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

DEPARTMENT ORDER

Woodland Pulp LLC
Washington County
Baileyville, Maine
A-215-77-15-A

Departmental
Findings of Fact and Order
New Source Review
NSR #15

FINDINGS OF FACT

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

I. REGISTRATION

A. Introduction

FACILITY	Woodland Pulp LLC (Woodland Pulp)
LICENSE TYPE	06-096 C.M.R. ch. 115, Major Modification
NAICS CODES	322121
NATURE OF BUSINESS	Pulp and Paper Mill
FACILITY LOCATION	144 Main Street, Baileyville, Maine 04694

B. NSR License Description

Woodland Pulp LLC (Woodland Pulp) has applied for a New Source Review (NSR) license to construct and operate two new tissue machines (TM3 and TM4) at their facility located in Baileyville, Maine.

Woodland Pulp previously licensed two tissue machines (TM1 and TM2) in NSR license A-215-77-6-A (issued 3/8/13). In that license, Woodland Pulp accepted an emissions cap in order to keep the project minor. As part of the current project, Woodland pulp has requested the removal of this cap.

C. Emission Equipment

The following are emission units addressed in this NSR license:

Production Equipment

Equipment	Maximum Capacity	Fuel Type	Pollution Control Equipment
TM1 Tissue Machine Dryer Burners	187.4 ADTFP/day[1] 50 MMBtu/hr (total)	N/A Natural Gas	Dust Collectors/Venturi Scrubber Low NO_x Burners
TM2 Tissue Machine Dryer Burners	187.4 ADTFP/day[1] 50 MMBtu/hr (total)	N/A Natural Gas	Dust Collectors/Venturi Scrubber Low NO_x Burners
TM3 Tissue Machine Dryer Burners	276 ADTFP/day[1] 183 MMBtu/hr (total)	N/A Natural Gas	Dust Collectors/Venturi Scrubber Ultra-Low NO_x Burners
TM4 Tissue Machine Dryer Burners	187.4 ADTFP/day[1] 50 MMBtu/hr (total)	N/A Natural Gas	Dust Collectors/Venturi Scrubber Ultra-Low NO_x Burners

1. ADTFP/day = air-dried tons of finished product per day

D. Acronym List

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

ADTFP/day	air-dried tons of finished product per day
ADT	air-dried tons
AGL	above ground level
BACT	Best Available Control Technology
BPT	Best Practical Treatment
C.F.R.	Code of Federal Regulations
C.M.R.	Code of Maine Rules
CO	Carbon Monoxide
CO_2e	Carbon Dioxide equivalent
EPA or US EPA	United States Environmental Protection Agency
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutants
LAER	Lowest Achievable Emission Rate
lb	pound
lb/ADT	pounds per air-dried ton
lb/hr	pound per hour

lb/MMBtu	pound per million British thermal units
LDC	lightweight dry crepe
LNB	low NOx burner
M.R.S.	Maine Revised Statutes
MMBtu	Millions of British Thermal Units
MMBtu/hr	Million British Thermal Units per hour
MNWR-Baring	Moosehorn National Wildlife Refuge – Baring Unit
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NOx	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	New Source Review
NWS	National Weather Service
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
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RBLC	RACT-BACT-LAER Clearinghouse
SO_2	Sulfur Dioxide
TAD	through-air-dried
ton/hr	ton per hour
ton/yr	ton per year
tpy	ton per year
ULNB	ultra low NOx burner
USEPA	US Environmental Protection Agency
USFWS	US Fish & Wildlife Service
VOC	Volatile Organic Compounds

E. Application Classification

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

The application for Woodland Pulp 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 Emissions 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 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 for existing affected emission units are equal to the average annual emissions from any consecutive 24-month period within the ten years prior to submittal of a complete license application. The selected 24-month baseline period can differ on a pollutant-by-pollutant basis. However, there are no existing emission units which are considered "affected" by this project.

   There will be no increase in production from the pulp mill due to this project. The pulp mill operates at or near capacity. Any pulp produced in excess of the mill's needs is sent to the pulp dryer and then shipped off-site. The additional pulp required by this project will simply reduce the amount sent to the pulp dryer. Therefore, none of the pulp mill equipment are considered affected units for this project.

   There will be no increase in steam demand from the boilers due to this project. Hot air within the yankee dryer hoods of TM1, TM2, and TM4 will be heated by direct-fired natural gas burners that are included as part of these new emission units. Both the yankee dryer hood and through-air-dryer of TM3 will be heated by direct-fired natural gas burners that are included as part of this new emission unit. The yankee drums on all four TMs are heated with steam, but there is no expected increase in steam load from the facility's boilers. Steam will be diverted from other sources, such as the pulp dryer, which is expected to dry less pulp as a result of this project. Therefore, none of the mill's boilers are considered affected units for this project.

   Tissue Machines TM1, TM2, TM3, and TM4 are all conservatively being treated as new units for the purposes of this license. Baseline actual emissions for new equipment are considered to be zero for all pollutants; therefore, the selection of a baseline year is unnecessary.

2. Projected Actual Emissions

Emission units (TM1, TM2, TM3, and TM4) must use potential to emit emissions for projected actual emissions. Those emissions are presented in the following table.

Projected Actual Emissions

Equipment	PM (ton/yr)	PM_{10} (ton/yr)	$PM_{2.5}$ (ton/yr)	SO_2 (ton/yr)	NO_x (ton/yr)	CO (ton/yr)	VOC (ton/yr)	CO_2e (ton/yr)
TM1 (and dryers)	13.0	14.7	13.3	0.1	19.8	18.0	35.4	25,818
TM2 (and dryers)	13.0	14.7	13.3	0.1	19.8	18.0	35.4	25,818
TM4 (and dryers)	13.0	14.7	13.3	0.1	19.8	18.0	35.4	25,818
TM3 (and dryers)	19.2	21.6	19.7	0.5	39.3	66.0	54.7	94,493
Total	**58.2**	**65.7**	**59.6**	**0.8**	**98.7**	**120.0**	**160.9**	**171,947**

<u>**Note:**</u> PM_{10} and $PM_{2.5}$ emissions are higher than PM emissions due to condensable particulate being included in the definitions of PM_{10} and $PM_{2.5}$ but not in the definition of PM.

3. Emissions Increases

The differences between the baseline actual emissions and projected actual emissions are compared to the significant emissions increase levels.

Pollutant	Baseline Actual Emissions (ton/year)	Projected Actual Emissions (ton/year)	Emissions Increase (ton/year)	Significant Emissions Increase Levels (ton/year)
PM	0	58.2	+58.2	25
PM_{10}	0	65.7	+65.7	15
$PM_{2.5}$	0	59.6	+59.6	10
SO_2	0	0.8	+0.8	40
NO_x	0	98.7	+98.7	40
CO	0	120.0	+120.0	100
VOC	0	160.9	+160.9	40
CO_2e	0	171,947	+171,947	75,000

<u>**Note:**</u> The emission rates listed above for particulate matter include estimates for fugitive emissions. For the remainder of this license, only readily quantifiable stack emissions will be addressed.

4. Classification

Since emissions increases exceed significant emissions increase levels, this NSR License is determined to be a major modification for PM, PM_{10}, $PM_{2.5}$, NO_x, CO, VOC, and CO_2e under *Minor and Major Source Air Emission License Regulations,* 06-096 C.M.R. ch. 115. Woodland Pulp has submitted an application to incorporate the requirements of this NSR license into the facility's Part 70 air emission license.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license, the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in 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. Nonattainment New Source Review

The proposed project results in a significant emission increase for NO_x and VOC, ground-level ozone precursor pollutants. Although Maine is classified as in attainment for ozone, the project is required to be reviewed under Nonattainment New Source Review (NNSR) due to Maine's inclusion in the Ozone Transport Region (OTR). NNSR requirements for ozone include obtaining offsets for each ton of pollutant increase (NO_x and VOC) as described in *Growth Offset Regulation,* 06-096 C.M.R. ch. 113 and applying Lowest Achievable Emission Rate (LAER) instead of BACT for these pollutants.

1. NO_x Waiver

Maine currently has an EPA approved NO_x waiver issued under section 182(f) of the Clean Air Act. The NO_x waiver exempts significant emission increases of NO_x from NNSR requirements. Instead, significant emission increases of NO_x are processed under the requirements of the Prevention of Significant Deterioration (PSD) program. PSD does not require offsets and BACT is applied instead of LAER.

2. LAER

This project must address VOC offsets and LAER. LAER for this project is addressed later in this license.

3. Emission Offset Credits

a. Identification of Emission Offset Credits

The proposed VOC emissions increase for this project is 160.9 tpy. Pursuant to the requirements of 06-096 C.M.R. ch. 113, an offset ratio of 1.15 has been applied resulting in an offset requirement of 185.0 tons.

Woodland Pulp certified 100.3 tons of NO_x offset credits and 84.9 tons of VOC offset credits from the permanent shutdown of their "Chip n' Saw" facility in offset certification A-126-71-R-O, dated 6/12/18. The trading of NO_x emissions credits for VOC without the application of an additional ratio is allowed by 06-096 C.M.R. ch. 113, § 3.E.(1)(b) since reductions of NO_x emissions in Maine are just as effective at reducing ground-level ozone as reductions in VOC emissions.

The 185.2 tons of offset credits certified in A-126-71-R-O shall be applied to this project to satisfy the offset requirement. By doing so, Woodland Pulp has satisfied the requirement to obtain and permanently retire 185.0 tons of emissions reduction credits to offset the VOC emission increase from the project.

b. Interprecursor Trading

In a letter to EPA dated June 14, 2018, the Department provided information demonstrating that either NO_x or VOC emission offset credits can be used to achieve the same potential ozone reductions for this project.

All areas in Maine are currently designated as attainment/unclassifiable for the current 2015 Ozone National Ambient Air Quality Standard (NAAQS). A trajectory analysis was provided which showed that emissions from Maine do not significantly contribute to any areas which are classified as nonattainment and that neither reductions of NO_x or VOC will help reduce ozone levels in those areas. In addition, an analysis of monitoring performed in Maine demonstrate that areas of the state where ozone events have occurred are transitional, meaning the majority of the time the creation of ozone is neither limited by NO_x nor VOC. In such cases, reductions of NO_x emissions would be equally effective in limiting ozone creation as reductions in VOC. Therefore, using NO_x emission offset credits in lieu of VOC emission offset credits would result in the same potential reductions in ozone.

EPA has stated to the Department that the written comments supplied by EPA on Woodland Pulp's draft license amendment are intended to fulfill the requirement in 06-096 C.M.R. ch. 113, § 3(E)(1)(b) for written notification of approval.

C. Tissue Machines

1. Project Description

Woodland Pulp is proposing to install and operate two new tissue machines, TM3 and TM4, and remove the emissions cap from the facility's two existing tissue machines, TM1 and TM2.

