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

DEPARTMENT ORDER

Clean Maine Carbon, LLC **Piscataquis County** **Greenville, Maine** **A-1164-71-B-M**	**Departmental** **Findings of Fact and Order** **Air Emission License** **Amendment #1**

FINDINGS OF FACT

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

I. REGISTRATION

A. Introduction

Clean Maine Carbon, LLC (CMC) was issued Air Emission License A-1164-71-A-N on October 25, 2022, for the operation of emission sources associated with their biochar manufacturing facility.

The equipment addressed in this license amendment is located at 185 Greenville Steam Rd, Greenville, Maine.

CMC has requested a minor revision to their license in order to address the trial processing of additional types of biomass and the addition of lime. This project is referred to in this license as the PFAS Phytoremediation Pilot Project.

B. Emission Equipment

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

Fuel Burning

Equipment	Heat Input	Firing Rate	Fuel Type	Date of Install.	Stack #
Biochar Line 1 Combustion Chamber	1.1 MMBtu/hr	220 lb/hr*	Biomass	2022	1

*Assumes moisture content of 40%.

Process Equipment

Equipment	Feed Rate	Production Rate	Pollution Control Equipment	Stack #
Biochar Line 1	2,200 lb/hr*	550 lb/hr	thermal oxidation	1

*Assumes moisture content of 40%.

C. Definitions

Biomass means any biomass-based solid fuel that is not a solid waste. This includes, but is not limited to, wood residue and wood products (*e.g.,* trees, tree stumps, tree limbs, bark, lumber, sawdust, sander dust, chips, scraps, slabs, millings, and shavings). This definition also includes wood chips and processed pellets made from wood or other forest residues.

With this amendment, CMC is adding vegetative agricultural materials such as hemp and sunflowers to the definition of biomass.

Inclusion in this definition does not constitute a determination on whether or not the material is considered a solid waste pursuant to state or federal solid waste regulations. CMC should consult with the Department before adding any new biomass type to its fuel mix.

Records or *Logs* mean either hardcopy or electronic records.

D. 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.

This amendment will not increase licensed emissions of any pollutant. Therefore, this amendment is determined to be a minor revision and has been processed as such.

E. Facility Classification

The facility is licensed as follows:

- As a natural minor source of criteria pollutants, because no license restrictions are necessary to 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. Revision Description

CMC operates a biochar manufacturing line (Biochar Line 1) which is comprised of a combustion chamber (Biochar Line 1 Combustion Chamber), a retention chamber, a rotary kiln, a thermal oxidation chamber, and a water cooler. CMC makes biochar primarily from biomass sourced from green wood.

Yale University (Yale) is studying the fate of per- and polyfluoroalkyl substances (PFAS) when growing agricultural crops on PFAS-impacted land. CMC intends to partner with Yale on the PFAS Phytoremediation Pilot Project to evaluate the feasibility of using the crops grown (hemp and sunflowers) to make biochar. Crops are currently being grown on a two-acre plot to support this trial. This is expected to yield 12 – 16 tons of air-dried biomass. CMC has requested that these agricultural materials be included in the definition of biomass in their air emission license.

At the end of the growing season, the biomass will be cut and left to dry in the field. It will then be baled for transport and storage. Yale will analyze the biomass for PFAS content. It will then be mixed with green wood and pyrolyzed in CMC's kiln to produce biochar. Yale intends to measure the PFAS in the initial feedstock, resulting biochar, and flue gas to determine the fate of the PFAS compounds and the potential ability of the system to destroy them. PFAS is not a regulated air pollutant as the term is defined in 06-096 C.M.R. ch. 100. PFAS incineration can result in hydrogen fluoride (HF), which is a hazardous air pollutant (HAP). Due to the small scale of the project, emissions of HF are expected to be negligible.

As part of the PFAS Phytoremediation Pilot Project, lime will be added to the kiln during pyrolysis. Yale expects this will enhance the thermal breakdown of PFAS by promoting alkaline conditions that facilitate defluorination reactions at elevated temperatures, which will improve the overall PFAS destruction efficiency. In the high-temperature environment of the kiln, lime may react with acid gases (e.g., HF) to form stable salts such as calcium fluoride (CaF_2). The addition of lime will also increase the pH and improve the properties of the resulting biochar. It may improve the biochar's effectiveness as a soil amendment

by neutralizing acidic soils and enhancing plant nutrient uptake. However, there is potential for the lime to be caried over in the exhaust stream resulting in increased emissions of particulate matter.

