



STATE OF DELAWARE
**DEPARTMENT OF NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL**

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SECRETARY'S ASSESSMENT REPORT OF A COASTAL ZONE ACT PERMIT APPLICATION

AgroRefiner, LLC (CZA-439P)
Hemp Extraction Facility
51 Steel Drive, New Castle, DE 19720

INTRODUCTION

Under §8.3.4 of the *Regulations Governing Delaware's Coastal Zone* (Regulations), the Secretary of the Department of Natural Resources and Environmental Control (Department) shall provide a written assessment of any application for a Coastal Zone Act Permit, including the proposed project's likely impact on the six criteria listed in §8.1, as well as a preliminary determination of the sufficiency of the offset project under §9.0. The completion of this assessment acknowledges the application submitted by AgroRefiner, LLC (AgroRefiner) as administratively complete. The fact that the Department considers the application to be administratively complete does not constitute the Department's position as to whether a permit should be issued or denied. That decision will be made after a public hearing is held and any comments are reviewed.

PROPOSED PROJECT OVERVIEW

AgroRefiner is proposing a new manufacturing activity within the Coastal Zone. This activity involves the extraction of cannabidiol (CBD) and cannabinal (CBN) from hemp for the purpose of distribution to manufacturers of consumer goods. The applicant registered as a Hemp Processor through the Delaware Department of Agriculture (DDA) through the end of calendar year 2019. The DDA is reviewing a newly-published rule and developing a state plan for the regulation of hemp. During this time, all registrants will be allowed to extend active registrations to February 1, 2020. Afterward, the applicant would need to renew registration as outlined in the state plan on hemp.

The proposed process would utilize a portion of an existing warehouse located at 51 Steel Drive, New Castle, Delaware 19720. Hemp would be delivered via refrigerated semi-trailers annually during the fall harvest in late September or early October. Some hemp would arrive

already dried, but the rest would be dried using two natural gas-fired furnaces, which would operate a maximum of 600 hours per year. The applicant estimates that the dried hemp from each harvest would take the entire year to process, for a maximum processing capacity of 78,000 pounds of dry hemp, yielding approximately 7716.2 pounds (3,500 kilograms) of CBD isolate and 169.8 pounds (77 kilograms) of CBN. Final product distribution would be demand-driven.

The proposed CBD processing can be broken into 4 basic parts: drying, extraction, distillation, and crystallization. Afterward, the remaining solution undergoes a process to isolate CBN.

The first step in the proposed process is drying the hemp. The two dryers operate at 400,000 Btus each with a temperature setting of 90 degrees Fahrenheit. According to the manufacturer, together, they can process an hourly maximum of 1,000 pounds of wet material, yielding approximately 220 pounds of dry material each hour.

Once dried, a cold ethanol wash is used to isolate the extract from the dried plant material, which results in a crude extract. The applicant estimates active ethanol usage at 60 gallons per day. Approximately 85% of the ethanol is recovered in this step of the closed-loop system.

After extraction, the crude oil is heated under a vacuum for 3 hours to remove carbon dioxide using a decarboxylation vessel. A cold trap in the vacuum line collects approximately 12% more of the ethanol. The biomass is then centrifuged in an additional effort to collect ethanol, resulting in a total ethanol recovery of approximately 97%. The other 3% remains on the plant material and is disposed of with the waste biomass. The decarboxylated crude oil is distilled in a continuous process using a wipe film distillation system.

Next, the CBD distillate is crystallized and recrystallized to refine and form the final CBD product. Pentane induces crystallization and the product is collected in a vacuum filtration process within a fume hood. Pentane usage is approximately 4 gallons per day with 98% recovery by roto-evaporation. There is an estimated 2% loss in the process per day from evaporation and crystals recovered in the vacuum oven.

An additional product, created post-crystallization, is known as CBN. The remaining solution after the crystallization (referred to in the application as mother liquor) undergoes a separation and purification process involving toluene, iodine, potassium thiosulfate, anhydrous sodium sulfate, and silica gel chromatography. Production is estimated to be 0.454 pounds (210 grams) per day.

Prior to distribution, a quality assurance test is completed to test the products for purity. The finished products are packaged into plastic pails and stored in a secure inventory storage area until distributed in bulk to third-party distributors and manufacturers.

In the State of Delaware, hemp is considered an agricultural commodity and is defined as a grain under Del. Code Title 3. THC concentration for CBD and CBN is not to exceed 0.3 percent on a dry weight-basis.

APPLICATION ASSESSMENT

Subsection 8.3.2 of the Regulations requires consideration of an application's effect on the six criteria of 7 Del. C. Ch. 70:

1. Direct and cumulative environmental impacts
2. Economic effects
3. Aesthetic effects
4. Number and type of supporting facilities and their anticipated impacts
5. Effect on neighboring land uses
6. Compatibility with county and municipal comprehensive plans

1. DIRECT AND CUMULATIVE ENVIRONMENTAL IMPACTS

AIR EMISSIONS

The proposed project would result in air emissions associated with the operation of the hemp dryers, as well as pentane evaporation during crystallization and toluene evaporation during CBN isolation.

- The dryers are fueled by natural gas and operate at approximately 400,000 Btus/hour each. If the furnaces were to run for 600 hours, total emissions of SO₂, NO_x, CO, PM, and VOCs would be approximately 3.523 pounds per day (0.044 tons per year). Calculations were made using the State & Local Emissions Inventory System, Method 28 Emission Factors for Natural Gas External Combustion Boilers <10 million BTU/hour.
- Approximately 0.146 pounds (66 grams) per day of pentane would be emitted in a fume hood during the CBD crystallization step.
- Approximately 0.793 gallons (3 liters, 5.727 pounds) of toluene per day would be used in the process of isolating CBN from the mother liquor. Calculations assume 100% evaporation.