TM1 and TM2 are both 200-inch lightweight dry crepe (LDC) machines, each with a maximum production capacity of approximately 187.4 air-dried tons (ADT) of finished product per day of bath, towel, and napkin grade tissue products, with production volume varying depending on the final grade mix of products to be manufactured. Each machine utilizes a yankee dryer, which includes a large steam-heated drum and a hood in which hot air produced by direct-fired natural gas burners with a heat input capacity of approximately 50 MMBtu/hr (total per machine) impinges on the paper sheet. The tissue is separated from the drum by a doctor blade. The yankee drum is heated by steam provided by the existing steam plant. TM1 and TM2 are co-located adjacent to the machine building that formerly housed the No. 4 Paper Machine. A tissue winder/combiner now occupies the former No. 4 Paper Machine building.

Similar to TM1 and TM2, TM4 will be a LDC machine with a maximum production capacity of 187.4 ADT/day of finished product. TM4 will also have a yankee dryer which operates in the same manner as described above for the yankee dryers on TM1 and TM2. The hot air in the hood of the yankee dryer for TM4 will be heated by direct-fired natural gas burners with a combined maximum heat input capacity of 50 MMBtu/hr, and the drum will be heated by steam from the existing steam plant. TM4 will be similar in size and production capacity to TM1 and TM2.

TM3 will be a through-air-dried (TAD) machine with a maximum production capacity of approximately 276 ADT/day. In addition to utilizing a yankee dryer as described above, TM3 will also utilize a through-air dryer. The yankee dryer and through-air dryer on TM3 will both be heated by direct-fired natural gas burners with a combined maximum heat input capacity of approximately 183 MMBtu/hr.

2. Exhaust Points

Each tissue machine has multiple exhaust points to the atmosphere as well as fugitive emissions. The primary exhaust points from each tissue machine include wet end exhausts, the dust stack, and the yankee hood/through-air-dryer stack.

There are no reliably quantifiable PM or combustion pollutants emitted from the wet end exhausts. However, VOC emission may occur at these locations.

The dust stacks collect and exhaust emissions in areas where PM emissions are expected to be highest, including the creping doctor blade at the yankee drum and the reel.

The yankee hood and through-air-dryer (TAD) stacks collect and exhaust emissions of products of combustion and some additional PM from the gas-fired yankee dryer hoods and through-air-dryer.

3. Best Available Control Technology (BACT)

The following is a summary of the BACT determination for the Tissue Machines, by pollutant.

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

PM emissions from the Tissue Machines are attributable to both the combustion and process sides of each unit. 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 tissue making process itself as dust particles are freed from the paper web during drying and as the dried sheet is removed from the yankee cylinder by the doctor blade. Potential control technologies for PM emissions include add-on pollution control equipment such as fabric filters (baghouses), electrostatic precipitators (ESP), wet scrubbers, cyclones, combustion of clean fuels, and good combustion practices.

Mechanical separators include cyclonic and inertial separators. In a cyclone, 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. Mechanical separators have typical removal efficiencies of 40 to 90 percent for PM_{10} and zero to 40 percent for $PM_{2.5}$. The use of cyclones is considered a technically and economically feasible option for the control of PM emissions from the Tissue Machines. Almost all of the projects found in the RBLC review employed dust collection and cyclone systems that are integral to the tissue machine itself. TM1 and TM2 include cyclone systems that are built in to the design of the machine itself. Similarly, TM3 and TM4 will have these built-in, integral cyclone systems. Therefore, the BACT analysis for all other particulate matter control technologies are based on emissions after the cyclones.

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 Tissue Machines' 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, it has been estimated that it would cost an additional $1,677,450 per tissue machine to install a wet ESP. This change would result in a reduction of PM emissions, above what cyclones can remove, of 0.22 tpy, resulting in a cost of $765,240/ton of PM controlled. The high capital and operating costs associated with wet ESPs make this option economically unjustifiable. A review of similar projects from the US EPA's RACT-BACT-LAER Clearinghouse (RBLC) did not indicate that any tissue machines currently employ the use of a wet ESP.

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 $PM_{2.5}$ (as low as 50 percent for spray tower scrubbers). 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. Although considered technically feasible, the higher capital and operating costs associated with wet scrubbers as compared to cyclones make this option economically unjustifiable. A review of the RBLC did identify one tissue machine employing the use of a wet scrubber. However, the air permit application for that tissue machine indicated the wet scrubber is needed for industrial hygiene and is not cost effective.

It has been estimated that it would cost an additional $223,660 per tissue machine to install wet scrubbers. This change would result in a reduction of PM emissions, above what cyclones can remove, of 0.22 tpy, resulting in a cost of $32,410/ton of PM controlled. The use of wet scrubbers on the tissue machines is determined not to be economically justifiable.

The combustion of clean fuels to minimize PM emissions is accomplished by burning fuels with a minimal amount of impurities in conjunction with good combustion practices. Good combustion practices include keeping the air-to-fuel ratio at the manufacturer's specified setting and having the proper air and fuel pressures at the burner. The facility has proposed to burn natural gas in the tissue machine dryers which has an inherently low PM content compared to other fuel alternatives.

The Department finds the use of a dust collection system to capture PM emissions and minimize fugitive emissions from the dry end of the Tissue Machines, routing the wet dust through cyclone separators, and the following emission limits on the dryer outlets and dust stacks to represent BACT for particulate matter emissions from the Tissue Machines:

Pollutant	Unit	Emission Limit
PM	TM1, TM2, and TM4 [each]	1.29 lb/hr
	TM3	1.90 lb/hr
PM_{10}	TM1, TM2, and TM4 [each]	2.44 lb/hr
	TM3	3.59 lb/hr
$PM_{2.5}$	TM1, TM2, and TM4 [each]	2.38 lb/hr
	TM3	3.51 lb/hr

Due to the wide variety of products that can be made on the tissue machines, rate-based emission limits in units of lb/ADT are not indicative of optimal operation of control equipment. Different grades of tissue can impact emissions of particulate matter in various ways and in a non-linear manner. Therefore, particulate matter emission limits in units of lb/hr only were determined to be most appropriate for this equipment.

Compliance with the PM lb/hr emission limits for TM1, TM2, and TM4 shall be demonstrated by conducting performance testing on the yankee hood stack and dust stack (both stacks tested simultaneously) on either TM1 or TM2 by July 27, 2021, in accordance with 40 C.F.R. Part 60, Appendix A, Method 5 or other method as approved by the Department.

Compliance with the PM lb/hr emission limit for TM3 shall be demonstrated by conducting performance testing on the TAD stack and dust stack (both stacks tested simultaneously) within 180 days of startup of TM3 in accordance with 40 C.F.R. Part 60, Appendix A, Method 5 or other method as approved by the Department.

To date, EPA has not published a test method to measure condensable particulate matter from a saturated wet plume such as from the tissue machines. Therefore, compliance with the emission limits listed above for PM_{10} and $PM_{2.5}$ shall be demonstrated by the following work practice standards to ensure the control equipment is properly maintained and operated.

(1) Monthly inspections of the wet dust collection system and cyclone separator on each tissue machine; and
(2) Recordkeeping of all maintenance, malfunctions, inspections, and downtime of the wet dust collection system and cyclone separators.

Records of these work practice standards shall be maintained and are considered periodic monitors.

b. Sulfur Dioxide: SO_2

Emissions of SO_2 from tissue machines are attributable to the oxidation of sulfur compounds contained in the fuel used to generate heat in the dryers. 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.

Flue gas desulfurization by means of wet scrubbing works by injecting a caustic solution, such as limestone or lime, into a 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 percent. For a low-sulfur fuel such as natural gas, the installation costs, annual operating and maintenance costs, costs for the caustic solution used in the scrubber, and the increased use of energy make this option technologically and economically infeasible.

The Department finds the use of clean fuels such as natural gas, which inherently has a low sulfur content, and SO_2 emission limits of 0.03 lb/hr each from TM1, TM2, and TM4 and 0.11 lb/hr from TM3 to represent BACT for SO_2 emissions from the Tissue Machines. Compliance shall be demonstrated by monthly records of the amount of natural gas fired in each tissue machine.

c. Nitrogen Oxides: NO_x

Emissions of NO_x from the Tissue Machines are attributable to the combustion of natural gas in the yankee hood and TAD burners. NO_x from the combustion process are 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, burner modifications, water/steam injection, and flue gas recirculation (FGR), and the combustion of clean fuel, such as distillate fuel or natural gas.

Add-on pollution control technology for the reduction of NO_x include SCR, where NO_x is reduced with the aid of a catalyst into diatomic nitrogen and water using a reductant, and SNCR, where either ammonia or urea is injected into the firebox of a combustion unit where the flue gas is between 1,400 and 2,000 degrees Fahrenheit to react with the NO_x produced by combustion to create diatomic nitrogen, carbon dioxide, and water. SCR and SNCR are primarily used on large industrial and utility boilers. It has been estimated that it would cost an additional $250,000 per tissue machine to install a SCR. This change would result in a reduction of annual NO_x emissions of 4.3 tpy per machine, resulting in a cost of $30,700/ton of NO_x controlled. It has been estimated that it would cost an additional $85,000 per tissue machine to install a SNCR. This change would result in a reduction of annual NO_x emissions of 8.6 tpy per machine, resulting in a cost of $15,100/ton of NO_x controlled. The use of SCR or SNCR on the tissue machines is determined not to be economically feasible. Additionally, the use of controls which utilize injection of ammonia or urea could adversely affect the quality of the product should the reagent be absorbed into the tissue during the manufacturing process. A review of similar projects from the RBLC did not indicate that any tissue or paper machines used an add-on control technology for NO_x emissions.

Combustion controls for control of NO_x emissions include low excess air firing, FGR, low NO_x burners (LNB), and ultra-low NO_x burners (ULNB). Low excess air firing involves limiting the net excess air flow to the combustion chamber to under 2%. 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. FGR systems require moderately high capital costs due to the ductwork needed to span from the burner outlet to the combustion air duct and the operating costs associated with the energy requirements of recirculation fans. Additionally, FGR systems can affect heat transfer and system pressures. A review of the RBLC did not identify any tissue or paper machines using low excess air firing or FGR to control NO_x emissions from dryer burners.

LNBs reduce NO_x by causing combustion to occur in stages; this delays the combustion process and results in a cooler flame that suppresses thermal NO_x formation. Similar to FGR systems, LNBs also require moderately high capital costs for the combustion technology. LNBs have been observed to have NO_x emission reductions of 40 to 85 percent relative to uncontrolled emission levels. LNBs are considered technically and economically feasible for control of NO_x emissions from the dryer burners.

