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west virginia department of environmental protection

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Joe Manchin, III, Governor  
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## ENGINEERING EVALUATION / FACT SHEET

### BACKGROUND INFORMATION

Application No.:	R13-2850
Plant ID No.:	067-00106
Applicant:	Argonaut BioEnergy, LLC
Facility Name:	Mt. Nebo
Location:	Nicholas County
SIC Code:	2499
Application Type:	Construction
Received Date:	July 12, 2010
Engineer Assigned:	Steven R. Pursley, PE
Fee Amount:	\$1,000.00
Date Received:	August 16, 2010
Complete Date:	August 16, 2010
Due Date:	November 12, 2010
Applicant Ad Date:	July 16, 2010; July 22, 2010
Newspaper:	<i>The Charleston Gazette; The Nicholas Chronicle</i>
UTM's:	Easting: 513.05 km      Northing: 4,229.36 km      Zone: 17
Description:	Construction of a 100,000 ton per year wood pellet manufacturing facility.

### DESCRIPTION OF PROCESS

Most of the following process description comes directly from the application.

Argonaut BioEnergy, LLC (Argonaut) proposes to construct a 100,000 ton per year wood pellet manufacturing facility near Mount Nebo, WV. The pellets will be used as fuel for residential pellet stoves. The facility will be located at a moth balled wood pallet manufacturing facility.

The process will include three distinct activities. Wood preparation, wood drying and pellet forming. In order to be classified as a Title V minor source, the applicant has proposed limiting hours of operation to 7,300 hours per year.

## WOOD PREPARATION

The process will utilize local hardwoods to be processed into pellets. Raw materials will arrive by truck as sawdust, chips or logs and stockpiled in the chipping and storage area. Logs will be chipped using a whole tree chipper. This chipper takes whole logs, debarks and converts the remaining fiber to a nominal 3/4 square paper mill quality wood chip. Chips from the chipper will be placed into a storage pile. The bark will be stockpiled and sold. From the stockpiles, the raw materials will be moved by front end loader to the feed system where the material is pneumatically transferred to the chip preparation area. Here, debris, such as gravel and metal objects, is removed from the raw material prior to grinding. An enclosed green wood hammer mill reduces the raw material to a thickness of 3/8 inch or less.

## WOOD DRYING

From chip preparation, the green wood enters a rotary dryer at a maximum moisture content of 50 percent and exits the dryer with a moisture content of approximately 10 percent. The dryer will use hot gases from a 40 million BTU per hour rated wood burner to dry the wood. An induced draft fan directs these gases through the rotary dryer, then through a high efficiency cyclone for dry wood recovery and is then exhausted.

A rotary interlock at the bottom of the cyclone drops the chips into a pre-pellet sizing system. In this system, a hammer mill further reduces the dried wood. Smaller material is fed back into the dryer burner and burned as fuel. The remaining sized material is then pneumatically transferred to a pre-pellet surge bin for storing prior to being used in the pellet forming operation. A high efficiency cyclone is used on the pneumatic transfer system to control particulate matter emissions from the sizing system along with the baghouse system.

## PELLET FORMING

Dried wood will be transferred from the pre-pellet surge bin to one of three parallel pellet mills. The wood will be formed into pellets in the mills utilizing the heat of friction and pressure. Due to the source and type of raw material no binders are needed. The pellets will then be pneumatically transferred to the pellet cooler system prior to being transferred to one of the two pellet storage silos. Three high efficiency cyclones are used in the pneumatic transfer system to control particulate matter emissions. From the silos, pellets will be transferred to the packaging system and placed into 40 pound bags. The bags will be loaded onto pallets, shrink wrapped and shipped off-site by truck to customers.

