NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: xx/xx/2020

Region: Fayetteville Regional Office
County: Robeson
NC Facility ID: 7800242
Inspector's Name:
Date of Last Inspection:
Compliance Code:

Facility Data

Applicant (Facility's Name): Active Energy Renewable Power

Facility Address:
Active Energy Renewable Power
1885 Alamac Road
Lumberton, NC 28358

SIC: 3999 / Manufacturing Industries, Nec
NAICS: 321999 / All Other Miscellaneous Wood Product Manufacturing

Facility Classification: Before: N/A **After:** Small
Fee Classification: Before: N/A **After:** Small

Permit Applicability (this application only)

SIP:
NSPS:
NESHAP:
PSD:
PSD Avoidance:
NC Toxics:
112(r):
Other:

GREENFIELD FACILITY

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Antonio Esposito Chief Operating Officer (910) 547-1920 1885 Alamac Road Lumberton, NC 28358	Antonio Esposito Chief Operating Officer (910) 547-1920 1885 Alamac Road Lumberton, NC 28358	Antonio Esposito Chief Operating Officer (910) 547-1920 1885 Alamac Road Lumberton, NC 28358

Application Data

Application Number: 7800242.19A
Date Received: 11/04/2019
Application Type: Greenfield Facility
Application Schedule: State

Existing Permit Data
Existing Permit Number: N/A
Existing Permit Issue Date: N/A
Existing Permit Expiration Date: N/A

Review Engineer: Gregory Reeves

Review Engineer's Signature: **Date:**

Comments / Recommendations:
Issue 10636/R00
Permit Issue Date: xx/xx/2020
Permit Expiration Date: xx/xx/2028

1. **Purpose of Application**:

Active Energy Renewable Power (AERP) is a greenfield wood pellet manufacturing facility located in Lumberton, Robeson County. The company has requested the initial air quality permit for this facility.

The facility will be classified as small, as the potential emissions before controls do not exceed the Title V permitting thresholds.

The application did not contain any confidential information.

The facility contact for the permit application is Antonio Esposito, chief operating officer, (910-547-1920). The facility utilized a consultant to prepare the permit application. The contact at the consultant, CP Engineering and Environmental Solutions, is Chalam Pakala, P.E. (704-541-4042).

2. Facility Description

Active Energy Renewable Power (AERP) is a proposed greenfield facility located at 1885 Alamac Road, Lumberton, Robeson County, North Carolina, will manufacture "black" wood pellets as a fuel source for power plants and industry, as a replacement for coal. The facility will receive dry wood chips as the raw material which will be pressure cooked using steam generated from a 20 mmBtu/hr natural gas-fired boiler. The water vapor and volatile organic compounds released from the pressure cooker process will be condensed by utilizing a water-cooled condenser using well water. The non-contact cooling water will be discharged to the facility's on-site wastewater treatment system, then discharged to the Cape Fear River. The company asserts that approximately 80% of the VOCs from the cooker process will be condensed, with the remainder vented to atmosphere. The condensed liquids will either be disposed of or the condensed organic liquids separated and sold, with the separated water processed through the facility's wastewater treatment plant, then discharged to the Cape Fear River. Wet cellulosic material from the pressure cooker will be sent to a Screw Press for additional de-watering prior to sending to a pellet press. Finished pellets will pass through a 4 mmBtu/hr natural gas-fired dryer to remove any residual surface moisture, then transported via conveyor to a pellet storage bin. The company asserts that 80-90% of the VOCs in the raw wood chips will be removed during the pressure cooking process and small amounts of VOCs will be released from the Screw Press/Pellet Making/Drying process.

The Pressure Cooker Process uses a "steam explosion" process to separate the cellulosic materials from the hemicellulosic materials and terpene chemicals in the wood, then the resultant solids are formed into pellets. A brief explanation of this process follows:

What is Steam Explosion?

