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-214-77-17-A**	**Departmental** **Findings of Fact and Order** **New Source Review** **NSR #17**

FINDINGS OF FACT

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

I. REGISTRATION

A. Introduction

FACILITY	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

Catalyst Paper Operations Inc. legally changed their name to ND Paper Inc. (NDP) in September 2018. NDP has requested a New Source Review (NSR) license to construct and operate a new 600 metric ton per day recycled pulp facility and associated boiler (#8 Power Boiler). The project also includes the permanent shutdown of #3 Power Boiler as well as physical modifications to the R-10, R-12, and R-15 paper machines and the R-9 pulp dryer. Throughout this license, this work will be referred to collectively as the Recycle Pulp Project.

Additionally, NDP has requested removal of NSR conditions associated with a previously licensed Tissue Machine Project. The equipment associated with air emission license A-214-77-14-A (issued 6/30/2017) was never installed and this project is beyond the 18-month window to commence construction. This license removes the equipment and conditions associated with that project.

C. Emission Equipment

The following new equipment is addressed in this NSR license:

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

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:

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) 110 (natural gas)	350 ton/day CaO	#6 fuel oil, natural gas, LVHCs	Wet Scrubber	KILN

Process Equipment

Equipment	Production Rate	Pollution Control Equipment	Stack #
Groundwood Operation	250 ADTUBP/day	–	fugitive
Smelt Tank C	4.4 MMlb BLS/day	2 Venturi Scrubbers	CR15, 18
Lime Slaker	1,050 gpm	Static Scrubber	LK16

D. Definitions

1-hour block average basis means demonstrating compliance by averaging three (3) one-hour performance test runs conducted in accordance with the appropriate test method as approved by the Department.

E. Acronym List

The following acronyms and units of measurement are used in this license:

ADSTPD	air dried short ton per day
ADT	air dried ton
ADTUBP	air dried ton of unbleached pulp
AGL	above ground level
BACT	Best Available Control Technology
BAE	Baseline Actual Emissions
BLS	Black Liquor Solids
BPT	Best Practical Treatment
° C	degrees Celsius
C.F.R.	Code of Federal Regulations
CEDRI	Compliance and Emissions Data Reporting Interface
CEMS	Continuous Emissions Monitoring System
C.M.R.	Code of Maine Rules
CMS	Continuous Monitoring System
CO	Carbon Monoxide
CO_2e	Carbon Dioxide equivalent
COMS	Continuous Opacity Monitoring System
EPA or US EPA	United States Environmental Protection Agency
ESP	Electrostatic Precipitator
° F	degrees Fahrenheit
FGR	Flue Gas Recirculation

GHG	Greenhouse Gases
gpm	gallons per minute
HCl	Hydrogen Chloride
Hg	Mercury
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutants
lb	pound
lb/hr	pound per hour
lb/MMBtu	pound per million British thermal units
LNB	low NOx burner
M.R.S.	Maine Revised Statutes
MMBtu	Millions of British Thermal Units
MMBtu/hr	Million British Thermal Units per hour
MMlb BLS/day	Million Pounds of Black Liquor Solids per Day
MTPD	metric ton per day
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NH_3	Ammonia
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	New Source Review
O_2	Oxygen
OCC	old corrugated container
PAE	Projected Actual Emissions
PM	Particulate Matter less than 100 microns in diameter
PM_{10}	Particulate Matter less than 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
ppmdv	parts per million by volume on a dry basis
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RACT	Reasonably Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
RTO	Regenerative Thermal Oxidizer
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulfur Dioxide
ton/hr	ton per hour

ton/yr	ton per year
tpy	ton per year
ULNB	ultra low NOx burner
VOC	Volatile Organic Compounds
WESP	Wet Electrostatic Precipitator

F. Recycle Pulp 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.

NDP proposes to add a new 600 metric ton per day (MTPD) recycled pulp operation. The recycled pulp plant will consist of a stock prep area in which recycled paper is unbaled and fed via conveyor into an open top pulping unit similar to a hydropulper. Within the pulper, the recycled paper is mixed with hot water by a central agitator to create a pulp slurry. No steam is required during the hydropulping process. The slurry then passes through a series of cleaning stages that consist of high-density cleaners, coarse screens, fine screens, and a disc filter prior to storage of the pulp in a pulp chest. The process will not include any de-inking.

The pulping and cleaning process will separate non-fiber and fibrous non-pulpable materials as rejects. Some of the reject stream will be sent to the NDP landfill, an off-site licensed disposal facility, and/or an off-site licensed incineration facility. However, a portion of the reject stream will include organic/fibrous material not suitable for pulping but similar to NDP's wastewater treatment plant sludge. NDP intends to mix these rejects with the wastewater treatment plant sludge and burn them in Cogen Boilers #6 and #7 to recover the heating value of the material. This material is not considered a solid waste when burned in the facility's boilers[1], as it is considered paper recycling residuals generated from the recycling of corrugated containers combusted in boilers designed to burn solid fuel per *Solid Wastes Used as Fuels or Ingredients in Combustion Units*, 40 C.F.R. Part 241, § 241.4(a)(6). Additionally, combustion of the OCC rejects in Boilers #6 and #7 will not result in any emissions increases from this equipment, as the OCC rejects will simply offset the use of other similar fuels.

Wastewater from the stock prep process will be pre-treated in an anaerobic digester prior to treatment at the mill's wastewater treatment plant. NDP intends to thermally oxidize the biogas generated in the digester in a dedicated 8.5 MMBtu/hr flare. Alternatively, NDP may combust the digester gas in the facility's boilers or lime kiln.

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

The majority of the recycled pulp will be used on R-12. The R-12 Paper Machine is currently configured to generate coated and uncoated paper, but will be physically modified to generate linerboard and other uncoated products. A portion of the recycled pulp may also be used in the R-9 Pulp Dryer.

The R-10 and R-15 Paper Machines and the R-9 Pulp Dryer will also be physically modified to improve quality and efficiency and to increase the current production capacity of each unit. This increase in production capacity will allow kraft and groundwood pulp produced by the mill and displaced from R-12 to continue to be fully utilized across the machines on-site. After the project, the mill will have the flexibility to fully utilize the facility's combined pulp production and take better advantage of market opportunities. There will be no increase in existing kraft and groundwood pulp production capacity as a result of the project.

Although the Recycle Pulp Project will increase the thermal efficiency of each machine, additional steam will be required due to the planned increase in production. NDP proposes to construct and operate a new 453 MMBtu/hr natural gas-fired boiler (#8 Power Boiler). The #8 Power Boiler will replace #3 Power Boiler and will exhaust through the same stack previously used by #3 and #5 Power Boilers.

G. 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 modified or 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.

BAE for new equipment (i.e., #8 Power Boiler and Digester Flare) are considered to be zero for all pollutants.

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	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	62.23
R-15	6.73	15.14	15.14	0.00	0.00	0.00	62.23
#3 Power Boiler	0.32	0.61	0.61	0.52	32.68	9.77	1.11
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	0.00	0.00	23.23
Lime Slaker	0.27	0.27	0.27	0.00	0.00	0.00	8.38
Groundwood Mill	0.00	0.00	0.00	0.00	0.00	0.00	23.25
Total	**154.37**	**213.72**	**197.15**	**98.04**	**647.24**	**468.18**	**209.78**

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 and downstream activities, such as increased usage of pulp mill equipment.

New emission units (#8 Power Boiler and Digester Flare) must use potential to emit emissions for projected actual emissions.

The paper machines and pulp dryer are physically modified equipment. PAE from this equipment were based on NDP's estimates of the maximum annual production rate of each machine following implementation of the project. PAE for VOC from the paper machines and pulp dryer were estimated based on a future production scenario that NDP has identified as the scenario that likely leads to the highest levels of emissions. A source-specific emission factor (in lb VOC/ADT) was developed based on the VOC content of actual chemicals and additives used on the machines over a recent 1-year period and assuming that 100% of the VOC is volatilized and emitted.

