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

DEPARTMENT ORDER

Maritimes & Northeast Pipeline, L.L.C. **Cumberland County** **Westbrook, Maine** **A-957-71-G-A**	**Departmental** **Findings of Fact and Order** **Air Emission License** **Amendment #2**

FINDINGS OF FACT

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

I. REGISTRATION

A. Introduction

Maritimes & Northeast Pipeline, L.L.C. (M&N) was issued Air Emission License A-957-71-E-R/A on 4/3/2019, for the operation of emission sources associated with their natural gas compressor station. The license was subsequently amended on 11/6/2019 (A-957-71-F-M).

The equipment addressed in this license amendment is located off Small Hardy Road in Westbrook, Maine.

M&N has requested an amendment to license a project known as the Westbrook XPress Project. M&N proposes to install new and modify existing facilities at the existing Westbrook Compressor Station and to install new equipment and facilities as part of an expansion to be located on the Westbrook Compressor Station property (Expansion Area).

B. Project Description

1. The Westbrook XPress Project includes the following activities at the existing Westbrook Compressor Station:

   a. Replace an existing filter/separator and modify the existing meter building at the Westbrook Meter Station 30006;
   b. Install two redundant meter runs and associated control valves at the Westbrook Meter Station 30006; and
   c. Modify station piping.

2. The Westbrook XPress Project includes the following activities at the Expansion Area:

   a. Install Turbine #3;
   b. Install Generator #2;
   c. Install Gas Heater #2;
   d. Install gas cooling; and
   e. Install a filter/separator.

C. Emission Equipment

The following equipment is addressed in this air emission license amendment:

Fuel Burning Equipment

Equipment	Max. Capacity (MMBtu/hr)	Maximum Firing Rate (scf/hr)	Fuel Type	Date of Installation	Stack #
Turbine #3	144.5[a]	141,634[a]	Natural Gas	2021	3
Generator #2	6.96	6,820	Natural Gas	2021	GEN-2
Gas Heater #2	1.62	1,584	Natural Gas	2021	HTR-2

[a] At ambient temperatures above 0 °F.

Gas cooling, station piping, and filters/separators are not considered emissions equipment except for potential fugitive emissions which are addressed in this license.

D. Definitions

The following definitions are specific to Turbine #3:

Low Temperature Operation means operation at or below an ambient temperature of 0 °F.

Normal Operation means operation when SoLoNO$_x$^{TM} is Enabled and Active at temperatures above 0 °F. During normal operation, the majority of fuel fired in the turbines is lean-premixed fuel, and the balance is pilot fuel. At these times, the turbine is considered to be achieving vendor guaranteed emissions rates, as indicated by the SoLoNO$_x$^{TM} system being both Enabled and Active.

Shutdown means the time from when SoLoNO$_x$^{TM} becomes Inactive to the end of fuel combustion.

Startup means the time from the start of fuel combustion to the time that SoLoNO$_x$^{TM} becomes Active.

Transient Event means a period of time when SoLoNO$_x$^{TM} is Enabled but also Inactive.

Post-Maintenance Low Load Operation means periods of operation following maintenance of the turbine that require slow start of the unit with operation at low-load with SoLoNO$_x$™ Disabled, as recommended by the manufacturer.

E. Application Classification

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

The modification of a minor source is considered a major or minor modification based on whether or not expected emission increases exceed the "Significant Emission" levels as defined in the Department's *Definitions Regulation*, 06-096 Code of Maine Rules (C.M.R.) ch. 100. The emission increases are determined by subtracting the current licensed annual emissions preceding the modification from the maximum future licensed annual emissions, as follows:

Pollutant	Current License (tpy)	Future License (tpy)	Net Change (tpy)	Significant Emission Levels
PM	7.5	11.5	+4.0	100
PM_{10}	7.5	11.5	+4.0	100
SO_2	6.5	9.8	+3.3	100
NO_x	64.6	86.0	+21.4	100
CO	85.1	93.1	+8.0	100
VOC	38.3	47.4	+9.1	50

This modification is determined to be a minor modification and has been processed as such.

F. Facility Classification

With the operating hours restrictions on the emergency generators and the limits on annual emissions, the facility is licensed as follows:

- As a synthetic minor source of air emissions, because M&N is subject to license restrictions that keep facility emissions below major source thresholds for criteria pollutants; and
- As an area source of hazardous air pollutants (HAP), because the licensed emissions are below the major source thresholds for HAP.

Emissions of NO_x, CO, and VOC are licensed above 80% of the major source threshold. Therefore, this facility is classified as an "80% Synthetic Minor" for the purpose of determining the minimum required compliance inspection frequency in accordance with Maine's Compliance Monitoring Strategy.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license, the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in *Definitions Regulation*, 06-096 C.M.R. ch. 100. Separate control requirement categories exist for new and existing equipment.

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in *Definitions Regulation*, 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. Turbine #3

M&N proposes to install Turbine #3, a Solar Mars Model 100-16002S4 simple-cycle combustion turbine. It will provide direct drive power to run a compressor used to recompress and move natural gas through the transmission pipeline. Turbine #3 will have an approximate maximum heat input of 144.5 MMBtu/hr firing natural gas.

1. 06-096 C.M.R. ch. 101

Turbine #3 is a stationary internal combustion engine (turbine). Thus, it is subject to a visible emission standard per *Visible Emissions Regulation*, 06-096 C.M.R. ch. 101. However, the BACT limit for visible emissions is more stringent. Therefore, only the most stringent visible emission limit is contained in this license.

2. 06-096 C.M.R. ch. 103

Turbine #3 is fuel burning equipment with a rated capacity greater than 3 MMBtu/hr and is therefore subject to *Fuel Burning Equipment Particulate Emission Standard*, 06-096 C.M.R. ch. 103. It is subject to a PM emission limit of 0.08 lb/MMBtu per § 2(B)(1)(b) because it has a maximum heat input capacity between 50 and 250 MMBtu/hr and fires natural gas. Turbine #3 will fire natural gas (an inherently low PM emitting fuel), and it will be subject to a BACT determined lb/hr PM limit that is significantly lower than the PM emission limit of 0.08 lb/MMBtu. Therefore, the requirements of 06-096 C.M.R. ch. 103 are determined to be met by complying with the unit's BACT determined lb/hr PM limit.

3. 40 C.F.R. Part 60, Subpart KKKK

Turbine #3 is subject to *Standards of Performance for Stationary Combustion Turbines*, 40 C.F.R. Part 60, Subpart KKKK since it was constructed after February 18, 2005.

Turbines which are subject to 40 C.F.R. Part 60, Subpart KKKK are exempt from the requirements of *Standards of Performance for Stationary Gas Turbines*, 40 C.F.R. Part 60, Subpart GG per § 60.4305(b).

a. Standards

(1) Nitrogen Oxides NO_x

Per Table 1 of Subpart KKKK, Turbine #3 is subject to a NO_x emission limit of 25 ppm at 15% O_2 during operation at or above 75% of peak load and at temperatures at or above 0 °F. However, the BACT limit for NO_x emissions for this type of operation is more stringent. Therefore, only the more stringent BACT limit is contained in this license.

For operating loads less than 75% of peak load or temperatures below 0 °F, Table 1 of Subpart KKKK limits NO_x emissions to 150 ppm at 15% O_2.

(2) Sulfur Dioxide (SO_2)

Turbine #3 shall not burn fuel which contains potential emissions in excess of 0.060 lb SO_2/MMBtu heat input. [40 C.F.R. § 60.4330(a)(2)]

M&N has elected to demonstrate compliance through recordkeeping in accordance with 40 C.F.R. § 60.4365(a).

b. Performance Testing

(1) M&N shall perform an initial performance test on Turbine #3 for NO_x within 60 days after achieving the maximum production rate but not later than 180 days after initial startup. [40 C.F.R. §§ 60.8(a) &60.4400(a)]

(2) Section § 60.4340(a) allows M&N to perform subsequent performance tests every two years (in lieu of annually) if the results of the performance test is less than or equal to 75% of the emission limit contained in Subpart KKKK. Since Turbine #3 is subject to a BACT emission limit for NO_x that is less than 75% of the Subpart KKKK emission limit, M&N will always be subject to performance testing on a two-year schedule.

