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

DEPARTMENT ORDER

ND Paper Inc. **Oxford County** **Rumford, Maine** **A-214-77-18-A**	**Departmental** **Findings of Fact and Order** **New Source Review** **NSR #18**

FINDINGS OF FACT

After review of the air emission license amendment 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	ND Paper Inc. (NDP)
LICENSE TYPE	06-096 C.M.R. ch. 115, Minor Modification
NAICS CODES	322110, 322121
NATURE OF BUSINESS	Pulp & Paper Mill
FACILITY LOCATION	35 Hartford Street, Rumford, Maine

B. NSR License Description

ND Paper Inc. (NDP) has requested a New Source Review (NSR) license amendment to make modifications to support the production of unbleached kraft paper products. This project will be referred to in this license as the Unbleached Kraft Project. It makes changes to and expands upon the Recycle Pulp Project addressed in NSR license A-214-77-17-A (NSR #17) issued 11/6/2019.

The Recycle Pulp Project licensed in NSR #17 included the following changes:

- Addition of a new 600 metric ton per day (MTPD) recycled pulp operation, equivalent to approximately 661 air dried tons per day (ADTPD);
- Addition of an anaerobic digester (AD) and associated flare to treat wastewater prior to the existing wastewater treatment plant;
- Replacement of #3 Power Boiler with #8 Power Boiler;
- Physical modifications to R-12 Paper Machine to convert the machine to making unbleached product grades in addition to current bleached uncoated grades; and
- Physical modifications to the R-10 and R-15 Paper Machines as well as the R-9 Pulp Dryer to improve quality and efficiency and to increase the current production capacity of each unit.

NDP has not commenced construction on any of the changes listed above except for the physical upgrades to the R-10 Paper Machine.

Due to changes in the market accelerated by the COVID-19 pandemic, NDP has proposed revising the project which will now be referred to as the Unbleached Kraft Project. The Unbleached Kraft Project includes the following changes:

- Shut down of the Softwood Bleach Plant (A-Line);
- Reduction in utilization of the Hardwood Bleach Plant (B-Line);
- Shut down of the Groundwood Pulp Mill;
- Conversion of an existing hydropulper and screening system to produce up to 300 ADTPD of recycled pulp;
- Operational changes to produce higher kappa pulp in the digesters;
- Installation of a new hot stock refiner;
- Physical modifications to R-10 Paper Machine to allow running unbleached grades in addition to current bleached coated/uncoated grades;
- Physical modifications to R-12 Paper Machine to convert the machine to making unbleached product grades in addition to current bleached uncoated grades;
- Physical modifications to R-15 Paper Machine to convert the machine to making unbleached linerboard; and
- Physical modifications to R-9 Pulp Dryer to allow the machine to run unbleached pulp in addition to current bleached pulp.

C. Emission Equipment

The following existing equipment is modified by this project:

Process Equipment

Equipment	**Pollution Control Equipment**	Stack #
R-9 Pulp Dryer	none	fugitive
R-10 Paper Machine		
R-12 Paper Machine		
R-15 Paper Machine		

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

Boilers

Equipment	Maximum Heat Input Capacity (MMBtu/hr)	Fuel Type*	Manuf. Date	Stack #
Cogen Boiler #6	610 (annual) 630 (24-hr)	#6 fuel oil, natural gas, biomass, coal, TDF, DPC, specification and off-spec. used oil, lime kiln rejects, LVHCs, HVLCs, SOGs, OCC residuals	1986 (started operation in 1990)	6&7
Cogen Boiler #7	610 (annual) 630 (24-hr)			

*

TDF – Tired-Derived Fuel	SOGs – Stripper Off-Gases
LVHCs –Low Volume, High Concentration Gases	
HVLCs – High Volume, Low Concentration Gases	
DPC – Delayed Petroleum Coke, a byproduct of petroleum refining	

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Rate/Capacity	Fuel Type	Control Equipment	Stack #
Recovery Boiler C	759 (#6 fuel oil)	4.4 MMlb BLS/day	#6 fuel oil, natural gas, black liquor, soap	ESP	CREC
Lime Kiln	100 (#6 fuel oil)	350 ton/day CaO	#6 fuel oil, natural gas, LVHCs	Wet Scrubber	KILN
	110 (natural gas)				

Process Equipment

Equipment	Production Rate	Pollution Control Equipment	Stack #
SW Bleach Plant (A-Line)	–	Wet Scrubber	SCRB
HW Bleach Plant (B-Line)		Wet Scrubber	
Groundwood Mill	250 ADTUBP/day	–	fugitive
Smelt Tank C	4.4 MM lb BLS/day	2 Venturi Scrubbers	CR15, 18
Lime Slaker	1,050 gpm	Static Scrubber	LK16

Installation of the following equipment was proposed in NSR #17 but was not installed and is no longer proposed to be installed:

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Maximum Firing Rate	Fuel Type	Control Equipment	Stack #
#8 Power Boiler	453	444,000 scfh	Natural Gas	Low-NO_x Burners Flue Gas Recirc. Oxygen Trim	3
RP Digester Flare	8.5	12,500 scfh	Digester Gas	N/A	N/A

Process Equipment

Equipment	Pollution Control Equipment
RP Digester	Flare

D. Unbleached Kraft Project Description

NDP owns and operates an integrated kraft pulp and paper mill which produces bleached kraft pulp and mechanical groundwood pulp used to produce coated and uncoated papers on paper machines R-10, R-12, and R-15. A portion of the pulp is also dried on the R-9 Pulp Dryer for use within the mill and/or sold as baled market pulp. The intent of the Unbleached Kraft Project is to allow NDP to respond to the market demand for unbleached pulp and paper products.