The PFAS Phytoremediation Pilot Project is a short-term project, but, if successful, may result in similar, larger-scale operations. Therefore, the Department finds that BACT for the PFAS Phytoremediation Pilot Project includes the following notification, testing, and recordkeeping requirements.

CMC shall notify the Department of the dates the PFAS Phytoremediation Pilot Project starts and ends. Notification shall be made within two business days of such occurrence.

CMC shall conduct stack testing for filterable particulate matter concurrent with each stack testing conducted for PFAS if lime is being introduced into the kiln. Testing shall be conducted in accordance with EPA Test Method 5 or other method approved by the Department. If the trial nature of the project does not allow for three 1-hour runs for each test, this must be addressed in the performance test protocol. Results shall be reported in both grains per dry standard cubic foot (gr/dscf) and mass rate (lb/hr).

For any performance testing required by this license, CMC shall submit to the Department for approval a performance test protocol, as outlined in the Department's Performance Testing Guidance, at least 30 days prior to the scheduled date of the performance test.

The Department's Performance Testing Guidance is available online at:
https://www.maine.gov/dep/air/emissions/testing.html

Stack test protocols and final reports should be submitted electronically to StackTestDEP@maine.gov.

CMC shall maintain the following records for the PFAS Phytoremediation Pilot Project:

1. The amount (tons) and type of agricultural biomass (e.g., hemp, sunflowers) and silvicultural biomass (wood) processed on a daily basis;
2. The moisture content of all agricultural biomass and silvicultural biomass processed in the kiln;
3. The ratio of agricultural biomass to silvicultural biomass processed during each stack test; and
4. The amount (pounds) of lime added to the kiln during each operating hour.

All conditions of the existing air emission license shall remain in effect for the duration of the PFAS Phytoremediation Pilot Project. This includes the emission limits on Biochar Line 1.

C. Annual Emissions

This license amendment will not change the facility's licensed annual emissions.

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-1164-71-B-M subject to the conditions found in Air Emission License A-1164-71-A-N 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 are new conditions:

(20) PFAS Phytoremediation Pilot Project

A. CMC is authorized to process agricultural biomass (including hemp and sunflowers) either alone or mixed with wood and/or lime in Biochar Line 1 as part of the PFAS Phytoremediation Pilot Project. CMC shall notify the Department of the dates the PFAS Phytoremediation Pilot Project starts and ends. Notification shall be made within two business days of such occurrence. [06-096 C.M.R. ch. 115, BACT]

B. CMC shall conduct stack testing for filterable particulate matter concurrent with each stack testing conducted for PFAS if lime is being introduced into the kiln. Testing shall be conducted in accordance with EPA Test Method 5 or other method approved by the Department. If the trial nature of the project does not allow for three 1-hour runs for each test, this must be addressed in the performance test protocol. Results shall be reported in both grains per dry standard cubic foot (gr/dscf) and mass rate (lb/hr). [06-096 C.M.R. ch. 115, BACT]

C. CMC shall maintain the following records for the PFAS Phytoremediation Pilot Project:

1. The amount (tons) and type of agricultural biomass (e.g., hemp, sunflowers) and silvicultural biomass (wood) processed on a daily basis;
2. The moisture content of all agricultural biomass and silvicultural biomass processed in the kiln;
3. The ratio of agricultural biomass to silvicultural biomass processed during each stack test; and
4. The amount (pounds) of lime added to the kiln during each operating hour.

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

DONE AND DATED IN AUGUSTA, MAINE THIS 24th DAY OF July, 2025.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:_____ for ____
MELANIE LOYZIM, COMMISSIONER

The term of this license amendment shall be ten (10) years from the issuance of Air Emission License A-1164-71-A-N (issued 10/25/2022).

[Note: If a renewal application, determined as complete by the Department, is submitted prior to expiration of this license, then pursuant to Title 5 M.R.S. § 10002, all terms and conditions of the license shall remain in effect until the Department takes final action on the license renewal application.]

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 6/20/2025
Date of application acceptance: 6/23/2025

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