(3) Performance testing for NO_x shall be done at any load condition within plus or minus 25% of 100% of peak load. M&N shall conduct three separate test runs for each performance test. The minimum run time shall be 20 minutes. The ambient temperature shall be greater than 0 °F during the performance test. [40 C.F.R. § 60.4400(b)]

(4) M&N shall perform an initial performance test on Turbine #3 for SO_2 within 60 days after achieving the maximum production rate but not later than 180 days after initial startup. Subsequent performance tests shall be conducted on an annual basis with no more than 14 calendar months between tests. [40 C.F.R. §§ 60.8(a) & 60.4415(a)]

M&N may conduct performance tests for SO_2 by collecting a representative sample of natural gas in accordance with ASTM D5287 and analyzing the sample for the total sulfur content of the fuel using ASTM D1072 or other procedures allowed by Subpart KKKK. The fuel analysis may be performed by M&N, a service contractor, the fuel vendor, or other qualified agency. [40 C.F.R. § 60.4415(a)(1)]

M&N intends to comply with the performance test requirement for SO_2 by producing a tariff sheet from the fuel vendor that contains documentation the method of sampling and analyzing the natural gas for total sulfur content of the fuel complies with the methods specified by 40 C.F.R. § 60.4415(a)(1).

c. Recordkeeping

M&N shall maintain a current FERC Gas Tariff establishing gas quality, which documents the total sulfur content is 20 grains of sulfur or less per 100 scf of gas. [40 C.F.R. § 60.4365(a)]

4. Operation at Low Temperatures

The turbine control system is programmed to increase pilot fuel when the ambient temperature drops below 0 °F to maintain combustion stability. As a result, emissions increase at these temperatures. This license includes provisions for increased emissions during periods when the ambient temperature is below 0 °F. Annual emissions estimates conservatively assume Turbine #3 will operate up to 161 hours/year at temperatures between 0 °F and -20 °F and one hour per year of operation below -20 °F. Emissions from operation at low temperatures are to be included when demonstrating compliance with the facility's annual emission limits.

5. Startup/Shutdown and Transient Events

As discussed in the BACT section below, emissions of NO_x, CO, and VOC will be controlled using Solar's SoLoNO$_x^{TM}$ which is a technology based on dry, lean-premixed combustion.

SoLoNO$_x^{TM}$ can be either Enabled or Disabled, essentially either on or off. SoLoNO$_x^{TM}$ is typically Disabled during low load conditions, i.e., startup and shutdown, as well as during low temperature events (see Definitions section) and post-maintenance low load operation as recommended by the manufacturer. The control system for Turbine #3 is equipped with an interlock which prevents operating in SoLoNO$_x^{TM}$ Disabled mode except for periods of startup, shutdown, low temperature, and post-maintenance low load operation as recommended by the manufacturer. Startup and shutdown events are estimated to take approximately nine minutes each with no more than 2 startups and 2 shutdowns in any given hour, for a total of approximately 18 minutes of startup and 17 minutes of shutdown in an hour.

When Enabled, SoLoNO$_x^{TM}$ can be either Active or Inactive. A transient event occurs when SoLoNO$_x^{TM}$ is Enabled but Inactive. These are infrequent periods of a short duration (typically a few minutes or less) when the turbine is not achieving the emissions guarantee provided by Solar. These periods occur as a result of the turbine losing combustion stability in the lean premix mode. To stabilize combustion, the turbine control system increases the pilot fuel to the combustion chamber resulting in higher emissions until stable lean premix mode can be achieved again. The cause of transient events is usually outside the control of M&N, e.g., a bump/drop in pipeline pressure due to a large facility coming on/off-line.

M&N will continuously monitor the SoLoNO$_x^{TM}$ system and whether it is Enabled/Disabled and Active/Inactive. In calculating compliance with the facility's annual emission limits, M&N shall determine the amount of operating time the turbine spent in each mode and calculate emissions based on the following:

Mode	**Calculate Emissions Using Emission Factors Based On…**
Startup	Emissions data supplied by the turbine manufacturer at the time of the most recent permit application.
Shutdown	Emissions data supplied by the turbine manufacturer at the time of the most recent permit application.
Normal Operation	Licensed emission limits for temperatures above 0 °F
Low Temperature	Licensed emission limits for appropriate temperature range
Transient Event	Licensed emission limits for temperatures less than or equal to -20 °F

6. Gas Releases: Turbine Case Venting

   When a turbine sits idle for some time, it is decompressed and vented to atmosphere to prevent damage to equipment. The turbine is also decompressed and vented when maintenance work is done on the turbine. M&N shall keep records as specified for the turbine venting.

7. BACT Findings

   M&N submitted a BACT analysis for control of emissions from Turbine #3.

   a. Electric Motor Drive (EMD)
   M&N evaluated the use of an EMD for gas compression in lieu of installation of Turbine #3 which would eliminate combustion pollutants. This change would fundamentally redesign the project which is typically beyond the scope of a BACT analysis. However, an analysis of this alternative was provided by M&N and is therefore included in this license.

   An EMD sufficient to provide the required compression would require 14 megawatts (MW) of power to operate. New electrical infrastructure required to meet that demand includes more than two miles of transmission line to bring power from the Pride's Corner Substation, upgrades to the Pride's Corner Substation, and addition of a new substation at M&N's facility.

   The increased capital costs associated with an EMD is $17.3 million, the additional annual operating costs due to the difference in electricity costs versus natural gas costs is $8.5 million per year, and the EMD alternative reduces NO_x emissions by no more than 20.5 tpy. This results in a cost per ton of pollutant eliminated of over $489,440. Therefore, the use of an EMD is not economically feasible. Additionally, operation of an EMD does not guarantee a significant reduction in emissions but may only shift the location of those emissions from the facility to the power producer.

   Therefore, the Department finds that use of an EMD instead of Turbine #3 does not represent BACT for this project.

   b. Particulate Matter (PM, PM_{10})
   Units firing fuels with low ash content (such as natural gas) and high combustion efficiency exhibit low particulate matter emissions. The Department finds the firing of only pipeline quality natural gas and emission limits of 0.95 lb/hr during normal operation and 0.98 lb/hr during operation at low temperature represent BACT for emissions of PM/PM_{10} from Turbine #3.

Visible emissions from Turbine #3 shall not exceed 10% opacity on a six-minute block average basis.

These standards apply at all times. Compliance with the particulate matter limits shall be demonstrated through performance testing upon request by the Department.

c. Sulfur Dioxide (SO_2)

SO_2 is formed from the oxidation of sulfur in fuel. The most stringent method of control for SO_2 that has been demonstrated for gas-fired turbines is firing pipeline quality natural gas. The Department finds the firing of only pipeline quality natural gas and an emission limit of 0.81 lb/hr during normal operation and 0.83 lb/hr during operation at low temperature represent BACT for emissions of SO_2 from Turbine #3. This standard applies at all times.

Compliance with the SO_2 limit is based on monthly recordkeeping of the amount of natural gas fired in Turbine #3 and the most recent tariff sheet showing the sulfur content of the natural gas fired.

d. Nitrogen Oxides (NO_x)

NO_x is formed from the oxidation of both fuel-bound nitrogen and atmospheric nitrogen (thermal NO_x). Natural gas has very little fuel-bound nitrogen. Therefore, reducing NO_x emissions typically focuses on reducing thermal NO_x.