ULNBs employ staged combustion similar to LNBs while also allowing for the injection of flue gas at the burner. This allows the flue gas and fuel gas to mix prior to combustion which serves to reduce flame temperature substantially and greatly suppress the formation of thermal NOx. ULNBs are capable of reducing NO_x emissions by 60 to 90 percent relative to uncontrolled emission levels. ULNBs represent the greatest NO_x emissions reduction potential, but also represent the highest capital cost of all the combustion control options. It has been estimated that it would cost an additional $61,275 per tissue machine to install ULNBs instead of LNBs. This change would result in a reduction of annual NO_x emissions of 3.8 tpy per machine, resulting in a cost of $16,125/ton of NO_x controlled. Although technically feasible, the higher costs and minimal additional emission reductions of using ULNBs instead of LNBs makes their use economically unjustifiable.

The final method for controlling NO_x from combustion sources is the combustion of fuel with less fuel bound nitrogen. Woodland Pulp proposes to burn natural gas in the dryers on the Tissue Machine which inherently has a low nitrogen content.

The Department finds the use of LNBs on TM1, TM2, TM3, and TM4, firing natural gas, and emission limits of 4.52 lb/hr for TM1, TM2, and TM4 (each) and 8.97 lb/hr for TM3 to represent BACT for NO_x emissions from the tissue machines.

Compliance with the NO_x lb/hr emission limits for TM1 and TM2 shall be demonstrated by conducting performance testing on the yankee hood stack on either TM1 or TM2 by July 27, 2021 in accordance with 40 C.F.R. Part 60, Appendix A, Method 7 or other method as approved by the Department.

Compliance with the NO_x lb/hr emission limit for TM3 shall be demonstrated by conducting performance testing on the TAD stack within 180 days of startup of TM3 in accordance with 40 C.F.R. Part 60, Appendix A, Method 7 or other method as approved by the Department.

Compliance with the NO_x lb/hr emission limit for TM4 shall be demonstrated by conducting performance testing on the yankee hood stack within 180 days of startup in accordance with 40 C.F.R. Part 60, Appendix A, Method 7 or other method as approved by the Department.

In addition, within 180 days of conducting NO_x performance testing for lb/hr limits on either TM1 or TM2, Woodland Pulp shall propose, and apply to amend their license to incorporate, NO_x limits in units of ppm for TM1 and TM2. Woodland Pulp shall propose, and apply to amend their license to incorporate, NO_x limits in units of ppm for TM3 and TM4 (each) within one year of each individual machine's startup.

d. Carbon Monoxide: CO

Emissions of CO from the Tissue Machines are attributable to the incomplete combustion of organic compounds contained in the natural gas fired in the yankee hood burners and TAD burners. Potential technologies for the control of CO emissions from the Tissue Machines include add-on controls, such as oxidation catalysts, and combustion control techniques, such as good combustion practices and ULNBs.

Add-on pollution control technology for the reduction of CO from combustion sources primarily includes oxidation catalysts, where CO is oxidized with the aid of a catalyst into carbon dioxide. Catalytic oxidation can achieve upwards of 90% removal efficiency of CO. Oxidation catalysts are commonly used on large natural gas-fired internal combustion sources such as stationary engines and stationary combustion turbines to reduce CO and VOC emissions, but their use has recently emerged on newer boilers. A review of the RBLC, however, did not indicate that any paper or tissue machines use oxidation catalysts for the control of CO emissions. This fact, in addition to the cost of installation, associated annual operating and maintenance costs, and increased energy consumption from use of an oxidation catalyst, make this option economically infeasible.

Potential combustion control techniques for the control of CO emissions from fuel combustion include good combustion practices and the use of ULNBs. ULNBs have historically been associated with higher CO emissions due to the limited oxygen available for complete combustion after the introduction of flue gas into the burner. Newer ULNB technology, however, uses sophisticated burner management control systems to maintain optimal fuel-to-air ratios; this allows newer ULNBs to reduce both NO_x and CO emissions considerably. These newer burners can reduce CO emissions between 65 and 85 percent compared to the burners they replace. The high capital costs associated with installing ULNBs for the control of CO alone, however, makes this option economically and technologically infeasible.

The Department finds the use of good combustion practices and CO emission limits of 4.12 lb/hr for TM1, TM2, and TM4 and 15.07 lb/hr for TM3 to represent BACT for CO emissions from the Tissue Machines.

Compliance with the CO lb/hr emission limits for TM1 and TM2 shall be demonstrated by conducting performance testing on the yankee hood stack on either TM1 or TM2 by July 27, 2021, in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or other method as approved by the Department.

Compliance with the CO lb/hr emission limit for TM3 shall be demonstrated by conducting performance testing on the TAD stack within 180 days of startup of TM3 in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or other method as approved by the Department.

Compliance with the CO lb/hr emission limit for TM4 shall be demonstrated by conducting performance testing on the yankee hood stack within 180 days of startup in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or other method as approved by the Department.

In addition, within 180 days of conducting CO performance testing for lb/hr limits on either TM1 or TM2, Woodland Pulp shall propose, and apply to amend their license to incorporate, CO limits in units of ppm for TM1 and TM2. Woodland Pulp shall propose, and apply to amend their license to incorporate, CO limits in units of ppm for TM3 and TM4 (each) within one year of each individual machine's startup.

e. Greenhouse Gas: GHG

GHG emissions from the Tissue Machines are attributable to the hot air dryers, which emit carbon dioxide (CO_2) as a product of the combustion process. No GHG emissions control technologies can be identified that may be considered technically feasible for application to these units. The Department finds the use of natural gas, a clean-burning fuel, to limit GHG emissions to represent BACT for GHG emissions from the Tissue Machines. Compliance shall be demonstrated by the recordkeeping requirements contained in this license.

f. Visible Emissions

BACT for visible emissions from the Tissue Machines shall be the following:

Visible emissions from each Tissue Machine and its associated fuel-burning equipment shall not exceed 10% opacity on a six-minute block average basis.

4. Lowest Achievable Emission Rate (LAER)

The following is a summary of the LAER determination for VOC for the Tissue Machines.

VOC emissions from the Tissue Machines are attributable to many different sources. Small amounts of VOC are present in the water carrying the pulp to the Tissue 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 tissue machines with direct-fired dryers, VOC are also emitted from the combustion of fuel.

A significant emissions increase of a nonattainment pollutant is required to meet the Lowest Achievable Emission Rate (LAER). LAER is defined in 06-096 C.M.R. ch. 100 to mean "*the most stringent emission limitation which is contained in the implementation plan of any State for that class or category of source, unless the owner or operator of the proposed source demonstrates that those limitations are not achievable; or the most stringent emission limitation which is achieved in practice by that class or category of source, whichever is more stringent. In no event may LAER result in emissions of any pollutant in excess of those standards and limitations promulgated pursuant to Section 111 or 112 of the United States Clean Air Act as amended, or any emission standard established by the Department.*"

A review of the RBLC identified a wide variety of VOC limitations on tissue machines, with some permits containing no VOC emission limitations whatsoever. None of the tissue machines identified employed any type of control technology for VOC. The most stringent VOC emission rate identified was for Irving Consumer Products (Irving) in Macon, GA, at 0.062 lb/ADT; however, achieving this emission rate would not be feasible for Woodland Pulp. The Irving emission rate appears to be based on a paper machine emission factor of 0.069 lb/ADT, published in Table 4.16 of NCASI TB 884, which is not an appropriate factor for tissue machines, which require a different set of additives and chemicals to create the special properties of tissue. The next most stringent emission rates identified were 0.58 lb/ADT and 0.75 lb/ADT for Gorham Paper and Tissue and Catalyst Paper Operations, respectively. These values are only technically achievable if the facility completely changes the product portfolio it currently produces and intends to produce on the Tissue Machines. Including these processes in the LAER analysis would involve fundamentally redefining the project. BACT and LAER do not require source redefinition as their intent is not to regulate the applicant's purpose or objective for the proposed facility.

The next most stringent VOC limit for tissue machine process emissions is 1.01 lb/ADT at Sofidel American in Circleville, OH. This limit is achievable based on actual, historical chemical/additive use for TM1 and TM2. Woodland Pulp has proposed a more stringent target limit on process VOC emission of 1.00 lb/ADT. This limit assumes 100% of the VOC in chemicals/additives is volatilized. This is a highly conservative approach to estimating VOC emissions from tissue machines since many paper/tissue machine additives will react with the web substrate, limiting actual VOC emissions to the unreacted portion of VOC only. In addition, some of the VOC retained in the white water recycle loop may be controlled by the wastewater treatment plant, and some of the VOC will volatilize in the drying sections of the machine where the paper web is exposed to higher temperatures.

VOC emitted from combustion sources, such as tissue machine dryers, are the result of incomplete combustion of fuel in the form of unburned hydrocarbons. VOC emissions from combustion sources are controlled through control equipment, such as oxidation catalysts, and good combustion controls. A review of the RBLC did not identify any tissue or paper machines using control equipment for the control of VOC emissions from the dryers. Therefore, the Department has determined the use of good combustion controls represents LAER for VOC emissions from the combustion of natural gas in the Tissue Machine dryers.

The Department finds good combustion controls and the following emission limits to represent LAER for VOC emissions from the Tissue Machines:

a. A process VOC limit of 1.00 lb/ADT for each Tissue Machine;
b. A combustion VOC limit of 0.27 lb/hr each for TM1, TM2, and TM4; and
c. A combustion VOC limit of 0.99 lb/hr for TM3.

5. Emission Limits

The BACT emission limits for the four Tissue Machines and associated dryers firing natural gas are the following:

Unit	PM lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	SO_2 lb/hr	NO_x lb/hr	CO lb/hr
TM1	1.29	2.44	2.38	0.03	4.52	4.12
TM2	1.29	2.44	2.38	0.03	4.52	4.12
TM3	1.90	3.59	3.51	0.11	8.97	15.07
TM4	1.29	2.44	2.38	0.03	4.52	4.12

The LAER emission limits for the four Tissue Machines and associated dryers firing natural gas are the following:

Unit	VOC (Combustion only) lb/hr	VOC (Process only) lb/ADT
TM1	0.27	1.00
TM2	0.27	1.00
TM3	0.99	1.00
TM4	0.27	1.00

Emissions of VOC from combustion of natural gas are well known and documented. The combustion VOC emission limits listed above will be met provided the burners are operating correctly. Thus, compliance with the combustion VOC emission limits shall be demonstrated by compliance with the NO_x emission limits contained in this license.