The product grades projected to run on R-12 will be derived primarily from recycled pulp and unbleached kraft pulp. Unbleached kraft pulp typically has a higher VOC content than the bleached kraft grades currently run on these machines because the methanol constituent is washed out of the pulp during the bleaching process. Therefore, NDP developed a composite emission factor for the product to be run on R-12 based on 30% unbleached kraft pulp and 70% recycled pulp.

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 National Council for Air and Stream Improvement (NCASI) Technical Bulletin 942.

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 #6 fuel oil and natural gas needed to be fired based on an average ratio of fuel use to CaO processed over calendar years 2014 through 2018.

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.

PAE from the Groundwood Mill were based on these units operating at a target maximum annual production capacity of 65,700 ADT/year.

The #3 Power Boiler will be decommissioned as part of this project. Since #3 Power Boiler 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	0.00	0.00	0.00	0.00	0.00	0.00	2.27
R-10	5.09	11.13	11.13	0.02	3.41	0.72	57.98
R-12	1.99	6.97	5.97	0.00	0.00	0.00	35.84
R-15	7.16	16.11	16.11	0.00	0.00	0.00	66.22
#3 Power Boiler	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovery Boiler C	90.15	133.63	119.21	96.15	556.92	489.39	16.21
Lime Kiln	27.60	31.09	30.45	2.68	132.71	2.78	2.48
Smelt Tank C	33.37	32.68	29.95	6.03	0.00	0.00	24.93
Lime Slaker	0.31	0.31	0.31	0.00	0.00	0.00	9.56
Groundwood Mill	0.00	0.00	0.00	0.00	0.00	0.00	36.14
#8 Power Boiler	5.95	5.95	5.95	1.98	65.48	73.41	10.71
RP Digester Flare	0.10	0.42	0.42	2.38	2.53	4.60	0.30
Total	**171.72**	**238.29**	**219.50**	**109.24**	**761.05**	**570.90**	**262.64**

3. Emission Adjustments

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. 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 or operational 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 Recycle Pulp 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	6.26	9.32	8.32	6.18	60.10	33.63	0.38
Lime Kiln	1.91	2.26	2.22	0.35	16.58	0.36	0.32
Smelt Tank C	2.28	2.23	2.05	0.41	0.00	0.00	1.70
Lime Slaker	0.04	0.04	0.04	0.00	0.00	0.00	1.18
Groundwood Mill	0.00	0.00	0.00	0.00	0.00	0.00	12.88
Total	**10.49**	**13.85**	**12.63**	**6.94**	**76.68**	**33.99**	**16.46**

4. Emissions Increases

Emissions increases are calculated by subtracting BAE and excludable emissions from the PAE. The emissions 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	154.37	171.72	10.49	6.86	25
PM_{10}	213.72	238.29	13.85	10.72	15
$PM_{2.5}$	197.15	219.50	12.63	9.72	10
SO_2	98.04	109.24	6.94	4.26	40
NO_x	647.24	761.05	76.68	37.13	40
CO	468.18	570.90	33.99	68.73	100
VOC	209.78	262.64	16.46	36.40	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 addressed in this NSR license as the Recycle Pulp Project.

6. Future Project Emissions Reporting

   NDP estimated PAE for all modified and affected emission units in accordance with the procedure specified in 40 C.F.R. §§ 52.21(b)(41)(ii)(a) through (c).

   In circumstances where PAE are calculated as described above and there is a reasonable possibility that a project that is not a major modification may result in a significant emissions increase of an NSR pollutant(s), the facility must monitor, calculate, and maintain a record of the annual emissions (in ton per year on a calendar year basis) of the emissions of those NSR pollutant(s) from emission units that are part of the project. [40 C.F.R. § 52.21(r)(6)]

   Because the estimated PAE (inclusive of those emissions excluded as demand growth) sum to at least 50 percent of the significant emission increase levels for PM_{10}, $PM_{2.5}$, NO_x, CO, and VOC, there is a reasonable possibility that the Recycle Pulp Project could result in a significant emissions increase of those pollutants. [40 C.F.R. § 52.21(r)(6)(vi)(a)]

   Since the project involves increasing the design capacity and/or potential to emit from the pulp dryer and paper machines, 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)(iii)]

   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:

   a. The facility name, address, and phone number;
   b. The annual emissions for the project; and
   c. 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)]

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. Recycled Paper Pulping Facility

NDP proposes to add a new 600 metric ton per day (MTPD) recycled pulp operation. The recycled pulp plant will consist of a stock prep area in which recycled paper is unbaled and fed via conveyor into an open top pulping unit similar to a hydropulper. Within the pulper, the recycled paper is mixed with hot water by a central agitator to create a pulp slurry. No steam is required during the hydropulping process. The slurry then passes through a series of cleaning stages that consist of high-density cleaners, coarse screens, fine screens, and a disc filter prior to storage of the pulp in a pulp chest. The process will not include any de-inking.

Hydropulpers, repulpers, and pulp handling processes are considered insignificant activities per 06-096 C.M.R. ch. 115, Appendix B, Section A(84). Therefore, this equipment is mentioned here for completeness and informational purposes only.

C. Pulp Dryer and Paper Machines

1. R-9 Pulp Dryer

The R-9 Pulp Dryer currently has the capacity to dry approximately 390 ADSTPD of pulp using primarily steam-heated dryer cans. NDP has proposed rebuilding R-9 Pulp Dryer to achieve a higher production capacity of approximately 600 ADSTPD. This increased capacity will allow for the consumption of all available kraft, groundwood, and recycle pulp and allow the mill to maintain pulp production when one or more paper machines is down. The project includes modification/replacement of the fiber supply equipment, press section, and dryer section of the machine.

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. NDP has proposed to increase the capacity of R-10 Paper Machine by installing a new shoe press, headbox, and reconfiguration of the top former.

The shoe press 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 as the current burners are sized sufficiently to support this project. Although there may be an increase in natural gas consumption due to increased usage, since these units are not being physically 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 linerboard and other related grades, as well as uncoated paper. The project includes modifications to stock preparation, the headbox, top former, press section, dryer section, hood system, size press, and winder. The project also includes the installation of a shoe press and starch storage silo. (See R-10 Paper Machine section for a description of a shoe press.) The R-12 Paper Machine will primarily use recycled pulp from the new Recycled Paper Pulping Facility, but it may also use bleached and unbleached kraft pulp on some product grades.

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 to increase the capacity of R-15 Paper Machine by installing a new shoe press and press frame as well as making coating system improvements. (See R-10 Paper Machine section for a description of a shoe press.)

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. 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 rapped mechanically to dislodge the PM at preset intervals 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 US EPA's RACT-BACT-LAER Clearinghouse (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. 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:

Pollutant	Unit	Emission Limit (lb/ADT)
PM	R-10, R-15 [each]	0.04
	R-12	0.02
PM_{10}	R-10, R-15 [each]	0.09
	R-12	0.07
$PM_{2.5}$	R-10, R-15 [each]	0.09
	R-12	0.06

These emission limits are based on emission factors published in NCASI Technical Bulletin 942. Emissions for R-10 and R-15 are based on emission factors for all paper production types. Emissions for R-12 are based on emission factors for linerboard production.

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 machines and dryers and may be released as the water is removed from the sheet. 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.

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. 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 162.0 tpy.

The Department finds that an annual emission limit of 162.0 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. Emissions shall be calculated based on actual chemical use assuming that 100% of the VOC is volatilized and emitted. When unbleached kraft pulp is used on R-12 Paper Machine, NDP shall calculate emissions from this machine based on an emission factor of 0.51 lb/ADT 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.