Potential control technologies for combustion turbines include add-on controls, such as selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), and EMx™, the use of combustion control techniques such as Dry Low-NO_x (DLN) combustion and water/steam injection, and the combustion of clean fuel such as natural gas.

DLN Combustion

Dry Low-NO_x (DLN) is a combustion control technology which reduces NO_x emissions by injecting the combustion air and/or fuel at several locations or stages which spreads the flame over a larger area. This reduces flame temperature and decreases the formation of thermal NO_x.

SoLoNO$_x$™ is Solar's version of DLN technology. (Previously, this technology was referred to as SoLoNO$_x$ II™. Solar has since dropped the "II" and simply refers to their DLN combustion control as SoLoNO$_x$™.) Turbine #3 will be equipped with SoLoNO$_x$™ as an integral part of the combustion system.

The use of SoLoNO$_x$™ has been determined to be feasible and has been selected as part of the BACT strategy for Turbine #3. The system is designed to achieve a

guaranteed NO_x emission rate of 9 ppmdv at 15% O_2 at ambient temperatures above 0 °F and steady-state operations between 50-100% load.

SCR

SCR employs the reaction of NO_x with ammonia (NH_3) or urea in the presence of a catalyst to produce nitrogen and water. The reduction is considered "selective" because the catalyst selectively targets NO_x reduction in the presence of ammonia within a temperature range of approximately 480 ºF to 800 ºF, according to the following reactions:

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

SCR systems have typical control efficiencies between 70 – 90%.

Although technically feasible, use of SCR to control NO_x emissions on Turbine #3 would be less efficient than in situations where SCR is typically employed. The molar ratio of ammonia to NO_x must be carefully controlled to allow for optimum NO_x reduction while limiting the amount of non-reacted ammonia emitted to the atmosphere (known as "ammonia slip"). This ratio is difficult to control in units which experience variable loads, such as those at compressor stations. The unit loading and speed of the turbine will fluctuate continually according to the time of day, change in weather, and customer demands. Throughout the day, the unit will be started and stopped and the loading changed to keep pipeline operating pressures within safe operating parameters and keep volumes sufficient to meet customer obligations. Although the variable nature of compressor station turbine loads does not make SCR operation infeasible, the inherent lag between CEMS sampling and ammonia injection make control of both NO_x and ammonia slip difficult during quickly changing conditions.

As described above, Turbine #3 will be equipped with SoLoNO$_x^{TM}$ combustion technology which meets a guaranteed NO_x emission rate of 9 ppmdv at 15% O_2 at ambient temperatures above 0 °F and steady-state operations between 50-100% load. The cost to apply SCR in addition to SoLoNO$_x^{TM}$ exceeds $54,000 per ton of pollutant removed. Therefore, SCR is considered not economically feasible.

SNCR

SNCR is a method of post combustion control that selectively reduces NO_x into nitrogen and water vapor by reacting the exhaust gas with a reagent such as ammonia or urea, similar to SCR. However, in SNCR, a catalyst is not used to lower the activation temperature of the NO_x reduction reaction. Therefore, SNCR is used when flue gas temperatures are between 1600 ºF and 2100 ºF.

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

The NO_x reduction efficiency decreases rapidly at temperatures outside the optimum temperature window which results in excessive unreacted ammonia slip and increased NO_x emissions. This temperature window is higher than the exhaust gas temperature from Turbine #3 and would require additional burners to raise the exhaust to the required temperature range. However, SNCR is technically feasible.

EMx™

EMx™ (formerly called SCONOX™) is a post-combustion catalytic NO_x reduction technology. EMx™ uses a precious metal catalyst and a NO_x absorption/regeneration process to convert CO and NO_x to CO_2, water, and elemental nitrogen. NO_x in the exhaust stream reacts with a potassium carbonate absorbent coating the surface of the oxidation catalyst in the EMx™ reactor forming potassium nitrites and nitrates that are deposited onto the catalyst surface. Each "can" within the reactor becomes saturated with potassium nitrites and nitrates over time and must be desorbed. Regeneration is accomplished by isolating the can and injecting hydrogen diluted with steam. The hydrogen is generated on-site with a small reformer that uses natural gas and steam as input streams. Hydrogen and carbon dioxide react with the potassium nitrites and nitrates to form elemental nitrogen and water and to regenerate the potassium carbonate for another absorption cycle.

The exhaust temperature of Turbine #3 exceeds the effective catalyst system operating temperature range of 300 – 700 °F. Furthermore, the catalyst regeneration process is complex, and would require additional emission units to produce steam. Therefore, EMx™ is not considered technically feasible for control of NO_x from Turbine #3.

Water/Steam Injections

Water/steam injection is the process of injecting water or steam into the combustion chamber to cool the combustion process and lower the peak flame temperature, thus reducing thermal NO_x. It is an effective control technique, reducing NO_x emissions by up to 50%. However, injection of steam or water into a turbine equipped with a SoLoNO$_x$™ combustion system may cause potential flameouts, increased maintenance requirements, and reduced turbine efficiency. Therefore, water/steam injections is not considered technically feasible for control of NO_x from Turbine #3.

BACT Determination for NO_x

Use of an SNCR system would involve installing burners to raise the exhaust temperature and would result in higher emissions of other combustion pollutants than use of the existing $SoLoNO_x^{TM}$ combustion system. Use of an SCR system is not economically justified given the level of emissions the turbine is designed to achieve. Therefore, the Department finds the use of $SoLoNO_x^{TM}$ combustion controls and the following emission limits represent BACT for emissions of NO_x from Turbine #3:

Pollutant	**T > 0 °F**	**0 °F ≥ T > -20 °F**	**T ≤ -20 °F**
NO_x	9 ppmdv @ 15% O_2		
	4.69 lb/hr	22.58 lb/hr	64.52 lb/hr

The NO_x standards apply at all times except for periods of startup, shutdown, transient events, and post-maintenance low load operation as recommended by the manufacturer, as described earlier in this license. Compliance with the emission standards for NO_x at ambient temperatures above 0 °F shall be demonstrated through performance testing as required by 40 C.F.R. Part 60, Subpart KKKK.

e. Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

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

The most effective control technology for the reduction of CO and VOC from a natural gas-fired turbine is the use of an oxidation catalyst. Exhaust gases are passed over a catalyst bed where excess oxygen in the exhaust oxidizes the CO to CO_2 and VOC to CO_2 and water. High temperature oxidation catalysts are generally employed in the case of simple-cycle turbines. The use of an oxidation catalyst is technically feasible. The cost to install and operate an oxidation catalyst in this application would exceed $6,000 per ton of CO controlled causing the applicant to question its economic feasibility. However, M&N has made the business decision to move forward with the installation of an oxidation catalyst in order to stay below major source thresholds.

The Department finds the use of SoLoNO$_x^{TM}$ combustion controls, an oxidation catalyst, and the following emission limits to represent BACT for emissions of CO and VOC from Turbine #3:

Pollutant	T > 0 °F	0 °F ≥ T > -20 °F	T ≤ -20 °F
CO	25 ppmdv @ 15% O_2		
	0.40 lb/hr	1.64 lb/hr	2.46 lb/hr
VOC	0.50 lb/hr	1.02 lb/hr	1.54 lb/hr

The CO and VOC standards apply at all times except for periods of startup, shutdown, transient events, and post-maintenance low load operation as recommended by the manufacturer, as described earlier in this license.

Compliance with the emission standards for CO at ambient temperatures above 0 °F shall be demonstrated through performance testing conducted every two years (i.e., on the same schedule as the performance testing for NO_x).

Compliance with the emission standards for VOC at ambient temperatures above 0 °F shall be demonstrated through performance testing upon request by the Department.