The SE method of wood fiber pretreatment involves exposing the material to saturated steam. The steam temperature and pressure, and the time in the reaction vessel, determines how much of the hemicellulose degrades, and what fraction of the feedstock matter gets converted into volatiles and biochemical compounds. The subsequent steam explosion is the rapid release of pressure. This explosive expansion of water in the cell walls of lignocellulosic feedstocks causes a breakdown of the wood fibers into very small particles. The severity of the steam treatment is controlled such that the cellulose and lignin are minimally affected, while the hemicellulose is partially degraded. When compared to white pellets, the resulting material, after densification in a pellet press, has a higher specific energy content in Btu/lb, improved grindability, is hard and produces fewer fines, and its affinity to water is changed from hygroscopic to hydrophobic.

The steam explosion process causes the lignin to emerge on the surface of the fine wood fibers in the form of small beads. When the fiber is densified in the pellet press, these beads form a film-like surface coating on the broken-down wood fibers, and results in hard, highly water-resistant pellets that produce almost no fines.

3. Application Chronology:

09/19/19 Greg Reeves spoke with Chuck Pakala by phone regarding the proposed pellet process at the site of the previous Alamac American facility in Lumberton. An applicability determination was proposed as a possibility in lieu of a permit, as the facility believed emissions to be <5 tons per year of VOC. Mr. Pakala was directed to submit information on the process, emission controls, and emission factors with the determination request.

10/02/19 Greg Reeves spoke with Chuck Pakala regarding emission factors for the various processes at the facility. The facility does not have any EFs available from previous stack testing at other plants. Therefore, it was suggested that EFs from the recent stack testing at the Enviva Sampson pellet facility be used as the best available information from a similar facility. It was noted to Mr. Pakala that it was understood that these EFs may not be totally representative of the actual processes, and that stack testing will be required after startup of the facility to verify the emissions. Using these factors and the throughputs provided by Mr. Pakala, it appears that VOC emissions are > 5 tons/yr and aggregate emissions >25 tons/yr. Therefore, an air permit will be required. Also discussed were that the wastewater treatment system, the emergency generator engine, and the fire pump engine would be exempt from permitting and added to the insignificant/exempt activities listing. Rescission of the existing air permit for Lumberton Energy Holdings was also discussed, and Mr. Pakala will discuss this with the facility management.

10/14/19 Greg Reeves spoke with Mr. Pakala and sent Mr. Pakala an email regarding the conversation. Based on the conversation and emission calculations, it would appear that the project will require an air permit.

10/07/19 Mr. Pakala sent an email to Greg Reeves with a request to review the project for permit exemption. Greg Reeves spoke with Chuck Pakala by phone regarding the source and appropriateness of the emission factors used in the emissions calculations.

10/16/19 FRO received the request for rescission of the permit for Lumberton Energy Holdings.

10/24/19 Mr. Pakala emailed Greg Reeves to ask if emission factors from the Enviva Ahoskie facility might be used for the dryer emissions.

10/25/19 Greg Reeves emailed Mr. Pakala regarding the email of 10/24. Mr. Pakala was advised that a permit application would be required if either the Enviva Sampson or the Enviva Ahoskie emission factors were utilized, and that stack testing would be required after startup of the process in order to confirm emissions

10/28/19 Greg Reeves sent Mr. Pakala information on the emission factors from the recent Enviva Sampson testing, and was advised to use these as best available factors in the permit application.

10/29/19 The permit for Lumberton Energy Holdings was rescinded.

11/04/19 FRO received the permit application package. The application package included a check in the amount of $50 for the applicable permit processing fees and a request for a Zoning Consistency Determination to the Robeson County Zoning and Planning Department. The application appeared to be complete for processing. The application package was sealed by a P.E

11/05/19 FRO sent the facility a letter acknowledging receipt of the completed application.

11/18/19 FRO received the completed Zoning Consistency Determination, which stated that *"…The proposed operation IS consistent with applicable zoning ordinances…"*

12/19/19 Heather Hillaker of SELC emailed Abdul Kadir, asking for a copy of the permit application. Mr. Kadir sent her an electronic copy of the application.

01/01/20 Application re-assigned to Greg Reeves for processing.

01/09/20 Greg Reeves requested additional information from Mr. Pakala regarding the inlet and outlet temperatures of the vapor stream to the condenser.
PERMIT APPLICATION CLOCK OFF

01/10/20 Mr. Pakala called Greg Reeves to discuss the condenser temperatures. The boiling point temperatures on the Form C7 are listed as 50-150^{o}F, but are in reality ^{o}C. Therefore, the boiling points are actually 130-356^{o}F. Mr. Pakala will call back with a proposed maximum outlet vapor temperature for the condenser control to include in the 02D .0611 condenser requirements permit condition.

