



DEPARTMENT ORDER

Verso Androscoggin LLC
Franklin County
Jay, Maine
A-718-77-2-A

Departmental
Findings of Fact and Order
New Source Review
NSR #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 (the Department) finds the following facts:

I. REGISTRATION

A. Introduction

FACILITY	Verso Androscoggin LLC
LICENSE TYPE	06-096 C.M.R. ch. 115, Minor Modification
NAICS CODES	221112
NATURE OF BUSINESS	Fossil Fuel Electric Power Generation
FACILITY LOCATION	300 Riley Road, Gate 15, Jay, Maine

B. NSR License Description

Verso Androscoggin LLC (Verso Cogen) has requested a New Source Review (NSR) license to install a wet compression system on Combustion Turbine 01 (CT01) which will increase the efficiency and increase the electrical generating capacity during warmer months.

C. Emission Equipment

The following equipment is addressed in this NSR license:

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Fuel Type, % sulfur	Maximum Firing Rate	Date of Manuf.	Date of Install	Stack #
Combustion Turbine 01 (CT01)	675	Distillate Fuel, 0.0015%	4,927 gal/hr	1999	1999	1
		Natural Gas, negl.	661,764 scf/hr			

D. Definitions

Distillate Fuel For the purposes of this license, *distillate fuel* means the following:

- Fuel oil that complies with the specifications for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials (ASTM) in ASTM D396;
- Diesel fuel oil numbers 1 or 2, as defined in ASTM D975;
- Kerosene, as defined in ASTM D3699;
- Biodiesel, as defined in ASTM D6751; or
- Biodiesel blends, as defined in ASTM D7467.

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 this New Source Review license does not violate any applicable federal or state requirements and does not reduce monitoring, reporting, testing, or recordkeeping requirements.

The modification of a major source is considered a major or minor modification based on whether or not expected emissions increases exceed the “Significant Emission Increase” levels as given in *Definitions Regulation*, 06-096 Code of Maine Rules (C.M.R.) ch. 100.

The emission increases are determined by subtracting the baseline actual emissions of the 24 months preceding the modification (or representative 24 months) from the projected actual emissions. The results of this comparison are as follows:

Pollutant	Baseline Actual Emissions 1/14 – 12/15 (ton/year)	Projected Actual Emissions (ton/year)	Net Emissions Increase (ton/year)	Significant Emissions Increase Levels (ton/year)
PM	5.38	5.53	0.15	25
PM ₁₀	5.38	5.53	0.15	15
PM _{2.5}	5.38	5.53	0.15	10
SO ₂	0.78	0.79	0.01	40
NO _x	11.99	12.30	0.31	40
CO	35.72	36.71	0.99	100
VOC	4.86	4.99	0.14	40
CO ₂ e	96,040	98,829	2,789	75,000

Note: The above values are for CT01 only. None of the other equipment at the facility is affected by this NSR license.

Therefore, this NSR license is determined to be a minor modification under *Minor and Major Source Air Emission License Regulations*, 06-096 C.M.R. ch. 115 since the changes being made are not addressed or prohibited in the Part 70 air emission license. An application to incorporate the requirements of this NSR license into the Part 70 air emission license shall be submitted no later than 12 months from commencement of the requested operation.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

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

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in 06-096 C.M.R. ch. 100. BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

B. Facility Description

Verso Cogen presently operates three turbine-generator sets (TG) to produce steam for the Verso Androscoggin pulp and paper mill in Jay, Maine, and electricity to the utility grid. Each TG consists of a combustion turbine (CT) combined with a heat recovery steam generator (HRSG), with each turbine output shaft coupled to its own dedicated electric generator.

The output of a TG is largely dependent on the mass throughput of combustion air admitted into the turbine. During colder months, the TG can approach their rated output capacities due to the higher density of the cold combustion air that mixes with the fuel being fired. Combustion air with a higher density contains more mass, which both permits higher quantities of fuel to be fired and has a greater capacity to drive the CT.