SITE INSPECTION

A site inspection of the proposed facility was performed by the writer on July 20, 2010. The facility will be located at a moth balled wood pallet manufacturing facility near Mt. Nebo, WV. The facility will be adjacent to US Rt. 19. There are several residences within 1/4 mile of the facility. To get to the facility take US Rt. 60 east to US Rt. 19. Then proceed north approximately 11 miles. Turn left on Old Gauley Road. Note that both Yahoo and Google maps call this road Lakeview Heights Road but I could find no signage indicating this. Then take an immediate right.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Controlled criteria emissions from the facility should be as follows:

Source	NO <sub>x</sub>		PM <sup>1</sup>		SO <sub>2</sub>		VOC		CO		Calc. Basis <sup>2</sup>
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
EP-01	--	--	0.01	0.01	--	--	--	--	--	--	4
EP-02	--	--	15.9	58.04	--	--	--	--	--	--	2,3,4
EP-03	8.80	32.12	8.80	32.12	1.00	3.65	0.68	2.48	24.00	87.6	1, 2,3
EP-05	--	--	0.81	2.96	--	--	--	--	--	--	2,3,4,7
EP-06	--	--	0.01	0.04	--	--	--	--	--	--	2,4
EP-07	--	--	1.45	5.29	--	--	--	--	--	--	2,3,4,7
Haul Rds.	--	--	40 lb/day	7.3	--	--	--	--	--	--	1,6
<b>Total</b>	8.80	32.12	66.98	105.8	1.00	3.65	0.68	2.48	24.0	87.6	--

<sup>1</sup>In order to be conservative, all PM is considered PM<sub>10</sub> for all rule applicability determinations except in the case of EP-03 (Dryer system) and the Haul Roads. PM<sub>10</sub> emissions from EP-03 are 29.2 tons per year and PM<sub>10</sub> emissions from haulroads are 1.42 tons per year. Therefore, total PM<sub>10</sub> emissions from the facility are 96.96 tons per year.

Note that the PM total includes fugitives (haulroads). For Title V applicability purposes, PM<sub>10</sub> emissions from point sources total 95.54 tons per year.

<sup>2</sup>1 - AP-42, 2 - Hours of operation permit limit, 3 - Hourly design capacity, 4 - Vendor guarantee, 5 - Permitted hourly throughput rate, 6 - Permitted yearly throughput rate, 7 - Engineering Estimate.

Hazardous Air Pollutant emissions from the facility should be as follows:

Source	Acrolein		Benzene		Formaldehyde		Styrene		Calc. Basis <sup>1</sup>
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
EP-01	--	--	--	--	--	--	--	--	--
EP-02	--	--	--	--	--	--	--	--	--
EP-03	0.16	0.59	0.17	0.62	0.18	0.66	0.08	0.35	1,2,3
EP-05	--	--	--	--	--	--	--	--	--
EP-06	--	--	--	--	--	--	--	--	--
EP-07	--	--	--	--	--	--	--	--	--
Haul Rds.	--	--	--	--	--	--	--	--	--
<b>Total</b>	0.16	0.59	0.17	0.62	0.18	0.66	0.08	0.30	2.16 tpy total HAP

<sup>1</sup>1 - AP-42, 2- Hours of operation permit limit, 3-Burner Rating

## REGULATORY APPLICABILITY

The following state and federal regulations apply to the modification:

### STATE RULES:

45CSR7 To Prevent and Control Particulate Matter Air Pollution From Manufacturing Processes and Associated Operations.

The main requirement of 45CSR7 is the process weight rate based PM stack emission rate in section 4 of the rule. Two sources at the facility have significant PM emissions (EP-02 and EP-03).

The process weight rate for EP-02 is 54,000 pounds per hour. For a type a source, this equates to an allowable PM emission rate of 31.16 pounds per hour. The permit will limit the chip preparation system to 15.9 pounds per hour. Therefore, EP-02 should meet the requirement.

The process weight rate for EP-03 is 57,000 pounds per hour. For a type a source, this equates to an allowable PM emission rate of 31.28 pounds per hour. The permit will limit the dryer to 8.8 pounds per hour. Therefore, EP-03 should meet the requirement.

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Argonaut BioEnergy, LLC  
Mt. Nebo

The facility is also subject to a twenty (20) percent opacity limit on all process source operations and must have a plan to minimize fugitive emissions. Argonaut BioEnergy proposes to meet these requirements mainly through the use of cyclones and a baghouse.