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. Limits are on a 1-hour block average basis unless otherwise stated.

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	0.02 lb/ADT	
	PM_{10}	0.07 lb/ADT	
	$PM_{2.5}$	0.06 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	162.0 tpy	

D. #8 Power Boiler

NDP proposes to install a new boiler (#8 Power Boiler) and associated 15 MW back pressure turbine. The #8 Power boiler will have a maximum heat input capacity of 453 MMBtu/hr and fire only pipeline natural gas.

The #8 Power Boiler will replace the existing #3 Power Boiler which fires #6 fuel oil and/or natural gas. The #8 Power Boiler will satisfy the new steam demand resulting from the Recycle Pulp Project. Additionally, it is capable of supplying more steam than required by the project which will provide additional flexibility for satisfying overall mill steam demand such as during boiler outages or other peak demand periods.

The #8 Power Boiler will exhaust through the same stack that previously served both #3 and #5 Power Boilers.

1. Best Available Control Technology (BACT)

   The following is a summary of the BACT determination for #8 Power Boiler by pollutant.

   a. Particulate Matter: $PM/PM_{10}/PM_{2.5}$

      The principle components of the particulate matter emissions from #8 Power Boiler include filterable and condensable particulate matter from incomplete combustion. Natural gas tends to have typically low emissions of filterable PM. Potential control technologies include baghouses, electrostatic precipitators (ESP), wet scrubbers, and multicyclones.

      Baghouses
      Baghouses consist of a number of fabric bags placed in parallel that collect particulate matter on the surface of the filter bags as the exhaust stream passes through the fabric membrane. The collected particulate is periodically dislodged from the bags' surface to collection hoppers via short blasts of high-pressure air, physical agitation of the bags, or by reversing the gas flow. Baghouse systems are capable of PM filterable collection efficiencies greater than 98%. A baghouse is a technically feasible option for control of PM from #8 Power Boiler.

      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. ESP/WESP systems are capable of PM filterable collection efficiencies up to 98%. An ESP/WESP is a technically feasible option for control of PM from #8 Power Boiler.

Multicyclones

Mechanical separators include cyclonic and inertial 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 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 – 90% for PM_{10} and zero to 40% for $PM_{2.5}$. The use of multicyclones is considered a technically feasible option for the control of PM emissions from #8 Power Boiler.

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. Wet scrubbers typically have removal efficiencies of 90 – 99% for emissions of PM_{10} and significantly lower efficiencies for $PM_{2.5}$ (as low as 50% for spray tower scrubbers). High-efficiency scrubbers such as venturi scrubbers can be used to achieve greater removal efficiencies for $PM_{2.5}$ of greater than 99% due to the high velocities and pressure drops at which they operate. A wet scrubber is a technically feasible option for control of PM from #8 Power Boiler.

BACT Determination for Particulate Matter

A search of the RBLC did not identify any particulate matter control technologies in use on natural gas-fired boilers similar to #8 Power Boiler. Although each of the control options listed above is technically feasible, uncontrolled emissions of particulate matter from #8 Power Boiler are estimated to be no more than 6 tpy. Even assuming 100% control from the most cost effective option (multicyclones), the cost of control would still exceed $100,000/ton. Therefore, additional controls for particulate matter from #8 Power Boiler are determined not to be economically feasible.

The Department finds the firing of natural gas and the following emission limits to represent BACT for particulate matter emissions from #8 Power Boiler:

Units	PM	PM_{10}	$PM_{2.5}$
lb/MMBtu	0.003	–	–
lb/hr	1.36	1.36	1.36

These standards apply at all times. Upon request by the Department, compliance with the particulate matter limits shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 5 or other method as approved by the Department.

Visible emissions from #8 Power Boiler shall not exceed 10% opacity on a six-minute block average basis. Compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 9 upon request by the Department.

b. Sulfur Dioxide: SO_2

Emissions of SO_2 from #8 Power Boiler are attributable to the oxidation of sulfur compounds contained in the fuel. Pollution control options to reduce SO_2 emissions include flue gas desulfurization by means of wet scrubbing and firing fuels with an inherently low sulfur content, such as natural gas.

<u>Flue Gas Desulfurization</u>
Flue gas desulfurization by means of wet scrubbing works by injecting a caustic solution into the scrubber unit to react with the SO_2 in the flue gas to form a precipitate and either carbon dioxide or water. Flue gas desulfurization by means of wet scrubbing can have control efficiencies upwards of 90%. The #8 Power Boiler will exhaust through a stack already equipped with a wet venturi scrubber. However, operation of the scrubber is very energy intensive due to the pressure differential created. Although technically feasible, uncontrolled emissions of SO_2 from #8 Power Boiler are estimated to be less than 2.0 tpy. Therefore, operation of a flue gas desulfurization for control of SO_2 from #8 Power Boiler is determined to not be economically feasible.

<u>BACT Determination for SO_2</u>
The Department finds the use of natural gas, which inherently has a low sulfur content, and an emission limit of 0.45 lb/hr represent BACT for SO_2 emissions from #8 Power Boiler. This standard applies at all times.

Compliance with the SO_2 limit is based on monthly recordkeeping of the amount of natural gas fired in #8 Power Boiler and the most recent tariff sheet showing the sulfur content of the natural gas fired.

c. Nitrogen Oxides: NO_x

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

Control of NO_x emissions can be accomplished through one of three methods: the use of add-on controls, such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR), the use of combustion control techniques, such as low excess air firing, low NO_x burners (LNBs), ultra-low NO_x burners (ULNBs), water/steam injection, and flue gas recirculation (FGR), and the combustion of clean fuel, such as natural gas.

<u>SCR</u>

SCR employs the reaction of NO_x with ammonia in the presence of a catalyst to produce nitrogen and water. The reduction is considered “selective” because the catalyst selectively targets NO_x reduction in the presence of ammonia within a temperature range of approximately 480 ºF to 800 ºF, according to the following reactions:

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

SCR systems have typical control efficiencies between 70 – 90%. SCR is considered technically feasible for control of NO_x emissions from #8 Power Boiler.

Capital costs for SCR systems are significantly higher than other types of NO_x control due to the large volume of catalyst that is required. Operation and maintenance costs are driven by reagent usage, catalyst replacement, and increased electrical power usage. Based on EPA’s Air Pollution Control Cost Estimator Spreadsheet for SCR (June 2019), the cost of control using an SCR system compared to the next highest level of control (LNBs and FGR) was estimated to be \$19,000 per ton of NO_x removed. Therefore, operation of an SCR system for control of NO_x from #8 Power Boiler is determined to not be economically feasible.

SNCR

SNCR is a method of post combustion control that selectively reduces NO_x into nitrogen and water vapor by reacting the exhaust gas with a reagent such as ammonia or urea, similar to SCR. However, in SNCR, a catalyst is not used to lower the activation temperature of the NO_x reduction reaction. Therefore, SNCR is used when flue gas temperatures are between 1600 ºF and 2100 ºF. The NO_x reduction efficiency decreases rapidly at temperatures outside this optimum temperature window which results in excessive unreacted ammonia slip and increased NO_x emissions.

The reagent solution (either ammonia or urea) is typically injected along the post-combustion section of the boiler. Injection sites must be optimized for reagent effectiveness and must balance residence time with flue gas stream temperature. The potential for unreacted ammonia slip emissions is greater with SNCR than with SCR and the overall NO_x reduction is less. SNCR systems have typical control efficiencies between 30 – 75%.

For boilers with a large turndown ratio, such as package boilers, it is nearly impossible to inject the reagent at a location where the temperature remains in the reaction window for all modes of operation. Additionally, to ensure proper mixing of the reagent with flue gas, a large amount of wall space is needed for installation of the injectors and a large furnace volume is needed to ensure adequate residence time for the reaction to occur. This is not possible for package boilers, such as #8 Power Boiler, as they have a very small equipment footprint and lack the size/volume necessary to ensure an efficient reduction reaction. Therefore, operation of an SNCR system for control of NO_x from #8 Power Boiler is determined to not be technically feasible.