Demonstrating compliance with the process VOC emission limits through performance testing is technically difficult as some VOC emissions are fugitive and do not exit through stacks. Woodland Pulp has proposed demonstrating compliance with the process VOC emission limits for the tissue machines by recordkeeping, including tracking the VOC content and volume of chemical additives used on each tissue machine. Process VOC emissions shall be assumed to be the total of all VOC contained in the chemical additives used on each machine. This method estimates emissions conservatively high as it does not take credit for any VOC that remains in the product or VOC that remains with the wastewater and controlled by the wastewater treatment plant. Therefore, compliance with the process VOC emission limits shall be demonstrated by the following recordkeeping:

(1) Monthly records of the amount of each VOC-containing chemical additive used on each machine;
(2) Records of the VOC content for each chemical additive used;

(3) Monthly records of the amount (ADT) of finished tissue product produced on each machine; and
(4) Monthly calculations demonstrating compliance with the process VOC emission limits.

These records are considered periodic monitors.

6. Periodic Monitoring

a. Periodic monitoring for the control equipment on the Tissue Machines shall include the following, as applicable:

(1) Monthly inspections of the wet dust collection system, venturi scrubber, and cyclone separator on each tissue machine;
(2) Recordkeeping to document all maintenance, malfunctions, inspections, and downtime of the wet dust collection systems, venturi scrubbers, and cyclone separators; and
(3) Monitoring and recordkeeping of the flow rate through and pressure drop across each venturi scrubber at least once per shift.

b. Periodic monitoring for all four Tissue Machines shall include the following:

(1) Monthly records of the amount of each VOC-containing chemical/additive used on each machine;
(2) Records of the amount of VOC in each chemical additive used;
(3) Monthly records of the amount (ADT) of finished tissue product produced on each machine;
(4) Monthly calculations demonstrating compliance with the process VOC emission limits; and
(5) Monthly records of fuel use for each tissue machine.

The records above shall be used to demonstrate compliance with the LAER limit of 1.00 lb/ADT of process VOC emissions. Compliance with the combustion VOC emission limits shall be based on fuel use records and the EPA emission factor for natural gas combustion of 5.5 lb VOC per million standard cubic feet.

7. Regulatory Applicability

a. Federal Regulations

(1) New Source Performance Standards

New Source Performance Standards (NSPS) require new, modified, or reconstructed individual industrial or source categories to control emissions to the level achievable by the best-demonstrated technology. Sources subject to an NSPS are also subject to the general provisions established in *General Provisions*, 40 C.F.R. Part 60, Subpart A.

There are no potentially applicable NSPS that could apply to the new Tissue Machines or their natural gas-fired dryers.

(2) National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations establish emission standards for air pollutants not covered by the National Ambient Air Quality Standards (NAAQS), primarily hazardous air pollutants (HAP). The standards for source categories establish requirements for the installation of the maximum available control technology (MACT), as determined by the United States Environmental Protection Agency (EPA).

The Tissue Machines at Woodland Pulp are not subject to *NESHAP: Paper and Other Web Coating*, 40 C.F.R. Part 63, Subpart JJJJ. EPA has determined that 40 C.F.R. Part 63, Subpart JJJJ does not apply to size presses or on-machine coaters used in the paper industry. Since the Tissue Machines do not have off-machine coaters, they are not subject to this subpart.

The Tissue Machines at Woodland Pulp are not subject to *NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*, 40 C.F.R. Part 63, Subpart DDDDD. The burners on the Tissue Machine dryers produce heat/exhaust that comes into direct contact with the product; therefore, the dryers are not considered process heaters as defined in 40 C.F.R. Part 63, subpart DDDDD.

b. State Regulations

(1) *Visible Emissions Regulation*, 06-096 C.M.R. ch. 101

The Tissue Machines are subject to *Visible Emissions Regulation*, 06-096 C.M.R. ch. 101. This chapter establishes opacity limitations for emissions from several categories of air contaminant sources. The Tissue Machines are subject to Section 2(B)(3)(d) of the chapter, which limits visible emissions from any general process source not specifically listed in 06-096 C.M.R. ch. 101 to 20% opacity on a six-minute block average basis, except for no more than one six-minute block average in a one-hour period. This limit shall be streamlined to the more stringent BACT limit of 10% opacity on a six-minute block average basis.

(2) *Fuel Burning Equipment Particulate Emission Standard*, 06-096 C.M.R. ch. 103

The Tissue Machines are not subject to *Fuel Burning Equipment Particulate Emission Standard*, 06-096 C.M.R. ch. 103, which applies to all fuel burning equipment that has a rated heat input capacity of 3 MMBtu/hr or greater. The natural gas-fired yankee hood and through-air dryers on TMs 1-4 have rated heat input capacities greater than 3 MMBtu/hr, but do not meet the definition of "fuel burning equipment" as defined in 06-096 C.M.R. ch. 100; therefore, the dryers are not subject to 06-096 C.M.R. ch. 103.

(3) *General Process Source Particulate Emission Standard*, 06-096 C.M.R. ch. 105

The Tissue Machines are subject to *General Process Source Particulate Emission Standard*, 06-096 C.M.R. ch. 105, which applies to any source except fuel-burning equipment, incinerators, mobile sources, open burning sources, and sources of fugitive dust, and establishes a limitation on the amount of particulate emissions allowed from the source determined on the basis of the size and rate at which the process operates.

The Tissue Machines have the potential to generate PM emissions, and are therefore subject to the applicable limitations in Table 105A of 06-096 C.M.R. ch. 105. Based on their maximum production rates of 187.4 ADT/day, TM1, TM2, and TM4 are each subject to a PM emission limit of 12.7 lb/hr. Based on its maximum production rate of 276 ADT/day TM3 is subject to a PM emission limit of 16.1 lb/hr. These limits are less stringent than the BACT limits for PM emissions from the Tissue Machines; therefore, the limits provided by 06-096 C.M.R. ch. 105 shall be streamlined to the units' BACT emission limits.

D. Additional Requirements

As part of their application, Woodland Pulp performed a refined modeling analysis to determine the facility's impact on ambient air quality. The facility was not able to demonstrate compliance with National Ambient Air Quality Standards (NAAQS) and Class I and Class II Increment Standards at the BACT emission rates listed above. In order to demonstrate compliance, Woodland Pulp has proposed additional controls and emission limits beyond what is considered BACT as outlined in this section. These requirements may be modified or removed through a license amendment that includes an updated ambient air quality analysis demonstrating compliance with NAAQS and Class I and II Increment Standards.

1. TM1, TM2, TM3, & TM4: Particulate Matter

To comply with NAAQS and Class I and II Increment Standards for particulate matter from the tissue machines, Woodland Pulp proposes the following additional requirements:

a. The use of venturi scrubbers on the dust stacks for all four tissue machines;
b. Increasing the stack height of each of the yankee/through-air-dryer sections on TM1 and TM2 to at least 117.3 feet AGL;
c. Exhausting emissions from the yankee/through-air-dryer sections of TM3 and TM4 to separate stacks that are each at least 117.75 feet AGL;
d. Compliance with the following emission limits:

Pollutant	Unit	Emission Limit
PM	TM1, TM2, and TM4 [each]	0.84 lb/hr
	TM3	1.23 lb/hr
PM_{10}	TM1, TM2, and TM4 [each]	0.82 lb/hr
	TM3	1.20 lb/hr
$PM_{2.5}$	TM1, TM2, and TM4 [each]	0.81 lb/hr
	TM3	1.19 lb/hr

The Department has determined that inclusion of the additional requirements listed above for particulate matter emissions from the tissue machines are appropriate for demonstrating compliance with NAAQS and Class I and II Increment Standards.

Compliance with the PM emission limit shall be demonstrated by conducting performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 5 or other method as approved by the Department.

To date, EPA has not published a test method capable of measuring condensable particulate matter from a saturated wet plume such as from the tissue machines. Therefore, compliance with the emission limits listed above for PM_{10} and $PM_{2.5}$ shall be demonstrated by the following work practice standards to ensure the control equipment is properly maintained and operated:

(1) Monthly inspections of the wet dust collection system and cyclone separator on each tissue machine; and
(2) Recordkeeping of all maintenance, malfunctions, inspections, and downtime of the wet dust collection system and cyclone separators.

Records of these work practice standards shall be maintained and are considered periodic monitors.

2. TM3 & TM4: NO_x

To comply with NAAQS and Class I and II Increment Standards for NO_x from the tissue machines, Woodland Pulp proposes the following additional requirements:

a. The use of ULNB on TM3 and TM4;

b. Compliance with the following emission limits:

Pollutant	Unit	Emission Limits
NO_x	TM3	5.74 lb/hr
	TM4	1.57 lb/hr

Compliance shall be demonstrated by conducting performance testing in accordance with 40 C.F.R. Part 60, Appendix A, Method 7 or other method as approved by the Department.

In addition, Woodland Pulp shall propose, and apply to amend their license to incorporate, NO_x limits in units of ppm for TM3 and TM4 (each) within one year of each individual machine's startup.

The Department has determined that inclusion of the additional requirements listed above for NO_x emissions from TM3 and TM4 are appropriate for demonstrating compliance with NAAQS and Class I and II Increment Standards.

3. Existing Equipment: $PM_{2.5}$

$PM_{2.5}$ has not previously been addressed in Woodland Pulp's license. To comply with NAAQS and Class I and II Increment Standards, Woodland Pulp has proposed incorporating the following new $PM_{2.5}$ emission limits into their license:

Pollutant	Unit	Emission Limit
$PM_{2.5}$	#9 Power Boiler	84.4 lb/hr[1]
		76.0 lb/hr[2]
	Smelt Dissolving Tank	10.0 lb/hr
	Lime Kiln	20.8 lb/hr[3]
		15.0 lb/hr[4]

[1] When firing #6 fuel oil in combination with other fuels.
[2] When firing natural gas or propane in combination with other fuels.
[3] When firing #6 fuel oil.
[4] When firing natural gas or propane.

The Department has determined that inclusion of the additional requirements listed above for $PM_{2.5}$ emissions from #9 Power Boiler, the Smelt Dissolving Tank, and the Lime Kiln are appropriate for demonstrating compliance with NAAQS and Class I and II Increment Standards.

4. Existing Equipment: SO_2

Woodland Pulp's current air emission license allows them to demonstrate compliance with SO_2 emission limits using a combined emission limit for #3 Recovery Boiler and #9 Power Boiler for up to 300 hours per calendar year. To comply with NAAQS and Class I and II Increment Standards, Woodland Pulp has proposed lowering the existing combined SO_2 emission limit for #3 Recovery Boiler and #9 Power Boiler from 793 lb/hr (based on a 3-hour block average) to 600 lb/hr (based on a 3-hour block average) when firing #6 fuel oil in combination with other fuels or 559 lb/hr (based on a 3-hour block average) when firing natural gas or propane in combination with other fuels.

The Department has determined that the lowering of the combined SO_2 emission limits for #3 Recovery boiler and #9 Power Boiler as described above are appropriate for demonstrating compliance with NAAQS and Class I and II Increment Standards.

