.R. ch. 138, §§ 4(B)(3) and (4)] Under this compliance option, Sappi may also utilize the alternative emission limits for periods of startup and shutdown as specified in § 6 of the rule.

- Sappi may request an alternative RACT determination in lieu of the applicable requirements of the rule, as proved by 06-096 C.M.R. ch. 138, § 4(H).

Sappi has requested an alternative RACT determination and has submitted a RACT analysis for control of $NO_x$ emissions from Boiler #21. Following is a summary of that analysis.

1. Identify Potential Control Options

   $NO_x$ from combustion is generated through one of three mechanisms: fuel $NO_x$, thermal $NO_x$, and prompt $NO_x$. Fuel $NO_x$ is produced by the oxidation of nitrogen in the fuel source, with low nitrogen content fuels such as natural gas producing less $NO_x$ than fuels with higher levels of fuel-bound nitrogen. Thermal $NO_x$ forms in the high temperature area of the combustor and increases exponentially with increases in flame temperature and linearly with increases in residence time. Flame temperature is dependent upon the ratio of fuel burned in a flame to the amount of fuel needed to consume all the available oxygen, also known as the equivalence ratio. The lower this ratio is, the lower the flame temperature; thus, by maintaining a low fuel-to-air ratio (lean combustion), the potential for $NO_x$ formation can be reduced. Prompt $NO_x$ forms from the oxidation of hydrocarbon radicals near the combustion flame and produces an insignificant amount of $NO_x$ in boilers.

   Control technologies considered include the addition of over-fire air (OFA), selective catalytic reduction (SCR), and selective non-catalytic reduction (SNCR).

   a. OFA

      Adding OFA to Boiler #21 would stage combustion such that the main combustion zone is fuel rich (i.e., low in oxygen). Additional air would be added above this zone to complete combustion. This lowers the peak flame temperature, which

reduces thermal $NO_x$. It also creates a locally reducing atmosphere that converts some of the fuel-bound nitrogen to $N_2$ rather than NO reducing fuel $NO_x$.

b. SCR

SCR employs the reaction of $NO_x$ with ammonia ($NH_3$) or urea in the presence of a catalyst to produce nitrogen and water, according to the following reactions:

$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$
$2NO_2 + 4NH_3 + O_2 \rightarrow 3N_2 + 6H_2O$

The reduction is considered "selective" because the catalyst selectively targets $NO_x$ reduction in the presence of ammonia within a temperature range of approximately 480 ºF to 800 ºF.

c. SNCR

SNCR is a method of post-combustion control that selectively reduces $NO_x$ into nitrogen and water vapor by reacting the exhaust gas with a reagent such as ammonia or urea, similar to SCR. However, in SNCR, a catalyst is not used to lower the activation temperature of the $NO_x$ reduction reaction. Therefore, SNCR is used when flue gas temperatures are between 1,600 ºF and 2,100 ºF.

The reagent solution (either ammonia or urea) is typically injected along the post-combustion section of the emissions unit. Injection sites must be optimized for reagent effectiveness and must balance residence time with flue gas stream temperature. The potential for unreacted ammonia emissions (ammonia slip) is greater with SNCR than with SCR, and the overall $NO_x$ reduction is less.

The $NO_x$ reduction efficiency decreases rapidly at temperatures outside the optimum temperature window, which can result in excessive unreacted ammonia slip and increased $NO_x$ emissions.

2. Eliminate Infeasible Control Options

a. SCR

SCR systems are dependent upon the flue gas and catalyst contacting at optimum temperatures. Typically, the minimum temperature required is 475 °F to 800 °F. If this minimum temperature range is not satisfied, the reaction kinetics decrease, and ammonia passes through the system unreacted as ammonia slip.

Additionally, SCR catalysts are sensitive to particulate matter emissions. The SCR catalyst can easily become deactivated from poisoning, fouling, plugging, and

erosion. The destruction of catalyst efficiency can be minimized by placing the SCR system after the particulate matter control equipment, but the catalyst will still have a much lower lifespan requiring more frequent replacement of the expensive catalyst.