M&N shall continuously monitor and record the oxidation catalyst inlet temperature and pressure drop across the catalyst during turbine operation.

f. Hazardous Air Pollutants (HAP)

Internal combustion of natural gas can emit small amounts of HAP, most notably formaldehyde. The oxidation catalyst used to control emissions of CO and VOC will also significantly reduce emissions of HAP, including formaldehyde. Total formaldehyde emissions from Turbine #3 will be less than 1.0 tpy, and facility emissions of formaldehyde will be less than 4 tpy, significantly below the major source threshold of 10 tpy.

The Department finds the use of good combustion practices and controls, such as those inherent to the SoLoNO$_x^{TM}$ combustion system, represents BACT for emissions of HAP from Turbine #3.

8. Summary of Emission Limits

Except during periods of startup, shutdown, and transient events, Turbine #3 shall each not exceed the following emissions limits.

Pollutant	Emission Limit T > 0 °F	Emission Limit 0 °F ≥ T > -20 °F	Emission Limit T ≤ -20 °F	Citation
PM	0.95 lb/hr	0.98 lb/hr		06-096 C.M.R. ch. 115, BACT
PM_{10}	0.95 lb/hr	0.98 lb/hr		
SO_2	0.81 lb/hr	0.83 lb/hr		
NO_x	9 ppmdv @ 15% O_2	–	–	
	–	150 ppmdv @ 15% O_2	150 ppmdv @ 15% O_2	40 C.F.R. Part 60, Subpart KKKK
	4.69 lb/hr	22.58 lb/hr	64.52 lb/hr	06-096 C.M.R. ch. 115, BACT
CO	0.40 lb/hr	1.64 lb/hr	2.46 lb/hr	
VOC	0.50 lb/hr	1.02 lb/hr	1.54 lb/hr	

Visible emissions from Turbine #3 shall not exceed 10% opacity on a six-minute block average basis.

C. 40 C.F.R. Part 60, Subpart OOOOa

M&N is subject to *Standards of Performance for Crude Oil and Natural Gas Facilities which Construction, Modification or Reconstruction Commenced After September 18, 2015*, 40 C.F.R. Part 60, Subpart OOOOa. This subpart establishes emission standards for the control of greenhouse gases (GHG) at a number of different types of facilities.

The facility is not subject to requirements for applicable units defined in §§ 60.5365a(a) through (i) for the following reasons:

- The facility is not a well affected facility;
- Turbine #3 is not a centrifugal compressor using a wet seal nor a reciprocating compressor;
- Any new pneumatic controller will not have a natural gas bleed rate greater than 6 scfh;
- The facility does not contain any new, modified, or reconstructed storage vessels; and
- The facility is not a natural gas processing plant.

However, the facility is a compressor station permitting the installation of a new compressor. Therefore, the collection of fugitive emissions components at the station are considered affected equipment per § 60.5365a(j).

M&N is subject to requirements to limit emissions of methane and VOC by complying with the requirements of § 60.5397a to monitor fugitive emission components, repair sources of fugitive emissions, and perform recordkeeping and reporting. These provisions are commonly referred to as Leak Detection and Repair (LDAR).

On June 16, 2017, EPA proposed to stay, for a period of time, certain requirements contained within Subpart OOOOa, including the LDAR requirements that M&N is subject to. The intent of the stay was to provide time to complete rulemaking to address issues for which EPA has granted reconsideration. Although EPA continues to move forward with rulemaking, the stay was never finalized, and the provisions currently remain in effect.

Due to the currently fluid nature of the LDAR requirements, they are incorporated into this license by reference only. M&N shall comply with the applicable requirements of the most current version of 40 C.F.R. Part 60, Subpart OOOOa.

D. Generator #2

M&N proposes to install an emergency generator (Generator #2) to support Turbine #3 and its associated equipment. Generator #2 will consist of an 880 brake horsepower (bhp) natural gas-fired engine with a 625 kilowatt (kW) electrical generator. Generator #2 will have a maximum heat input of 6.96 MMBtu/hr and will be manufactured after 2009.

1. BACT Findings

The BACT emission limits for Generator #2 are based on the following:

PM/PM_{10}	- 0.12 lb/MMBtu per 06-096 C.M.R. ch. 103 - lb/hr limits based on 9.99 x 10^{-3} lb/MMBtu based on AP-42 Table 3.2-2 dated 7/00
SO_2	- 5.88 x 10^{-4} lb/MMBtu based on AP-42 Table 3.2-2 dated 7/00 and the firing of pipeline natural gas
NO_x	- 2.0 g/bhp-hr from 40 C.F.R. Part 60, Subpart JJJJ, Table 1
CO	- 4.0 g/bhp-hr from 40 C.F.R. Part 60, Subpart JJJJ, Table 1
VOC	- 1.0 g/bhp-hr from 40 C.F.R. Part 60, Subpart JJJJ, Table 1 plus formaldehyde emissions from AP-42 Table 3.2-2 dated 7/00
Visible Emissions	- 06-096 C.M.R. ch. 115, BACT

The BACT emission limits for Generator #2 are the following:

Unit	Pollutant	lb/MMBtu
Generator #2	PM	0.12

Unit	PM (lb/hr)	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Generator #2	0.07	0.07	neg.	3.88	7.76	3.48

Visible emissions from Generator #2 shall not exceed 10% opacity on a six-minute block average basis.

2. 40 C.F.R. Part 60, Subpart JJJJ

Standards of Performance for Spark Ignition Internal Combustion Engines, 40 C.F.R. Part 60, Subpart JJJJ is applicable to Generator #2 since the unit was ordered after June 12, 2006, and manufactured after January 1, 2009. [40 C.F.R. § 60.4230] By meeting the requirements of 40 C.F.R. Part 60, Subpart JJJJ, Generator #2 also meets the requirements found in the *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, 40 C.F.R. Part 63, Subpart ZZZZ. [40 C.F.R. § 63.6590(c)]

A summary of the currently applicable federal 40 C.F.R. Part 60, Subpart JJJJ requirements is listed below.

a. Emergency Engine Designation and Operating Criteria

Under 40 C.F.R. Part 60, Subpart JJJJ, a stationary reciprocating internal combustion engine (ICE) is considered an emergency stationary ICE (emergency engine) as long as the engine is operated in accordance with the following criteria. Operation of an engine outside of the criteria specified below may cause the engine to no longer be considered an emergency engine under 40 C.F.R. Part 60, Subpart JJJJ, resulting in the engine being subject to requirements applicable to non-emergency engines.

(1) Emergency Situation Operation (On-Site)

There is no operating time limit on the use of an emergency engine to provide electrical power or mechanical work during an emergency situation. Examples of use of an emergency engine during emergency situations include the following:

- Use of an engine to produce power for critical networks or equipment (including power supplied to portions of a facility) because of failure or

interruption of electric power from the local utility (or the normal power source, if the facility runs on its own power production);
- Use of an engine to mitigate an on-site disaster or equipment failure;
- Use of an engine to pump water in the case of fire, flood, natural disaster, or severe weather conditions; and
- Similar instances.

(2) Non-Emergency Situation Operation

An emergency engine may be operated up to a maximum of 100 hours per calendar year for maintenance checks, readiness testing, and other non-emergency situations as described below.

(i) An emergency engine may be operated for a maximum of 100 hours per calendar year for maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government; the manufacturer; the vendor; the regional transmission organization or equivalent balancing authority and transmission operator; or the insurance company associated with the engine. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency ICE more than 100 hours per calendar year.

(ii) An emergency engine may be operated for up to 50 hours per calendar year for other non-emergency situations. **However, these operating hours are counted as part of the 100 hours per calendar year operating limit described in paragraph (2) and (2) (i) above.**

The 50 hours per calendar year operating limit for other non-emergency situations cannot be used for peak shaving, demand response, or to generate income for a facility by providing power to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

[40 C.F.R. §§ 60.4243(d) and 60.4248]

b. Emission Standards

The engine is subject to the following emission standards:

Unit	NO_x (g/bhp-hr)	CO (g/bhp-hr)	VOC[a] (g/bhp-hr)	Origin
Generator #2	2.0	4.0	1.0	40 C.F.R. § 60.4233(e)

[a] This VOC emission standard does not include formaldehyde.

c. Certified vs. Non-Certified Engine

Subpart JJJJ requires M&N to either purchase an engine certified by the manufacturer to meet the applicable emission standards or the demonstration of compliance with standards through performance testing. If the engine is not operated according to the manufacturer's written instructions, it is considered a non-certified engine.