LNBs/ULNBs

LNBs reduce NO_x by accomplishing combustion in stages which delays the combustion process resulting in a cooler flame that suppresses thermal NO_x formation. While the technology varies between manufacturers, LNBs typically target emission levels around 30 ppmdv at 3% O_2. LNBs are a technically feasible option for control of NO_x from #8 Power Boiler.

ULNBs typically employs rapid mixing of gaseous fuel with air near the burner exit. ULNBs typically target emission levels around 9 ppmdv at 3% O_2. Rapid mixing virtually eliminates prompt NO_x formation and promotes complete fuel combustion. However, the high amounts of excess air used in rapid mix burners reduces boiler efficiency. In addition, this type of burner configuration does not allow for high turndown ratios. NDP does not plan to use #8 Power Boiler in a base-load configuration, and the boiler will modulate frequently in response to changes in mill steam demand. A high turndown ratio is required to operate this equipment as intended. Therefore, ULNBs are not a technically feasible option for control of NO_x from #8 Power Boiler as the project is currently defined.

FGR

FGR is a system where a portion of the flue gas is recirculated back into the main combustion chamber; this helps to decrease the formation of thermal NO_x by lowering the peak flame temperature and reducing the oxygen concentration surrounding the flame zone. The recycled flue gas consists of combustion products which act as inert heat sinks during combustion of the fuel/air mixture. This reduces NO_x emissions by two mechanisms. Primarily, the recirculated gas acts as a diluent to reduce combustion temperatures, lowering peak flame temperatures, thus suppressing thermal NO_x. In addition, the recirculated flue gas lowers the average oxygen concentration in the combustion zone, which lowers the oxygen available to react with nitrogen to form NO_x. FGR systems are capable of control efficiencies up to 75%. FGR is considered technically feasible for control of NO_x emissions from #8 Power Boiler.

Water/Steam Injections

Water/steam injection is the process of injecting water or steam into the combustion chamber to act as a thermal ballast in the combustion process. The ballast lowers the combustion temperature, minimizing thermal formation of NO_x. Water/steam injection can reduce NO_x emissions at a rate equivalent to flue gas recirculation and is technically feasible for the control of NO_x emissions from #8 Power Boiler.

BACT Determination for NO_x

NDP has proposed the installation and operation of LNBs and FGR to control NO_x from #8 Power Boiler. The Department finds the use of LNBs and FGR for control of NO_x emissions and the following emission limits to represent BACT for NO_x emissions from #8 Power Boiler:

Units	NO_x
ppmdv @ 3% O_2 (30-day rolling average)	27
lb/MMBtu (30-day rolling average)	0.033
lb/hr (24-hour block average)	14.95

These standards apply at all times. Compliance with the NO_x emission limits shall be demonstrated by operation of a NO_x CEMS on the individual exhaust from #8 Power Boiler.

d. Carbon Monoxide and Volatile Organic Compounds: CO & VOC

CO and VOC emissions are attributable to the incomplete combustion of organic compounds in the fuel. Emissions result when there is insufficient residence time or when there is insufficient oxygen available near the hydrocarbon molecule during combustion to complete the final step in oxidation. Combustion modifications taken to reduce NO_x emissions may result in increased emissions of CO. Pollution control options to reduce CO and VOC emissions include add-on technologies such as catalytic oxidation and thermal oxidizers as well as combustion controls.

<u>Catalytic Oxidation</u>
Catalytic oxidation is a post combustion control technology that has been used extensively with gas turbines and internal combustion engines. Catalysts are typically based on a noble metal and operate by decreasing the temperature at which oxidation of CO and VOC will occur. The catalyst lowers the activation energy necessary for CO to react with available oxygen in the exhaust to produce CO_2. Despite the decreased oxidation temperature, process exhaust gas must typically be preheated prior to contact with the catalyst bed. An oxidation catalyst is located within the heat recovery section of the system, or in a downstream location where the exhaust gases are reheated to meet the proper temperature environment. The operating temperature window of an oxidation catalyst is between approximately 600 °F and 800 °F. Catalytic oxidation is considered technically feasible for control of CO and VOC emissions from #8 Power Boiler.

A review of the RBLC did not find any boilers currently utilizing catalytic oxidation at similar sources. According to the US EPA Air Pollution Control Technology Fact Sheet (EPA-452/F-03-018) for catalytic incinerators, posted 7/15/03, the average annualized cost for a catalytic incinerator to control roughly 87,000 scfm of exhaust would be roughly $2,522,100. This would conservatively result in a cost of $35,000 per ton of CO controlled. The cost to control VOC would be significantly higher. Based on the combination of the cost per ton of pollutant controlled and the need to fire additional fuel to reheat the flue gas, the installation and operation of an oxidation catalyst for control of CO and VOC on #8 Power Boiler is determined to be economically infeasible and environmentally unjustified.

<u>Thermal Oxidation</u>
Thermal oxidizers reduce CO and VOC emissions by completing combustion and converting CO and other organic compounds to CO_2. Thermal oxidation has been reported to achieve up to 95% reduction of CO in the exhaust gas in some types of industrial facilities. Regenerative thermal oxidizers (RTOs) are designed to preheat the inlet emission stream with heat recovered from the incinerated exhaust gases. Gases entering the RTO are heated by passing through preheated beds packed with

a ceramic media. A gas burner brings the preheated emissions up to an incineration temperature between 788 °C and 871 °C (1450 °F – 1600 °F) in a combustion chamber with sufficient gas residence time to complete the combustion. Combustion gases then pass through a cooled ceramic bed where heat is extracted. By periodically reversing the flow through the beds, the heat transferred from the combustion exhaust air preheats the gases to be treated, thereby reducing auxiliary fuel requirements. Thermal oxidization is a technical feasible control technology for reducing CO and VOC emissions from the package boiler.

According to the US EPA Air Pollution Control Technology Fact Sheet (EPA-452/F-03-021) for RTOs, posted 7/15/03, the average annualized cost for an RTO to control roughly 87,000 scfm of exhaust will be roughly $2,304,670. This would conservatively result in a cost of $32,000 per ton of CO controlled. The cost to control VOC would be significantly higher. Based on the combination of the cost per ton of pollutant controlled and the need to fire additional fuel to reheat the flue gas, the installation and operation of a thermal oxidizer for control of CO and VOC on #8 Power Boiler is determined to be economically infeasible and environmentally unjustified.

Oxygen Trim

Oxygen trim systems monitor the amount of oxygen in the exhaust gas and adjust the inlet flow of combustion air in order to achieve an optimum air-to-fuel ratio. By monitoring the oxygen level in the exhaust gas, fine adjustments can be applied to the combustion air ratio to compensate for combustion variables such as barometric pressure change, air humidity, and variances in fuel quality. If insufficient combustion air is available in the combustion chamber, incomplete combustion occurs, resulting in increased CO and VOC emissions. An oxygen trim system ensures adequate combustion air is present for complete combustion. Use of an oxygen trim system is considered technically feasible for control of CO and VOC emissions from #8 Power Boiler.

BACT Determination for CO and VOC

The Department finds the use of an oxygen trim system and emission limits of 16.76 lb/hr for CO and 2.45 lb/hr for VOC represent BACT for CO and VOC emissions from #8 Power Boiler.

These standards apply at all times. Upon request by the Department, compliance shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or 19 (CO) and Method 25A (VOC) or other method as approved by the Department.