From this information, total pounds per day and tons per year were calculated, as shown in the table below.

Pollutant	Lbs./day	Tons/year
SO ₂	0.011	0.0001
NO _x	1.848	0.0231
CO	1.552	0.0194
PM	0.0096	0.0001
VOC	0.102	0.0013
Pentane	0.146	0.0267
Toluene	5.727	1.045
Total	9.396	1.116

WATER USE AND DISCHARGE

The proposed change in operation would not result in changes in water use and water discharge to surface waters.

STORMWATER

The proposed project would operate within an existing warehouse and would not impact stormwater.

LAND EROSION

The proposed project would operate within an existing warehouse and would not impact land erosion.

SOLID AND HAZARDOUS WASTE

It is an objective of the proposed project to reclaim and reuse as much of the solvents utilized within the process as possible. Any wastes would be tested to determine whether or not they should be classified as "hazardous" prior to disposal.

The proposed project would generate 78,000 pounds of waste biomass annually. Approximately 1.8 gallons (11.86 pounds) per day of ethanol would be disposed of with the biomass. Additionally, approximately 0.317 gallons (4.44 pounds, 1.2 liters), of thiosulfate and 13.228 pounds (6 kilograms) of silica gel waste would be generated daily and disposed of on a bi-weekly basis. It is intended for pentane to be fully recovered within the system; however, if any of the solvent is not able to be recovered, it will be disposed of lawfully, following all applicable local and state regulations.

WETLANDS OR HABITAT FOR FLORA AND FAUNA

The proposed project would operate within an existing warehouse and would not impact wetlands or habitat for flora and fauna.

GLARE, HEAT, NOISE, VIBRATION, RADIATION, ELECTROMAGNETIC INTERFERENCE, OBNOXIOUS ODORS

The proposed project would not generate glare, heat, noise, vibration, radiation, or electromagnetic interference outside of the existing warehouse.

Odors emitted during the drying process in September and October would be controlled through the employment of an in-duct odor mitigation system. The system generates ozone to alter the chemical structure of the odorous molecules through oxidation. The proposed system would produce approximately 0.0006 pounds (270 milligrams) per hour of ozone that would readily attach to odor molecules in the ventilation system and destroy them. If the system were to run without coming into

contact with any odors during the 600 hours of dryer operation, approximately 0.36 pounds (163,293 milligrams) of ozone would be generated. However, a balanced system would result in net 0 odor and ozone emissions.

THREATENED OR ENDANGERED SPECIES

Operations for the proposed project would occur entirely inside the existing warehouse. The project location is not known to DNREC Division of Fish & Wildlife to have any threatened or endangered species present.

POTENTIAL TO POLLUTE

The proposed project operations are entirely inside an existing warehouse. Each step of the process is manually operated on a batch-basis and work can be immediately halted by shutting down the equipment in the event of a malfunction at any step. Many processes are isolated in different rooms and spill kits will be located in the production areas. The building also includes fire detection alarms and sprinklers.

2. ECONOMIC EFFECTS

Tenant improvements to the warehouse prior to the start of operations are estimated to have a total cost of \$750,000. Improvements expended locally are estimated to be \$500,000 with services such as engineering, general construction, electrical, plumbing, and HVAC upgrades.

The proposed project would employ 11 permanent workers. Additionally, up to 5 temporary employees may be required during the harvest season. Total payroll for permanent employees is estimated to be \$740,000.

Taxes attributable to this project:

State personal income taxes	\$65,674
State corporate income taxes	\$363,500

3. AESTHETIC EFFECTS

The operation within an existing warehouse does not impact the aesthetics of the area.

4. NUMBER AND TYPE OF SUPPORTING FACILITIES IMPACTS

No supporting facilities are proposed.

5. EFFECT ON NEIGHBORING LAND USES

The closest residence is approximately 360 feet away from the project location. The facility does not interfere with a person's ability to access recreational facilities or resources.

6. COMPATIBILITY WITH COUNTY AND MUNICIPAL COMPREHENSIVE PLANS

A New Castle County Building Official confirmed that the proposed project is consistent with county and municipal planning.

OFFSET PROPOSAL

Subsection 9.1.1 of the Regulations states that offset proposals must “more than offset the negative environmental impact associated with the proposed project of activity requiring a permit.”

As indicated by the assessment, the negative environmental impacts of the proposed project, under normal operating conditions, is limited to air emissions. AgroRefiner proposes purchasing 3 tons of emission reduction credits (ERCs) from the Delaware Division of Small Business to more than offset their 1.12 tons of annual emissions. ERCs come from the *7 DE Admin. Code* 1134 Emissions Banking and Trading Program and are parsed into ozone season and non-ozone season for NOx and VOCs. More than 98% of the emissions of this proposed activity could be attributed to NOx and VOCs; therefore, the CZA Program considers this proposal to be reasonable and practicable, given that the credits purchased should closely reflect actual emissions and time of year to ensure that the emissions are more than offset.

SUFFICIENCY STATEMENT AND CONCLUSION

The application by DSPC addresses the questions of the permit application form and the six criteria required to be reviewed under *7 Del. C. §7004*.

The applicant proposes purchasing 3 tons of emission reduction credits from the Delaware Division of Small Business to more than offset the project's 1.12 tons of annual emissions.

This application for a CZA Permit, including supplemental information, has been reviewed by DNREC to determine its completeness. After a thorough review of the application, the Department considers this application to be administratively complete and sufficient for proceeding to public hearing.

Approved:



Shawn M. Garvin
Secretary, DNREC

Date:

1/7/20