01/10/20 Mr. Pakala sent an email to Greg Reeves proposing the maximum outlet vapor temperature for the condenser to be 99^{o}C (210^{o}F).
PERMIT APPLICATION CLOCK ON

01/31/20 The DAQ Director determined that the draft permit would be noticed to the public and posted for a public comment period. A public meeting will also be held in the Lumberton, Robeson County area in order to receive comments from the public concerning the draft permit.
PERMIT APPLICATION CLOCK OFF

02/06/20 Greg Reeves called Mr. Esposito and confirmed that the facility will be processing 50% softwood, 50% hardwood in their process.

4. Zoning

The permit application included a request for a Zoning Consistency Determination from the Robeson County Zoning and Planning Department.

A completed Zoning Consistency Determination was received on 11/14/19 from the Robeson County Zoning and Planning Department. The determination was signed by Dixon Ivey, Director of Planning & Inspections on 11/12/19 and indicated that *"…The proposed operation IS consistent with applicable zoning ordinances…"*

5. Changes in Equipment, Emissions and Regulations and PE Review Requirements

PE Seal – The permit application contained Form D5 that was sealed and signed by Chalam Pakala, P.E. (N.C. Seal #19807) on 10/30/2019.

The facility's permitted emission sources and controls are as follows:

Emission Source ID	Emission Source Description	Control System ID	Control System Description
ES-B-1 **(NSPS)**	Natural Gas-Fired Boiler 20 mmBtu/hr maximum heat input	N/A	N/A
ES-P-1	Pressure Cooker Process	CD-1	Water Circulation Condenser
ES-SPD-1	Screw Press/Pellet Press/Natural Gas-fired Dryer Process 4 mmBtu/hr maximum heat input	N/A	N/A

The facility's Insignificant / Exempt Activities are as follows:

Source	Exemption Regulation	Source of TAPs?	Source of Title V Pollutants?
IES-WWTP Wastewater Treatment Plant	02Q .0102 (g)(6)	Yes	No
IES-FP 180 HP Diesel-fired Fire Pump (NESHAP ZZZZ) (NSPS IIII)	02Q .0102 (h)(5)	Yes	Yes
IES-GEN 15 HP Diesel-fired Emergency Generator (NESHAP ZZZZ) (NSPS IIII)	02Q .0102 (h)(5)	Yes	Yes
IES- PROPANE Propane Vaporizer	02Q .0102 (h)(5)	Yes	Yes
IES- PSTG Pellet Storage	02Q .0102 (h)(5)	Yes	Yes

6. NSPS, NESHAP, PSD, Attainment Status, and 112(r)

- **NSPS**

  - ✓ The Natural gas-fired Boiler (20 mmBtu/hr maximum heat input) (ID No. ES-B-1) is subject to NSPS Subpart Dc.

  - ✓ The diesel-fired fire pump and diesel-fired emergency generator (IES-FP and IES-GEN) are subject to NSPS Subpart IIII since they are manufactured after 2006. These engines will be EPA certified as complying with applicable emission standards

- **NESHAP**

  - ✓ The Natural gas-fired Boiler (20 mmBtu/hr maximum heat input) (ID No. ES-B-1) is not subject to NESHAP Subpart JJJJJJ "Industrial, Commercial, and Institutional Boilers Area Sources" since it is a gas-fired boiler, only capable of firing gaseous fuels.

  - ✓ The diesel-fired fire pump and diesel-fired emergency generator (IES-FP and IES-GEN) are subject to NESHAP subpart ZZZZ. These are considered new engines under this rule, and compliance with the rule is demonstrated by compliance with the requirements of NSPS Subpart IIII.

- **PSD** – The potential emissions do not exceed PSD threshold limits; therefore, this facility does not trigger a PSD review. PSD minor-source increment tracking has been triggered in Robeson County for PM_{10} and SO_2. This application will consume 0.01 lb/hr of PM_{10} and 0.15 lb/hr of SO_2.

