



DEPARTMENT ORDER

The President and Trustees of
Colby College
Kennebec County
Waterville, Maine
A-107-71-Y-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

The President and Trustees of Colby College (Colby) was issued Air Emission License A-107-71-W-R/M on April 15, 2016, for the operation of emission sources associated with their educational institution. The license was subsequently amended on October 29, 2019 (A-107-71-X-A).

Colby has requested an amendment to their license in order to add a new 100-kW natural gas-fired emergency generator (SICE #9), to be used as a backup power source for the campus data center.

The equipment addressed in this license amendment is located at 5000 Mayflower Hill Drive in Waterville, Maine.

B. Emission Equipment

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

Stationary Engines

Equipment	Max. Input Capacity (MMBtu/hr)	Rated Engine Output (HP)	Rated Generator Capacity (kW)	Fuel Type, % sulfur	Firing Rate (scf/hr)	Date of Manuf.	Date of Install.
SICE #9	1.4	155	100	Natural Gas, negligible	1,389	2020	2021

C. 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	11.6	11.6	--	100
PM ₁₀	11.6	11.6	--	100
SO ₂	4.6	4.6	--	100
NO _x	68.7	68.7	--	100
CO	37.2	37.3	0.1	100
VOC	5.7	5.7	--	50

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

D. Facility Classification

With the annual heat input limit on Boilers 10A, 10B, and 10C, and the operating hours restriction on the emergency generators, the facility is licensed as follows:

- As a synthetic minor source of air emissions, because Colby 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.

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. Emergency Generator SICE #9

Colby plans to install an emergency generator set, designated as SICE #9, to provide backup power for the campus data center. This new generator set will consist of a natural gas-fired engine having a maximum heat input capacity of 1.4 MMBtu/hr and an electrical generator with a rated electrical output of 100 kW. SICE #9 was manufactured in 2020.

1. BACT Findings

a. Particulate Matter (PM and PM₁₀)

PM emissions from natural gas-fired engines are generally controlled through proper operation and maintenance of the unit. In accordance with 40 C.F.R. § 60.4233(e), SICE #9 will be subject to the EPA emission standards identified in Table 1 of 40 C.F.R. Part 60, Subpart JJJJ. Additionally, SICE #9 will be subject to an annual restriction established in 40 C.F.R. Part 60, Subpart JJJJ that limits the non-emergency operating hours of emergency engines to no more than 100 hours per year. Given the low PM emission standards that SICE #9 will be required to meet, along with the operating hours restriction, it would not be economically feasible to install add-on controls to further reduce PM emissions from SICE #9. The Department finds proper operation and maintenance of an engine certified to meet the requirements of Subpart JJJJ, the operating hours restriction, and an emission limit of 0.07 lb/hr to constitute BACT for PM and PM₁₀ emissions from SICE #9.

b. Sulfur Dioxide (SO₂)

SICE #9 is being licensed as an emergency generator, and as such it is restricted by 40 C.F.R. Part 60, Subpart JJJJ to an operating hours limit of 100 hours per year for non-emergency use. Additionally, SICE #9 will be licensed to exclusively fire natural gas, which inherently has a low sulfur content. As such, potential SO₂ emissions are relatively low, making the use of wet scrubbers or other additional SO₂ add-on control methods economically unfeasible. Therefore, the Department finds the exclusive use of natural gas as a fuel, in conjunction with the licensed operating hour limit for non-emergency use to constitute BACT for SO₂ emissions from SICE #9.

c. Nitrogen Oxides (NO_x)

Potentially available control options for reducing emissions of NO_x from natural gas-fired generators include combustion controls, selective catalytic reduction (SCR) and non-selective catalytic reduction (NSCR). Combustion controls are typically implemented through design features such as electronic engine controls, injection systems, combustion chamber geometry, and turbocharging systems.

SCR and NSCR are both post-combustion NO_x reduction technologies. SCR uses ammonia to react with NO_x in the gas stream in the presence of a catalyst to form nitrogen and water. NSCR uses a catalyst to convert CO, NO_x, and hydrocarbons into carbon dioxide, nitrogen, and water without the use of an additional reagent, and requires strict air-to-fuel control to maintain high reduction effectiveness without increasing hydrocarbon emissions. For a unit installed to be used as an emergency back-up engine, neither SCR nor SNCR would be economically feasible considering the minimal emissions due to the limited use of the engine.

The Department finds that the proper operation and maintenance of this engine certified to meet the requirements of Subpart JJJJ, along with good combustion controls and an emission limit of 0.68 lb/hr constitute BACT for NO_x emissions from SICE #9.

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

CO and VOC emissions from emergency engines are the result of incomplete combustion, caused by conditions such as insufficient residence time or limited oxygen availability. CO and VOC emissions from natural gas-fired emergency engines are generally controlled through proper operation and maintenance. Oxidation catalysts have been used on large engines to reduce CO and VOC emission levels in the exhaust, but like SCR and SNCR, use of an oxidation catalyst on an emergency engine with limited yearly operating hours would not provide a significant environmental benefit and would not be economically feasible.