E. Incorporation into the Part 70 Air Emission License

The requirements in this 06-096 C.M.R. ch. 115 New Source Review license shall apply to the facility as specified in the Order section of this 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. Woodland Pulp submitted an application to incorporate the requirements of this NSR License into their Part 70 License on May 15, 2018.

F. Annual Emissions

1. Emission Totals

For annual fee purposes, the following represents the annualized total of licensed emission limits applicable to Woodland Pulp for the emission units listed. The listed emission units at Woodland Pulp shall be restricted to the following annual emissions, based on a 12-month rolling total:

Total Licensed Annual Emissions for the Facility[1]
Tons/year
(used to calculate the annual license fee[2])

	PM	PM_{10}	SO_2	NO_x	CO	VOC	TRS
Tissue Machines[4]	25.3	47.8	0.8	98.7	120.0	160.9	---
No. 9 Power Boiler	355.0	355.0	676.0	780.0	5,008.0	130.0	---
#3 Recovery Boiler	178.2	178.2	1,567.0	601.0	1,966.0	176.0	---
Smelt Dissolving Tank	50.0	50.0	---	---	---	---	13.6
Lime Kiln	87.0	87.0	35.0	175.0	1,750.0	---	---
Package Boiler	56.0	56.0	9.9	5.6	1.4	0.1	---
NCG Incinerator	8.4	8.4	12.7	39.6	2.8	0.2	---
Natural Gas Heater	0.7	0.7	---	1.3	1.1	0.1	---
Total	**760.6**	**783.1**	**2,301.4**	**1,178.0[3]**	**8,849.3**	**467.3**	**13.6**

1. Emission limits in the table do not include insignificant activities and process units (e.g. the woodyard) with no licensed emission limits, and do not include emergency engines whose possible emissions provide little or no noticeable contribution to the totals represented in this table.
2. PM_{10}, CO, and TRS are not used in the calculation of the annual fee but are included in this table for completeness.
3. Note that the total NOx limit for the mill is less than total allowable emissions from individual units. Woodland Pulp may emit up to each required limit for any one individual unit, provided that the total of all units does not exceed the mill wide total of 1,178.0 ton/year on a 12-month rolling total basis. See Condition (17) of Air Emission License A-215-70-I-R/A, issued November 18, 2011.
4. PM, PM_{10}, and NO_x emissions from the tissue machines are calculated based on BACT emission limits and without fugitive components.

2. Greenhouse Gases

Greenhouse gases are considered regulated pollutants as of January 2, 2011, through 'Tailoring' revisions made to EPA's *Approval and Promulgation of Implementation Plans,* 40 C.F.R. Part 52, Subpart A, § 52.21, *Prevention of Significant Deterioration of Air Quality* rule. Greenhouse gases, as defined in 06-096 C.M.R. ch. 100 are the aggregate group of the following gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. For licensing purposes, greenhouse gases (GHG) are calculated and reported as carbon dioxide equivalents (CO_2e).

The quantity of CO_2e emissions from this facility is greater than 100,000 tons per year, based on the following:

- the facility's fuel use and throughput limits;
- worst case emission factors from the following sources: U.S. EPA's AP-42, the Intergovernmental Panel on Climate Change (IPCC), and *Mandatory Greenhouse Gas Reporting,* 40 C.F.R. Part 98; and
- global warming potentials contained in 40 C.F.R. Part 98.

As defined in 06-096 C.M.R. ch. 100, any source emitting 100,000 tons/year or more of CO_2e is a major source for GHG. This license includes applicable requirements addressing GHG emissions from this source, as appropriate.

III. AMBIENT AIR QUALITY ANALYSIS

A. Overview

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

Based upon the magnitude of the SO_2, PM_{10} and NO_2 emissions increase and the distance from Woodland Pulp to the nearest Class I area, the US Fish & Wildlife Service (USFWS) have determined that a visibility assessment for plume blight is required for Moosehorn National Wildlife Refuge – Baring Unit (MNWR-Baring).

B. Model Inputs

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

All modeling was performed in accordance with all applicable requirements of the Maine Department of Environmental Protection, Bureau of Air Quality (MEDEP-BAQ) and the United States Environmental Protection Agency (USEPA). The most-recent regulatory version of the AERMOD-PRIME model and its associated processors were used to conduct the analyses.

A valid five-year hourly on-site meteorological database was used in the AERMOD-PRIME modeling analysis. The following parameters and their associated heights were collected at Woodland Pulp's meteorological monitoring site during the five-year period July 1, 1991 to June 30, 1996:

TABLE III-1: Meteorological Parameters and Collection Heights

Parameter	Sensor Heights
Wind Speed	10 & 76 meters
Wind Direction	10 & 76 meters
Standard Deviation of Wind Direction (Sigma Θ)	10 & 76 meters
Temperature	10 & 76 meters

When possible, hourly ISHD surface data collected at the Bangor International Airport NWS site were substituted for missing on-site surface data. All other missing data were interpolated or coded as missing, per USEPA guidance. In addition, hourly Bangor International Airport NWS data, from the same time period, were used to supplement the primary surface dataset for any required variables that were not explicitly collected on-site.

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

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

Point-source parameters, used in the modeling for Woodland Pulp are listed in Table III-2.

TABLE III-2: Woodland Pulp Point Source Stack Parameters

Woodland Pulp Stacks	Stack Base Elevation (m)	Stack Height (m)	GEP Stack Height (m)	Stack Diameter (m)	UTM Easting NAD83 (m)	UTM Northing NAD83 (m)
PROPOSED/CURRENT						
#9 Power Boiler	37.06	68.58	128.45	3.66	625,698	5,001,618
#3 Recovery Boiler	35.88	83.82	130.05	2.90	625,747	5,001,644
#3 Smelt Tank	35.72	70.71	130.21	1.78	625,745	5,001,652
Lime Kiln	38.51	79.55	127.00	1.27	625,649	5,001,526
TM #1 – Yankee Hood	40.75	35.75	88.49	1.31	625,481	5,001,613
TM #1 – Dust Vent	40.75	29.66	88.49	1.60	625,480	5,001,640
TM #2 – Yankee Hood	40.75	35.75	70.97	1.31	625,432	5,001,594
TM #2 – Dust Vent	40.75	29.66	70.97	1.60	625,420	5,001,618
TM #3 – TAD	45.42	35.89	66.30	1.68	625,390	5,001,538
TM #3 – Dust Vent	45.42	29.79	66.30	1.68	625,370	5,001,549
TM #4 – Yankee Hood	45.42	35.89	66.30	1.31	625,330	5,001,497
TM #4 – Dust Vent	45.42	29.79	66.30	1.60	625,318	5,001,513
2010 BASELINE ($PM_{2.5}$ INCREMENT)						
#9 Power Boiler	37.06	68.58	128.45	3.66	625,698	5,001,618
#3 Recovery Boiler	35.88	83.82	130.05	2.90	625,747	5,001,644
#3 Smelt Tank	35.72	70.71	130.21	1.78	625,745	5,001,652
Lime Kiln	38.51	79.55	127.00	1.27	625,649	5,001,526
1987 BASELINE (NO_2 INCREMENT)						
#9 Power Boiler	37.06	46.33	92.26	3.66	625,698	5,001,618
Lime Kiln	38.51	49.07	127.00	1.49	625,649	5,001,526
1977 BASELINE (SO_2/PM_{10} INCREMENT)						
#9 Power Boiler	37.06	46.33	92.26	3.66	625,698	5,001,618
Lime Kiln	38.51	49.07	90.81	1.49	625,649	5,001,526
#8 Power Boiler	37.06	37.19	92.26	2.44	625,637	5,001,628

Emission parameters for Woodland Pulp NAAQS and increment modeling are listed in Table III-3. Emission parameters are based on two maximum license-allowed operating configurations: a combination of units firing oil and/or natural gas, and all units firing exclusively natural gas.

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

- NO_x emissions were assumed to convert to NO_2 using USEPA's Tier II Ambient Ratio Method (ARM2);
- all particulate emissions were conservatively assumed to convert to PM_{10}.

TABLE III-3: Stack Emission Parameters

Stacks	Averaging Periods	SO_2 (g/s)	PM_{10} (g/s)	PM2.5 (g/s)	NO_x (g/s)	CO (g/s)	Stack Temp (K)	Stack Velocity (m/s)
MAXIMUM LICENSE ALLOWED SCENARIO 1								
#9 Power Boiler (Oil)	All	28.60	10.63	10.63	23.44	150.24	341.5	9.57
#3 Recovery Boiler (Oil)	All	47.00	5.13	5.13	22.68	189.00	466.5	28.68
#3 Smelt Tank (Oil)	All	0.74	1.50	1.26	-	-	341.5	6.43
Lime Kiln (Oil)	All	1.05	2.62	2.62	5.25	52.54	344.3	7.92
TM #1 – Yankee Hood (NG)	All	0.01	0.10	0.10	0.57	0.52	654.3	17.79
TM #1 – Dust Vent (NG)	All	-	0.004	0.003	-	-	303.2	13.12
TM #2 – Yankee Hood (NG)	All	0.01	0.10	0.10	0.57	0.52	654.3	17.79
TM #2 – Dust Vent (NG)	All	-	0.004	0.003	-	-	303.2	13.12
TM #3 – TAD (NG)	All	0.01	0.15	0.15	0.72	1.90	400.9	21.17
TM #3 – Dust Vent (NG)	All	-	0.005	0.004	-	-	303.2	17.58
TM #4 – Yankee Hood (NG)	All	0.01	0.10	0.10	0.20	0.52	654.3	17.79
TM #4 – Dust Vent (NG)	All	-	0.004	0.003	-	-	303.2	13.12
MAXIMUM LICENSE ALLOWED SCENARIO 2								
#9 Power Boiler (NG)	All	23.44	10.63	9.58	23.44	150.24	328.7	10.67
#3 Recovery Boiler (NG)	All	47.00	5.13	5.13	22.68	189.00	474.3	31.85
#3 Smelt Tank (NG)	All	0.74	1.50	1.26	-	-	338.7	6.49
Lime Kiln (NG)	All	1.05	2.62	1.89	5.25	52.54	332.6	7.07
TM #1 – Yankee Hood (NG)	All	0.01	0.10	0.10	0.57	0.52	654.3	17.79
TM #1 – Dust Vent (NG)	All	-	0.004	0.003	-	-	303.2	13.12
TM #2 – Yankee Hood (NG)	All	0.01	0.10	0.10	0.57	0.52	654.3	17.79
TM #2 – Dust Vent (NG)	All	-	0.004	0.003	-	-	303.2	13.12
TM #3 – TAD (NG)	All	0.01	0.15	0.15	0.72	1.90	400.9	21.17
TM #3 – Dust Vent (NG)	All	-	0.005	0.004	-	-	303.2	17.58
TM #4 – Yankee Hood (NG)	All	0.01	0.10	0.10	0.20	0.52	654.3	17.79
TM #4 – Dust Vent (NG)	All	-	0.004	0.003	-	-	303.2	13.12
2016/2017 CURRENT ACTUALS								
#9 Power Boiler	3-Hour	23.44	-	-	-	-	328.7	10.67
	24-Hour	14.56	9.58	9.58	-	-		9.50
	Annual	1.65	6.17	6.17	9.70	-		7.47
#3 Recovery Boiler	3-Hour	47.00	-	-	-	-	474.3	31.85
	24-Hour	24.23	3.73	3.10	-	-		28.03
	Annual	3.50	3.21	2.66	15.84	-		26.76
#3 Smelt Tank	3-Hour	0.74	-	-	-	-	338.7	6.49
	24-Hour	0.23	1.26	1.26	-	-		5.71
	Annual	0.19	1.15	1.15	-	-		5.45
Lime Kiln	3-Hour	1.05	-	-	-	-	332.6	7.07
	24-Hour	0.98	1.33	1.33	-	-		7.07
	Annual	0.62	0.88	0.88	1.65	-		6.65