During months where outdoor ambient air temperatures reach or exceed 50°F (typically March through November), the ambient air used for combustion in the CT is less dense than it is in colder months. This results in lower mass flow rates of combustion air entering the CT, which equates to lower efficiency and lower achievable energy outputs from the turbines available to drive their generators.

C. Wet Compression System for CT01

1. Project Description

Verso Cogen is proposing to install a micron size water droplet injection system (Wet Compression System) to the inlet of the combustion turbine compressor for CT01. Injecting water into the combustion air for CT01 will offset the reduced air density caused by the higher ambient air temperatures that exist during the warmer months and allow CT01 to approach its maximum designed output capacity that can typically only be achieved during the winter months.

It is expected that the addition of a wet compression system on CT01 will increase its electrical output by as much as 4.6 MW from March through November. This increase will be due to the ability of CT01 to combust fuel at higher rates, similar to those realized during the colder months. With the use of a wet compression system, it is estimated that the fuel usage will increase by 4% during the months of March through November. Consequently, the emissions generated from CT01 are also expected to increase by 4% across the season that the wet compression system is being used.

The proposed system will not result in a change in rated capacity of CT01. Additionally, it will not cause an increase in CT01's short-term emission rates as the projected pollutant emission rates will not exceed the emission rates presently experienced during the colder operating months.

2. Regulatory Requirements

CT01 is currently subject to federal Environmental Protection Agency (EPA) Clean Air Act (CAA) regulation 40 C.F.R. Part 60, Subpart GG – *Standards of Performance for Stationary Gas Turbines* because its construction commenced on or after October 3, 1977. Provided below is a review of the applicability determination for the wet compression system being proposed for installation on CT01.

a. New Source Performance Standards

1. **40 C.F.R. Part 60, Subpart KKKK – *Standards of Performance for Stationary Combustion Turbines***

This regulation applies to stationary combustion turbines with heat inputs greater than 10 MMBtu per hour, which commenced construction, modification, or reconstruction after February 18, 2005. [40 C.F.R. §§ 60.4300]

Construction on CT01 commenced prior to February 18, 2005.

CT01 has not undergone any activities since its construction commencement date that meets the definition of reconstruction or modification as defined by this regulation. [40 C.F.R. §§ 60.14(a) and 60.15(b)]

The proposed installation of the wet compression system on CT01 does not meet the definition of a modification of CT01 as defined in this regulation. [40 C.F.R. § 60.14(a)]

The proposed installation of the wet compression system on CT01 does not meet the definition of a reconstruction of CT01 as defined in this regulation. [40 C.F.R. § 60.15(b)]

Therefore, the construction commencement date for CT01 will remain 1999 after completion of the proposed wet compression system installation. Because its construction commencement date remains prior to February 18, 2005, CT01 is not subject to the requirements of 40 C.F.R. Part 60, Subpart KKKK.

2. **40 C.F.R. Part 60, Subpart GG – *Standards of Performance for Stationary Gas Turbines***

This regulation applies to stationary gas turbines for which construction commenced after October 3, 1977.

Because the proposed installation of the wet compression system to CT01 does not meet the definition of modification or reconstruction of a stationary gas turbine as defined in 40 C.F.R. §§ 60.14(a) or 60.15(b) respectively, the construction commencement date for CT01 remains 1999.

Because the construction commencement date will remain 1999 after the proposed installation of the wet compression system, CT01 shall continue to be subject to all applicable requirements and conditions of 40 C.F.R. Part 60, Subpart GG as specified in air license A-718-70-E-R/A dated October 22, 2013.

b. National Emission Standards for Hazardous Air Pollutants

40 C.F.R. Part 63, Subpart YYYY – *Standards of Performance for Stationary Combustion Turbines*

This regulation applies to stationary combustion turbines located at major sources of hazardous air pollutants (HAP) emissions. For this regulation, sources are classified as either new, reconstructed or existing, with existing stationary combustion turbines being exempt from its requirements.