NDP proposes to shut down the Softwood Bleach Plant (A-Line) and reduce the amount of hardwood kraft pulp that is bleached on B-Line in order to generate more softwood and hardwood unbleached kraft pulp. The Unbleached Kraft Project involves the construction of piping and fiber line infrastructure to allow all softwood kraft produced by the pulp mill to bypass the A-Line bleach plant for use on the paper machines and potentially the pulp dryer. The piping and infrastructure needed for hardwood kraft to bypass the B-Line bleach plant will be constructed as well because NDP intends to produce both bleached and unbleached hardwood kraft pulp. The bleach plant is a source of fiber loss. By allowing a significant portion of pulp to bypass the bleaching process, NDP will retain more fiber for use in paper making and pulp drying.

Additionally, unbleached pulp products have a higher tolerance for residual lignin (higher kappa pulp). NDP plans to operate the existing digester cooking process in consideration of this higher lignin tolerance which will result in greater fiber yield from the digesters without any additional equipment or physical modifications. Although the fiber yield may

increase, the quantity of hardwood or softwood chips able to be processed by the pulp mill will not change as a result of this project.

While producing higher kappa pulp may result in increased chip yield, the pulp fibers are not as flexible due to the residual lignin, which limits bonding points and reduces pulp strength. To increase pulp strength and improve machine runnability, NDP proposes the installation of a new, electrically-driven hot stock refiner to process the higher kappa pulp.

Though the Unbleached Kraft Project does not require physical changes to the existing pulp mill emission units, the changes to the cooking process could impact emissions from Recovery Boiler C, the Smelt Dissolving Tank, the Lime Kiln, and the Lime Slaker. Therefore, these units are considered project affected units.

NDP proposes to shut down the Groundwood Mill but continue to use an existing hydropulper and screen system to generate up to 300 ADTPD of recycled pulp. The hydropulper will mix recycled paper and hot water with a central agitator to create a pulp slurry. Steam is not utilized in this process and the process does not include de-inking.

The recycle pulping and cleaning process will separate non-fiber and fibrous non-pulpable materials as rejects. These old corrugated cardboard and the double-lined kraft (collectively referred to as OCC) residuals may be sent to the NDP landfill, an off-site licensed disposal facility, and/or an off-site licensed incineration facility. However, NDP proposes to primarily combust the OCC residuals in Cogen Boilers #6 and #7 to recover the heating value of the material.

Pivoting resources toward the unbleached fiber market will require NDP to make physical modifications to the paper machines and pulp dryer to support the processing of unbleached and/or recycled pulp. The physical modifications proposed for the R-10 and R-15 Paper Machines will increase the production capacity of each unit. The physical modifications will not increase the capacity of the R-12 Paper Machine or R-9 Pulp Dryer, although production levels are expected to change due to the increase in fiber yield/fiber retention resulting from the switch to unbleached pulp. NDP intends to pursue unbleached grades that are uncoated. Therefore, the finished tons of product across the machines will contain more fiber than bleached coated grades since coatings can comprise as much as 30% of a coated products weight. Using unbleached pulp on the machines also has the potential to increase emissions of volatile organic compounds (VOC) due to residual methanol in the pulp (a byproduct of the kraft pulping process) that would otherwise have been removed in the bleaching process.

The modifications to the paper machines and pulp dryer could result in an increase in steam demand. There will also be a reduction in steam demand due to the shutting down of the softwood bleach plant. The overall net impact is a small net increase in steam demand. Therefore, Cogen Boilers #6 and#7 have been included as project affected units.

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 for NDP does not violate any applicable federal or state requirements and does not reduce monitoring, reporting, testing, or recordkeeping requirements.

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. NDP has proposed using calendar years 2017 and 2018 as the 24-month baseline period from which to determine baseline actual emissions for all pollutants for emission units affected as part of this project.

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 from the paper machines and pulp dryer are not collected in the annual emissions report. These emissions were based on actual equipment throughput. When available, emission factors were based on site-specific stack testing. When stack test data was not available, emissions were based on standard emission factors for the industry.

b. Emissions of PM_{10} and $PM_{2.5}$ were adjusted to include emissions of condensable particulate matter.

c. Emissions of VOC from the paper machines and pulp dryer were originally reported based on an emission factor which assumes the pounds of VOC emitted per air-dried ton of paper/pulp processed. Emissions of VOC were recalculated based on the VOC content of the chemicals and additives actually used on the machines and assuming 100% of the VOC is volatilized and emitted.