- **Attainment Status –** Robeson County is in attainment

- **112(r)** – The facility does not store any of the subject materials at or above the 112(r) threshold quantities and is therefore not required to maintain a written Risk Management Plan (RMP).

7. Facility Emissions Review:

Pollutant	Expected Actual Emissions (tons/yr)	Potential Emissions Before Controls (tons/yr)	Potential Emissions After Controls (tons/yr)
PM	0.05	0.05	0.05
PM_{10}	0.05	0.05	0.05
$PM_{2.5}$	0.05	0.05	0.05
SO_2	0.05	0.05	0.05
NOx	9.41	10.31	10.31
CO	7.91	8.65	8.65
VOC	23.63	49.48	25.87
Highest Individual HAP (Acetaldehyde)	1,479 lbs/yr	1,619 lbs/yr	1,619 lbs/yr
Total HAP	4,963 lbs/yr	5,435 lbs/yr	5,435 lbs/yr

The Expected Actual Emissions in the table above are taken from the permit application. The emissions due to natural gas combustion from both the Natural Gas-Fired Boiler and the natural gas-fired Dryer (ID Nos. ES-B-1 and ES-SPD-1) are estimated using the NCDENR "Natural Gas Combustion Emissions Calculator Revision N 01/05/2017". The expected actual VOC emissions from the Screw Press, Pellet Press and Natural Gas-fired Dryer (ES ID No. ES-SPD-1) and Pressure Cooker (ES ID No. ES-P-1) are calculated using the emission factor obtained from stack testing conducted in March 2017 and March 2018 at Enviva Pellets Sampson, LLC (Facility ID No. 8200152), and applying the 80% control of VOC for the condenser on the cooker process. The Enviva testing was conducted with the facility processing a mixture of 52% softwood and 48% hardwood. The Active Energy facility is proposing to use 50% softwood and 50% hardwood in their process. The only expected process emissions from the cooker and the screw press/pellet press/dryer are VOC. There are no expected particulate emissions from these processes. Particulate, SO_2, NOx, and CO emissions listed in the table are from combustion of natural gas in the boiler and dryer. Potential uncontrolled process VOC emissions from the cooker and screw press/pellet press/dryer are calculated using the uncontrolled emission factor from the Enviva Sampson stack testing in March 2017 and March 2018 (1.07 lb/ODT for cooker, 1.07 lb/ODT for screw press/pellet press/dryer processes = 2.14 lb/ODT total for the cooker and dryer operations combined) and the stated maximum throughput of 39,420 ODT/yr. The potential after control VOC emissions are calculated applying the 80% VOC control for the condenser for the cooker operation only.

Note that the facility asserts that the emission factors used in the emission calculations are very conservative numbers, and that the actual emissions from the process will be lower than indicated in the table above. However, they have provided no empirical test data to substantiate this assertion. As such, DAQ will require source testing for VOC emissions from both the Pressure Cooker Process (ID No. ES-P-1) and from the Screw Press/Pellet Press/Dryer Process (ID No. ES-SPD-1) within 180 days after startup to verify the VOC emissions from the two processes.

8. Facility Wide Air toxics:

Toxic pollutant emissions from the facility operations are detailed in the table below. There are no toxic pollutant emissions that exceed the toxic air pollutant permitting emissions rates (TPERs). Therefore, no air dispersion modeling demonstration is required. There will be a 02Q .0711 toxics condition in the permit, but there is not a 02D .1100 toxics condition in the permit.

Pollutant	Expected Actual Emissions After Controls	TPER (02Q .0711(b)	Exceed TPER?
Acetaldehyde	0.074 lb/hr	28.43 lb/hr	No
Acrolein	4.23E-07 lb/hr	0.02 lb/hr	No
Ammonia	0.0752 lb/hr	2.84 lb/hr	No
Benzene	0.433 lb/yr	11.069 lb/yr	No
Benzo(a)pyrene	2.5E-04 lb/yr	3.044 lb/yr	No
Formaldehyde	0.064 lb/hr	0.16 lb/hr	No
n-hexane	0.93 lb/day	46.3 lb/day	No
Toluene	1.8E-04 lb/day	197.96 lb/day	No
	8.0E-05 lb/hr	58.94 lb/hr	No