2010 BASELINE ($PM_{2.5}$ INCREMENT)								
#9 Power Boiler	Short Term	-	-	10.63	-	-	341.5	9.19
	Annual	-	-	7.85	-	-	341.5	6.79
#3 Recovery Boiler	Short Term	-	-	3.02	-	-	466.5	21.22
	Annual	-	-	1.60	-	-	466.5	20.08
#3 Smelt Tank	Short Term	-	-	1.03	-	-	341.5	4.40
	Annual	-	-	0.72	-	-	341.5	4.50
Lime Kiln	Short Term	-	-	2.62	-	-	344.3	7.92
	Annual	-	-	2.20	-	-	344.3	6.26
1987 BASELINE (NO_2 INCREMENT)								
#9 Power Boiler	Annual	-	-	-	21.54	-	341.5	8.23
Lime Kiln	Annual	-	-	-	4.68	-	344.3	5.38
1977 BASELINE (SO_2/PM_{10} INCREMENT)								
#9 Power Boiler	Short Term	145.29	17.72	-	-	-	449.8	9.37
	Annual	93.67	15.20	-	-	-	449.8	7.26
Lime Kiln	Short Term	0.79	3.94	-	-	-	344.3	5.77
	Annual	0.63	3.17	-	-	-	344.3	5.38
#8 Power Boiler	Short Term	71.60	5.82	-	-	-	449.8	6.16
	Annual	15.82	1.29	-	-	-	449.8	5.75

C. Single Source Modeling Impacts

AERMOD-PRIME refined modeling was performed for a range of operating scenarios that represented a range of boiler/equipment operations.

The significant impact model results for Woodland Pulp alone are shown in Table III-4. Maximum predicted impacts that exceed their respective significance level are indicated in boldface type. For comparison to the Class II significance levels, the impacts for 1-hour SO_2, 1-hour NO_2, 24-hour $PM_{2.5}$ and annual $PM_{2.5}$ were conservatively based on the maximum High-1st-High predicted values, averaged over five-years of meteorological data. All other pollutants/averaging periods were conservatively based on their maximum High-1st-High predicted values. For the purpose of determining maximum predicted impacts, all NO_x was conservatively assumed to convert to NO_2.

TABLE III-4: Maximum AERMOD-PRIME Significant Impact Results from Woodland Pulp

Pollutant	Averaging Period	Max Impact (μg/m³)	Receptor UTM E (m)	Receptor UTM N (m)	Receptor Elevation (m)	Class II Significance Level (μg/m³)	Class II Significance Distance (km)	Load Case
SO_2	1-hour	**229.78**	624,600	4,999,800	135.70	**10**[a]	>50.0	Max Oil
	3-hour	**214.94**	626,180	5,000,997	40.91	**25**	41.3	Max Oil
	24-hour	**83.37**	625,038	5,001,913	45.44	**5**	41.3	Max Oil
	Annual	**8.03**	626,180	5,001,397	27.82	**1**	4.2	Max Oil
PM_{10}	24-hour	**34.62**	626,130	5,001,397	28.73	**5**	9.0	Max NG
	Annual	**4.43**	626,033	5,001,490	31.18	**1**	2.3	Max NG
$PM_{2.5}$	24-hour	**27.98**	626,033	5,001,490	31.18	**1.2**	44.5	Max Oil
	Annual	**3.61**	626,110	5,001415	28.41	**0.3**	4.9	Max Oil
NO_2	1-hour	**228.15**	623,100	4,999,600	144.64	**10**[a]	>50.0	Max NG
	Annual	**7.51**	626,127	5,001,426	27.78	**1**	3.9	MaxNG
CO	1-hour	**2588.08**	622,600	4,999,100	135.61	**2,000**	4.0	Max NG
	8-hour	**768.46**	626,800	4,999,600	124.69	**500**	3.9	MaxNG

[a] Interim Significant Impact Level (SIL) adopted by Maine

D. Secondary Formation of $PM_{2.5}$

Since proposed $PM_{2.5}$ emissions for this modification are greater than 15 tpy and the increase in NO_x emissions is expected to be greater than 40 tpy, a review of secondary impacts due to $PM_{2.5}$ precursor emissions (secondary $PM_{2.5}$) is required.

The $PM_{2.5}$ compliance demonstration must account for both primary $PM_{2.5}$ from a source's direct PM emissions, as well as secondarily formed $PM_{2.5}$ from a source's precursor emissions of NO_x and SO_2. The formation of secondary $PM_{2.5}$ is dependent on the concentrations of precursor and relative species, atmospheric conditions and the interactions of precursors with other entities, such as particles, rain, fog or cloud droplets.

Since the contribution from secondary formation of $PM_{2.5}$ is not explicitly accounted for in AERMOD-PRIME, the impacts of secondarily formed $PM_{2.5}$ from Woodland Pulp was determined using a Tier I analysis following methodologies prescribed in USEPA's *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program.*

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

Using methodologies and values found in Appendix A of *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program*, Woodland Pulp estimated potential secondary $PM_{2.5}$ impacts due to precursor emissions by using a ratio of 'predicted secondary $PM_{2.5}$ concentration impact per ton of precursor emission', expressed in μg/m³ per tpy. Using results from USEPA's hypothetical modeling scenarios, the 'predicted secondary $PM_{2.5}$ concentrations per ton of precursor emission' from the most conservative sources in Maine were multiplied by the tpy precursor emissions from Woodland Pulp. This procedure was followed for both NO_x and SO_2 precursors and the results summed to achieve a final estimated potential secondary $PM_{2.5}$ concentration, as shown in Table III-5.

TABLE III-5: Secondary $PM_{2.5}$ from NOx & SO_2 Precursors

Pollutant	Impact/EmissionsRatio (μg/m³ / TPY)	Potential Increase of Precursors (TPY)	Estimated Secondary $PM_{2.5}$ Impacts (μg/m³)
NOx	0.00024	71.62	0.0172
SO_2	0.00172	0.86	0.0015
Total Estimated Secondary $PM_{2.5}$ from NOx & SO_2 precursors			**0.0187**

Using this method, the total estimated secondary $PM_{2.5}$ impact due to Woodland Pulp's NO_x and SO_2 precursor emissions were predicted to be extremely low (<0.02 μg/m³) and are not expected to contribute significantly to the $PM_{2.5}$ NAAQS and Class I or Class II increment impacts.

E. Combined Source Modeling Impacts

As indicated in boldface type in Table III-4, other sources not explicitly included in the modeling analysis must be accounted for by using representative background concentrations for the area.

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

TABLE III-6 : Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	Monitoring Site
SO_2	1-hour	24	Presque Isle
	3-hour	18	Acadia National Park
	24-hour	11	
	Annual	1	
PM_{10}	24-hour	42	Baileyville
	Annual	10	
$PM_{2.5}$	24-hour	15	Bangor
	Annual	6	
NO_2	1-hour	43	Presque Isle
	Annual	4	
CO	1-hour	365	Acadia National Park
	8-hour	322	

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

The maximum modeled impacts, which were explicitly normalized to the form of their respective NAAQS, were added with conservative rural background concentrations to demonstrate compliance with NAAQS, as shown in Table III-7.

Because all pollutant/averaging period impacts using this method meet NAAQS, no further NAAQS modeling analyses need to be performed. Final predicted impacts for PM_{10} and $PM_{2.5}$ were adjusted by 0.02 $\mu g/m^3$ to account for secondary formation of particulate, as calculated in Section D.

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

Pollutant	Averaging Period	Max Impact (µg/m³)	Receptor UTM E (m)	Receptor UTM N (m)	Receptor Elevation (m)	Back-Ground (µg/m³)	Total Impact (µg/m³)	NAAQS (µg/m³)
SO_2	1-hour	153.91	626,130	5,001,397	28.73	24	177.91	196
	3-hour	180.18	626,180	5,001,047	36.13	18	198.18	1,300
	24-hour	62.46	626,230	5,001,397	26.92	11	73.46	365
	Annual	8.03	626,180	5,001,397	27.82	1	9.03	80
PM_{10}	24-hour	29.74	626,200	5,001,400	27.41	42	71.74	150
	Annual	4.45	626,033	5,001,490	31.18	10	14.45	50
$PM_{2.5}$	24-hour	18.21	626,105	5,001,457	27.33	15	33.21	35
	Annual	3.63	626,110	5,001,415	28.41	6	9.63	12
NO_2	1-hour	104.12	626,023	5,001,492	31.97	43	147.12	188
	Annual	6.76	626,118	5,001,420	28.10	4	10.76	100
CO	1-hour	1686.41	623,100	4,999,600	144.64	365	2,051.41	40,000
	8-hour	609.50	625,580	5,001,147	37.55	322	931.50	10,000

F. Secondary Formation of Ozone

The compliance demonstration must also account for the formation of ozone, which is a secondary pollutant formed through non-linear photochemical reactions, primarily driven by precursor emissions of NO_x and VOC in the presence of sunlight.

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

The proposed emissions increase can be expressed as a percent of the lowest Modeled Emission Rates for Precursors (MERP) for each precursor and then the individual contributions summed. A value less than 100% indicates that the critical air-quality threshold will not be exceeded when considering the combined impacts of these precursors on 8-hour daily maximum ozone levels.