(1) Certified Engine

If the engine is operated as a certified engine:

(i) The engine shall be certified by the manufacturer as meeting the emission standards for new nonroad spark ignition engines found in 40 C.F.R. Part 60, Subpart JJJJ, Table 1. [40 C.F.R. §§ 60.4233(e) & 60.4243(b)]

(ii) The engine shall be operated and maintained according to the manufacturer's written instructions. M&N may only change those settings that are permitted by the manufacturer. [40 C.F.R. § 60.4243(b)(1)]

(2) Non-Certified Engine

If the engine is operated as a non-certified engine:

(i) Initial Notification
Within 30 days of commencement of construction (i.e, the date the engine is ordered), M&N shall submit an initial notification to EPA and the Department which contains the following information for Generator #2:

1. Name and address of the owner or operator;
2. The address of the affected source;

3. Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;
4. Emission control equipment; and
5. Fuel used.

[40 C.F.R. § 60.4245(c)]

(ii) Compliance Demonstration

Within 60 days of achieving the maximum production rate, but not later than 180 days from initial startup, M&N shall conduct an initial performance test on the engine to demonstrate compliance with the NO_x, CO, and VOC emission limits. M&N shall conduct subsequent performance tests every 8,760 hours or 3 years, whichever comes first.
[40 C.F.R. §§ 60.8(a) and 4243(b)(2)(ii)]

M&N shall provide 30-days notice of any performance test to both the Department and EPA. [40 C.F.R. § 60.8(d)]

Performance tests shall be conducted in accordance with 40 C.F.R. § 60.4244 including, but not limited to, the following:

(1) Each performance test shall be conducted within 10% of 100% peak (or the highest achievable) load. [40 C.F.R. § 60.4244(a)]
(2) When calculating emissions of VOC, emissions of formaldehyde shall not be included. [40 C.F.R. § 60.4244(f)]

(iii) Maintenance Plan

M&N shall keep a maintenance plan and records of conducted maintenance. M&N shall, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. [40 C.F.R. § 60.4243(b)(2)(ii)]

(iv) Reporting

M&N shall submit a copy of each performance test report to the Department and EPA within 30 days after the test has been completed.
[40 C.F.R. §4245(d) and 06-096 C.M.R. ch. 115]

d. Non-Resettable Hour Meter Requirements

A non-resettable hour meter shall be installed and operated on the engine.
[40 C.F.R. § 60.4237(a) and 06-096 C.M.R. ch. 115, BACT]

e. Annual Time Limit for Maintenance and Testing

As an emergency engine, the unit shall be limited to 100 hours/year for maintenance and testing. The emergency engine may operate up to 50 hours per year in non-emergency situations, but those 50 hours are included in the 100 hours total allowed for maintenance and testing. The 50 hours for non-emergency use cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity. [40 C.F.R. § 60.4243(d)]

f. Recordkeeping

M&N shall keep records of the following for Generator #2:

(1) All notifications submitted to comply with this subpart;
(2) All maintenance conducted on the engine;
(3) Documentation that the engine meets the emission standards (e.g., copies of performance test reports or supplier certification).
[40 C.F.R. § 60.4245(a)]
(4) Hours of operation for the engine recorded through the non-resettable hour meter. Documentation shall include the number of hours the unit operated for emergency purposes, the number of hours the unit operated for non-emergency purposes, and the reason the engine was in operation during each time.
[40 C.F.R. § 60.4243(b)(2)(ii)]

E. Gas Heater #2

M&N proposes to install a fuel gas heater (Gas Heater #2) to be used to pre-heat the turbine fuel gas. Gas Heater #2 will be a new unit rated at 1.62 MMBtu/hr and firing natural gas.

1. BACT Findings

The BACT emission limits for Gas Heater #2 were based on the following:

PM/PM_{10}	–	7.6 lb/MMscf based on AP-42 Table 1.4-2 dated 7/98
SO_2	–	0.6 lb/MMscf based on AP-42 Table 1.4-2 dated 7/98 and the firing of pipeline natural gas
NO_x	–	98.43 lb/MMscf based on emission rates provided by the manufacturer
CO	–	150 lb/MMscf based on emission rates provided by the manufacturer
VOC	–	36.15 lb/MMscf based on AP-42 Table 1.4-3 dated 7/98 and emission rates provided by the manufacturer
Visible Emissions	–	06-096 C.M.R. ch. 101

The BACT emission limits for Gas Heater #2 are the following:

Unit	PM (lb/hr)	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Gas Heater #2	0.01	0.01	neg	0.16	0.24	0.06

2. Visible Emissions

   Visible emissions from Gas Heater #2 shall not exceed 10% opacity on a six-minute block average basis.

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

   Due to its size, Gas Heater #2 is not subject to *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units* 40 C.F.R. Part 60, Subpart Dc for units greater than 10 MMBtu/hr manufactured after June 9, 1989. [40 C.F.R. § 60.40c]

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

   Gas Heater #2 is not subject to the *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources*, 40 C.F.R. Part 63, Subpart JJJJJJ. This subpart is not applicable to units firing natural gas. [40 C.F.R. §§63.11195]

F. Fugitive Emissions

The Westbrook XPress Project will result in new and modified equipment and configuration of the station piping. Operation of the facility's equipment and plant piping will result in fugitive emissions of gas. Annual combined emissions of VOC from fugitive emissions shall not exceed 7.4 tpy

M&N shall keep an updated inventory of equipment counts (e.g., valves, pump seals, connectors, flanges, etc.) and calculate fugitive emissions on a calendar year basis using emission factors obtained from EPA's *Protocol for Equipment Leak Emission Estimates*, EPA-453/R-95-017, Table 2-4, dated November 1995.[1]

[1] https://www3.epa.gov/ttnchie1/efdocs/equiplks.pdf

These fugitive emissions (including VOC and methane) shall be reported to the Department annually as part of the facility's emissions inventory collected per *Emission Statements*, 06-096 C.M.R. ch. 137.

G. Annual Emission Limits

Based on the addition of Turbine #3, Generator #2, Gas Heater #2, and the changes to station piping, the facility-wide annual emission limits for M&N are updated to the following:

Pollutant	Tons/year
PM	11.5
PM_{10}	11.5
SO_2	9.8
NO_x	86.0
CO	93.1
VOC	47.3
Single HAP	9.9
Total HAP	24.9

These limits are on a 12-month rolling total basis. Compliance shall be demonstrated by recordkeeping and calculations of actual emissions performed at least once annually. Additional calculation of emissions to demonstrate compliance with these limits on a 12-month rolling total basis shall be performed upon request by the Department.

H. Annual Emissions

The table below provides an estimate of facility-wide annual emissions for the purposes of calculating the facility's annual air license fee. Only licensed equipment is included, i.e., emissions from insignificant activities are excluded. Similarly, unquantifiable fugitive particulate matter emissions are not included. Maximum potential emissions were calculated based on the following assumptions:

- Operation of Turbines #1, #2, and #3 for 8,760 hrs/year each, assuming 161 hrs/year each of operation between -20 °F and 0 °F and one hour per year each of operation below -20 °F;
- 10 hr/year of startup and 10 hrs/year of shutdown events per year (each) for Turbines #1, #2, and #3;
- Operation of Boiler #1 and Gas Heater #2 for 8,760 hrs/year each; and
- Operation of Generators#1 and #2 for 100 hrs/year each.