This calculation method results in significantly higher baseline VOC emissions. However, projected actual emissions from this equipment were calculated using a similar conservatively high estimate. Therefore, any advantage of an increased baseline is cancelled out by a similar increase in projected actual emissions.

d. Emissions of VOC from the softwood and hardwood bleach plants were calculated based on an emission factor of 0.103 lb/ADT of bleached pulp from the National Council for Air and Stream Improvement (NCASI) TB 973, *Compilation of Air Toxic and Total Hydrocarbon Emissions Data for Pulp and Paper Mill Sources* dated February 2010. The emission factor previously used for the annual emissions report only included emissions of methanol and acetaldehyde. The NCASI emission factor is more comprehensive and includes all VOC quantified from bleach plant scrubbers.

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

Baseline Actual Emissions (1/2017 – 12/2018 Average)

Equipment	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)	NO_x (tpy)	CO (tpy)	VOC (tpy)
R-9	–	–	–	–	–	–	1.27
R-10	3.84	8.43	8.43	0.01	2.19	0.46	44.21
R-12	2.53	5.69	5.69	–	–	–	27.83
R-15	6.73	15.14	15.14	–	–	–	62.23
Recovery Boiler C	83.90	124.31	110.88	89.62	496.17	455.58	16.19
Lime Kiln	25.69	28.82	28.23	2.29	116.21	2.37	2.09
Smelt Tank C	31.09	30.45	27.90	5.62	–	–	23.23
Lime Slaker	0.27	0.27	0.27	–	–	–	8.38
SW Bleach Plant	–	–	–	–	–	–	6.50
HW Bleach Plant	–	–	–	–	–	–	17.50
Cogen Boiler #6	7.52	30.27	29.45	429.33	590.42	17.85	0.81
Cogen Boiler #7	6.21	25.00	24.33	355.37	486.96	14.47	0.69
Groundwood Mill	–	–	–	–	–	–	23.25
Total	**167.78**	**268.38**	**250.31**	**882.23**	**1,691.93**	**490.72**	**234.18**

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 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 the changes in use of pulp mill equipment or changes in steam demand.

a. Paper Machines and Pulp Dryer

The paper machines and pulp dryer are physically modified equipment. In determining PAE from this equipment, NDP evaluated three possible operating scenarios.

Scenario 1 assumed the shoe press was not installed on the R-15 Paper Machine and PAE was based on NDP's estimates of the maximum annual production rate of each machine following implementation of the project. For VOC, NDP assumed each machine processed exclusively unbleached pulp which has the highest (worst-case) emission factor (0.51 lb/ADT[1]).

No reliable emission estimates are available for emissions of particulate matter from pulp dryers. Emissions of particulate matter from the paper machines were estimated based on emission factors from the NCASI TB 942, *Measurement of PM, PM_{10}, $PM_{2.5}$, and CPM emissions from Paper Machine Sources*, November 2007.

Scenarios 2 and 3 assumed the shoe press is installed on the R-15 Paper Machine as planned. In which case, NDP cannot generate enough pulp to fill all machines to capacity even with the shift to unbleached fiber and higher yields from higher kappa pulp production. Therefore, in Scenario 2, R-12 Paper Machine operates at full capacity with any remaining fiber being run on R-9 Pulp Dryer, and in Scenario 3, R-9 Pulp Dryer operates at full capacity with any remaining fiber being run on R-12 Paper Machine. Scenario 2 resulted in the highest (worst-case) emissions for all pollutants. This scenario was conservatively selected for use in the PAE calculations.

b. Cogen Boilers #6 and #7

Cogen Boilers #6 and #7 are affected units because there is the potential for the project to result in an increase in steam demand. The shutting down of the Softwood Bleach Plant will result in a decrease in steam demand. The paper machines and pulp dryer use steam to support production and the proposed modifications to these units will result in an increase in steam demand over baseline.

[1] NCASI TB 858, *Compilation of Air Toxic and Total Hydrocarbon Emissions Data for Sources at Kraft, Sulfite and Non-Chemical Mills – an Update*, 2003

NDP evaluated the three scenarios described in the paper machine/pulp dyer section above in analyzing the potential increase in steam demand. The installation of the shoe press on R-15 Paper Machine will result in significant steam savings. Since Scenarios 2 and 3 assume installation of the shoe press, the projected increases in steam demand for these scenarios is far less than those for Scenario 1. Since Scenario 1 results in the highest steam consumption and therefore the worst-case emissions from Cogen Boilers #6 and #7, it was conservatively used as the basis for PAE for these units.

The net result of Scenario 1 with the shutting down of the Softwood Bleach Plant is an estimated increase in steam demand of 150,088 klbs/year. NDP developed site-specific emission factors for each pollutant by dividing annual emissions from Cogen Boilers #6 and #7 by annual steam production from these units (lb pollutant /klbs steam) and used these emission factors to determine the emission increase due to the increase in steam demand. PAE from Cogen Boilers #6 and #7 is the sum of the BAE for these units and the increases based on increased steam demand.

c. Pulp Mill Equipment

PAE from Recovery Boiler C were estimated based on its maximum capacity (4.41 MMlb BLS/day) and using a combination of CEMS data, stack test results, and emission factors consistent with the calculation methods used in the most recent emissions inventory submitted per 06-096 C.M.R. ch. 137.