Subpart YYYY classifies a stationary combustion turbine as existing if the construction or reconstruction of the unit commenced on or before January 14, 2003. CT01 commenced construction in 1999 and since that time it has not undergone any activities that meet the definition of reconstruction as specified in 40 C.F.R. § 63.2. Therefore, CT01 is considered an existing stationary combustion turbine for the purposes of determining the applicability of Subpart YYYY.

The installation of the proposed wet compression system on CT01 does not meet the definition of a reconstruction as defined in 40 C.F.R. § 60.15(b).

With the proposed wet compression system installed on CT01, the unit will remain classified as an existing stationary combustion turbine as defined in this regulation. Subpart YYYY stipulates that existing stationary combustion turbines are not subject to the requirements of Part 63, Subparts YYYY or Subpart A. Therefore, CT01 will remain exempt from the requirements of 40 C.F.R. Part 63, Subpart YYYY after the installation of the proposed wet compression system. [40 C.F.R. § 63.6090(b)(4)]

c. State Air Regulations

CT01 is currently subject to 06-096 C.M.R. ch. 103, *Fuel Burning Equipment Particulate Emission Standard* and 06-096 C.M.R. ch. 101, *Visible Emissions Regulation*. The installation of a wet compression system on CT01 will not affect the applicability of these standards.

3. BACT Analysis

As the proposed installation of a wet compression system on CT01 represents a minor modification pursuant to 06-096 C.M.R. ch. 115, Verso Cogen must demonstrate that the emissions from the modified CT01 will receive BACT for each pollutant, as defined in 06-096 C.M.R. ch. 100, *Definitions Regulation*.

The proposed minor modification has the potential to increase the emissions of the following criteria air pollutants from CT01; particulate matter (PM / PM₁₀), sulfur dioxide (SO₂), nitrous oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), greenhouse gases (GHG) and ammonia (NH₃). The following BACT analysis was prepared in accordance with the Northeast States for Coordinated Air Use Management (NESCAUM) BACT guideline and presented by Verso Cogen.

a. Particulate Matter (PM / PM₁₀)

PM emissions from combustion turbines primarily result from carryover of noncombustible trace constituents in the fuel. PM emissions are negligible with natural gas firing and marginally significant with distillate oil firing because of the low ash content. Potential control technologies for PM emissions from combustion sources are mechanical collectors, wet scrubbers, electrostatic precipitators, fabric filters, and good combustion practices. Verso Cogen does not currently use add-on controls to limit PM emissions from CT01. The Department finds that good combustion practices and the firing of the clean fuels currently licensed in air emission license A-718-70-E-R/A (October 22, 2013) for CT01 shall constitute BACT as the control strategy for Verso Cogen to minimize PM emissions.

b. Sulfur Dioxide (SO₂)

SO₂ emissions from combustion turbines are directly related to the sulfur content of the fuel being fired in them. Because natural gas has an inherently low sulfur content, SO₂ emissions from a combustion turbine firing natural gas is negligible, while the firing of distillate fuel results in higher quantities of SO₂ generated.

Verso Cogen presently fires natural gas as their primary fuel, with distillate fuel that has a maximum sulfur content of 0.0015% by weight utilized as a secondary fuel. Because Verso Cogen is licensed to only fire fuels with low sulfur content in their combustion turbines, the facility does not presently use add-on controls to limit SO₂ emissions. The installation of add-on control technology to further reduce SO₂ emissions from CT01 is not economically feasible based on the minimal expected reduction of SO₂ generation that would be achieved. The Department finds that BACT for minimizing SO₂ emissions from CT01 is the use of good operating, maintenance and combustion practices and the continued utilization of the low sulfur content fuels as previously established in air emission license A-718-70-E-R/A (October 22, 2013).

c. Nitrogen Oxides (NO_x)

Verso Cogen currently employs the use of low NO_x combustors in their combustion turbines and low NO_x burners in their HRSG, as well as water injection in the turbines when firing distillate fuel and ammonia injection (SCR) when firing natural gas, all designed to reduce the systems' NO_x emissions.

