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

DEPARTMENT ORDER

University of New England **York County** **Biddeford, Maine** **A-487-71-R-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 University of New England (UNE) was issued Air Emission License A-487-71-P-R on August 20, 2014, for the operation of emission sources associated with their educational facility. The license was subsequently amended on September 1, 2017 (A-487-71-Q-A).

UNE has requested an amendment to their license in order to replace an existing boiler with a new larger unit.

The equipment addressed in this license amendment is located at 11 Beach Hill Road, Biddeford, Maine.

B. Emission Equipment

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

Boilers

Equipment	Building	Max. Capacity (MMBtu/hr)	Maximum Firing Rate (gph)	Fuel Type, % sulfur	Date of Manuf.	Stack #
Boiler #2 – to be removed	Assisi	4.2	45.9 30	Propane, neg. Distillate fuel, 0.0015	1985	1
Boiler #10	Assisi	8.4	91.8 60	Propane, neg. Distillate fuel, 0.0015	2018	1

C. 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.

A new emission unit at an existing minor source is considered a major 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.

UNE has not requested increases to their facility wide fuel use limitation which includes fuel supplied to Boiler #10; thus, there will be no overall increases in licensed annual emissions at the facility.

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

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.
BPT for existing emissions equipment means that method which controls or reduces emissions to the lowest possible level considering:

- the existing state of technology;
- the effectiveness of available alternatives for reducing emissions from the source being considered; and
- the economic feasibility for the type of establishment involved.

B. Boiler #10

UNE plans to operate and utilize Boiler #10 for heat and hot water for their facility. Boiler #10 is rated at 8.4 MMBtu/hr and is capable of firing propane and distillate fuel. Boiler #10 was manufactured in 2018 and will be installed at the facility during the winter of 2018/2019. The boiler will exhaust into Stack #1, which is a shared stack with Boilers #6 and #7. Boiler #2 is to be decommissioned and removed prior to the start-up of Boiler #10.

1. BACT Findings

a. Particulate Matter (PM and PM_{10})

Particulate matter emissions from fuel combustion are formed from incomplete combustion of fuel and non-combustible material in the fuel. Emissions of particulate matter from new propane-fired boilers are generally very low. Given the size of the unit and the minimal particulate matter emissions from the burning of propane, add-on emission control equipment for control of particulate matter from Boiler #10 when firing propane is not economical.

During periods of propane curtailment, supply interruption, or for periodic testing/maintenance, Boiler #10 will fire distillate fuel. Given the size of the unit and the intermittent nature of distillate fuel firing in the unit, add-on emission control equipment for the control of particulate matter from Boiler #10 when firing distillate fuel is not economical.

The Department finds firing propane as the primary fuel, use of efficient burner combustion technology, and emission limits of 0.05 lb/MMBtu and 0.42 lb/hr when firing propane and 0.08 lb/MMBtu and 0.67 lb/hr when firing distillate fuel to be BACT for PM and PM_{10} emissions from Boiler #10.

b. Sulfur Dioxide (SO_2)

Sulfur dioxide is formed from the combustion of sulfur present in the fuel. Potential control options for sulfur dioxide emissions include the use of fuel with a low sulfur content, sorbent injection, and SO_2 scrubbing technologies such as flue gas desulfurization and packed-bed scrubbers.

Emissions of sulfur dioxide from new propane-fired boilers are very low due to the low sulfur content of propane. Given the low level of sulfur dioxide emissions from the firing of propane, add-on emission control equipment for control of sulfur dioxide from Boiler #10 when firing propane is not economically feasible.

During periods when propane is unavailable or for periodic testing/maintenance, Boiler #10 will fire distillate fuel. Given the intermittent nature of distillate fuel firing in the unit and the size of the unit, the use of add-on emission control equipment for the control of SO_2 emissions from Boiler #10 when firing distillate fuel is not economical.

The Department finds firing propane as the primary fuel, the use of distillate fuel with a maximum sulfur content not to exceed 0.0015% by weight (15 ppm) when propane is unavailable and for periodic maintenance/testing, and an emission limit

of 0.01 lb/hr when firing either propane or distillate fuel to be BACT for SO_2 emissions from Boiler #10.

c. Nitrogen Oxides (NO_x)

Nitrogen oxides mainly consist of nitric oxide (NO) and nitrogen dioxide (NO_2). NO_x from fuel combustion are generated through one of three mechanisms: fuel NO_x, thermal NO_x, and prompt NO_x. Fuel NO_x is produced by the oxidation of nitrogen in the fuel source, with low nitrogen content fuels such as distillate fuel and propane producing less NO_x than fuels with higher levels of fuel-bound nitrogen. Thermal NO_x forms in the high temperature area of the combustor and increases exponentially with increases in flame temperature and linearly with increases in residence time. Prompt NO_x forms from the oxidation of hydrocarbon radicals near the combustion flame; this produces an insignificant amount of NO_x.