The facility is also subject to the fugitive particulate matter control systems requirement of section 5.1 of 45CSR7. Although AP-42 acknowledges that wood chip storage piles **could** produce PM emissions it has no data for actually quantifying those emissions. It seems likely to the writer that emissions from these piles would be negligible. Regardless, any emissions from these piles would be fugitive and therefore not count towards PSD or Title V applicability. Additionally, the requirement of section 5.1 will be placed in the permit so that any fugitives that might be generated are minimized.

45CSR10 To Prevent and Control Air Pollution From the Emission of Sulfur Oxides.

45CSR10 section 4.1 limits the in stack SO<sub>2</sub> concentration from the dryer (EP-03) to 2,000 ppm. Maximum SO<sub>2</sub> emissions from the stack will be limited in the permit to 1.00 pound per hour. Based on a stack gas exhaust temperature of 240°F and a flow rate of 69,541 acfm, 1.00 pounds per hour equates to approximately 1.91 ppm. Therefore this requirement should be met.

45CSR13 Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation).

Because emissions from the facility exceed 6 pounds per hour and 10 tons per year of NO<sub>x</sub>, CO and PM the applicant is required to obtain a Rule 13 permit prior to construction.

45CSR22 Air Quality Management Fee Program

The facility is not subject to any NSPS, MACT or NESHAP. Additionally, the with the issuance of this permit, the facility will be a synthetic minor source. Therefore the facility is not subject to 45CSR30 and will pay its annual fees through the Rule 22 program.

## **Nonapplicability Determinations**

45CSR17 To Prevent and Control Particulate Matter Air Pollution From Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter.

Section 6.1 of 45CSR17 exempts sources which are subject to 45CSR7. Since this is a manufacturing source it is subject to 45CSR7.

45CSR30 Requirements for Operating Permits

It should be noted that the limit on hours of operation placed in the permit are designed to establish the facilities status as a Title V minor source.

## TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The following information was obtained from USEPA's Air Toxic Website.

### **Acrolein**

Acrolein is primarily used as an intermediate in the synthesis of acrylic acid and as a biocide. It may be formed from the breakdown of certain pollutants in outdoor air or from the burning of organic matter including tobacco, or fuels such as gasoline or oil. It is toxic to humans following inhalation, oral or dermal exposures. Acute (short-term) inhalation exposure may result in upper respiratory tract irritation and congestion. No information is available on its reproductive, developmental, or carcinogenic effects in humans, and the existing animal cancer data are considered inadequate to make a determination that acrolein is carcinogenic to humans.

### **Benzene**

Benzene is found in the air from emissions from burning coal and oil, gasoline service stations, and motor vehicle exhaust. Acute (short-term) inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic (long-term) inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings. Reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidence of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen.

## **Formaldehyde**

Formaldehyde is used mainly to produce resins used in particleboard products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

## **Styrene**

Styrene is primarily used in the production of polystyrene plastics and resins. Acute (short-term) exposure to styrene in humans results in mucous membrane and eye irritation, and gastrointestinal effects. Chronic (long-term) exposure to styrene in humans results in effects on the central nervous system (CNS), such as headache, fatigue, weakness, and depression, CSN dysfunction, hearing loss, and peripheral neuropathy. Human studies are inconclusive on the reproductive and developmental effects of styrene; several studies did not report an increase in developmental effects in women who worked in the plastics industry, while an increased frequency of spontaneous abortions and decreased frequency of births were reported in another study. Several epidemiologic studies suggest there may be an association between styrene exposure and an increased risk of leukemia and lymphoma. However, the evidence is inconclusive due to confounding factors. EPA has not given a formal carcinogen classification to styrene.

## AIR QUALITY IMPACT ANALYSIS

Because this is a minor source no modeling was performed.

## MONITORING OF OPERATIONS

The permittee shall maintain records of the following:

- \* Total monthly and annual pellet production rates.
- \* Total monthly and annual hours of operation.

## RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit

R13-2850 for the construction of a wood pellet manufacturing facility near Mt. Nebo, Nicholas County, be granted to Argonaut BioEnergy, LLC.

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Steven R. Pursley, PE  
Engineer

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Date