PAE from the Lime Kiln were estimated based on the amount of quicklime (CaO) projected to be produced to support the maximum annual BLS processing rate of the recovery boiler. PAE also include the estimated quantity of natural gas needed to be fired based on an average ratio of fuel use to CaO processed over calendar years 2014 through 2018. NDP's economic forecast does not anticipate firing fuel oil in the Lime Kiln at any point in the future. Therefore, there is no emissions contribution from fuel oil in its PAE.

PAE from the Lime Slaker were based on the projected quantity of CaO produced by the Lime Kiln. PAE for Smelt Tank C were based on the projected quantity of BLS processed by Recovery Boiler C.

The Hardwood Bleach Plant is expected to operate less following the project as some hardwood pulp will bypass the bleaching system. However, PAE for this equipment has been assumed to be the same as BAE, a conservatively high estimate.

The Groundwood Mill and Softwood Bleach Plant will be shut down as part of this project. Since this equipment will not operate following the completion of the project, PAE from this equipment are zero for all regulated pollutants.

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)
R-9	–	–	–	–	–	–	13.03
R-10	4.58	10.06	10.06	0.02	3.10	0.60	56.05
R-12	2.63	5.91	5.91	–	–	–	33.51
R-15	7.96	17.90	17.90	–	–	–	101.45
Recovery Boiler C	90.20	133.60	119.20	96.20	556.90	489.40	16.20
Lime Kiln	29.30	33.00	32.30	2.80	140.70	2.90	2.60
Smelt Tank C	33.40	32.70	30.00	6.00	–	–	24.90
Lime Slaker	0.30	0.30	0.30	–	–	–	9.60
SW Bleach Plant	–	–	–	–	–	–	–
HW Bleach Plant	–	–	–	–	–	–	17.50
Cogen Boiler #6	7.70	31.02	30.17	439.94	604.94	18.28	0.83
Cogen Boiler #7	6.39	25.75	25.05	365.98	501.48	14.90	0.71
Groundwood Mill	–	–	–	–	–	–	–
Total	**182.45**	**290.23**	**270.89**	**910.94**	**1,807.12**	**526.08**	**276.38**

3. Emission Adjustments

For the next step in determining projected actual emissions, NDP excluded increases in emissions that the existing equipment could have accommodated during the baseline period and are unrelated to the current project. This is known as the Demand Growth Exclusion.

Current and future plans for NDP are to maximize pulp production due to a growing market demand, regardless of whether the pulp produced is bleached or unbleached. Any pulp not utilized by the mill itself is, and will continue to be, sold for use off-site. This project does not include any physical changes to the existing pulp mill equipment. As currently configured, the paper machines and pulp dryer are capable of handling the maximum production of the pulp mill both physically and within the constraints of their current license.

Therefore, any future increases in utilization of the pulp mill equipment are unrelated to the Unbleached Kraft Project. They are a reflection of a potential increase in market demand and NDP's intent to maximize pulp production, regardless of whether that pulp is used internally or shipped off-site.

The amount of emissions covered by the Demand Growth Exclusion is based on the maximum sustained physical operating capacity of the pulp mill minus the BAE.

Based on the analysis outlined above, the following emissions are excludable under the Demand Growth Exclusion:

Demand Growth Exclusion Emissions Adjustments

Equipment	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)	NO_x (tpy)	CO (tpy)	VOC (tpy)
Recovery Boiler C	6.30	9.29	8.32	6.58	60.74	33.83	0.02
Lime Kiln	3.61	4.18	4.07	0.51	24.50	0.53	0.51
Smelt Tank C	2.31	2.25	2.10	0.39	0.00	0.00	1.67
Lime Slaker	0.03	0.03	0.03	0.00	0.00	0.00	1.22
Total	**12.25**	**15.75**	**14.52**	**7.48**	**85.23**	**34.35**	**3.41**

4. Emissions Increases

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

Pollutant	Baseline Actual Emissions 01/2017-12/2018 (ton/year)	Projected Actual Emissions (ton/year)	Excludable Emissions (ton/year)	Emissions Increase (ton/year)	Significant Emissions Increase Levels (ton/year)
PM	167.78	182.45	12.25	2.43	25
PM_{10}	268.38	290.23	15.75	6.10	15
$PM_{2.5}$	250.31	270.89	14.52	6.06	10
SO_2	882.23	910.94	7.48	21.23	40
NO_x	1,691.93	1,807.12	85.23	29.96	40
CO	490.72	526.08	34.35	1.01	100
VOC	234.18	276.38	3.41	38.78	40

5. Classification

Since emissions increases do not exceed significant emissions increase levels, this NSR license is determined to be a minor modification under *Minor and Major Source Air Emission License Regulations*, 06-096 C.M.R. ch. 115. An application to incorporate the requirements of this NSR license into the Part 70 air emission license shall be

submitted no later than 12 months from commencement of operations associated with the Unbleached Kraft Project.