Control of NO_x emissions can be accomplished using one of three methods: the use of add-on controls, such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR); the use of combustion control techniques, such as low NO_x burners, flue gas recirculation (FGR), and good combustion practices; and the combustion of clean fuel, such as propane and distillate fuel.

Given the size of the unit and the low potential annual NO_x emissions from the unit, the use of add-on controls such as SCR and SNCR are not economically feasible when firing either propane or distillate fuel.

Combustion control methods available to control NO_x from small industrial and commercial boilers include low NO_x burners, FGR, and good combustion practices. 'Low NO_x burners' refers to burner components (burner register, atomizing nozzle, diffuser) that are designed to achieve lower NO_x by mixing the fuel and combustion air in a way that limits NO_x formation. This is generally done by mixing the combustion air and fuel in multiple stages and by utilizing a specially designed nozzle and/or diffuser to achieve a particular flame pattern. The use of low NO_x burners is technically and economically feasible for firing propane and distillate fuel in Boiler #10.

In FGR systems, a portion of the combustion gases are recirculated back into the combustion zone. This process lowers peak flame temperatures, and therefore thermal NO_x formation, by allowing the relatively cool flue gas to absorb heat released by the burner flame. Although considered technically feasible, the use of FGR is not economically feasible for a small boiler such as Boiler #10 due to the moderately high capital costs due to the ductwork needed to span from the burner outlet to the combustion air duct, the operating costs associated with the energy requirements of recirculation fans, and marginal emission reduction benefit. Additionally, FGR systems can affect heat transfer and system pressures.

Good combustion practices include operating the system based on the design and recommendations provided by the manufacturer and by maintaining proper air-to-fuel ratios with periodic maintenance checks.

The Department finds the use of propane as the primary fuel, the use of distillate fuel when propane is unavailable and for periods of maintenance/testing, the use of low NO_x burners, the use of good combustion practices, and emission limits of 1.2 lb/hr when firing propane or distillate fuel to be BACT for NO_x emissions from Boiler #10.

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

Carbon monoxide and volatile organic compounds emissions are a result of incomplete combustion, caused by conditions such as insufficient residence time or limited oxygen availability. Potential control options for CO and VOC emissions include combustion controls and the use of a catalyst system.

Emissions of CO and VOC from new propane-fired boilers are generally low. Given the size of the unit and the low potential CO and VOC emissions, the use of add-on emission control equipment for the control of CO and VOC emissions from Boiler #10 when firing propane is not considered economically feasible. Instead, UNE has proposed the use of efficient burner combustion technology which includes the use of an oxygen trim system.

During periods when propane in unavailable or for periodic maintenance/testing, Boiler #10 will fire distillate fuel. Given the intermittent nature of distillate fuel firing in the unit and the size of the unit, the use of add-on emission control equipment for the control of CO and VOC emissions from Boiler #10 when firing distillate fuel is not economically feasible. Instead, UNE has proposed the use of efficient burner combustion technology which includes the use of an oxygen trim system.

The Department finds the use of propane as the primary fuel, the use of distillate fuel when propane is not available or for periodic maintenance/testing, the use of efficient burner combustion technology, and the following emission limits to be BACT for CO and VOC emissions from Boiler #10:

Pollutant	Fuel	lb/hr
CO	Propane	0.70
	Distillate fuel	0.30
VOC	Propane	0.09
	Distillate fuel	0.02

e. Visible Emissions

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

f. Heat Input Restriction

Total facility propane use shall not exceed 750,000 gallons per year based on a calendar year. Total facility distillate fuel use shall not exceed 340,000 gallons per year, based on a calendar year. UNE shall maintain records of propane and distillate fuel use to demonstrate compliance with this limit.

2. Emission Limits

The BACT emission limits for Boiler #10 were based on the following:

Propane

PM/PM_{10}	–	0.05 lb/MMBtu based on 06-096 C.M.R. ch. 115, BACT
SO_2	–	0.018 lb/1000 gal based on AP-42, Table 1.5-1, dated 07/08
NO_x	–	13 lb/1000 gal based on AP-42, Table 1.5-1 dated 07/08
CO	–	7.5 lb/1000 gal based on AP-42, Table 1.5-1 dated 07/08
VOC	–	1 lb/1000 gal based on AP-42, Table 1.5-1 dated 07/08
Visible Emissions	–	06-096 C.M.R. ch. 115, BACT

Distillate Fuel

PM/PM_{10}	–	0.08 lb/MMBtu based on 06-096 C.M.R. ch. 115, BACT
SO_2	–	based on firing distillate fuel with a maximum sulfur content of 0.0015% by weight
NO_x	–	20 lb/1000 gal based on AP-42 Table 1.3-1 dated 5/10
CO	–	5 lb/1000 gal based on AP-42 Table 1.3-1 dated 5/10
VOC	–	0.34 lb/1000 gal based on AP-42 Table 1.3-3 dated 5/10
Visible Emissions	–	06-096 C.M.R. ch. 115, BACT