The installation of a wet compression system to CT01 is anticipated to increase the NO_x emissions from the facility by 0.31 tons per year. Additional add-on pollution control is not technically or economically feasible to install. The Department finds

that the continued use of the existing NO_x pollution control techniques identified above, and compliance with the existing NO_x emission limits established in air license A-718-70-E-R/A (October 22, 2013) shall constitute BACT for NO_x emissions control.

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

Verso Cogen currently uses catalytic oxidation technologies to reduce CO and VOC emissions. These technologies were installed when the facility was constructed in 1999. Catalytic oxidation remains as BACT for control of CO and VOC from combustion equipment. Therefore, the Department finds that BACT for controlling CO and VOC from CT01 shall be the continued use of catalytic oxidation technologies, along with maintaining good combustion practices, operating CT01 at loads to achieve maximum fuel efficiencies and complete combustion, and complying with the CO and VOC emission limits previously established in air license A-718-70-E-R/A (October 22, 2013).

e. Greenhouse Gases (GHG)

Carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) emissions are produced during natural gas and distillate fuel combustion in gas turbines. Nearly all of the fuel carbon is converted to CO₂ during a complete combustion process. CH₄ is present in the exhaust gas from unburned fuel in the case of natural gas, and is a product of combustion when distillate fuel is fired. Formation of N₂O during the combustion process is governed by a complex series of reactions.

The installation and operation of a wet compressor system on CT01 will result in higher operating efficiencies, which in turn will result in lower greenhouse gas emissions for the given output.

As described in its guidance document, U.S. EPA has placed potentially applicable GHG control alternatives in three categories:

1. Inherently Lower-Emitting Processes / Practices / Designs;
2. Add-on Controls; and
3. Combinations of Lower-Emitting Processes / Practices / Designs and Add-on Controls

Inherently lower-emitting processes / practices / designs are not applicable to the installation of a wet compressor system on CT01, as Verso Cogen is already limited to firing clean fuels and employs good operating and maintenance practices to promote the efficient operation of CT01.

U.S. EPA generally considers carbon capture and storage (CCS) to be an available add-on pollution control technology for facilities emitting CO₂ in large amounts (e.g. coal fired power plants) and industrial facilities with high-purity CO₂ streams. However, there are no identified add-on control technologies to control GHG emissions for natural gas or distillate fuel-fired combustion turbines like CT01. Therefore, the use of CCS or other add-on controls is not considered technically feasible as BACT for CT01.

The Department finds that BACT for control of GHG from CT01 shall be the continued use of inherently clean fuels as mandated in air license A-718-70-E-R/A (October 22, 2013) along with the use of good combustion, operation and maintenance practices.

f. Ammonia (NH₃)

Selective Catalytic Reduction (SCR) systems selectively reduce NO_x emissions by injecting NH₃ into the exhaust flue gas stream upstream of a catalyst. NO_x, NH₃ and O₂ react on the surface of the catalyst to form N₂ and H₂O. Emissions of NH₃ result from unreacted NH₃ slip from the SCR system. Because most of the NH₃ injected into the exhaust flue gas stream is consumed by the process, only a small amount and concentration of NH₃ is emitted downstream of the catalyst. Add-on control technologies are not considered technically or economically feasible for NH₃ emissions from the SCR system. The Department finds that continuing to meet the existing license limits for NH₃ emissions from the SCR found in constitutes BACT for CT01 at Verso Cogen.

Pollutant	Origin and Authority	Emission Standard
NH ₃	06-096 C.M.R. ch. 140, BPT and A-718-70-E-R/A (October 22, 2013)	10 ppm _{dv} @ 15% O ₂ , 30-day rolling average basis
		20 ppm _{dv} @ 15% O ₂ , 24-hour block average basis

D. 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 upon issuance. 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.