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. Recycle Pulping

NDP proposes to shut down the Groundwood Mill but continue to use an existing hydropulper and screen system to generate up to 300 ADTPD of recycled pulp. The hydropulper will mix recycled paper and hot water with a central agitator to create a pulp slurry. Steam is not utilized in this process and the process does not include de-inking.

Hydropulpers, repulpers, and pulp handling processes are considered insignificant activities per 06-096 C.M.R. ch. 115, Appendix B, § A(84). Therefore, this equipment is not subject to BACT and is mentioned here for completeness and informational purposes only.

C. Hot Stock Refiner

NDP proposes to install a new, electrically-driven hot stock refiner and an in-line spare. A refiner deforms pulp fibers by compressive and shear forces improving its characteristics for use on the paper machines. Use of a refiner increases the flexibility of the fibers and fibrillate the fiber surface creating a greater surface area for bonding. This is a closed mechanical process with no emissions of regulated air pollutants. Therefore, this equipment is not considered an emission unit and is not subject to BACT. It is mentioned here for completeness and informational purposes only.

D. Cogen Boilers #6 and #7

NDP proposes to include OCC residuals in the fuel mix for Cogen Boilers #6 and #7. Cogen Boilers #6 and #7 are designed to burn solid fuel and the fibrous OCC residuals meet the definition of paper recycling residuals in *Solid Wastes Used as Fuels or Ingredients in Combustion Units,* 40 C.F.R. Part 241. Therefore, the fibrous OCC residuals are categorically not a solid waste when used as a fuel pursuant to 40 C.F.R. § 241.4(a)(6).

NDP affirms that the non-fibrous OCC residuals meet the legitimacy criteria pursuant to 40 C.F.R. §§ 241.3(b)(1) and 241.3(d)(1). This claim is supported by information provided in a letter to the Department dated October 21, 2020, showing that the non-fibrous OCC residuals will be managed as a valuable commodity, have a meaningful heating value, and contains contaminants at levels comparable in concentration (or lower) to the traditional fuel it replaces (biomass).

Therefore, both the fibrous and non-fibrous OCC residuals are not considered solid wastes when burned in the facility's boilers[2]. Additionally, combustion of the OCC residuals in Cogen Boilers #6 and #7 will not result in any emissions increases from this equipment, as the OCC residuals will simply offset the use of other similar fuels. There will not be any physical changes made to Cogen Boilers #6 and #7. Since these units are not being modified, they are not subject to BACT.

E. Pulp Dryer and Paper Machines

1. R-9 Pulp Dryer

This project will modify R-9 Pulp Dryer to allow the machine to run unbleached pulp in addition to the current bleached pulp. There will be no change to the maximum machine speed or production capacity. Modifications are limited to the stock preparation/approach systems to deliver unbleached fiber.

The R-9 Pulp Dryer has fugitive emissions of VOC.

2. R-10 Paper Machine

The R-10 Paper Machine uses steam-heated dryer cans, natural gas-fired air floatation dryers, and an on-machine coater to produce coated paper products. In NSR #17, NDP proposed physical changes to this machine including installation of a new shoe press, upgrading the headbox, top former, and stock approach systems, and making changes to increase the machine's speed (i.e., new drives/motors). Although much of this work was completed, the changes to the stock approach systems and to increase machine speed were not and are no longer included in this project. Therefore, only the shoe

[2] The determination that OCC residuals are not a solid waste is intended to apply to the applicability of federal air rules only.

press, headbox, and top former upgrades are included in this license amendment. These changes result in an increase in machine's production capacity.

The new shoe press aids with dewatering and supports running unbleached grades in addition to the current bleached coated/uncoated grades. It improves the dewatering capacity of the wet press section by extending the amount of time the paper sheet remains in the press nip between press rolls. In conventional press rolls, the pressure applied to the sheet and the nip residence time are constrained since higher pressures damage the sheet and higher machine speeds reduce nip residence time. The shoe press replaces the bottom press roll and includes a nip that is stationary and somewhat concave allowing for greater nip pressure and longer residence times. Improved dewatering in the wet press section of the machine results in a sheet with less moisture as it heads to the dryer, thus reducing the amount of steam/heat needed in the drying section.

The R-10 Paper Machine has fugitive emissions of PM, PM_{10}, $PM_{2.5}$, and VOC from the papermaking and coating processes.

There will not be any physical changes made to the R-10 Dryers. Although there may be an increase in natural gas consumption due to increased usage, since these units are not being modified, they are not subject to BACT.

3. R-12 Paper Machine

The R-12 Paper Machine currently uses steam-heated dryer cans and an on-line coater to produce coated and uncoated paper products. NDP has proposed modifying R-12 Paper Machine to produce uncoated and unbleached grades using unbleached kraft pulp from the pulp mill as well as recycle pulp. There will be no change to the maximum machine speed or production capacity.

The R-12 Paper Machine has fugitive emissions of PM, PM_{10}, $PM_{2.5}$, and VOC.

