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-214-77-20-A**	**Departmental** **Findings of Fact and Order** **New Source Review** **NSR #20**

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, 322120
NATURE OF BUSINESS	Pulp & Paper Mill
FACILITY LOCATION	35 Hartford Street, Rumford, Maine

B. NSR License Description

On November 18, 2020, the Department issued New Source Review (NSR) license A-214-77-18-A to ND Paper Inc. (NDP) for facility changes referred to as the Unbleached Kraft Project. With that project, NDP prioritized the production of unbleached products. NDP has requested an NSR license amendment to modify the Unbleached Kraft Project to maintain the flexibility to produce either bleached or unbleached products.

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		
SW Bleach Plant (A-Line)	Wet Scrubber	SCRB

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 #
HW Bleach Plant (B-Line)	–	Wet Scrubber	SCRB
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

D. Unbleached Kraft Project Description and Proposed Changes

NDP owns and operates an integrated kraft pulp and paper mill which produces bleached and unbleached kraft pulp and previously produced 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 was to allow NDP to respond to the market demand for unbleached pulp and paper products. The physical changes outlined in A-214-77-18-A (issued 11/18/2020) have been completed.

In 2020, NDP idled the Softwood Bleach Plant (A-Line) and reduced the throughput to the Hardwood Bleach Plant (B-Line) in order to generate more softwood and hardwood unbleached kraft pulp.[1] As part of the Unbleached Kraft Project, NDP constructed piping and fiber line infrastructure to allow both softwood and hardwood pulp produced by the mill to bypass the bleach plant for use on the paper machines and potentially the pulp dryer.

The project emissions accounting for the Unbleached Kraft Project assumed the projected actual emissions (PAE) for volatile organic compounds (VOC) from the Softwood Bleach Plant would be zero. Based on this assumption, an annual VOC emissions cap was established for the paper machines and pulp dryer that allowed the project to be classified as a minor modification, i.e., the project's emissions increase for VOC was less than the significant emissions increase level.

NDP now proposes to modify the Unbleached Kraft Project to maintain the flexibility to produce bleached softwood pulp. This changes the assumptions used in the project emissions accounting. This license amendment relicenses the Unbleached Kraft Project including updating the application classification section to take those changes into account. Relicensing of the Unbleached Kraft Project requires reconsideration of Best Available Control Technology (BACT) for all modified equipment. This includes the paper machines and the pulp dryer. Because resuming the bleaching of softwood pulp will require the bleach plant to undergo physical and operational changes, it is also being considered modified equipment for the purposes of this license amendment.

As part of the Unbleached Kraft Project, NDP permanently shut down the Groundwood Mill. Though the Unbleached Kraft Project did not require physical changes to existing pulp mill emission units other than those listed above, 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.

The modifications to the paper machines and pulp dryer addressed by the Unbleached Kraft Project have the potential to result in an increase in steam demand. The overall net impact

[1] Although NDP's licenses often refer to a "softwood bleach plant" and a "hardwood bleach plant," there is only one bleach plant at the facility with the ability to process either softwood or hardwood pulp.

is a 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 estimation method giving conservatively high values. Therefore, any advantage of an increased baseline is cancelled out by a similar increase in projected actual emissions.

d. Emissions of VOC from the Bleach Plant 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
Bleach Plant	–	–	–	–	–	–	24.00
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. For the relicensing of the Unbleached Kraft Project, NDP must consider PAE for the ten years (12-month periods) from the anticipated restart of the Softwood Bleach Plant because the Unbleached Kraft Project involves increasing the production capacity of some of paper machines.

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

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

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.

In determining PAE from this equipment in 2020, NDP evaluated three possible operating scenarios.

Scenario 1 assumed the shoe press was not installed on the R-15 Paper Machine and PAE were based on NDP's estimates of the maximum annual production rate of each machine following implementation of the project.