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

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

	PM	PM_{10}	SO_2	NO_x	CO	VOC
Turbine #1	3.7	3.7	3.2	31.7	42.2	4.3
Turbine #2	3.7	3.7	3.2	31.7	42.2	4.3
Turbine #3	3.9	3.9	3.3	20.5	6.6	2.3
Boiler #1	0.1	0.1	0.1	1.1	0.6	0.1
Gas Heater #2	0.1	0.1	–	0.7	1.0	0.2
Generator #1	–	–	–	0.1	0.1	0.1
Generator #2	–	–	–	0.2	0.4	0.2
Gas Releases	–	–	–	–	–	28.4
Fugitive	–	–	–	–	–	7.4
Total TPY	**11.5**	**11.5**	**9.8**	**86.0**	**93.1**	**47.3**

Pollutant	Tons/year
Single HAP	9.9
Total HAP	24.9

III. AMBIENT AIR QUALITY ANALYSIS

A. Overview

A refined modeling analysis was performed to show that emissions from M&N, 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 II increments for SO_2, PM_{10}, $PM_{2.5}$ or NO_2.

Since the current licensing action for M&N has been determined to be a minor modification to an existing minor source, an assessment of Class I Air Quality Related Values (AQRVs) is not required.

B. Model Inputs

The AERMOD-PRIME 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 for 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 off-site meteorological database was used in the AERMOD refined modeling analysis. Wind data was collected at heights of 10 and 100 meters at the SAPPI Westbrook meteorological monitoring site during the 5-year period 1989 - 1993. The following parameters and their associated heights were as follows:

TABLE III-1 : Meteorological Parameters and Collection Heights

Parameter	Sensor Height(s)
Scalar Wind Speed	10 meters, 100 meters
Scalar Wind Direction	10 meters, 100 meters
Standard Deviation of Wind Direction	10 meters, 100 meters
Temperature	7 meters

Each year of meteorological data minimally met the 90% data recovery requirement, both singularly and jointly.

When possible, hourly ISHD surface data collected at the Portland Jetport NWS site were substituted for any missing surface data collected at the primary site. All other missing data were interpolated or coded as missing, per USEPA guidance. In addition, hourly Portland Jetport 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 Gray 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 M&N, are listed in Table III-2.

TABLE III-2 : M&N Point Source Stack Parameters – Project Only (Turbine #3)

Stack	Stack Base Elevation (m)	Stack Height (m)	GEP Stack Height (m)	Stack Diameter (m)	UTM Easting NAD83 (m)	UTM Northing NAD83 (m)
CURRENT/PROPOSED						
• M&N Turbine #3 (Mars 100)	85.00	16.46	33.97	3.27	389,564	4,841,594
2012 BASELINE ($PM_{2.5}$ INCREMENT)						
• M&N Turbine #3 did not exist during the 2012 baseline year, no $PM_{2.5}$ credits to be taken.						
1987 BASELINE (NO_2 INCREMENT)						
• M&N Turbine #3 did not exist during the 1987 baseline year, no NO_2 credits to be taken.						
1977 BASELINE (SO_2/PM_{10} INCREMENT)						
• M&N Turbine #3 did not exist during the 1977 baseline year, no SO_2/PM_{10} credits to be taken.						

Emission parameters for M&N Turbine #3 (project-only) NAAQS and increment modeling are listed in Table III-3. Emission parameters are based on the maximum (100%) operation, with refined modeling scenarios representing the following ambient temperatures: 100˚F, 45˚F and a low temperature which is a pro-rated emission rate based on average hours per year at ≤-20 ˚F, ≥-20 ˚F and ≤ 0˚F , and > 0˚F. Startup and shutdown (SU/SD) emission rates were also pro-rated based on minutes in the hour at each stage of SU/SD and normal operation, and the maximum hours per year of SU/SD.

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} and $PM_{2.5}$

TABLE III-3 : Stack Emission Parameters

Stack	Averaging Periods	SO_2 (g/s)	PM_{10}/ $PM_{2.5}$ (g/s)	NO_x (g/s)	CO (g/s)	Stack Temp (K)	Stack Velocity (m/s)
MAXIMUM LICENSE ALLOWED							
• M&N Turbine #3 Mars 100 – 0˚F	All	0.105	0.124	0.633	0.053	729.00	11.82
• M&N Turbine #3 Mars 100 – 50˚F		0.094	0.111	0.545	0.046	754.00	11.20
• M&N Turbine #3 Mars 100 – 100˚F		0.080	0.094	0.461	0.039	781.00	10.17
• M&N Turbine #3 Mars 100 – SU/SD		-	-	0.061	2.230	649.00	8.30
2012 BASELINE ($PM_{2.5}$ INCREMENT)							
• M&N Turbine #3 did not exist during the 2012 baseline year, no $PM_{2.5}$ credits to be taken.							
1987 BASELINE (NO_2 INCREMENT)							
• M&N Turbine #3 did not exist during the 1987 baseline year, no NO_2 credits to be taken.							
1977 BASELINE (SO_2/PM_{10} INCREMENT)							
• M&N Turbine #3 did not exist during the 1977 baseline year, no SO_2/PM_{10} credits to be taken.							

C. Single Source Modeling Impacts

The significant impact model results for M&N Turbine #3 (project-only emissions) 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 and 1-hour NO_2 were conservatively based on the maximum daily High-1st-High predicted values, averaged over five-years of meteorological data. The impacts for 24-hour $PM_{2.5}$ and annual $PM_{2.5}$ were conservatively based on the 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. No additional refined NAAQS or increment modeling was required for pollutants that did not exceed their respective significance levels.

TABLE III-4 : Maximum AERMOD-PRIME Significant Impact Results (Project-Only)

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (m)	Receptor UTM N (m)	Receptor Elevation (m)	Class II Significance Level ($\mu g/m^3$)	Load Case*
SO_2	1-hour	7.87	389,601	4,841,562	78.99	7.9	100%, 0˚F
	3-hour	9.96	389,538	4,841,551	79.87	25	100%, 0˚F
	24-hour	4.93	389,538	4,841,551	79.87	5	100%, 0˚F
	Annual	0.03	389,538	4,841,551	79.87	1	100%, 0˚F
PM_{10}	24-hour	**5.82**	389,538	4,841,551	79.87	5	100%, 0˚F
	Annual	0.09	389,538	4,841,551	79.87	1	100%, 0˚F
$PM_{2.5}$	24-hour	**2.57**	389,538	4,841,551	79.87	1.2	100%, 0˚F
	Annual	0.03	389,538	4,841,551	79.87	0.2	100%, 0˚F
NO_2	1-hour	**42.72**	389,601	4,841,562	78.99	7.5	100%, 0˚F
	Annual	0.42	389,538	4,841,551	79.87	1	100%, 0˚F
CO	1-hour	245.85	389,538	4,841,551	79.87	2,000	SU/SD
	8-hour	210.03	389,538	4,841,551	79.87	500	SU/SD

*0˚F represents the low temperature scenario.

D. 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-5, are derived from representative rural background data for use in the Southern Maine region.

TABLE III-5 : Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	Monitoring Site
PM_{10}	24-hour	43	Portland
$PM_{2.5}$	24-hour	16	
NO_2	1-hour	43	

MEDEP examined other nearby sources to determine if any impacts would be significant in or near the M&N significant impact area. Due to the location of the M&N facility, extent of the predicted significant impact area and other nearby source's emissions, MEDEP has determined that no other sources would be included in combined-source refined modeling other than the two existing facility turbines.

The maximum AERMOD-PRIME modeled impacts were added with conservative representative background concentrations to demonstrate compliance with NAAQS, as shown in Table III-6.

Because all significant pollutant/averaging period impacts using this method meet NAAQS, no further NAAQS modeling analyses need to be performed.