4. R-15 Paper Machine

The R-15 Paper Machine currently uses steam-heated dryer cans and an on-line coater to produce coated paper products. NDP has proposed modifying R-15 Paper Machine to produce uncoated, unbleached linerboard grades using unbleached kraft pulp from the pulp mill as well as recycle pulp.

NDP has also proposed the installation of a shoe press on R-15 Paper Machine, similar to that described for the R-10 Paper Machine. Production on R-15 is currently limited by drying capacity. Therefore, improving the drying efficiency by adding a shoe press will allow NDP to increase production on this machine. The R-15 Paper Machine has fugitive emissions of PM, PM_{10}, $PM_{2.5}$, and VOC.

5. BACT Findings

NDP submitted a BACT analysis for control of emissions from the pulp dryer and paper machines.

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

No reliable emission estimates are available for emissions of particulate matter from pulp dryers. Therefore, it is not possible to evaluate the effectiveness of pollution control equipment for R-9 Pulp Dryer.

Emissions of particulate matter from the paper machines are attributable to the process side of each unit. In the case of R-10, there are also emissions from natural gas combustion in the dryers.

PM emissions from natural gas-fired sources are generally minimal and are comprised of filterable and condensable PM generated both from the carryover of noncombustible trace constituents in the fuel and as products of incomplete combustion.

PM emissions from the process side of each unit 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 rooms each have multiple venting points to the atmosphere along the form and press sections and drying, coating, and winding sections. The paper machines are not permanently enclosed structures, so particulate dust is considered to be emitted fugitively within the paper machine buildings and in very low concentrations from building vents.

Potential control technologies for PM emissions include add-on pollution control equipment such as fabric filters (baghouses), electrostatic precipitators (ESP), wet scrubbers, cyclones, and combustion of clean fuels.

Mechanical separators include cyclonic separators (multicyclone). In a multicyclone, centrifugal force separates larger PM 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 PM 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 PM emissions from the paper machines. 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 US EPA's

RACT-BACT-LAER Clearinghouse (RBLC) showed that the only machines that employed the use of multicyclones for PM control were 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. Therefore, the use of multicyclones on the paper machines is determined not to be economically justifiable.

Fabric filters, commonly referred to as baghouses, use fabric filter media to remove PM (filterable) from the exhaust gases of air emission sources. Baghouses consist of a matrix of fabric bags surrounded by an outer shell. Air enters the bags at the bottom and passes through the fabric filter media of the bags. Particles too large to fit through the pore spaces in the fabric are trapped on the inside of the bag, while the exhaust gas continues on to the stack. The bags are then emptied into a hopper located at the bottom of the unit at preset intervals. Baghouses can achieve filterable PM removal efficiencies of up to 99.9 percent. Due to the high moisture loading of the exhaust and ventilation streams, baghouses would be blinded and not effective in this application. Therefore, baghouses are considered technologically infeasible for this application.

ESPs remove filterable PM from a gas stream through the use of electric fields. Exhaust gas 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. 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 NDP's site due to limited space and the relatively large size of the equipment leading to a high capital cost to install. 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 on the paper machines is determined not to be economically justifiable.

Wet scrubbers remove PM from gas streams primarily through impaction and, to a lesser extent, other mechanisms such as interception and diffusion. A scrubbing liquid (typically water) is sprayed countercurrent to the exhaust gas stream. Contact between the larger scrubbing liquid droplets and the suspended particulates removes the PM from the gas stream. Entrained liquid droplets then pass through a mist eliminator (coalescing filter) which causes the droplets to become heavier and

fall out of the exhaust stream. 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. 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 the only machines that employed the use of wet scrubbers for PM control were 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. Therefore, the use of wet scrubbers on the paper machines is determined not to be economically justifiable.

The combustion of clean fuels in the R-10 Dryers to minimize PM emissions is accomplished by burning fuels with a minimal amount of impurities in conjunction with good combustion practices. The facility has proposed to burn natural gas in the R-10 Dryers which has an inherently low PM content compared to other fuel alternatives.

The Department finds the firing of natural gas in the R-10 Dryers and the following emission limits to represent BACT for particulate matter emissions from the paper machines:

Unit	PM (lb/ADT)	PM_{10} (lb/ADT)	$PM_{2.5}$ (lb/ADT)
R-10	0.04	0.09	0.09
R-12	0.04	0.09	0.09
R-15	0.04	0.09	0.09

These emission limits are based on emission factors published in NCASI TB 942, *Measurement of PM, PM_{10}, $PM_{2.5}$, and CPM emissions from Paper Machine Sources*, November 2007.

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 shall be demonstrated by combusting only natural gas in the R-10 Dryers and 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 the paper machines and pulp dryer are attributable to many different sources. Small amounts of VOC are present in the water carrying the pulp to the paper machines with unbleached pulp typically having a higher VOC content than bleached pulp and recycle pulp having a very low VOC content. 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. On paper machines with dryers (R-10), VOC are also emitted from the combustion of fuel.