Scenarios 2 and 3 assumed the shoe press is installed on the R-15 Paper Machine as planned. In this 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. Since 2020, NDP has installed the shoe press on R-15, and Scenario 2 still represents the most conservative PAE for the paper machines and pulp dryer.

(2) Volatile Organic Compounds (VOC)

NDP has proposed a VOC limit of 197.0 tpy for the four machines (R-10, R-12, and R-15 Paper Machines, and R-9 Pulp Dryer) combined. This limit represents the future potential to emit (PTE) for the paper machines and, thus, is most conservative.

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 paper machines and pulp dryer use steam to support production, and the modifications to these units will result in an increase in steam demand over baseline.

Determination of PAE for Cogen Boilers #6 and #7 originally conservatively assumed a shoe press was not installed on R-15. However, NDP has installed a shoe press on R-15 resulting in substantial steam savings. PAE for Cogen Boilers #6 and #7 have therefore been recalculated based on Scenario 2, as it more accurately represents actual expected emissions.

The net result of Scenario 2 is an estimated increase in steam demand of 49,937 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 expected 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 although it is capable of accommodating oil firing.

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.

Consistent with NDP's intent to maintain the flexibility to bleach both hardwood and softwood pulp, PAE for the Bleach Plant have been assumed to be the same as BAE.

The Groundwood Mill was shut down as part of the Unbleached Kraft 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	–	–	–	–	–	–	197.00
R-10	4.58	10.06	10.06	0.02	3.10	0.60	
R-12	2.63	5.91	5.91	–	–	–	
R-15	7.96	17.90	17.90	–	–	–	
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
Bleach Plant	–	–	–	–	–	–	24.00
Cogen Boiler #6	7.58	30.51	29.68	432.81	595.19	17.99	0.82
Cogen Boiler #7	6.26	25.24	24.56	358.85	491.72	14.61	0.69
Groundwood Mill	–	–	–	–	–	–	–
Total	**182.21**	**289.23**	**269.92**	**896.69**	**1,787.61**	**525.50**	**275.81**

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 emissions units. 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 quantity 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. Emission increases are then compared to 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	182.21	12.25	2.18	25
PM_{10}	268.38	289.23	15.75	5.10	15
$PM_{2.5}$	250.31	269.92	14.52	5.09	10
SO_2	882.23	896.69	7.48	6.98	40
NO_x	1,691.93	1,787.61	85.23	10.45	40
CO	490.72	525.50	34.35	0.43	100
VOC	234.18	275.81	3.41	38.22	40

5. Classification

Since emissions increases do not exceed significant emissions increase levels, the Unbleached Kraft Project as modified in this license is determined to still be a minor modification under *Minor and Major Source Air Emission License Regulations,* 06-096 C.M.R. ch. 115.

This NSR license is not licensing a new major stationary source of an NSR pollutant that is not greenhouse gases (GHG), nor is it authorizing a major modification for an NSR pollutant to an existing major stationary source. Therefore, greenhouse gases are not considered subject to regulation in this license pursuant to 40 C.F.R. §§ 51.166(b)(48)(iii - iv).

An application to incorporate the requirements of this NSR license amendment into the Part 70 air emission license shall be submitted no later than 12 months from restarting the Softwood Bleach Plant.

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. Pulp Dryer and Paper Machines

Relicensing of the Unbleached Kraft Project requires reconsideration of BACT for all modified equipment. This includes the paper machines and the pulp dryer. In addition to the changes below specific to the Unbleached Kraft Project, NDP proposes to maintain the flexibility to continue to produce bleached products on these machines.

1. R-9 Pulp Dryer

The Unbleached Kraft Project modified the R-9 Pulp Dryer to allow the machine to run unbleached pulp in addition to bleached pulp. There was no change to the maximum

machine speed or production capacity. Modifications were 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

Changes to the R-10 Paper Machine included installation of a new shoe press and upgrading the headbox and top former. These changes resulted in an increase in the machine's production capacity.