2. New Source Performance Standards (NSPS): 40 C.F.R. Part 60, Subpart Db

The #8 Power Boiler is subject to the New Source Performance Standards (NSPS) titled *Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units*, 40 C.F.R. Part 60, Subpart Db. These standards apply to steam generating units with a heat input capacity of 100 MMBtu/hr or more that are constructed after June 9, 1984. The #8 Power Boiler is a unit that fires natural gas.

A summary of the currently applicable 40 C.F.R. Part 60, Subpart Db requirements for #8 Power Boiler is listed below.

a. Notification

NDP shall submit to EPA and the Department notification of the date of initial startup of #8 Power Boiler which includes the design heat input capacity of the boiler, the fuels to be combusted, and the annual capacity factor at which the boiler is anticipated to be operated. [40 C.F.R. § 60.49b(a)]

b. Standards

(1) The #8 Power Boiler will fire only natural gas. As such, it is exempt from the SO_2 emission limits of Subpart Db.
[40 C.F.R. § 60.42b(k)(2)]

(2) The #8 Power Boiler will fire only natural gas. As such, there are no applicable PM emission limits in Subpart Db.

(3) The #8 Power Boiler shall not exceed a NO_x emission limit of 0.20 lb/MMBtu on a 30-day rolling average basis. [40 C.F.R. §§ 60.44b(a) and (i)]

(4) The NO_x emission standard applies at all times (including periods of startup, shutdown, and malfunction.) [40 C.F.R. §§ 60.44b(h) and 60.46b(a)]

c. Compliance and Monitoring Requirements

(1) NDP shall demonstrate initial compliance within 30 days after achieving the maximum production rate at which #8 Power Boiler will be operated but not later than 180 days after the initial start-up of the boiler. [40 C.F.R. § 60.8(a)]

(2) The #8 Power Boiler will fire only natural gas. Therefore, NDP is not required to install and operate a Continuous Opacity Monitoring System (COMS) on #8 Power Boiler. [40 C.F.R. § 60.48b(j)(2)]

(3) NDP shall install, calibrate, maintain, and operate a NO_x CEMS and O_2 CEMS on the exhaust of #8 Power Boiler and shall record the output of the system. [40 C.F.R. § 60.48b(b)(1)]

(4) Initial performance testing for NO_x shall be conducted using the NO_x CEMS. For the initial compliance test, NO_x shall be monitored for 30 successive steam generating unit operating days and the 30-day average emission rate shall be used to determine compliance with the NO_x emission standard. The 30-day average emission rate is calculated as the average of all hourly emissions data recorded by the monitoring system during the 30-day test period. [40 C.F.R. § 60.46b(e)]

(5) NDP shall demonstrate continuous compliance with the ppmdv and lb/MMBtu NO_x emission limits on a continuous basis through the use of a 30-day rolling average emission rate. A new 30-day rolling average emission rate is calculated each steam generating unit operating day as the average of all the hourly NO_x emission data for the preceding 30 steam generating unit operating days. [40 C.F.R. § 60.6b(e)(3) and 06-096 C.M.R. ch. 115, BPT]

(6) The NO_x and O_2 CEMS shall be operated and data recorded during all periods of operation of #8 Power Boiler except for CEMS breakdowns and repairs. Data shall be recorded during calibration checks and zero and span adjustments. [40 C.F.R. § 60.48b(c)]

(7) The 1-hour average NO_x emission rates measured by the NO_x CEMS shall be expressed in both ppmdv and lb/MMBtu heat input. [40 C.F.R. § 60.48b(d) and 06-096 C.M.R. ch. 115, BPT]

d. Recordkeeping

(1) NDP shall maintain records of the amounts of each fuel combusted during each day and calculate the annual capacity factor for the recording period. The annual capacity factor is determined on a 12-month rolling average basis with a new annual capacity factor calculated at the end of each calendar month. [40 C.F.R. § 60.49b(d)(1)]

(2) NDP shall maintain records of the NO_x monitoring information contained in 40 C.F.R. § 60.49b(g) for each operating day for #8 Power Boiler.

e. Reporting

(1) NDP shall submit excess emission reports for any excess emissions that occurred during the reporting period. [40 C.F.R. § 60.49b(h)]

(2) NDP shall submit reports containing the information recorded per 40 C.F.R. § 60.49b(g). [40 C.F.R. § 60.49b(i)]

(3) The reporting period is each 6-month period. All reports shall be submitted to EPA and to the Department and shall be postmarked by the 30th day following the end of the reporting period. [40 C.F.R. § 60.49b(w)]

3. National Emission Standards for Hazardous Air Pollutants (NESHAP): 40 C.F.R. Part 63, Subpart DDDDD

The #8 Power Boiler is subject to the *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*, 40 C.F.R. Part 63, Subpart DDDDD. The #8 Power Boiler will fire natural gas and will be considered a new boiler in the “units designed to burn gas 1 fuels” subcategory.

A summary of the currently applicable 40 C.F.R. Part 63, Subpart DDDDD requirements for #8 Power Boiler is listed below.

a. Compliance Date
The #8 Power Boiler must comply with the requirements of 40 C.F.R. Part 63, Subpart DDDDD upon startup. [40 C.F.R. § 63.7495(a)]

b. Initial Compliance Requirements

(1) Boilers in the “units designed to burn gas 1 fuels” subcategory are not subject to the emission limits in Tables 1 and 2 or 11 through 13 or the operating limits in Table 4. [40 C.F.R. § 60.7500(e)]

(2) Fuel analyses are not required for boilers that fire a single type of fuel. [40 C.F.R. § 63.7510(a)(2)(i)]

(3) Initial compliance shall be demonstrated by completing the required initial tune-up within 61 months of the initial startup of #8 Power Boiler. [40 C.F.R. §§ 63.7510(g) and 63.7515(d)]

c. Continuous Compliance Requirements

(1) At all times, NDP must operate and maintain #8 Power Boiler, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. [40 C.F.R. § 63.7500(a)(3)]

(2) NDP has proposed operation of an oxygen trim system as part of the BACT analysis for #8 Power Boiler. Therefore, NDP shall demonstrate continuous compliance by performing tune-ups on #8 Power Boiler every 5 years as specified in §§ 63.7540(a)(10)(i) through (vi). Each tune-up must be conducted no more than 61 months after the previous tune-up. NDP may delay the burner inspection specified in § 63.7540(a)(10)(i) until the next scheduled or unscheduled unit shutdown, but the burner shall be inspected at least once every 72 months. [40 C.F.R. §§ 63.7515(d) and 63.7540(a)(12)]

(3) If #8 Power Boiler is not operating on the required date for a tune-up, the tune-up must be conducted within 30 calendar days of startup.
[40 C.F.R. § 63.7540(a)(13)]

(4) The oxygen level shall be set no lower than the oxygen concentration measured during the most recent tune-up. [40 C.F.R. § 63.7540(a)(12)]

d. Recordkeeping

(1) Records shall be kept for a period of 5 years. [40 C.F.R. § 63.7560(b)]

(2) Records shall be kept on-site, or be accessible from on site, for at least 2 years. Records may be kept off-site for the remaining 3 years. [40 C.F.R. § 63.7560(c)]

(3) NDP shall maintain records in accordance with 40 C.F.R. Part 63, Subpart DDDDD including, but not limited to, copies of notifications and reports submitted to comply with the subpart and any supporting documentation; [40 C.F.R. § 63.7555(a)(1)]

e. Notifications and Reports

NDP shall submit to the Department and EPA all notifications and reports required by 40 C.F.R. Part 63, Subpart DDDDD including, but not limited to, the following:

(1) An Initial Notification shall be submitted no later than 15 days after the date of startup of #8 Power Boiler. [40 C.F.R. § 63.7545(c)]

(2) NDP shall prepare and submit a compliance report every 5 years which contains the following information:

(i) Company and Facility name and address;
(ii) Process unit information, emissions limitations, and operating parameter limitations;
(iii) Date of report and the beginning and ending dates of the reporting period;
(iv) Date of the most recent tune-up and date of the most recent burner inspection if not conducted with the tune-up;
(v) Statement by a responsible official with that official's name, title, and signature, certifying the truth, accuracy, and completeness of the content of the report.