A recent analysis for a similar boiler found the control cost to be approximately $39,000 per ton of $NO_x$ reduced. Therefore, the use of an SCR system for control of $NO_x$ emissions from Boiler #21 is determined not to be economically feasible.

In addition, use of an SCR system would have negative environmental and energy impacts, including emissions of additional pollutants from the combustion of additional fuel, and hazards associated with the storage and use of the hazardous reagents.

b. SNCR With Limited Use

SNCR is technically feasible for use as a control for Boiler #21. However, Boiler #21 is currently temporarily shut down and it is unknown when it may operate again for extended periods.

EPA's cost control manual[1] and SNCR cost calculation spreadsheet[2] were used to estimate the cost of control at different load scenarios as shown below.

| Load Scenario | Cost per ton of $NO_x$ Removed (2025 dollars) |
|---|---|
| Maximize use of Coal (397 MMBtu/hr) | $1,135 |
| Maximize use of Oil (597 MMBtu/hr) | $1,994 |
| Maximum load combined fuels (1,074 MMBtu/hr) | $1,478 |
| Maximum load combined fuels (1,074 MMBtu/hr) at 100.0 tpy of $NO_x$ (~ 7% annual capacity) | $16,533 |

Under normal operating conditions, SNCR is feasible as a RACT control option for $NO_x$ from Boiler #21. However, the use of SNCR is not economically feasible if Boiler #21 continues to operate at a low annual capacity factor, such as when total annual operation results in $NO_x$ emissions below 100.0 tpy.

[1] U.S. Environmental Protection Agency, *EPA Air Pollution Control Cost Control Estimation: Control Cost Manual, 7th Edition (EPA/452/B-02-001)*.
[2] U.S. Environmental Protection Agency. (2021, March). *Selective non-catalytic reduction (SNCR) cost calculation spreadsheet (Version F)*.

3. Ranking of Control Options

   The use of OFA and SNCR are both determined to be feasible control options for control of $NO_x$ from Boiler #21 under normal operational loads. The use of SNCR is expected to meet the same level of control as required by 06-096 C.M.R. ch. 138, i.e., 0.20 lb/MMBtu/hr on a 24-hour block average basis. The use of OFA is both more expensive and not likely to achieve as great a level of control as SNCR. Therefore, SNCR was considered the higher, more economically feasible level of control, and only SNCR was considered further.

4. Determination

   The Department finds an emission limit of 0.20 lb/MMBtu to represent RACT for $NO_x$ from Boiler #21, but only if emissions from the boiler exceed 100.0 tpy. This limit is on a 24-hour daily block average except that a shorter time period may be used on days that include periods of startup and shutdown. Sappi shall install and begin operation of SNCR or other control method to comply with this new $NO_x$ RACT standard within 24 months of Boiler #21 exceeding $NO_x$ emissions of 100.0 tpy based on a 12-month rolling total. This requirement takes effect as of the issuance of this license, i.e., the first 12-month period begins the month this license is issued.

   Pursuant to 06-096 C.M.R. ch. 138, §§ 4 and 6, during periods of startup and shutdown, Sappi must either meet the applicable operating standard (i.e., 0.20 lb/MMBtu) or an alternative emission limit (AEL). The AEL is the mass emission rate equivalent to half of the applicable standard at the unit's maximum capacity. For Boiler #21, the AEL is 107.4 lb/hr calculated as shown below.

$$\left(\frac{0.20\ lb}{MMBtu}\right) \times \left(\frac{1{,}074\ MMBtu}{hr}\right) \div 2 = 107.4\ lb/hr$$

   The AEL is on a 24-hour daily block average basis, or shorter time period if the startup or shutdown does not last for the entire 24-hour daily block period. Operating times other than periods of startup and shutdown may be excluded from the block average.

   The AEL shall not be utilized for more than two consecutive calendar days per event or for more than 10% of the unit's total operating time in any continuous 12-month period.

   Compliance with both the normal operating limit of 0.20 lb/MMBtu and the AEL shall be demonstrated through use of a CEMS operated pursuant to the requirements of *Source Surveillance – Emissions Monitoring*, 06-096 C.M.R. ch. 117.