The new shoe press aids with dewatering and supports running unbleached grades in addition to 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.

No physical changes were 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 Unbleached Kraft Project changed the operation of the R-12 Paper Machine such that it has the flexibility to produce uncoated and unbleached grades using unbleached kraft pulp as well as recycle pulp. There was 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 Unbleached Kraft Project modified the R-15 Paper machine to produce uncoated, unbleached linerboard grades using unbleached kraft pulp as well as recycle pulp. NDP installed a shoe press similar to that described for the R-10 Paper Machine.

Production on R-15 was limited by drying capacity. Improving the drying efficiency by adding a shoe press allowed 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.

(1) Identify Potential Control Options

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

<u>Multicyclones</u>
Cyclonic separators, or multicyclones, are mechanical separators. 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 PM entrained in the

exhaust gas to impact collectors on the outer wall of the unit and fall into a hopper for collection.

Baghouses

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 suspended fabric bags surrounded by an outer shell. Exhaust gases pass through the bags, and particles too large to fit through the pore spaces in the fabric are trapped on one side of the bag, while the exhaust gas continues on to the stack. The particles collected by the bags are then emptied into a hopper located at the bottom of the unit at preset intervals.

ESPs/WESPs

ESPs work by charging particles in the exhaust stream with a high voltage, oppositely charging a collection surface where the particles accumulate, removing the collected dust by a rapping process, and collecting the dust in hoppers. In wet ESPs (WESPs), the collectors are either intermittently or continuously washed by a spray of liquid, usually water. Instead of collection hoppers, a drainage system is used.

Wet Scrubbers

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.

(2) Eliminate Infeasible Control Options

Multicyclones

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. Also, in the Department's experience, multicyclones work poorly in conditions where there is high moisture content and low stack gas temperature such as is expected in this equipment. Therefore, the use of multicyclones on the paper machines is determined not to be technically or economically feasible.

Baghouses
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/WESPs
Dry ESPs are not technically feasible for very high moisture exhaust streams such as from paper machines.

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 feasible.

Wet Scrubbers
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 feasible.

(3) Ranking of Control Options

There are no control options for control of emissions of particulate matter from the paper machines and pulp dryer that are both technically and economically feasible.

(4) Determination

The Department finds 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 the 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 or propane 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 compound most often detected 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.

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 and R-12 Paper Machines are expected to continue producing coated, bleached products, but, like R-9, may potentially run unbleached pulp. R-15 Paper Machine will produce either unbleached or bleached products.

Therefore, the primary contributor to VOC emissions has been assumed to be the processing of unbleached kraft pulp and, where applicable, coatings.

(1) Identify Potential 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, usually activated carbon, where it is held by physical attraction. Periodically, VOC is desorbed from the solid (usually through heating) as part of an adsorbent regeneration cycle. The VOC is then condensed and recovered or thermally destroyed.

Biofiltration
Biofiltration is a less common 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.

Thermal Oxidation
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.

Low-VOC Coatings
The use of low-VOC content coatings reduces emissions of VOC by minimizing the amount of VOC added to the system.

(2) Eliminate Infeasible Control Options

Adsorption
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 VOC 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

Biofilters is most effective with 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 feasible for control of VOC from the paper machines and pulp dryer.

Thermal Oxidization

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 more than $100,000 per ton of pollutant removed[2]. Additionally, thermal oxidizers would require the burning of significant amounts of fuel to maintain temperatures to destroy VOC, resulting in 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.

Low-VOC Coatings

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 197.0 tpy.

(3) Ranking of Control Options

There are no add-on control options that are both technically and economically feasible for control of emissions of VOC from the paper machines and pulp dryer.

The use of low-VOC coatings is determined to be the only control option that is feasible for control of VOC from the paper machines and pulp dryer.

[2] Based on U.S. EPA Air Pollution Control Technology Fact Sheet (EPA-452/F-03-021) for thermal oxidizers dated July 15, 2003.