The Department finds that proper operation and maintenance of an engine certified to meet the requirements of Subpart JJJJ, and an emissions limit of 1.37 lb/hr for CO and 0.34 lb/hr for VOC to constitute BACT for CO and VOC emissions from SICE #9.

e. Visible Emissions

Visible emissions from SICE #9 shall not exceed 10% opacity on a six-minute block average basis.

The Department has determined that the BACT visible emissions limit is more stringent than the applicable limit currently in 06-096 C.M.R. ch. 101. Therefore,

the visible emissions limit for SICE #9 shall be streamlined to the more stringent BACT limit, and only this more stringent limit shall be included in the air emission license.

2. The BACT emission limits for the generator are based on the following:

PM/PM ₁₀	- 0.05 lb/MMBtu, from 06-096 C.M.R. ch. 115, BACT
SO ₂	- 0.000588 lb/MMBtu, from AP-42, Table 3.2-2 dated 7/00
NO _x	- 2.0 g/HP-hr, from 40 C.F.R. Part 60, Subpart JJJJ, Table 1
CO	- 4.0 g/HP-hr, from 40 C.F.R. Part 60, Subpart JJJJ, Table 1
VOC	- 1.0 g/HP-hr, from 40 C.F.R. Part 60, Subpart JJJJ, Table 1
Visible Emissions	- 06-096 C.M.R. ch. 115, BACT

The BACT emission limits for SICE #9 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)
SICE #9	0.07	0.07	0.01	0.68	1.37	0.34

Visible emissions from SICE #9 shall not exceed 10% opacity on a six-minute block average basis.

3. 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 SICE #9 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, the unit 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. 40 C.F.R. Part 60, Subpart JJJJ Requirements

(1) Manufacturer Certification Requirement

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]

(2) Non-Resettable Hour Meter Requirement

A non-resettable hour meter shall be installed and operated on the engine. [40 C.F.R. § 60.4237]

(3) Operation and Maintenance Requirement

The engine shall be operated and maintained according to the manufacturer's written instructions or procedures developed by Colby that are approved by the engine manufacturer. Colby may only change those settings that are permitted by the manufacturer. [40 C.F.R. § 60.4243]

(4) 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)]

(5) Recordkeeping

Colby shall keep records that include maintenance conducted on the engine and the hours of operation of 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. § 60.4245(b)]

C. 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:

- A combined heat input of 246,840 MMBtu/year for Boilers 10A, 10B, and 10C;
- Operating Boilers BIO1 and BIO2 for 8,760 hours/year (each); and
- Operating SICE #1-9 for 100 hours/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
Boilers 10A, 10B, and 10C	6.2	6.2	0.1	12.3	10.2	2.5
Boilers BIO1 and BIO2	5.3	5.3	4.4	54.8	26.3	3.0
SICE #1-8	0.1	0.1	0.1	1.6	0.7	0.2
SICE #9	--	--	--	--	0.1	--
Total TPY	11.6	11.6	4.6	68.7	37.3	5.7

Pollutant	Tons/year
Single HAP	9.9
Total HAP	24.9

III. AMBIENT AIR QUALITY ANALYSIS

The level of ambient air quality impact modeling required for a minor source is determined by the Department on a case-by case basis. In accordance with 06-096 C.M.R. ch. 115, an ambient air quality impact analysis is not required for a minor source if the total licensed annual emissions of any pollutant released do not exceed the following levels and there are no extenuating circumstances:

Pollutant	Tons/Year
PM ₁₀	25
SO ₂	50
NO _x	50
CO	250

The total annual licensed emissions for Colby are above at least one of the emission levels contained in the table above. However, Colby has previously submitted an ambient air quality impact analysis for PM₁₀, SO₂, NO₂, and CO for air emission license A-107-71-Q-R/A (dated November 5, 2010) and one for NO₂ for air emission license amendment A-107-71-S-M (dated October 25, 2013). Results from those analyses demonstrated that emissions from the facility, in conjunction with all other sources, do not violate Ambient Air Quality Standards (AAQS). Due to the minimal increase in annual air emissions that will result from the execution of this project, no additional air quality impact analysis is required for this license amendment.

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-107-71-Y-A, subject to the conditions found in Air Emission License A-107-71-W-R/M, in amendment A-107-71-X-A, 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 Specific Condition (19) of Air Emission License Amendment A-107-71-X-A (October 29, 2019):

(19) **Emergency Engines SICE #6, SICE #7, SICE #8, and SICE #9**

A. SICE #6, SICE #7, SICE #8, and SICE #9 shall each be limited to 100 hours of operation per calendar year, excluding operating hours during emergency situations. [06-096 C.M.R. ch. 115, BPT]

B. Emissions shall not exceed the following:

<u>Unit</u>	<u>Pollutant</u>	<u>lb/MMBtu</u>	<u>Origin and Authority</u>
SICE #8	PM	0.05	06-096 C.M.R. ch. 115, BACT

C. Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BPT (SICE #6, SICE #7, and SICE #8) and 06-096 C.M.R. ch. 115, BACT (SICE #9)]:

<u>Unit</u>	<u>PM (lb/hr)</u>	<u>PM₁₀ (lb/hr)</u>	<u>SO₂ (lb/hr)</u>	<u>NO_x (lb/hr)</u>	<u>CO (lb/hr)</u>	<u>VOC (lb/hr)</u>
SICE #6	0.01	0.01	0.01	0.86	1.72	0.43
SICE #7	0.06	0.06	0.01	0.66 ¹	0.70	0.66 ²
SICE #8	0.16	0.16	0.01	2.73	3.66	0.91
SICE #9	0.07	0.07	0.01	0.68	1.37	0.34

1. This is the calculated worst-case emissions for NO_x, assuming that all of the pollutants covered in the NMHC + NO_x emission factor is NO_x.
2. This is the calculated worst-case emissions for VOC, assuming that all of the pollutants covered in the NMHC + NO_x emission factor is VOC.