Until the effective date of the 0.20 lb/MMBtu emission limit, the previously established RACT limit of 0.38 lb/MMBtu on a 24-hour block average basis shall continue to apply. This limit applies at all times, including periods of startup and shutdown.

E. 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 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.

F. Annual Emissions

This license amendment will not change the facility's licensed annual emissions.

## ORDER

The Department hereby grants $NO_x$ RACT amendment A-29-77-9-A pursuant to the licensing requirements of 06-096 C.M.R. chs. 115 and 138 and subject to the specific conditions below.

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

## SPECIFIC CONDITIONS

(1) **Boiler #22**

Boiler #22 is subject to the following work practice standards beginning May 1, 2026:

A. The boiler shall be equipped with an oxygen trim system that automatically maintains an optimum air-to-fuel ratio.

B. Sappi shall perform a boiler tune-up at least once every five years. The first boiler tune-up is due no later than May 1, 2031. A tune-up conducted to comply with 40 C.F.R. Part 63, Subpart DDDDD shall satisfy this requirement provided it complies with the requirements of the following paragraph.

C. Boiler tune-ups shall be performed as specified below:

1. As applicable, inspect the burner, and clean or replace any component of the burner as necessary. Delay of the burner inspection until the next scheduled shutdown is permitted for up to 72 months from the previous inspection.

2. Inspect the flame pattern, as applicable, and adjust the burner as necessary to optimize the flame pattern, consistent with the manufacturer's specifications.

3. Inspect the system controlling the air-to-fuel ratio, as applicable, and ensure it is correctly calibrated and functioning properly. Delay of the inspection until the next scheduled shutdown is permitted for up to 72 months from the previous inspection.

4. If the unit is not operating on the required date for a tune-up, the tune-up shall be conducted within 30 days of start-up.

D. Sappi shall keep the following records in a form suitable and readily available for expeditious review and made available to the Department upon request:

1. Identification of the boiler, the date of tune-up, procedures followed for tune-up, and the manufacturer's specifications to which the boiler was tuned;

2. Records of the occurrence and duration of each malfunction of the boiler; and

3. Records of actions taken during periods of malfunction to minimize emissions, including corrective actions to restore operation of the malfunctioning boiler.

[06-096 C.M.R. ch. 138, §§ 4(B)(1) and 4(C)]

(2) **Boiler #21**

A. Sappi shall keep records of the amount of $NO_x$ emitted by Boiler #21 on a 12-month rolling total basis.

B. If Boiler #21 emits more than 100.0 tons of $NO_x$ in any consecutive 12-month period, Sappi shall notify the Department within 30 days of such occurrence.

C. Within 24 months of exceeding 100.0 tons of $NO_x$ emissions in any consecutive 12-month period, Sappi shall comply with the following:

1. Sappi shall install and begin operation of SNCR or other control method to comply with an emission limit of 0.20 lb/MMBtu on a 24-hour block average basis, except for periods of startup and shutdown.

2. During periods of startup or shutdown, Sappi shall either meet the applicable operating standard (i.e., 0.20 lb/MMBtu) or an AEL of 107.4 lb/hr. The AEL is on a 24-hour daily block average basis, or shorter time period if the startup or shutdown does not last for the entire 24-hour daily block period. Operating times other than periods of startup and shutdown may be excluded from the block average.

3. The AEL shall not be utilized for more than two consecutive calendar days per event or for more than 10% of the unit's total operating time in any consecutive 12-month period.

4. Compliance with both the normal operating limit of 0.20 lb/MMBtu and the AEL shall be demonstrated through use of a CEMS operated pursuant to the requirements of 06-096 C.M.R. ch. 117.

D. Until the effective date of the 0.20 lb/MMBtu emission limit, Sappi shall comply with the previously established RACT limit of 0.38 lb/MMBtu on a 24-hour block average basis. This limit applies at all times, including periods of startup and shutdown.

[06-096 C.M.R. ch. 138, § 4(H)]

DONE AND DATED IN AUGUSTA, MAINE THIS 23 DAY OF JANUARY, 2026.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:_____ for ____
MELANIE LOYZIM, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 10/27/2025
Date of application acceptance: 10/27/2025

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