(4) Determination

The Department finds that an annual emission limit of 197.0 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[4] to account for the higher emissions from unbleached kraft. These calculation methods are considered conservative since many paper machine additives will react with the web substrate limiting VOC emissions to the unreacted portion only.

C. Bleach Plant

NDP has proposed relicensing the Unbleached Kraft Project to maintain the flexibility to produced bleached softwood kraft pulp. Because resuming the bleaching of softwood pulp will require the bleach plant to undergo physical and operational changes, it is also being considered modified equipment subject to a BACT analysis for the purposes of this license amendment.

1. Existing Equipment and Pollutants

NDP uses a three-stage continuous bleaching sequence consisting of (1) delignification with chlorine dioxide, (2) extraction with oxygen and hydrogen peroxide, and (3) delignification with chlorine dioxide. Both the hardwood and softwood sides of the bleach plant are equipped with two packed-bed scrubbers in series to remove residual chlorine and chlorine dioxide from the Bleach Plant exhausts. A weak caustic/white liquor solution is used as the scrubbing medium in the packed bed towers. Treated gases from the hardwood and softwood sides of the Bleach Plant vent to a combined stack.

The Bleach Plant has the potential to emit VOC, total reduced sulfur (TRS) compounds, chlorine, and chlorine dioxide. However, the Bleach Plant is not expected to operate differently than in the baseline years, and the only pollutant emitted by the Bleach Plant

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

for which the Unbleached Kraft Project is expected to result in an emission increase is VOC. Therefore, VOC is the only pollutant subject to BACT. [06-096 C.M.R. ch. 115, § 4(A)(4)(d)]

2. BACT Findings

NDP submitted a BACT analysis for control of VOC emissions from the Bleach Plant.

Emissions of VOC from bleach plants vary depending on numerous factors including the wood species being bleached, the bleaching sequence used, and the amount of methanol entering the system based on the efficiency of the pulp washing system.

a. Identify Potential Control Options

A review of the RBLC and recent construction permits for similar projects did not yield any add-on control technologies applied to bleach plants specifically for the control of VOC.

The existing caustic scrubber system is not expected to significantly reduce VOC emissions. In addition, the majority of bleach plant vents tested for VOC and included in NCASI studies were downstream of similar scrubbers. Therefore, this technology is considered part of the Bleach Plant itself and was not included as potential control equipment in the BACT analysis.

Potential technologies for control of VOC emissions considered include adsorption, biofiltration, and thermal oxidation. These three technologies were described earlier in this license.

b. Eliminate Infeasible Control Options

<u>Adsorption</u>
While adsorption is commonly used to treat high volume, low concentration VOC gas streams, there are no known applications on bleach plant emissions. The large range of VOC contained in the exhaust from the Bleach Plant prevents refinement and reuse as an option. Carbon adsorption might be effective in controlling some of the individual VOC compounds, but it is unclear how many and to what extent. For these reasons, adsorption is considered an unproven technology for this application and therefore not technically feasible for control of VOC from the Bleach Plant.

<u>Biofiltration</u>
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 near the Bleach Plant. Additionally, the microbes in a bioreactor are

sensitive to temperature swings, loading levels, and changes in available moisture. The microbes could also be easily killed by an upset in the bleaching process. For all of these reasons, biofiltration is not considered technically feasible for control of VOC from the Bleach Plant.