Expected actual emissions of Acetaldehyde and Formaldehyde from the cooker operation are based on uncontrolled emission factors from the Enviva Sampson stack testing of March 2017 and April 2017, using expected throughput of 36,000 ODT/yr and applying a control efficiency of 80% for the condenser. Note that the uncontrolled emission factors are as follows (total for both cooker and screw press/pellet press/dryer processes):

Acetaldehyde 0.320 lb/ODT
Formaldehyde 0.369 lb/ODT

Expected actual emissions of other TAPs listed in the table above are based on the expected natural gas combustion in the boiler and dryer operations. TPERs listed in the table are for unobstructed, vertical stacks from 02Q .0711(b).

9. Facility Compliance Status:

This is a greenfield facility and has no previous compliance history. The facility has not commenced construction.

10. Stipulation Review:

The following regulations are applicable to this facility:

Regulation	Affected Sources	Emission Limit or Requirement
15A NCAC 02D .0202	Facility-wide	Permit Renewal and Emission Inventory Requirement
15A NCAC 02D .0503	Boiler ES-1	PM $\leq$ 0.50 lb/mmBtu
15A NCAC 02D .0515	ES-P-1 ES-SPD-1	$E = 4.10 * (P)^{0.67}$ for $P \leq 30$ tons/hr $E = 55 * (P)^{0.11} - 40$ for $P > 30$ tons/hr
15A NCAC 02D .0516	Facility-wide	$SO_2 \leq 2.3$ lb/mmBtu
15A NCAC 02D .0521	Facility-wide	20% opacity
15A NCAC 02D .0524 NSPS Subpart Dc	Boiler ES-B-1	Notification of initial startup within 15 days of startup Recordkeeping - Monthly Fuel Usage
15A NCAC 02D .0535	Facility-wide	Notification requirement
15A NCAC 02D .0540	Facility-wide	Fugitive Dust Control Requirement
15A NCAC 02D .0605	ES-P-1 ES-SPD-1	Testing Requirements Test for VOC emissions from Cooker (ES-P-1) and from Screw Press/Pellet Press/Dryer (ES-SPD-1) within 180 days of startup to confirm emission factors Submit Test Report within 30 days after testing completed
15A NCAC 02D .0611	Condenser CD-1	Condenser Requirements Maintain outlet exhaust temperature <99°C (210°F) Continuously record temperature I & M per Manufacturer's Recommendations, Annual Inspection, Recordkeeping
15A NCAC 02D .1806	Facility-wide	Odor Requirement
15A NCAC 02Q .0102	IES-FR IES-GEN	Applicability of NSPS Subpart IIII and NESHAP Subpart ZZZZ to fire pump engine and emergency generator engine
15A NCAC 02Q .0309	Facility-wide	Written Startup Notification within 15 days after startup
15A NCAC 02Q .0711	Facility-wide	Toxics Emissions exceeding TPERs requires permitting

11. Conclusions, Comments, and Recommendations:

I recommend that air permit 10636R00 be issued to Active Energy Renewable Power.

- The following modifications have been made to IBEAM Permit Writer:
  - ✓ Adjusted column widths, bolded and shaded to improve appearance.
  - ✓ Re-numbered the paragraphs under the 02D .0605 "Testing Requirement" condition to be consistent with the remainder of the document.
  - ✓ Added new section (a) in the 02D .0605 "Testing Requirement" condition as follows: "…Unless otherwise specified by federal rules, the Permittee shall perform such testing in accordance with 15A NCAC 02D .2600…."
  - ✓ Re-worded section (e) in the 02D .0605 "Testing Requirement" condition to reflect that stack testing results must be submitted per the requirements of 15A NCAC 02D .2600.
  - ✓ Deleted the column in the 02Q .0711 Toxics condition for "Acute Systemic Toxicants", as there were no entries in this column.
  - ✓ Deleted the sentence in the 02Q 0309 Startup Notification condition that states that "…*Any existing equipment being replaced is permitted to operate in compliance until the replacement equipment is operational…*"

Review Engineer: _____ Date: _____

Permit Coordinator: _____ Date: _____

AQ Supervisor: _____ Date: _____

\gwr

cc: FRO Files