[40 C.F.R. § 63.7550(c)(1)]

(3) The first compliance report covers the period beginning on the date of startup of #8 Power Boiler and ending on December 31 within 5 years after the startup of #8 Power Boiler. Subsequent compliance reports shall cover the 5-year period from January 1 through December 31 as applicable. Each compliance report shall be submitted or postmarked no later than January 31. [40 C.F.R. § 63.7550(b)]

(4) All reports required by 40 C.F.R. Part 63, Subpart DDDDD shall be submitted electronically to EPA via the Compliance and Emissions Data Reporting Interface (CEDRI). [40 C.F.R. § 7550(h)(3)]

4. Emission Limit Summary

Below is a summary of the applicable emission limits for #8 Power Boiler. The emission standards/limits apply at all times, including periods of startup, shutdown, and malfunction. Unless otherwise stated, limits are on a 1-hour block average basis demonstrated in accordance with the methods described herein or as required by the relevant standard.

Pollutant	Applicable Emission Limits	Origin and Authority
PM	0.003 lb/MMBtu	06-096 C.M.R. ch. 115, BACT
	1.36 lb/hr	
PM_{10}	1.36 lb/hr	06-096 C.M.R. ch. 115, BACT
$PM_{2.5}$	1.36 lb/hr	06-096 C.M.R. ch. 115, BACT
SO_2	0.45 lb/hr	06-096 C.M.R. ch. 115, BACT
NO_x	27 ppmdv @ 3% O_2 (30-day rolling average)	06-096 C.M.R. ch. 115, BACT
	0.20 lb/MMBtu (30-day rolling average)	40 C.F.R. §§ 60.44b(a) and (i)
	0.033 lb/MMBtu (30-day rolling average)	06-096 C.M.R. ch. 115, BACT
	14.95 lb/hr (24-hour block average)	
CO	16.76 lb/hr	06-096 C.M.R. ch. 115, BACT
VOC	2.45 lb/hr	06-096 C.M.R. ch. 115, BACT

E. Shutdown of #3 Power Boiler

The Recycle Pulp Project includes the permanent shutdown of #3 Power Boiler. NDP may continue to operate #3 Power Boiler for up to six months from first fire of #8 Power Boiler, after which, #3 Power Boiler will be taken out of service.

Although NDP does not intend to ever operate these two boilers simultaneously, until #8 Power Boiler is fully commissioned, NDP may want to keep #3 Power Boiler in a low operating mode in case it needs to be brought online quickly to maintain facility steam load. Therefore, during the six-month overlap when both boilers are operational, the total heat input to both boilers combined shall not exceed 600 MMBtu/hr on a 1-hour block average basis. This is equivalent to the combined maximum heat input of #3 Power Boiler and the previously licensed #5 Power Boiler which was the configuration for which the most recent modeling analysis was performed. Compliance shall be demonstrated by records of hourly fuel use to #3 Power Boiler and #8 Power Boiler (each). Records shall be kept starting with first fire of #8 Power Boiler, and this recordkeeping obligation shall end with the final shutdown of #3 Power Boiler.

F. Anaerobic Digester and Flare

Wastewater from the recycled pulp stock prep process will be pre-treated in an anaerobic digester (RP Digester) prior to treatment at the mill's wastewater treatment plant. Biogas from the RP Digester (digester gas) will contain primarily methane and carbon dioxide as well as VOC and small amounts of hydrogen sulfide (H_2S).

1. Best Available Control Technology (BACT)

Potential controls for VOC in the digester gas include catalytic oxidation and thermal oxidation. Both would destroy the VOC through oxidation to CO_2.

The digester gas will contain contaminants that would quickly poison a catalyst. Therefore, catalytic oxidation is determined not to be technically feasible.

Thermal oxidation may be accomplished through use of a flare or regenerative thermal oxidizer (RTO) or through combustion of the digester gas in the facility's boilers or lime kiln. Use of an RTO would require additional fuel to fire the burner. For this reason, it is considered not environmentally justified.

NDP has proposed thermally oxidizing the digester gas either in the #6 or #7 Power Boilers or the Lime Kiln, where it will offset usage of natural gas, or through use of a dedicated 8.5 MMBtu/hr flare. Both methods would destroy >98% of the VOC produced by the RP Digester without significant use of additional fuel combustion. Therefore, use of thermal oxidation to control VOC from the RP Digester is determined to be BACT for VOC from the RP Digester.

Combustion of the digester gas will convert any sulfur compounds, such as H_2S, to SO_2. NDP estimates the H_2S concentration of the digester gas will be less than 250 ppm based on data from similar units. Additional controls of SO_2 at this level is determined not to be economically feasible.

Although the digester gas may be combusted in #6 or #7 Power Boilers or the Lime Kiln or a dedicated flare, flare emissions represent the most conservative (highest) emission rates and have been used in calculating the project emissions.

The BACT emission limits for the RP Digester Flare are based on the following:

PM	–	1.9 lb/MMscf based on AP-42 Table 1.4-2 dated 7/98
$PM_{10}/PM_{2.5}$	–	7.6 lb/MMscf based on AP-42 Table 1.4-2 dated 7/98
SO_2	–	0.54 lb/hr based on an estimated H_2S concentration of 250 ppm
NO_x	–	0.068 lb/MMBtu based on AP-42 Table 13.5-1 dated 2/18
CO	–	84 lb/MMscf based on AP-42 Table 1.4-1
VOC	–	5.5 lb/MMscf based on AP-42 Table 1.4-2
Visible Emissions	–	06-096 C.M.R. ch. 115, BACT

All emission calculations assume a heating value for biogas of 680 Btu/scf.

The BACT emission limits for the RP Digester Flare are the following:

Unit	Pollutant	lb/MMBtu
RP Digester Flare	PM	0.003

Unit	PM (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
RP Digester Flare	0.02	0.10	0.10	0.54	0.58	1.06	0.07

Compliance with the emission limits for the flare shall be demonstrated by use of standardized emission factors, annual recordkeeping of the amount of digester gas fired, and annual testing of the digester gas H_2S concentration. NDP shall test the digester gas for H_2S within 180 days of startup and once per calendar year thereafter.

Visible emissions from the RP Digester Flare shall not exceed 10% opacity on a six-minute block average basis. Compliance shall be demonstrated by testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 9 upon request by the Department.

2. National Emission Standards for Hazardous Air Pollutants

"Other gas 1 fuels" are defined in 40 C.F.R. Part 63, Subpart DDDDD as a gaseous fuel that is not natural gas or refinery gas and does not exceed a maximum mercury concentration of 40 micrograms/cubic meter.

NDP may elect to fire gas from the RP Digester in the facility's boilers and process heaters designed to fire natural gas. However, prior to firing digester gas in any of the facility's boilers or process heaters subject to 40 C.F.R. Part 63, Subpart DDDDD, NDP shall perform a fuel specification analyses for mercury according to the procedures in

§§ 63.7521(g) through (i) in order to demonstrate that the digester gas meets the definition of "other gas 1 fuel." [40 C.F.R. § 63.7521(f)]

G. 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.

H. 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.

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	1,655.6	1,090.0	22.1
Cogen Boiler #7	82.8	82.8	772.6	1,655.6	1,090.0	22.1
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	--	--	--
R10 Air Floatation Dryers	15.2	15.2	0.1	19.6	2.7	0.7
Building Air Heaters	2.0	2.0	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
Groundwood Operations	--	--	--	--	--	36.0
#8 Power Boiler	6.0	6.0	2.0	65.5	73.4	10.7
RP Digester Flare	0.1	0.4	2.4	2.5	4.6	0.3
Total TPY	**744.5**	**648.9**	**2,578.9**	**4,620.5**	**3,448.0**	**121.7**

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).]