E. Annual Emissions

1. Total Annual Emissions

For purposes of determining the annual license fee at Verso Cogen, the annual emissions are calculated based on the following:

- a. 11,180,000 gallons of fuel oil with a maximum sulfur content not to exceed 0.0015% by weight fired in the three turbines, with natural gas fired at a maximum capacity for the remainder of the year;
- b. 2,637.2 MMscf of natural gas fired in the three HRSG's; and
- c. Heaters #1 and #2 operating 8,760 hours per year.

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

<u>Unit</u>	<u>PM</u>	<u>PM₁₀</u>	<u>SO₂</u>	<u>NO_x</u>	<u>CO</u>	<u>VOC</u>	<u>NH₃</u>
Cogen Systems #1, #2 and #3							
- With Turbines Firing Oil	28.2	28.2	39.4	154.6	362.6	49.8	62.8
- With Turbines Firing Natural Gas	75.2	75.2	16.2	292.2	889.8		
Heaters #1 and #2	0.7	0.7	0.01	1.3	1.1	0.1	--
Total TPY	104.1	104.1	55.6	448.1	1253.5	49.9	62.8

The emissions listed above are based on specific worst-case emission scenarios to determine the source's maximum potential to emit, as follows;

- The values for VOC and NH₃ emissions from Cogen Systems #1, #2 and #3 were calculated using worst case lb/hour emission rates. The VOC annual total includes an allowance to account for the higher licensed lb/hour VOC emission rate during startup, shutdown, and fuel transfer periods.
- Yearly emissions of NH₃ from the SCR system are calculated using average stack conditions to convert NH₃ limits in ppm to lb/hour limits. Based on historical stack test data, NH₃ emissions are higher when the turbines fire alone and lower when the turbines and the duct burners are operated simultaneously. Yearly NH₃ emissions were calculated based on maximum operation of the turbines without the duct burners operating.

- Yearly emissions of PM, PM₁₀, SO₂ NO_x and CO were calculated based on firing the license allowed amount of fuel oil in the turbines while simultaneously firing the HRSGs, followed by firing the turbines at maximum capacity using natural gas while continuing to fire the HRSGs until the license allowed amount of natural gas for the steam generators is expended, after which the turbines are fired alone with natural gas at maximum capacity.
- The heaters are assumed to fire natural gas at maximum capacity.

2. Greenhouse Gases

CO₂e is not used to calculate the annual fee and is not listed in the table above since Verso Cogen is already classified as major for greenhouse gases and does not currently have annual restrictions imposed.

III. AMBIENT AIR QUALITY ANALYSIS

Verso Cogen previously submitted an ambient air quality analysis demonstrating that emissions from the facility, in conjunction with all other sources, do not violate ambient air quality standards (see license A-718-71-A-N, issued March 31, 1998). An additional ambient air quality analysis is not required for this NSR license.

ORDER

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

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

The Department hereby grants New Source Review License A-718-77-2-A pursuant to the preconstruction licensing requirements of 06-096 C.M.R. ch. 115 and subject to the specific conditions below.

Severability - The invalidity or unenforceability of any provision of this License 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

- (1) Verso Cogen is licensed to install a micron size water droplet injection system (Wet Compression System) to the inlet of the combustion turbine compressor on Combustion Turbine 01 (CT01).
- (2) When firing distillate fuel, CT01 shall only fire distillate fuel having a maximum sulfur content of 0.0015% by weight.
- (3) Verso Cogen shall submit an application to incorporate this NSR license into the facility's Part 70 air emission license no later than 12 months from commencement of the requested operation. [06-096 C.M.R. ch. 140 § 1(C)(8)]

DONE AND DATED IN AUGUSTA, MAINE THIS 2 DAY OF March, 2018.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Mark Allen Robert Corse for
PAUL MERCER, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: November 22, 2017

Date of application acceptance: December 1, 2017

Date filed with the Board of Environmental Protection:

This Order prepared by Patric J. Sherman, Bureau of Air Quality.