D. Visible Emissions

1. Visible emissions from SICE #6 shall not exceed 10% opacity on a six-minute block average basis, except for no more than two six-minute block averages in a continuous three-hour period. [06-096 C.M.R. ch. 115, BPT]
2. Visible emissions from SICE #7 shall not exceed 20% opacity on a six-minute block average basis, except for no more than two six-minute block averages in a continuous three-hour period. [06-096 C.M.R. ch. 101, § 2.A.(4)]
3. Visible emissions from SICE #8 and SICE #9 shall not exceed 10% opacity on a six-minute block average basis.

E. SICE #7 shall meet the applicable requirements of 40 C.F.R. Part 60, Subpart III, including the following [incorporated under 06-096 C.M.R. ch. 115, BPT]:

1. Manufacturer Certification

The engine shall be certified by the manufacturer as meeting the emission standards for new nonroad compression ignition engines found in § 60.4202. [40 C.F.R. § 60.4205(b)]

2. Ultra-Low Sulfur Fuel

The fuel fired in the engine shall not exceed 15 ppm sulfur (0.0015% sulfur). Compliance with the fuel sulfur content limit shall be demonstrated by fuel delivery receipts from the supplier, fuel supplier certification, certificate of analysis, or testing of the tank containing the fuel to be fired. [40 C.F.R. § 60.4207(b) and 06-096 C.M.R. ch. 115, BPT]

3. Non-Resettable Hour Meter

A non-resettable hour meter shall be installed and operated on the engine. [40 C.F.R. § 60.4209(a)]

4. Annual Time Limit for Maintenance and Testing

a. 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). These 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. § 60.4211(f) and 06-096 C.M.R. ch. 115, BPT]

b. Colby shall keep records that include maintenance conducted on the engine and the hours of operation of 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. § 60.4214(b)]

5. Operation and Maintenance

The engine shall be operated and maintained according to the manufacturer's emission-related written instructions. Colby may only change those emission-related settings that are permitted by the manufacturer. [40 C.F.R. § 60.4211(a)]

F. SICE #6, SICE #8, and SICE #9 shall each 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, BPT]:

1. Manufacturer Certification

The engines 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)]

2. Non-Resettable Hour Meter

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

3. Annual Time Limit for Maintenance and Testing

- a. As emergency engines, the units shall each 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, BPT]
- b. Colby shall keep records that include maintenance conducted on the engines and the hours of operation of each engine recorded through the non-resettable hour meter. Documentation shall include the number of hours each unit operated for emergency purposes, the number of hours each unit operated for non-emergency purposes, and the reason each engine was in operation during each time. [40 C.F.R. § 60.4245(b)]

4. Operation and Maintenance

Each engine shall be operated and maintained according to the manufacturer's written instructions or procedures developed by Colby that are approved by the engine manufacturer. Colby may only change those settings that are permitted by the manufacturer. [40 C.F.R. § 60.4243]

The following shall replace Specific Condition (24)(B)(1) of Air Emission License Amendment A-107-71-X-A (October 29, 2019):

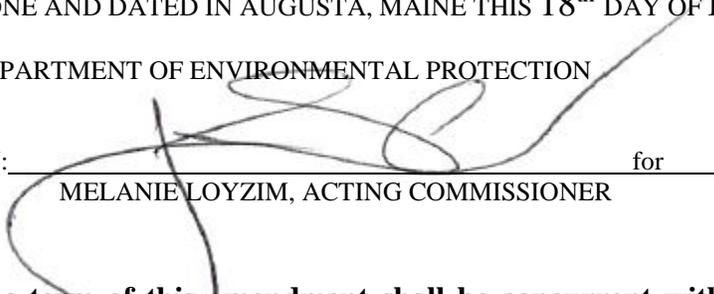
(24) Annual Emission Statement

B. Colby shall keep the following records in order to comply with 06-096 C.M.R. ch. 137:

1. The amount of natural gas fired in Boilers 10A, 10B, and 10C and SICE #4, SICE #5, SICE #6, SICE #8, and SICE #9 (each) on a monthly basis;

DONE AND DATED IN AUGUSTA, MAINE THIS 18th DAY OF FEBRUARY, 2021.

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-107-71-W-R/M.

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: January 15, 2021

Date of application acceptance: January 19, 2021

Date filed with the Board of Environmental Protection:

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

FILED
FEB 18, 2021
State of Maine
Board of Environmental Protection