TABLE III-6 : Maximum Combined Source Impacts ($\mu g/m^3$)

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (m)	Receptor UTM N (m)	Receptor Elevation (m)	Back-Ground ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	24-hour	4.06	389,615	4,841,576	79.05	43	47.06	150
$PM_{2.5}$	24-hour	0.67	389,914	4,841,894	87.34	16	16.67	35
NO_2	1-hour	31.64	390,014	4,841,944	90.26	43	74.64	188

E. Class II Increment

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

Results of the Class II $PM_{2.5}$ increment analysis are shown in Table III-7. Since modeled maximum $PM_{2.5}$ increment impacts were below the increment standard, no additional Class II increment modeling needed to be performed.

TABLE III-7 : Class II Increment Consumption

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (m)	Receptor UTM N (m)	Receptor Elevation (m)	Class II Increment ($\mu g/m^3$)
PM_{10}	24-hour	4.06	389,615	4,841,576	79.05	30
$PM_{2.5}$	24-hour	4.06	389,615	4,841,576	79.05	9

F. Summary

In summary, it has been demonstrated that M&N will not cause or contribute to a violation of any SO_2, PM_{10}, $PM_{2.5}$, NO_2 or CO or to Class II increments for SO_2, PM_{10}, $PM_{2.5}$ or NO_2.

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, and
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License Amendment A-957-71-G-A subject to the conditions found in Air Emission License A-957-71-E-R/A, in amendment A-957-71-F-M, and the following conditions.

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

SPECIFIC CONDITIONS

The following shall Replace Condition (20) of Air Emission License A-957-71-E-R/A:

(20) **Annual Emissions Limits**

A. Total emissions from all licensed sources at the facility shall not exceed the following on a 12-month rolling total basis. [06-096 C.M.R. ch. 115, BACT]

Pollutant	Tons/year
PM	11.5
PM_{10}	11.5
SO_2	9.8
NO_x	86.0
CO	93.1
VOC	47.3
Single HAP	9.9
Total HAP	24.9

B. As part of documenting compliance with the annual emission limits listed above, M&N shall include turbine emissions from startup, shutdown, and transient events and calculate turbine emissions based on the following:

Mode	Calculate Emissions Using Emission Factors Based On…
Startup	The emissions data supplied by the turbine manufacturer at the time of the most recent permit application.
Shutdown	The emissions data supplied by the turbine manufacturer at the time of the most recent permit application.
Normal Operation	Licensed emission limits for temperatures above 0 °F
Low Temperature	Licensed emission limits for appropriate temperature range
Transient Event	Licensed emission limits for temperatures less than or equal to -20 °F

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

C. Compliance with the annual emission limits shall be demonstrated through the recordkeeping outlined in this license with calculations of emissions performed at least once annually. Additional calculation of emissions to demonstrate compliance with these limits on a 12-month rolling total basis shall be performed upon request by the Department. [06-096 C.MR. ch. 115, BACT]

Condition (16)(D) of Air Emission License A-957-71-E-R/A is Deleted and Replaced with the following New Condition:

(25) **Ambient Temperature**

M&N shall keep records of the number of hours during the calendar year that the ambient temperature is at or below 0 °F and at or below -20 °F. Ambient temperature will be measured at the turbine inlet primarily, but for any gaps in M&N's temperature data, it may utilize meteorological data from an appropriate representative location.
[06-096 C.M.R. ch. 115, BPT]

The following are New Conditions:

(26) **Turbine #3**

A. Turbine #3 shall only fire pipeline-quality natural gas.
[06-096 C.M.R. ch. 115, BACT]

B. Except during periods of startup, shutdown, and transient events, Turbine #3 shall not exceed the following emission limits:

Pollutant	Emission Limit T > 0 °F	Emission Limit 0 °F ≥ T > -20 °F	Emission Limit T ≤ -20 °F	Citation
PM	0.95 lb/hr	0.98 lb/hr		06-096 C.M.R. ch. 115, BACT
PM_{10}	0.95 lb/hr	0.98 lb/hr		
SO_2	0.81 lb/hr	0.83 lb/hr		
NO_x	9 ppmdv @ 15% O_2	–	–	
	–	150 ppmdv @ 15% O_2	150 ppmdv @ 15% O_2	40 C.F.R. Part 60, Subpart KKKK
	4.69 lb/hr	22.58 lb/hr	64.52 lb/hr	06-096 C.M.R. ch. 115, BACT
CO	0.40 lb/hr	1.64 lb/hr	2.46 lb/hr	
VOC	0.50 lb/hr	1.02 lb/hr	1.54 lb/hr	

C. Visible emissions from Turbine #3 shall not exceed 10% opacity on a six-minute block average basis. [06-096 C.M.R. ch. 115, BACT]

D. M&N shall not operate Turbine #3 in SoLoNO$_x$^{TM} Disabled mode except for periods of startup, shutdown, low temperature, and post-maintenance low load operation as recommended by the manufacturer. Compliance shall be demonstrated by continuously monitoring the SoLoNO$_x$^{TM} system and whether it is Enabled/Disabled.
[06-096 C.M.R. ch. 115, BACT]

E. M&N shall continuously monitor the SoLoNO$_x$^{TM} system on Turbine #3 during all operating times, whether it is Active/Inactive, and use that information to determine the frequency and duration of transient events. This information shall be used in demonstrating compliance with the facility's annual emission limits.
[06-096 C.M.R. ch. 115, BACT]

F. Performance Testing

1. M&N shall conduct an initial performance test on Turbine #3 for NO_x within 60 days after achieving the maximum production rate but not later than 180 days after initial startup. [40 C.F.R. §§ 60.8 and 60.4400(a)]

2. M&N shall conduct an initial performance test on Turbine #3 for CO within 60 days after achieving the maximum production rate but not later than 180 days after initial startup. [06-096 C.M.R. ch. 115, BACT]

3. M&N shall conduct performance testing on Turbine #3 for NO_x every two years (no more than 26 calendar months between tests).
[40 C.F.R. § 60.4340(a)]

4. M&N shall conduct performance testing on Turbine #3 for CO every two years (i.e., on the same schedule as performance testing for NO_x).
   [06-096 C.M.R. ch. 115, BACT]

5. Performance testing for NO_x and CO shall be conducted at any load condition within plus or minus 25% of 100% of peak load. M&N shall conduct three separate test runs for each performance test. The minimum run time shall be 20 minutes. The ambient temperature shall be greater than 0 °F during the performance test.
   [40 C.F.R. § 60.4400(b) and 06-096 C.M.R. ch. 115, BACT]

6. M&N shall perform an initial performance test on Turbine #3 for SO_2 within 60 days after achieving the maximum production rate but not later than 180 days after initial startup. Subsequent performance tests shall be conducted on an annual basis with no more than 14 calendar months between tests.
   [40 C.F.R. §§ 60.8(a) & 60.4415(a)]

   M&N may conduct performance tests for SO_2 by collecting a representative sample of natural gas in accordance with ASTM D5287 and analyzing the sample for the total sulfur content of the fuel using ASTM D1072 or other procedures allowed by Subpart KKKK. The fuel analysis may be performed by M&N, a service contractor, the fuel vendor, or other qualified agency.
   [40 C.F.R. § 60.4415(a)(1)]

   Compliance with the performance test requirement for SO_2 may be achieved by producing a tariff sheet from the fuel vendor that contains documentation the method of sampling and analyzing the natural gas for total sulfur content of the fuel complies with the methods specified by 40 C.F.R. § 60.4415(a)(1).

G. M&N shall keep documentation of all maintenance and repairs (both planned and unplanned, including parts replacement) performed on Turbine #3 and any associated control equipment. The documentation shall include the date maintenance occurred and what maintenance was performed or which parts replacement were replaced. These records shall be available to the Department upon request.
   [06-096 C.M.R. ch. 115, BACT]

H. Turbine #3 is subject to, and shall comply with, the applicable requirements of 40 C.F.R. Part 60, Subpart KKKK.

I. M&N shall maintain a current FERC Gas Tariff establishing gas quality, which documents the total sulfur content is 20 grains of sulfur or less per 100 scf of gas or otherwise comply with the specified methods for demonstrating compliance with the fuel sulfur content requirements of 40 C.F.R. § 60.4365(a).