The only significant new source of emissions associated with this project is #8 Power Boiler. The #8 Power Boiler will exhaust through the stack previously used by #3 Power Boiler and #5 Power Boiler, both of which were included in the previous ambient air quality analysis. The #5 Power Boiler has been permanently shut down, and #3 Power Boiler will be permanently shut down following the commissioning of #8 Power Boiler. The #8 Power Boiler has a lower heat input than #3 and #5 Power Boilers combined and significantly lower emission limits. With all other modeling parameters being the same, the Department is confident that modeled impacts from#8 Power Boiler would not be any greater than those of #3 and #5 Power Boilers. Therefore, it has been determined that an updated ambient air quality analysis is not required for this NSR License.

ORDER

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

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

The Department hereby grants New Source Review License A-214-77-17-A pursuant to the preconstruction licensing requirements of 06-096 C.M.R. ch. 115 and subject to the standard and specific conditions below.

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

SPECIFIC CONDITIONS

Specific Condition (1) of NSR License A-214-77-14-A is Deleted, and approval to construct TM-1 and its associated dryers is revoked.

The following are New Conditions.

(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]:

Pollutant	Unit	Emission Limit (lb/ADT)
PM	R-10, R-15 [each]	0.04
	R-12	0.02
PM_{10}	R-10, R-15 [each]	0.09
	R-12	0.07
$PM_{2.5}$	R-10, R-15 [each]	0.09
	R-12	0.06

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 162.0 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. Emissions shall be calculated based on actual chemical use assuming that 100% of the VOC is volatilized and emitted. When unbleached kraft pulp is used on R-12 Paper Machine, NDP shall calculate emissions from this machine based on an emission factor of 0.51 lb/ADT to account for the higher emissions from unbleached kraft. [06-096 C.M.R. ch. 115, BPT]

(2) **#8 Power Boiler**

A. The #8 Power Boiler shall fire only natural gas. [06-096 C.M.R. ch. 115, BPT]

B. Control Equipment

1. NDP shall operate and maintain LNBs on #8 Power Boiler for control of NO_x during all times #8 Power Boiler is operating. [06-096 C.M.R. ch. 115, BPT]

2. NDP shall operate and maintain FGR on #8 Power Boiler for control of NO_x during all times #8 Power Boiler is operating except during periods of startup and shutdown. [06-096 C.M.R. ch. 115, BPT]

3. NDP shall operate and maintain an oxygen trim system on #8 Power Boiler for control of CO and VOC during all times #8 Power Boiler is operating.
[06-096 C.M.R. ch. 115, BPT]

C. Emission Limits and Standards

1. Emissions from #8 Power Boiler shall not exceed the following limits. These limits apply at all times (including periods of startup, shutdown, and malfunction). Unless otherwise stated, limits are on a 1-hour block average basis demonstrated in accordance with the methods described herein or as required by the relevant standard.

Pollutant	Applicable Emission Limits	Origin and Authority
PM	0.003 lb/MMBtu	06-096 C.M.R. ch. 115, BACT
	1.36 lb/hr	
PM_{10}	1.36 lb/hr	06-096 C.M.R. ch. 115, BACT
$PM_{2.5}$	1.36 lb/hr	06-096 C.M.R. ch. 115, BACT
SO_2	0.45 lb/hr	06-096 C.M.R. ch. 115, BACT
NO_x	27 ppmdv @ 3% O_2 (30-day rolling average)	06-096 C.M.R. ch. 115, BACT
	0.20 lb/MMBtu (30-day rolling average)	40 C.F.R. §§ 60.44b(a) and (i)
	0.033 lb/MMBtu (30-day rolling average)	06-096 C.M.R. ch. 115, BACT
	14.95 lb/hr (24-hour block average)	
CO	16.76 lb/hr	06-096 C.M.R. ch. 115, BACT

Pollutant	Applicable Emission Limits	Origin and Authority
VOC	2.45 lb/hr	06-096 C.M.R. ch. 115, BACT

2. Visible emissions from #8 Power Boiler shall not exceed 10% opacity on a six-minute block average basis. [06-096 C.M.R. ch. 101, § 3(A)(3)]

D. Compliance Demonstration

1. Upon request by the Department, compliance with the particulate matter limits shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 5 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BPT]

2. Compliance with the SO_2 limit is based on monthly recordkeeping of the amount of natural gas fired in #8 Power Boiler and the most recent tariff sheet showing the sulfur content of the natural gas fired. [06-096 C.M.R. ch. 115, BPT]

3. Compliance with the NO_x limits shall be demonstrated through use of a Continuous Emission Monitoring System (CEMS) which meets the performance specifications of 40 C.F.R. Part 60, Appendix B and F, 40 C.F.R. Part 75, Appendix A and B, and 06-096 C.M.R. ch. 117 as applicable. [06-096 C.M.R. ch. 115, BPT]

4. Upon request by the Department, compliance with the CO limit shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or 19 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BPT]

5. Upon request by the Department, compliance with the VOC limit shall be demonstrated through performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 25A or other method as approved by the Department. [06-096 C.M.R. ch. 115, BPT]

6. Upon request by the Department, 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. [06-096 C.M.R. ch. 115, BPT]

E. Periodic Monitoring

NDP shall operate, record data, and maintain records from the following periodic monitors for #8 Power Boiler:

1. Amount of natural gas fired in #8 Power Boiler on a daily basis. [40 C.F.R. § 60.49b(d)(1)].
2. The annual capacity factor for natural gas, on a 12-month rolling total basis, calculated at the end of each calendar month. [40 C.F.R. § 60.49b(d)(1)]
3. Records of the current tariff sheet showing the maximum total sulfur content of the natural gas fired. [06-096 C.M.R. ch. 115, BPT]

F. CEMS

1. NDP shall install, calibrate, maintain, and operate a NO_x CEMS and O_2 CEMS on the exhaust of #8 Power Boiler and shall record the output of the system. [40 C.F.R. § 60.48b(b)(1)]

2. NDP shall demonstrate continuous compliance with the ppmdv and lb/MMBtu NO_x emission limits on a continuous basis through the use of a 30-day rolling average emission rate. A new 30-day rolling average emission rate is calculated each steam generating unit operating day as the average of all the hourly NO_x emission data for the preceding 30 steam generating unit operating days. [40 C.F.R. § 60.6b(e)(3) and 06-096 C.M.R. ch. 115, BPT]

3. NDP shall demonstrate continuous compliance with the lb/hr NO_x emission limit on a continuous basis through the use of a 24-hour block average emission rate. [06-096 C.M.R. ch. 115, BPT]

4. The NO_x and O_2 CEMS shall be operated and data recorded during all periods of operation of #8 Power Boiler except for CEMS breakdowns and repairs. Data is recorded during calibration checks and zero and span adjustments. [40 C.F.R. § 60.48b(c)]

5. The 1-hour average NO_x emission rates measured by the NO_x CEMS shall be expressed in both ppmdv and lb/MMBtu heat input. [40 C.F.R. § 60.48b(d) and 06-096 C.M.R. ch. 115, BPT]

6. NDP shall maintain records of the NO_x monitoring information contained in 40 C.F.R. § 60.49b(g) for each operating day for #8 Power Boiler.