Using methodologies from *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program* and from values in Table 7.1 (*Most Conservative (Lowest) Illustrative MERP Values by Precursor, Pollutant and Region*), Woodland Pulp demonstrated compliance as follows:

(71.62 TPY NO_x increase / 170 TPY NO_x 8-hour daily maximum O_3 MERP) +

(160.90 TPY VOC increase / 1159 TPY default VOC 8-hour daily maximum O_3 MERP) =

0.42 + 0.14 = 0.56

The final calculated value is 0.56 (56%). A value less than 100% indicates that the USEPA's critical air-quality threshold value of 1 part per billion (ppb) for ozone will not be exceeded. Therefore, the proposed NO_x and VOC emissions are not expected to contribute to any new significant ozone formation.

G. Class II Increment

AERMOD-PRIME was used to predict maximum Class II increment impacts.

Results of the Class II increment analysis are shown in Tables III-8. Because all predicted increment impacts meet Class II increment standards, no additional Class II SO_2, PM_{10}, $PM_{2.5}$ or NO_2 increment modeling needed to be performed.

For the purpose of determining maximum predicted impacts, all NO_x was conservatively assumed to convert to NO_2. Final predicted impacts for PM_{10} and $PM_{2.5}$ were adjusted by 0.02 $\mu g/m^3$ to account for secondary formation of particulate, as calculated in Section D.

TABLE III-8: Class II Increment Consumption

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class II Increment ($\mu g/m^3$)
SO_2	3-hour	23.35	625,980	5,001,247	30.48	512
	24-hour	2.70	625,611	5,001,753	31.04	91
	Annual	0.00	-	-	-	20
PM_{10}	24-hour	5.43	626,001	5,001,370	31.53	30
	Annual	0.02	-	-	-	17
$PM_{2.5}$	24-hour	4.66	625,368	5,001,444	43.14	9
	Annual	0.86	625,409	5,001,472	44.92	4
NO_2	Annual	0.73	625,401	5,001,467	44.78	25

Federal guidance and 06-096 C.M.R. ch. 115 require that any major new source or major source undergoing a major modification provide additional analyses of impacts that would occur as a direct result of the general, commercial, residential, industrial and mobile-source growth associated with the construction and operation of that source.

GENERAL GROWTH: Some increases in local emissions due to construction related activities are expected to occur for several months, with the majority of emissions due to truck and construction-vehicle traffic (such as soil removal, concrete delivery/pouring/finishing, delivery of materials, etc.). Increases in potential emissions of NO_x and $PM_{2.5}$ due to vehicle traffic will likely be temporary and short-lived. Emissions of dust from construction related activities will be minimized by the use of "Best Management Practices" for construction on-site.

RESIDENTIAL, COMMERCIAL AND INDUSTRIAL GROWTH: Population growth in the general area of Woodland Pulp can be used as a surrogate factor for the growth in emissions from residential combustion sources. Since the 1977 (PM_{10}), 1988 (NO_x) and 2010 ($PM_{2.5}$) baseline years, there has been a decrease in population in Washington County as show in Table III-9.

TABLE III-9: Washington County Population Growth

Pollutant	Baseline Year	Baseline Year Population	2017 Population	Percent Change from Baseline Year
NO_2	1988	35,308 (1990)	31,593	-10.5%
PM_{10}	1977	34,963 (1980)		-9.6%
$PM_{2.5}$	2010	32,827 (2010)		-3.8%

In addition, the manpower requirements, operations and support required for the construction and operation of the proposed project will be available from the local workforce in surrounding communities. Therefore, no new significant residential, commercial and/or industrial growth will follow from the modification associated with Woodland Pulp.

MOBILE SOURCE GROWTH: Since area and mobile sources are considered minor sources of NO_2, their contribution to increment has to be considered. Technical guidance from USEPA points out that screening procedures can be used to determine whether additional detailed analyses of minor source emissions are required. Compiling a source inventory may not be required if it can be shown that little or no growth has taken place in the impact area of the proposed source since the pollutant baseline dates were established.

Maine Department of Transportation has compiled Vehicle Miles Travelled (VMT) data for all counties in Maine from 1985 through 2016. As shown in Table III-10, the calculated growth in VMT over that time period, combined with the increasingly stringent federal NO_x emission requirements for mobile sources and the concurrent decrease in NO_2 background concentrations, indicate that mobile sources are not expected to significantly impact the available increment.

TABLE III-10: Washington County Growth in Vehicle Miles Travelled

Pollutant	Baseline Year	Baseline Year VMTs	2016 VMTs	Percent Change from Baseline Year
NO_2	1988	352,664,880	385,520,160	+9.3%

Therefore, additional analyses of mobile source NO_x emissions are not warranted.

H. Impacts on Plants, Soils & Animals

In accordance with guidance prescribed in USEPA's 1990 Prevention of Significant Deterioration manual, Woodland Pulp evaluated the impacts of its emissions using procedures described in *A Screening Procedure for the Impacts of Air Pollution on Plants, Soils and Animals*.

Maximum predicted impacts over all Class I and Class II areas from the AERMOD-PRIME modeling were compared to USEPA's 'Screening Concentrations' (see Table III-11), which represent the minimum concentration at which adverse growth effects or tissue injury in sensitive vegetation can be expected.

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

Pollutant	Averaging Period	Max Impact (μg/m³)	Screening Concentration (μg/m³)
SO_2	1-hour	229.78	917
	3-hour	214.94	786
	Annual	8.03	18
NO_2	4-hour	150.54	3,760
	8-hour	108.24	3,760
	Month	13.95	564
	Annual	7.51	94
CO	Week	451.62	1,800,000

Because all predicted impacts for all pollutants and averaging periods were below their respective screening concentrations, no further assessment of the impacts to plants, soils and animals is required, per USEPA guidance.

I. Class I Increment

AERMOD-PRIME was used to predict maximum Class I increment impacts in Moosehorn National Wildlife Refuge – Baring.

Results of the Class I increment analysis are shown in Table III-12. Because all predicted increment impacts meet Class I SO_2, PM_{10}, $PM_{2.5}$ and NO_2 increment standards, no additional Class I increment modeling needed to be performed.

For the purpose of determining maximum predicted impacts, all NO_x was conservatively assumed to convert to NO_2. Final predicted impacts for PM_{10} and $PM_{2.5}$ were adjusted by 0.02 $\mu g/m^3$ to account for secondary formation of particulate, as calculated in Section D.

TABLE III-12: Class I Increment Consumption

Pollutant	Averaging Period	Max Impact (µg/m³)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class I Increment (µg/m³)
SO_2	3-hour	1.07	632,104	4,995,894	73.76	25
	24-hour	0.00	-	-	-	5
	Annual	0.00	-	-	-	2
PM_{10}	24-hour	0.30	632,104	4,995,894	73.76	8
	Annual	0.02	-	-	-	4
$PM_{2.5}$	24-hour	0.10	634,766	4,994,097	110.20	2
	Annual	0.02	-	-	-	1
NO_2	Annual	0.00	-	-	-	2.5

J. Class I Air Quality Related Valuess

Based upon the magnitude of the SO_2, PM_{10} and NO_2 emissions increase and the distance from Woodland Pulp to the nearest Class I area, the US Fish & Wildlife Service (USFWS) has determined that a visibility assessment for plume blight is required for Moosehorn National Wildlife Refuge – Baring Unit (MNWR-Baring).

Using guidance obtained from USFWS staff and methodologies/procedures prescribed in *Workbook for Plume Visual Impact Screening and Analysis (Revised)* and *Federal Land Managers Air Quality Related Values Work Group: Phase I Report* (FLAG 2010), a VISCREEN Level 2 modeling analysis was performed for MNWR - Baring.

The VISCREEN model calculates the change in color difference index (Delta E) and contrast between a coherent plume and the viewing background. If the visual plume screening analysis can demonstrate that the increase in project emissions will not cause a plume with any hourly estimates greater than or equal to 2.0, or the absolute value of plume contrast greater than or equal to 0.05, that no further review of visibility impacts is required.

Inputs for the VISCREEN Level 2 modeling can be found in Table III – 13.

Table III – 13: VISCREEN Level 2 Inputs for MNWR - Baring

Pollutant		Maximum Hourly Emissions (g/s)	
Particulates (PM_{10})		0.47	
NO_x (as NO_2)		2.06	
Primary NO_2		0.00	
Soot		0.00	
Primary SO_4		0.00	
Background Characteristics			
Background Ozone		45 ppb	
Background Visual Range		166.0 km	
Plume-Source-Observer Angle		11.25°	
Level-2 Worst Case Meteorological Conditions			
Stability Class		F	
Wind Speed		3.0 m/s	
Level-2 Particle Characteristics			
Constituent		**Density (g/cm^3)**	**Mass Median Diameter (μg)**
Background Fine		1.5	0.3
Background Coarse		2.5	6.0
Plume Particulate		2.5	2.0
Plume Soot		2.0	0.1
Plume Sulfate		1.5	0.5
Distance Input Data			
Class I Area	**Source-Observer Distance**	**Minimum Source to Class I Distance**	**Maximum Source to Class I Distance**
MNWR - Baring	7.8 km	7.8 km	13.1 km

The results of the VISCREEN Level 2 visibility modeling are listed in Table III-14. Because all predicted visibility (Delta E and Contrast) impacts are below the critical values defined in *Workbook for Plume Visual Impact Screening and Analysis (Revised)*, no additional visibility modeled needs to be performed.

Table III – 14: VISCREEN Level 2 Results for MNWR - Baring

Background	Scatter Angle (degrees)	Azimuthal Angle (degrees)	Distance (km)	Alpha (degrees)	Inside MNWR - Baring	
					Delta E	Contrast (+/-)
Sky	10	153	13.1	16	0.585	0.005
Sky	140	153	13.1	16	0.408	-0.006
Terrain	10	84	7.8	84	1.339	0.004
Terrain	140	84	7.8	84	0.065	0.000
Critical Values (Sky & Terrain)					**2.000**	**0.050**

K. Summary

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

In addition, it has also been determined that Woodland Pulp will not cause an impairment to visibility AQRVs in MNWR – Baring.