The BACT emission limits for Boiler #10 are the following:

Unit	Pollutant	lb/MMBtu
Boiler #10, propane	PM	0.05
Boiler #10, distillate fuel	PM	0.08

Unit	PM (lb/hr)	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Boiler #10, propane	0.42	0.42	0.01	1.20	0.70	0.09
Boiler #10, distillate fuel	0.67	0.67	0.01	1.20	0.30	0.02

The distillate fuel fired in Boiler #10 shall not exceed a sulfur content of 0.0015% by weight (15 ppm). Compliance with this limit shall be demonstrated by fuel records from the supplier indicating the sulfur content of the fuel.

3. Periodic Monitoring

Periodic monitoring for Boiler #10 shall include recordkeeping to document fuel use both on a monthly and calendar year basis. Documentation shall include the type of fuel used and sulfur content of the fuel, if applicable.

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

Due to the size of the unit, Boiler #10 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]

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

Boiler #10 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 (Subpart JJJJJJ). The unit is considered a new gas-fired boiler rated less than 10 MMBtu/hr. [40 C.F.R. §§63.11193 and 63.11195]

Gas-fired boilers are exempt from 40 C.F.R. Part 63, Subpart JJJJJJ. However, boilers which fire fuel oil are not. A "gas-fired boiler" is defined as any boiler that burns gaseous fuels, including propane, not combined with any solid fuels and burns distillate fuel only during periods of gas curtailment, gas supply interruption, startups, or periodic testing on distillate fuel. Periodic testing of distillate fuel shall not exceed a combined total of 48 hours during any calendar year. [40 C.F.R. § 63.11237]

Boiler #10 is to be operated as a gas fired unit, firing distillate fuel only during periods when propane is not available or periodic testing on distillate fuel. If Boiler #10 no longer operates as a gas-fired unit, it shall become subject to Subpart JJJJJJ as a new oil-fired boiler and shall comply with Subpart JJJJJJ including but not limited to the following:
[40 C.F.R. § 63.11225(a)(2)]

a. UNE shall demonstrate compliance with Subpart JJJJJJ for Boiler #10 within 180 days of the effective date of the fuel switch [40 C.F.R. § 63.112210(i)]

b. Notification of the changes shall be submitted to the EPA and the Department within 30 days of the fuel switch and shall provide the following:
   (1) The name of the owner or operator of the affected source, the location of the source, the boiler(s) that have switched fuels, whether the boilers were physically changed or took a permit limit, and the date of the notice.
   (2) The date upon which the fuel switch, physical change, or permit limit occurred. [40 C.F.R. § 63.11225(g)]

c. UNE shall complete the initial performance tune-up on this boiler firing distillate fuel, by following the procedures described in §63.11223(b), no later than 180 days after the boiler begins being operated as an oil-fired boiler. [40 C.F.R. § 63.11210(k)(2)]

d. An Initial Notification submittal to EPA and to the Department is due within 120 days after Boiler #10 becomes subject to the standard. [40 C.F.R. § 63.11225(a)(2)]

e. UNE shall implement a boiler tune-up program. [40 C.F.R. § 63.11223]

f. Each tune-up shall be conducted at a frequency specified by the rule and based on the size, age, and operations of the boiler. See chart below

Boiler Category	**Tune-Up Frequency**
Boiler #10 is a new oil fired boiler >5MMBtu/hr with an oxygen trim system	Every 5 years

[40 C.F.R. § 63.11223(a) and Table 2]
See A-487-71-P-R/A and Subpart JJJJJJ for details of the tune-up program and recordkeeping requirements.

C. Annual Emissions

UNE's annual emissions licensed allowed, based on a calendar year total and the following:

- Total fuel use for all boilers combined shall not exceed 340,000 gallons per year of distillate fuel with a maximum sulfur content not to exceed 0.0015% by weight;
- Total fuel use in all boilers combined shall not exceed 90,000 gallons per year of #4 fuel oil with a maximum sulfur content not to exceed 0.5 % by weight;
- Total fuel use for all boilers combined shall not exceed 750,000 gallons per year of propane; and
- Each Emergency Generator, #1-#11 inclusive, shall be limited to 100 hours per year of non-emergency operation (as defined by Subpart ZZZZ and Subpart IIII), based on a calendar year total:

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, Distillate	1.90	1.90	0.04	7.14	0.85	0.06
Boilers, #4 Fuel Oil	0.79	0.79	3.47	1.97	0.23	0.02
Boilers, Propane	1.70	1.70	0.01	4.88	2.81	0.38
Emergency Gen. #1	0.04	0.04	0.01	0.98	0.26	0.03
Emergency Gen. #2	0.02	0.02	0.01	0.58	0.12	0.05
Emergency Gen. #3	0.01	0.01	0.01	0.34	0.07	0.03
Emergency Gen. #4	0.01	0.01	0.01	0.26	0.05	0.02
Emergency Gen. #10	0.01	0.01	0.01	0.28	0.06	0.02
Emergency Gen. #6	0.03	0.03	0.01	0.82	0.22	0.02
Emergency Gen. #7	0.03	0.03	0.01	0.75	0.20	0.02
Emergency Gen. #8	0.03	0.03	0.01	0.75	0.20	0.02
Emergency Gen. #9	0.01	0.01	0.01	0.24	0.05	0.02
Emergency Gen. #10	0.01	0.01	0.01	0.30	0.06	0.02
Emergency Gen. #11	0.04	0.04	0.01	1.16	0.31	0.03
Total TPY	4.6	4.6	3.6	20.5	5.5	0.7

* TPY for SO_2 updated based on 38 M.R.S. § 603-A(2)(A)(3) which resulted in a lower sulfur content for distillate fuel.

Pollutant	Tons/year
*Single HAP	9.9
*Total HAP	24.9

* Calculated based on emission factors provided by the department

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-487-71-R-A subject to the conditions found in Air Emission License A-487-71-P-R/A and in amendment A-487-71-Q-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

This is a new condition added to A-487-71-P-R/A (August 20, 2014).

(20) **Boiler #10**

A. Boiler #2 shall be removed and/or decommissioned prior to the start-up of Boiler #10.

B. Boiler #10 is licensed to fire propane and distillate fuel utilizing the boiler's low NOx burners and the oxygen trim system.

C. Emissions from Boiler #10 shall not exceed the following:

Emission Unit	Pollutant	lb/MMBtu	Origin and Authority
Boiler #10, propane	PM	0.05	06-096 C.M.R. ch. 115, BACT
Boiler #10, distillate fuel	PM	0.08	06-096 C.M.R. ch. 115, BACT

D. 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)
Boiler #10, propane	0.42	0.42	0.01	1.20	0.70	0.09
Boiler #10, distillate	0.67	0.67	0.01	1.20	0.30	0.02

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

F. If Boiler #10 no longer meets the definition of a gas fired boiler and becomes subject to the requirements of 40 C.F.R. Part 63, Subpart JJJJJJ as a new oil-fired boiler, UNE shall:
[incorporated under 06-096 C.F.R. ch. 115, BACT]

1. Comply with the applicable requirements of 40 C.F.R. Part 63, Subpart JJJJJJ as outlined in Specific Condition (16) D. of A-487-71-P-R/A (8/20/2014).

2. Demonstrate compliance with Subpart JJJJJJ for the Boiler #10 within 180 days of the effective date of the fuel switch. [40 C.F.R. § 63.112210(i)]

3. Submit a notification of the changes to the EPA and the Department within 30 days of the fuel switch and shall provide the following:
   a. The name of the owner or operator of the affected source, the location of the source, the boiler(s) that have switched fuels, whether the boilers were physically changed or took a permit limit, and the date of the notice.
   b. The date upon which the fuel switch, physical change, or permit limit occurred. [40 C.F.R. § 63.11225(g)]

4. Complete the initial performance tune-up on each boiler firing distillate fuel, by following the procedures described in § 63.11223(b), no later 180 days after the boiler(s) begins being operated as an oil-fired boiler. [40 C.F.R. § 63.11210(k)(2)]

5. Submit an Initial Notification to EPA and to the Department is due within 120 days after Boiler #10 becomes subject to the standard. [40 C.F.R. § 63.11225(a)(2)]

6. Implement a boiler tune-up program. [40 C.F.R. § 63.11223]

7. Each tune-up shall be conducted at a frequency specified by the rule and based on the size, age, and operations of the boiler. See chart below

Boiler Category	**Tune-Up Frequency**
Boiler #10 is a new oil fired boiler with heat input capacities >5 MMBtu/hr with an oxygen trim system.	Every 5 years

[40 C.F.R. § 63.11223(a) and Table 2]
Refer to A-487-71-P-R/A and Subpart JJJJJJ for the tune-up program and recordkeeping requirements.

DONE AND DATED IN AUGUSTA, MAINE THIS 21 DAY OF December, 2018.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Marc Allen Robert Cone for
MELANIE LOYZIM, ACTING COMMISSIONER

The term of this amendment shall be concurrent with the term of Air Emission License A-487-71-P-R/A.

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 11/30/18
Date of application acceptance: 11/30/18
Date filed with the Board of Environmental Protection:
This Order prepared by Lisa P. Higgins, Bureau of Air Quality

Filed
DEC 21 2018
State of Maine
Board of Environmental Protection