G. 40 C.F.R. Part 60, Subpart Db

Following are applicable requirements of 40 C.F.R. Part 60, Subpart Db not addressed elsewhere in this Order:

1. NDP shall submit to EPA and the Department notification of the date of initial startup of #8 Power Boiler which includes the design heat input capacity of the boiler, the fuels to be combusted, and the annual capacity factor at which the boiler is anticipated to be operated. [40 C.F.R. § 60.49b(a)]

2. NDP shall demonstrate initial compliance with the NO_x emission limits within 30 days after achieving the maximum production rate at which #8 Power Boiler will be operated but not later than 180 days after the initial start-up of the boiler. [40 C.F.R. § 60.8(a)]

3. Initial performance testing for NO_x shall be conducted using the NO_x CEMS. For the initial compliance test, NO_x shall be monitored for 30 successive steam generating unit operating days and the 30-day average emission rate used to determine compliance with the NO_x emission standard. The 30-day average emission rate is calculated as the average of all hourly emissions data recorded by the monitoring system during the 30-day test period. [40 C.F.R. § 60.46b(e)]

4. NDP shall submit excess emission reports for any excess emissions that occurred during the reporting period. [40 C.F.R. § 60.49b(h)]

5. NDP shall submit reports containing the information recorded per 40 C.F.R. § 60.49b(g). [40 C.F.R. § 60.49b(i)]

6. The reporting period is each 6-month period. All reports shall be submitted to EPA and to the Department and shall be postmarked by the 30th day following the end of the reporting period. [40 C.F.R. § 60.49b(w)]

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

Following are applicable requirements of 40 C.F.R. Part 63, Subpart DDDDD not addressed elsewhere in this Order:

1. Initial compliance with 40 C.F.R. Part 63, Subpart DDDDD shall be demonstrated by completing the required initial tune-up within 61 months of the initial startup of #8 Power Boiler. [40 C.F.R. §§ 63.7510(g) and 63.7515(d)]

2. At all times, NDP must operate and maintain #8 Power Boiler, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. [40 C.F.R. § 63.7500(a)(3)]

3. NDP shall demonstrate continuous compliance by performing tune-ups on #8 Power Boiler every 5 years as specified in §§ 63.7540(a)(10)(i) through (vi). Each tune-up must be conducted no more than 61 months after the previous tune-up. NDP may delay the burner inspection specified in § 63.7540(a)(10)(i) until the next scheduled or unscheduled unit shutdown, but the burner shall be inspected at least once every 72 months. [40 C.F.R. §§ 63.7515(d) and 63.7540(a)(12)]

4. If #8 Power Boiler is not operating on the required date for a tune-up, the tune-up must be conducted within 30 calendar days of startup. [40 C.F.R. § 63.7540(a)(13)]

5. The oxygen level shall be set no lower than the oxygen concentration measured during the most recent tune-up. [40 C.F.R. § 63.7540(a)(12)]

6. Recordkeeping

   a. Records shall be kept on site, or be accessible from on site, for at least 2 years. Records may be kept off site for the remaining 3 years. [40 C.F.R. § 63.7560(c)]
   b. NDP shall maintain records in accordance with 40 C.F.R. Part 63, Subpart DDDDD including, but not limited to, copies of notifications and reports submitted to comply with the subpart and any supporting documentation; [40 C.F.R. § 63.7555(a)(1)]

7. Notifications and Reports

   NDP shall submit to the Department and EPA all notifications and reports required by 40 C.F.R. Part 63, Subpart DDDDD including, but not limited to, the following:

   a. An Initial Notification shall be submitted no later than 15 days after the date of startup of #8 Power Boiler. [40 C.F.R. § 63.7545(c)]

b. NDP shall prepare and submit a compliance report every 5 years which contains the following information:

(1) Company and Facility name and address;
(2) Process unit information, emissions limitations, and operating parameter limitations;
(3) Date of report and the beginning and ending dates of the reporting period;
(4) Date of the most recent tune-up and date of the most recent burner inspection if not conducted with the tune-up;
(5) Statement by a responsible official with that official's name, title, and signature, certifying the truth, accuracy, and completeness of the content of the report.

[40 C.F.R. § 63.7550(c)(1)]

c. The first compliance report covers the period beginning on the date of startup of #8 Power Boiler and ending on December 31 within 5 years after the startup of #8 Power Boiler. Subsequent compliance reports shall cover the 5-year period from January 1 through December 31 as applicable. Each compliance report shall be submitted or postmarked no later than January 31.
[40 C.F.R. § 63.7550(b)]

d. All reports required by 40 C.F.R. Part 63, Subpart DDDDD shall be submitted electronically to EPA via the Compliance and Emissions Data Reporting Interface (CEDRI). [40 C.F.R. § 7550(h)(3)]

(3) **#3 Power Boiler**

A. NDP shall permanently shut down #3 Power Boiler no later than 180 days from first fire of #8 Power Boiler. [06-096 C.M.R. ch. 115, BPT]

B. The total heat input to #3 Power Boiler and #8 Power Boiler operating concurrently (combined) shall not exceed 600 MMBtu/hr on a 1-hour block average basis. Compliance shall be demonstrated by records of hourly fuel use to #3 Power Boiler and #8 Power Boiler (each). Records shall be kept starting with first fire of #8 Power Boiler, and this recordkeeping obligation shall end with the final shutdown of #3 Power Boiler. [06-096 C.M.R. ch. 115, BPT]

C. Upon final shut down of #3 Power Boiler, all NSR Conditions specific to this unit shall be considered obsolete and no longer in effect. [06-096 C.M.R. ch. 115, BPT]

(4) **RP Digester and RP Digester Flare**

A. NDP shall combust all of the biogas generated by the RP Digester either in the RP Digester Flare or in #6 or #7 Power Boilers or the Lime Kiln.
[06-096 C.M.R. ch. 115, BPT]

B. Prior to firing digester gas in any of the facility's units subject to 40 C.F.R. Part 63, Subpart DDDDD, NDP shall perform a fuel specification analyses for mercury according to the procedures in §§ 63.7521(g) through (i) in order to demonstrate that the digester gas meets the definition of "other gas 1 fuel." [40 C.F.R. § 63.7521(f)]

C. Emissions from the RP Digester Flare shall not exceed the following limits:

Pollutant	lb/MMBtu	Origin and Authority
PM	0.003	06-096 C.M.R. ch. 115, BACT

D. Emissions from RP Digester Flare shall not exceed the following limits:

Pollutant	lb/hr	Origin and Authority
PM	0.02	06-096 C.M.R. ch. 115, BACT
PM_{10}	0.10	
$PM_{2.5}$	0.10	
SO_2	0.54	
NO_x	0.58	
CO	1.06	
VOC	0.07	

E. Visible emissions from the RP Digester Flare shall not exceed 10% opacity on a six (6) minute block average basis. Compliance shall be demonstrated by 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]

F. When using the RP Digester Flare to combust digester gas, compliance with the SO_2 emission limit shall be demonstrated by testing the digester gas for the H_2S concentration within 180 days of startup and once per calendar year thereafter. The most recent H_2S concentration along with the maximum design hourly flow rate or actual annual hourly average flow rate shall be used to calculate the hourly SO_2 emission rate on an annual basis. [06-096 C.M.R. ch. 115, BPT]

G. Periodic Monitoring/Recordkeeping

NDP shall operate, record data, and maintain records (as applicable) from the following periodic monitors for the RP Digester and RP Digester Flare:

1. Digester gas total flow on an annual basis.
2. Records to demonstrate which unit was used to combust the digester gas at any time.
3. Records of each digester gas H_2S concentration test.

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

(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_{10}, $PM_{2.5}$, NO_x, CO, and VOC for all emission units that are part of the Recycle Pulp Project. 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)]

(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 the requested operation. [06-096 C.M.R. ch. 140 § 1(C)(8)]

DONE AND DATED IN AUGUSTA, MAINE THIS 6th DAY OF November, 2019.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: ____________________ for

GERALD D. REID, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 10/1/2019
Date of application acceptance: 10/2/2019

Date filed with the Board of Environmental Protection:

Filed
NOV 06 2019
State of Maine
Board of Environmental Protection

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