J. M&N shall operate and maintain Turbine #3 and its associated air pollution control equipment and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times, including during startup, shutdown, and malfunction. [40 C.F.R. § 60.4333(a)]

K. M&N may install like-kind manufacturer-supplied replacement components for the turbine that occur either as part of scheduled maintenance of a turbine or in the event of a malfunction or outage and subsequent repair. M&N shall notify the Department in writing in advance of any replacement of turbine components and shall still be subject to and responsible for any applicable New Source Performance Standard provisions with respect to replacement of the turbine or any components.
[06-096 C.M.R. ch. 115, BACT]

L. Parameter Monitors

1. M&N shall monitor and record the following. These are considered Parameter Monitors. [06-096 C.M.R. ch. 115, BACT]

Parameter	Monitor	Record Monitor Data	Total	Notes
Natural Gas Fuel Flow Rate to Turbine #3 (standard cubic feet input)	Continuously	Continuously	Monthly	a
SoLoNO$_x$™ Enabled/Disabled Status on Turbine #3	Continuously (status)	Continuously (minutes)	Monthly (minutes)	b
SoLoNO$_x$™ Active/Inactive Status on Turbine #3	Continuously (status)	Continuously (minutes)	Monthly (minutes)	b
Oxidation Catalyst Inlet Temperature for Turbine #3	Continuously	Continuously	N/A	c
Oxidation Catalyst Pressure Drop for Turbine #3	Continuously	Continuously	N/A	c

Notes:

a. For this parameter, Continuously means the total fuel flow will be recorded at least once per 15-minute period during turbine operation.
b. For this parameter, Continuously means the total minutes for each status will be recorded at least once per 15-minute period during turbine operation.
c. For this parameter, Continuously means the parameter will be recorded at least once per 15-minute period during turbine operation.

2. If any parameter monitor is recording accurate and reliable data less than 98% of the source-operating time within any quarter of the calendar year, the Department may initiate enforcement action and may include in that enforcement action any period of time that the parameter monitor was not recording accurate and reliable data during that quarter unless the licensee can demonstrate to the satisfaction of the Department that the failure of the system to record accurate and reliable data was due to the performance of established quality assurance and quality control procedures or unavoidable malfunctions.
[06-096 C.M.R. ch. 115, BACT]

(27) **Generator #2**

A. Generator #2 shall be limited to 100 hours of operation per calendar year, excluding operating hours during emergency situations. [06-096 C.M.R. ch. 115, BACT]

B. Emissions shall not exceed the following:

Unit	Pollutant	lb/MMBtu	Origin and Authority
Generator #2	PM	0.12	06-096 C.M.R. ch. 103, § (2)(B)(1)(a)

C. Emissions shall not exceed the following [40 C.F.R. § 60.4233(e)]

Unit	NO_x (g/bhp-hr)	CO (g/bhp-hr)	VOC[a] (g/bhp-hr)
Generator #2	2.0	4.0	1.0

[a] The VOC emission limit in units of g/bhp-hr does not include formaldehyde.

D. Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

Unit	PM (lb/hr)	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Generator #2	0.07	0.07	neg.	3.88	7.76	3.48

E. Visible Emissions

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

F. Generator #2 shall meet the applicable requirements of 40 C.F.R. Part 60, Subpart JJJJ, including the following: [incorporated under 06-096 C.M.R. ch. 115, BACT]

1. Certified Engine

If the engine is operated as a certified engine:

a. The engine shall be certified by the manufacturer as meeting the emission standards for new nonroad spark ignition engines found in 40 C.F.R. Part 60, Subpart JJJJ, Table 1. [40 C.F.R. §§ 60.4233(e) & 60.4243(b)]

b. The engine shall be operated and maintained according to the manufacturer's written instructions. M&N may only change those settings that are permitted by the manufacturer. [40 C.F.R. § 60.4243(b)(1)]

2. Non-Certified Engine

If the engine is operated as a non-certified engine:

a. Within 30 days of commencement of construction (i.e, the date the engine is ordered), M&N shall submit an initial notification to EPA and the Department which contains the following information for Generator #2:

(1) Name and address of the owner or operator;
(2) The address of the affected source;
(3) Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;
(4) Emission control equipment; and
(5) Fuel used.
[40 C.F.R. § 60.4245(c)]

b. Within 60 days of achieving the maximum production rate, but not later than 180 days from initial startup, M&N shall conduct an initial performance test on the engine to demonstrate compliance with the NO_x, CO, and VOC emission limits. M&N shall conduct subsequent performance tests every 8,760 hours or 3 years, whichever comes first. [40 C.F.R. §§ 60.8(a) and 4243(b)(2)(ii)]

c. M&N shall provide 30-days notice of any performance test to both the Department and EPA. [40 C.F.R. § 60.8(d)]

d. Performance tests shall be conducted in accordance with 40 C.F.R. § 60.4244 including, but not limited to, the following:

(1) Each performance test shall be conducted within 10% of 100% peak (or the highest achievable) load. [40 C.F.R. § 60.4244(a)]
(2) When calculating emissions of VOC, emissions of formaldehyde shall not be included. [40 C.F.R. § 60.4244(f)]

e. M&N shall keep a maintenance plan and records of conducted maintenance. M&N shall, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. [40 C.F.R. § 60.4243(b)(2)(ii)]

f. M&N shall submit a copy of each performance test report to the Department and EPA within 30 days after the test has been completed. [40 C.F.R. §4245(d) and 06-096 C.M.R. ch. 115]

3. Non-Resettable Hour Meter
A non-resettable hour meter shall be installed and operated on the engine.
[40 C.F.R. § 60.4237(a) and 06-096 C.M.R. ch. 115, BACT]

4. Annual Time Limit for Maintenance and Testing
As an emergency engine, the unit shall be limited to 100 hours/year for maintenance checks and readiness testing. Up to 50 hours/year of the 100 hours/year may be used in non-emergency situations (this does not include peak shaving, demand response, or to generate income for a facility by providing power to an electric grid or otherwise supply power as part of a financial arrangement with another entity). The limits are based on a calendar year. Compliance shall be demonstrated by records (electronic or written log) of all engine operating hours.
[40 C.F.R. § 60.4243(d) and 06-096 C.M.R. ch. 115, BACT]

5. Recordkeeping
M&N shall keep records of the following for Generator #2:

a. All notifications submitted to comply with this subpart;
b. All maintenance conducted on the engine;
c. Documentation that the engine meets the emission standards (e.g., copies of performance test reports or supplier certification).
[40 C.F.R. § 60.4245(a)]
d. Hours of operation for the engine recorded through the non-resettable hour meter. Documentation shall include the number of hours the unit operated for emergency purposes, the number of hours the unit operated for non-emergency purposes, and the reason the engine was in operation during each time.
[40 C.F.R. § 60.4243(b)(2)(ii)]

(28) **Gas Heater #2**

A. Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BACT]:

Emission Unit	PM (lb/hr)	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Gas Heater #2	0.01	0.01	neg.	0.16	0.24	0.06

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

DONE AND DATED IN AUGUSTA, MAINE THIS 21st DAY OF SEPTEMBER, 2020.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____ for _____
MELANIE LOYZIM, ACTING COMMISSIONER

The term of this amendment shall be concurrent with the term of Air Emission License A-957-71-E-R/A.

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 3/25/2020
Date of application acceptance: 3/26/2020

Date filed with the Board of Environmental Protection:

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

FILED

SEP 21, 2020

State of Maine
Board of Environmental Protection