Following completion of the Unbleached Kraft Project, R-9 Pulp Dryer is expected to continue to process bleached market pulp (an uncoated product). However, R-9 Pulp Dryer may potentially run unbleached fiber. Similarly, R-10 Paper Machine is expected to continue producing coated, bleached products, but like R-9, may potentially run unbleached pulp. R-12 and R-15 Paper Machines will produce primarily uncoated, unbleached products. Therefore, the primary contributor to VOC emissions has been assumed to be the processing of unbleached kraft pulp and, where applicable, coatings.

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.

With adsorption, VOC migrates from a gas stream to the surface of the solid, 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 or pulp dryer. The large range of VOCs contained in the exhaust from these units 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 the paper machines and pulp dryer.

Biofiltration is a less established 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 which is not available at the mill. 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 or economically feasible for control of VOC from the paper machines and pulp dryer.

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. This would lead to a prohibitively expensive cost, estimated to be in excess of $100,000 per ton of pollutant removed. Additionally, thermal oxidizers would require the burning of significant amounts of fuel to destroy the VOC leading to significantly 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 the paper machines and pulp dryer.

The use of low-VOC coatings and additives is a technically feasible option for controlling emissions of VOC from the paper machines and pulp dryer. All paper machines listed in the RBLC with BACT limits for VOC controlled emissions using this practice. NDP has proposed using low-VOC coatings where possible to limit emissions of VOC from all paper machines and the pulp dryer (combined) to 204.0 tpy.

The Department finds that an annual emission limit of 204.0 tpy (12-month rolling total basis) of VOC from paper machines R-10, R-12, and R-15 and from R-9 Pulp Dryer (all equipment combined) to represent BACT for emissions of VOC.

Compliance with the annual VOC emission limit shall be demonstrated by calculations of emissions performed monthly. VOC emissions from machines running bleached fiber shall be calculated based on actual chemical use assuming that 100% of the VOC is volatilized and emitted. When a machine is running only recycle fiber, NDP shall calculate emissions from the machine based on an emission factor of 0.295 lb/ADT[3] and when running unbleached kraft pulp NDP shall calculate emissions from the machine based on an emission factor of 0.51 lb/ADT to account for the higher emissions from unbleached kraft. These calculation

[3] NCASI TB 973, *Compilation of Air Toxic and Total Hydrocarbon Emissions Data for Pulp and Paper Mill Sources – a Second Update*, Table 10.1, 2010

methods are considered conservative since many paper machine additives will react with the web substrate limiting VOC emissions to the unreacted portion only.

6. Emission Limit Summary

Below is a summary of the applicable emission limits for the paper machines and pulp dryer. The emission standards/limits apply at all times, including periods of startup, shutdown, and malfunction.

Emissions Unit	Pollutant	Emission Limit	Origin and Authority
R-10 Paper Machine	PM	0.04 lb/ADT	06-096 C.M.R. ch. 115, BACT
	PM_{10}	0.09 lb/ADT	
	$PM_{2.5}$	0.09 lb/ADT	
R-12 Paper Machine	PM	0.04 lb/ADT	
	PM_{10}	0.09 lb/ADT	
	$PM_{2.5}$	0.09 lb/ADT	
R-15 Paper Machine	PM	0.04 lb/ADT	
	PM_{10}	0.09 lb/ADT	
	$PM_{2.5}$	0.09 lb/ADT	
R-9, R-10, R-12, & R-15 (Combined)	VOC	204.0 tpy	

F. Incorporation Into the Part 70 Air Emission License

Per *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.

G. Annual Emissions

NDP is licensed for the following annual emissions. Calculation of these annual emission rates was based on constant operation of each emission unit at its maximum licensed capacity, including those limited either by firing rate, hours of operation, or via an annual fuel use cap.

Please note, this information provides the basis for fee calculation only and should not be construed to represent a comprehensive list of license restrictions or permissions.

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

Unit	PM	PM_{10}	SO_2	NO_x	CO	VOC
Cogen Boiler #6	82.8	82.8	772.6	1,655.60	1,090.00	22.1
Cogen Boiler #7	82.8	82.8	772.6	1,655.60	1,090.00	22.1
Power Boiler #3	65.7	65.7	341.6	525.60	262.80	19.7
Lime Kiln	105.1	105.1	100.7	227.8	170.8	8.8
Recovery Boiler C	379.7	284.7	903.6	941.7	972.4	16.2
Smelt Tank C	70.1	69.2	24.1	–	–	–
Paper Machines & Pulp Dryer (combined)	15.0	33.7	–	–	–	204.0
R10 Air Floatation Dryers	15.2	15.2	0.1	19.6	2.7	0.7
Building Air Heaters	2	2	0.2	40.6	40.6	2.2
Cogen Emergency Generator	0.1	0.1	0.1	1.6	0.4	0.1
R15 Emergency Generator	0.1	0.1	0.1	1.4	0.3	0.1
Mill Emergency Diesel Generator	0.2	0.2	0.1	4.4	1.2	0.1
Diesel Fire Water Pump	0.1	0.1	0.1	1.8	0.4	0.1
Lift Pump Emergency Generator	0.1	0.1	0.1	2.1	1.1	2.1
Lime Kiln Auxiliary Drive	0.1	0.1	0.1	0.3	0.1	0.1
Total TPY	**819.1**	**741.9**	**2,916.1**	**5,078.1**	**3,632.8**	**298.4**

III. AMBIENT AIR QUALITY ANALYSIS

NDP previously submitted an ambient air quality analysis demonstrating that emissions from the facility, in conjunction with other local sources, do not violate National Ambient Air Quality Standards (NAAQS). [See NO_x modeling results in license A-214-71-AN-A (4/9/2002) and modeling results for other pollutants in license A-214-71-S-A/R (9/3/1996).]