Thermal Oxidization

Thermal oxidation is technically feasible. Based on the U.S. EPA Control Technology Fact Sheet (EPA-452/F-03-021) for thermal oxidizers and the Bleach Plant's total flow rate of 16,711 scfm, the estimated annualized cost to operate a thermal oxidizer ranges from $11,200 – $46,300 per ton of VOC controlled. It is assumed that the actual cost would be on the higher end of this range due to the additional fuel needed to heat the relatively cool moisture-laden exhaust stream. Therefore, thermal oxidation is not considered economically feasible for control of VOC from the Bleach Plant.

c. Ranking of Control Options

There are no control options that are both technically and economically feasible for control of emissions of VOC from the Bleach Plant. NDP has proposed an emission limit of 0.103 pounds per air-dried ton (lb/ADT) based on NCASI TB 973: *Compilation of Air Toxic and Total Hydrocarbon Emissions Data for Pulp and Paper Mill Sources*, dated February 2010.

d. Determination

The Department finds that an emission limit of 0.103 lb/ADT represents BACT for emissions of VOC from the Bleach Plant. Compliance shall be demonstrated through stack testing upon request by the Department.

3. Other Applicable Requirements

The Bleach Plant is subject to other applicable requirements pursuant to *National Emission Standards for Hazardous Air Pollutants from the Pulp and Paper Industry*, 40 C.F.R. Part 63, Subpart S and *Reasonably Available Control Technology for Facilities that Emit Volatile Organic Compounds,* 06-096 C.M.R. ch. 134. These requirements are already addressed in NDP's current Part 70 air emission license.

D. 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 (i.e., restarting softwood bleaching), as provided in 40 C.F.R. Part 70.5.

E. 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:

- Operating at the worst-case lb/hr emission limit for 8,760 hr/year for Power Boiler #3, Cogen Boilers #6 and #7, the Lime Kiln, Recovery Boiler C, Smelt Tank C, and R-10 Dryers #1 - #4;
- A heat input limit of 812,808 MMBtu/year for all building heaters combined;
- Worst-case emissions from the paper machines and pulp dryer as outlined in this license;
- Bleaching 540,200 ADBT/year of hardwood and softwood pulp[5];
- Operating each emergency stationary engine for 100 hr/year; and
- Operation of the Lime Kiln Auxiliary Drive for 8,760 hr/year.

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. That information is provided in the Order section of this license.

[5] This represents the most conservative (highest) scenario for hardwood and softwood bleach plant production (air-dried bleached tons).

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	–	–	–
Bleach Plant	–	–	–	–	–	27.8
Paper Machines & Pulp Dryer (combined)	15.0	33.7	–	–	–	197.0
R10 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
ClO_2 Emergency Generator	–	–	–	0.3	0.1	–
Total TPY	**819.1**	**741.9**	**2,916.1**	**5,078.4**	**3,632.9**	**319.2**

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).] An additional ambient air quality impact analysis is not required for this NSR license amendment.

This determination is based on information provided by the applicant regarding the licensed 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 NDP 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 Amendment A-214-77-20-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 all Conditions of NSR License A-214-77-18-A:

(1) **Softwood Bleach Plant**

A. NDP is licensed to resume operation of the Softwood Bleach Plant (A-Line).

B. The Bleach Plant shall not exceed a VOC emission limit of 0.103 lb/ADT. Compliance shall be demonstrated through stack testing upon request by the Department.

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

(2) **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 197.0 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 or propane in the R-10 Dryers and compliance with the visible emissions limit. [06-096 C.M.R. ch. 115, BACT]

2. Compliance with the visible emissions 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, BACT]

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, BACT]

(3) **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 $PM_{2.5}$ 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 10 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)]

(4) 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 (i.e., within 12 months of resuming bleaching of softwood pulp). [06-096 C.M.R. ch. 140 § 1(C)(8)]

The following are New Conditions:

(5) NDP shall notify the Department in writing within 30 days of resuming bleaching of softwood pulp. [06-096 C.M.R. ch. 115, BACT]

(6) If the Department determines that any parameter value pertaining to construction and operation of the 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, NDP may be required to submit additional information. Upon written request from the Department, NDP 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 9th DAY OF MAY, 2024.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____ for _____
MELANIE LOYZIM, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 4/5/2024
Date of application acceptance: 4/8/2024

Date filed with the Board of Environmental Protection:

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

FILED

MAY 09, 2024

State of Maine
Board of Environmental Protection