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-215-77-15-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

Upon startup of TM3 or TM4 (whichever is first) all Specific Conditions found in NSR License A-215-77-6-A are Deleted and Replaced with the following Condition:

(1) **Tissue Machines (TM1, TM2, TM3, and TM4)**

A. Woodland Pulp is licensed to install and operate TM1, TM2, TM3 and TM4. TM1 and TM2 were installed in 2015 and 2016, respectively. [06-096 C.M.R. ch. 115, BACT]

B. Control Equipment

1. TM1, TM2, TM3, and TM4 shall each be equipped with wet dust collection systems that employ cyclone separators for control of particulate matter (PM, PM_{10}, and $PM_{2.5}$). These controls shall be operated whenever the associated tissue machine is in operation. [06-096 C.M.R. ch. 115, BACT]

2. The dryer burners of TM1, TM2, TM3, and TM4 shall utilize, at a minimum, low NO_x burners for control of NO_x. Condition (2)(A)(2)(b) shall supersede this condition where applicable. [06-096 C.M.R. ch. 115, BACT]

C. Emission Limits

1. Emissions from the Tissue Machines and associated dryers shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

Unit	PM lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	SO_2 lb/hr	NO_x lb/hr	CO lb/hr
TM1	1.29	2.44	2.38	0.03	4.52	4.12
TM2	1.29	2.44	2.38	0.03	4.52	4.12
TM3	1.90	3.59	3.51	0.11	8.97	15.07
TM4	1.29	2.44	2.38	0.03	4.52	4.12

2. Within 180 days of conducting NO_x performance testing on either TM1 or TM2 as required by Condition (3) of this license, Woodland Pulp shall propose, and apply to amend their license to incorporate, NO_x limits in units of ppm for TM1 and TM2. [06-096 C.M.R. ch. 115, BACT]

3. Within 180 days of conducting CO performance testing on either TM1 or TM2 as required by Condition (3) of this license, Woodland Pulp shall propose, and apply to amend their license to incorporate, CO limits in the units of ppm for TM1 and TM2. [06-096 C.M.R. ch. 115, BACT]

4. Within one year of startup of TM3, Woodland Pulp shall propose, and apply to amend their license to incorporate, a NO_x limit in units of ppm for TM3. [06-096 C.M.R. ch. 115, BACT]

5. Within one year of startup of TM3, Woodland Pulp shall propose, and apply to amend their license to incorporate, a CO limit in units of ppm for TM3. [06-096 C.M.R. ch. 115, BACT]

6. Within one year of startup of TM4, Woodland Pulp shall propose and apply to amend their license to incorporate, a NO_x limit in units of ppm for TM4. [06-096 C.M.R. ch. 115, BACT]

7. Within one year of startup of TM4, Woodland Pulp shall propose, and apply to amend their license to incorporate, a CO limit in units of ppm for TM4. [06-096 C.M.R. ch. 115, BACT]

8. Woodland Pulp shall demonstrate compliance with the applicable $PM/PM_{10}/PM_{2.5}$ emission limits for TM1, TM2, TM3, and TM4 listed in this license by conducting initial performance testing as described in Specific Condition (3) of this NSR license and complying with the following work practice standards:

   a. Monthly inspections of the wet dust collection system and cyclone separator on each tissue machine; and
   b. Recordkeeping of all maintenance, malfunctions, inspections, and downtime of the wet dust collection system and cyclone separators.

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

9. Emissions from the Tissue Machines and associated dryers shall not exceed the following [06-096 C.M.R. ch. 115, LAER]:

Unit	VOC (Combustion only) lb/hr	VOC (Process only) lb/ADT
TM1	0.27	1.00
TM2	0.27	1.00
TM3	0.99	1.00
TM4	0.27	1.00

   Compliance with the VOC emission limits shall be demonstrated by the recordkeeping requirements of this license.

D. Visible emissions from each Tissue Machine and its associated fuel burning equipment shall not exceed 10% opacity on a six-minute block average basis. Compliance shall be demonstrated in accordance with 40 C.F.R. Part 60, Appendix A, Method 9 upon request of the Department. [06-096 C.M.R. ch. 115, BACT]

E. Periodic Monitoring

1. Periodic monitoring for the control equipment on the Tissue Machines shall include the following:

   a. Records of the monthly inspections of the wet dust collection system and cyclone separator on each tissue machine; and
   b. Recordkeeping to document all maintenance, malfunctions, inspections, and downtime of the wet dust collection systems and cyclone separators.

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

2. Periodic monitoring for all four Tissue Machines shall include the following:

   a. Monthly records of the amount of each VOC-containing chemical additive used on each machine;
   b. Records of the VOC content for each chemical additive used;
   c. Monthly records of the amount (ADT) of finished tissue product produced on each machine;
   d. Monthly calculations demonstrating compliance with the process VOC emission limits; and
   e. Monthly records of fuel use for each tissue machine.

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

The following new Condition shall take effect upon startup of TM3 or TM4 (whichever is first):

(2) Tissue Machine (TM1, TM2, TM3, and TM4) NAAQS Compliance

In addition to the requirements of Condition (1) above, Woodland Pulp shall comply with the following requirements to demonstrate compliance with NAAQS and Class I and Class II Increment Standards:

A. Control Equipment

1. The dust collection system stacks from TM1 and TM2 shall each be retrofitted with venturi scrubbers no later than July 27, 2020. Once installed, the scrubbers shall be operated whenever the associated tissue machine is in operation.
   [06-096 C.M.R. ch. 115, §§ 4(A)(6)(j) and 7]

2. TM3 and TM4

   a. The dust collection system stacks from TM3 and TM4 shall each be equipped with venturi scrubbers for control of particulate matter (PM, PM_{10}, $PM_{2.5}$). These controls shall be operated whenever the associated tissue machine is in operation. [06-096 C.M.R. ch. 115, § 7]
   b. The yankee/through-air-dryer burners of TM3 and TM4 shall utilize ultra-low NO_x burners for control of NO_x. [06-096 C.M.R. ch. 115, § 7]

B. Emissions from the yankee/through-air-dryer sections of TM3 and TM4 shall each be vented to separate stacks that are each at least 117.75 feet AGL.
[06-096 C.M.R. ch. 115, § 7]

C. No later than July 27, 2020, Woodland Pulp shall increase the height of the yankee dryer section exhaust stacks of TM1 and TM2 to at least 117.3 feet AGL each.
[06-096 C.M.R. ch. 115, §§ 4(A)(6)(j) and 7]

D. Emission Limits

Upon installation of TM3 and TM4 and startup of the venturi scrubbers on TM1 and TM2, emissions from the Tissue Machines and associated dryers shall not exceed the following [06-096 C.M.R. ch. 115, § 7]:

Unit	PM lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	NO_x lb/hr
TM1	0.84	0.82	0.81	N/A*
TM2	0.84	0.82	0.81	N/A*
TM3	1.23	1.20	1.19	5.74
TM4	0.84	0.82	0.81	1.57

*NO_x emission limits for this equipment are addressed elsewhere in this license.

E. Periodic monitoring for the control equipment on TM1, TM2, TM3, and TM4 shall include the following. [06-096 C.M.R. ch. 115, § 7]

1. Monthly inspections of the venturi scrubber;
2. Recordkeeping to document all maintenance, malfunctions, inspections, and downtime of the venturi scrubber; and
3. Woodland Pulp shall monitor and record the flow rate through and pressure drop across each venturi scrubber at least once per shift.

The following new Condition shall take effect upon startup of TM3 or TM4 (whichever is first):

(3) **Initial Performance Testing**

A. TM1, TM2, and TM4

1. By July 27, 2021, Woodland Pulp shall demonstrate compliance with the PM lb/hr emission limits for TM1, TM2, and TM4 by conducting performance testing on the yankee hood stack and dust stack (both stacks tested simultaneously) on either TM1 or TM2 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, BACT]

2. By July 27, 2021, Woodland Pulp shall demonstrate compliance with the NO_x lb/hr emission limits for TM1 and TM2, by conducting performance testing on the yankee hood stack on either TM1 or TM2 in accordance with 40 C.F.R. Part 60, Appendix A, Method 7 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BACT]

3. By July 27, 2021, Woodland Pulp shall demonstrate compliance with the CO lb/hr emission limits for TM1 and TM2 by conducting performance testing on the yankee hood stack on either TM1 or TM2 in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BACT]

4. Within 180 days of startup of TM4, Woodland Pulp shall demonstrate compliance with the NO_x lb/hr emission limit for TM4 by conducting performance testing on the yankee hood stack in accordance with 40 C.F.R. Part 60, Appendix A, Method 7 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BACT]

5. Within 180 days of startup of TM4, Woodland Pulp shall demonstrate compliance with the CO lb/hr emission limit for TM4 by conducting performance testing on the yankee hood stack in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BACT]

B. TM3

1. Within 180 days of startup of TM3, Woodland Pulp shall demonstrate compliance with the PM lb/hr emission limit for TM3 by conducting performance testing on the TAD stack and dust stack (both stacks tested simultaneously) 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, BACT]

2. Within 180 days of startup of TM3, Woodland Pulp shall demonstrate compliance with the NO_x lb/hr emission limit for TM3 by conducting performance testing on the TAD stack in accordance with 40 C.F.R. Part 60, Appendix A, Method 7 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BACT]

3. Within 180 days of startup of TM3, Woodland Pulp shall demonstrate compliance with the CO lb/hr emission limit for TM3 by conducting performance testing on the TAD stack in accordance with 40 C.F.R. Part 60, Appendix A, Method 10 or other method as approved by the Department. [06-096 C.M.R. ch. 115, BACT]

The following new Condition shall take effect upon startup of TM3 or TM4 (whichever is first):

(4) **NAAQS and Class I and Class II Increment Standards Compliance**

A. Emissions from the #9 Power Boiler shall not exceed the following:

Pollutant	lb/hr	Origin and Authority
$PM_{2.5}$	84.4[1]	06-096 C.M.R. ch. 115, § 7
	76.0[2]	

1. When firing #6 fuel oil in combination with other fuels
2. When firing natural gas or propane in combination with other fuels

B. Emissions from the Smelt Dissolving Tank shall not exceed the following:

Pollutant	lb/hr	Origin and Authority
$PM_{2.5}$	10.0	06-096 C.M.R. ch. 115, § 7

C. Emissions from the Lime Kiln shall not exceed the following:

Pollutant	lb/hr	Origin and Authority
$PM_{2.5}$	20.8[1]	06-096 C.M.R. ch. 115, § 7
	15.0[2]	

1. When firing #6 fuel oil
2. When firing natural gas or propane

Upon startup of TM3 or TM4 (whichever is first), the following combined alternative emission limit shall replace the combined SO_2 lb/hr alternative emission limit for the #3 Recovery Boiler and #9 Power Boiler in any previously issued NSR License:

(5) **Alternative Emissions Cap**

The combined total SO_2 emissions from the #3 Recovery Boiler and the #9 Power Boiler shall not exceed 600 lb/hr (based on a three-hour block average) when firing #6 fuel oil in combination with other fuels or 559 lb/hr (based on a three-hour block average) when firing natural gas or propane in combination with other fuels. These alternative emissions caps shall be in effect for no more than 300 hours per calendar year, combined.
[06-096 C.M.R. ch. 115, BACT and § 7]

DONE AND DATED IN AUGUSTA, MAINE THIS 27 DAY OF July , 2018.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Marc Allen Robert Cone for
PAUL MERCER, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: May 15, 2018
Date of application acceptance: May 15, 2018

Date filed with the Board of Environmental Protection:

This Order prepared by Jonathan E. Rice and Lynn Muzzey, Bureau of Air Quality.

Filed
JUL 27 2018
State of Maine
Board of Environmental Protection