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 Amendment A-214-77-18-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 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

The following shall replace Specific Condition (1) of NSR Air Emission License A-214-77-17-A:

(1) **Paper Machines and Pulp Dryer**

A. Emission Limits and Standards

1. Emissions from the paper machines and pulp dryer shall each not exceed the following limits [06-096 C.M.R. ch. 115, BACT]:

Emissions Unit	Pollutant	Emission Limit
R-10 Paper Machine	PM	0.04 lb/ADT
	PM_{10}	0.09 lb/ADT
	$PM_{2.5}$	0.09 lb/ADT
R-12 Paper Machine	PM	0.04 lb/ADT
	PM_{10}	0.09 lb/ADT
	$PM_{2.5}$	0.09 lb/ADT
R-15 Paper Machine	PM	0.04 lb/ADT
	PM_{10}	0.09 lb/ADT
	$PM_{2.5}$	0.09 lb/ADT

2. Visible emissions from the paper machine building vents shall not exceed 10% opacity on a six-minute block average basis. [06-096 C.M.R. ch. 115, BACT]

3. Emissions of VOC from paper machines R-10, R-12, and R-15 and from R-9 Pulp Dryer (all equipment combined) shall not exceed 204.0 tpy (12-month rolling total basis). [06-096 C.M.R. ch. 115, BACT]

B. Compliance Demonstration

1. Compliance with the particulate matter emission limits shall be demonstrated by combusting only natural gas in the R-10 Dryers and compliance with the visible emissions limit. [06-096 C.M.R. ch. 115, BPT]

2. 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. [06-096 C.M.R. ch. 115, BPT]

3. Compliance with the annual VOC emission limit shall be demonstrated by calculations of emissions performed monthly. For machines running bleached fiber, emissions shall be calculated based on actual chemical use assuming that 100% of the VOC is volatilized and emitted. When only recycle fiber is used, NDP shall calculate emissions from the machine based on an emission factor of 0.295 lb/ADT. When unbleached kraft pulp is used, NDP shall calculate emissions from the machine based on an emission factor of 0.51 lb/ADT.
[06-096 C.M.R. ch. 115, BPT]

Conditions (2), (3), and (4) of NSR Air Emission License A-214-77-17-A are Deleted.

The following shall replace Specific Condition (5) of NSR Air Emission License A-214-77-17-A:

(5) **Future Project Emissions Reporting**

A. NDP shall monitor, calculate, and maintain a record of the annual emissions, in tons per year on a calendar year basis, of $PM_{2.5}$, SO_2, NO_x, and VOC for all emission units that are part of the Unbleached Kraft Project (modified or affected). NDP must monitor, calculate, and maintain a record of the annual emissions for a period of 5 years following the resumption of regular operations after the change.
[40 C.F.R. § 52.21(r)(6)]

B. If the annual emissions, in tons per year, from the project exceed the baseline actual emissions, excluding any emission increase unrelated to the project and due to demand growth, for any of these pollutants by an amount equal to or greater than the significant emissions increase level for that pollutant, NDP shall submit a report to the Department and EPA within 60 days after the end of the calendar year which contains the following:

1. The facility name, address, and phone number;
2. The annual emissions for the project; and
3. Any other information that the facility wishes to include in the report (e.g., an explanation as to why the emissions differ from the preconstruction projection.)

[40 C.F.R. § 52.21(r)(6)(v)]

The following shall replace Specific Condition (6) of NSR Air Emission License A-214-77-17-A:

(6) NDP shall submit an application to incorporate this NSR license into the facility's Part 70 air emission license no later than 12 months from commencement of operation of equipment that was modified by the Unbleached Kraft Project.
[06-096 C.M.R. ch. 140 § 1(C)(8)]

The following are New Conditions:

(7) NDP shall notify the Department within 30 days of the dates of final shut down of the Softwood Bleach Plant (A-Line) and Groundwood Pulp Mill. Any NSR conditions specific to this equipment shall become obsolete as of those shutdown dates.
[06-096 C.M.R. ch. 115, BPT]

DONE AND DATED IN AUGUSTA, MAINE THIS 18th DAY OF NOVEMBER, 2020.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____ for ____
MELANIE LOYZIM, ACTING COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 10/23/2020
Date of application acceptance: 10/23/2020

Date filed with the Board of Environmental Protection:

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

FILED

NOV 18, 2020

State of Maine
Board of Environmental Protection