Illinois Environmental Protection Agency
Bureau of Air, Permit Section
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Springfield, Illinois 62794-9276

Project Summary for a Construction Permit Application from Jo Carroll Energy, Inc. for a Wood and Biomass Fuel-Fired Power Plant in Thomson, Illinois

Site Identification No.: 015813AAD
Application No.: 09120002
Date Received: December 2, 2009

Schedule
Public Comment Period Begins: May 4, 2011
Public Comment Period Closes: June 3, 2011

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I. INTRODUCTION

Jo Carroll Energy Inc. (Jo-Carroll), a rural electric cooperative serving Jo Daviess, Carroll and Whiteside Counties in Illinois, has proposed to construct a wood and biomass fuel-fired power plant at 4341 Sand Ridge Road in Thomson. The plant would generate up to 20 MWe (gross output) of electricity. The project requires a permit from the Illinois EPA because of its emissions.

The Illinois EPA has reviewed Jo-Carroll's application and made a preliminary determination that the application meets applicable requirements. Accordingly, the Illinois EPA has prepared a draft construction permit that it would propose to issue for the proposed power plant. However, before issuing this permit, the Illinois EPA is holding a public comment period to receive comments on the proposed issuance of the permit and the terms and conditions of the draft permit.

II. PROJECT DESCRIPTION

The proposed power plant would have one boiler. The steam from the boiler would be sent to a turbine generator to produce electricity. The nominal heat input capacity of the boiler will be 266 million Btu per hour (mmBtu/hr). The plant would be designed to fire primarily wood fuel, as well as wood supplemented with other biomass fuels. The boiler would be a bubbling fluidized bed boiler, a design that is well suited for firing of wood and biomass fuel. Natural gas will be used as the auxiliary fuel for the boiler.

Wood fuel will be transported to the plant by barge up the Mississippi River and delivered to the plant by truck. Wood fuel may also be supplied to the plant from wooded areas in the region around the plant. To accommodate possible closure of the Mississippi River to barge traffic in winter months, whole logs may also be delivered to the plant during the fall and stockpiled. When barge delivery of fuel is interrupted, logs from the log storage yard would be shredded and chipped, and used as fuel in the boiler.

While the boiler's principal fuel will be wood, the boiler would also be able to co-fire other biomass fuels, such as corn stover or switchgrass supplied from farms in the region. Corn stover is the stalks and leaves of the corn plant and the corn cobs, which remain after the grain has been harvested. Corn stover can be harvested by a separate collection of corn stover in a second pass over the field. Switchgrass is a perennial grass that can be harvested and baled with commercially available haying equipment. Bales of corn stover and switchgrass will be transported to the plant by trucks.

The boiler would be a source of emissions of particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO) and volatile organic material (VOM). To control emissions, various techniques and add-on controls equipment would be used, including a

selective non-catalytic reduction (SNCR) system to control NO_x and a baghouse to control PM.

The formation of NOx will be minimized by use of a fluidized bed boiler. The fluidized bed will mix fuel and air in a way that reduces the peak flame temperatures and maintains oxygen concentrations. A selective non-catalytic reduction (SNCR) system would be used to control NO_x that is formed. In an SNCR system, ammonia or urea is injected into the flue gases at a point where reactions leading to the reduction of NO_x can occur (at gas temperatures greater than 1550°F). Suitable conditions for use of SNCR will exist in the back end sections of the boiler.

Emissions of particulate matter (PM) would be controlled by baghouse. The baghouse would consist of several compartments, each containing rows of fabric bags. Particle laden flue gas passes through the fabric of the bags. Particles are retained on the upstream face of the bags, and the cleaned gas stream is vented to the atmosphere.

Carbon monoxide (CO) and volatile organic material (VOM) emissions are a result of incomplete combustion of fuel. The boiler will be operated with good combustion practices to minimize emissions of CO and VOM.

This plant would also include fuel and bulk material storage, preparation, and handling facilities for the boiler. Control of particulate matter emissions will be by work practices and by baghouses.

The plant would have a water cooling system and other ancillary equipment.

Fugitive dust emissions would also be generated by vehicle traffic and wind blown dust on roadways, parking lots and other open areas at the plant. These emissions would be minimized by implementation of a fugitive dust control program as well as pavement of major roadways at for the plant.

III. PROJECT EMISSIONS

The potential or permitted annual emissions of the proposed plant, as would be allowed by the draft permit, are summarized below. Actual emissions will be less than the permitted emissions to the extent that the proposed plant would operate at less than its maximum capacity and control equipment normally operates to achieve emission rates that are lower than the applicable standards and limitations.

Permitted Annual Emissions of the Plant (Tons/Year)

PM^*	NO_x	SO_2	CO	VOM
55.7	198.9	198.3	140.0	49.5

* Particulate matter, including both filterable and condensable particulate but excluding fugitive emissions (e.g., road dust)

IV. APPLICABLE EMISSION STANDARDS

The application shows that the proposed plant will readily comply with applicable emission standards adopted by the State of Illinois (35 IAC Subtitle B) and applicable federal emission standards adopted by the USEPA.

The proposed boiler would be subject to emission standards for NO_x, PM and opacity, pursuant to the federal New Source Performance Standards (NSPS). It would also be subject to state standards for PM, CO, SO_2 and opacity. Potential emissions of hazardous air pollutant (HAP) from the proposed plant would be less than 25 tons per year in the aggregate and less than 10 tons per year for any single HAP. Specifically, emissions of hydrogen chloride, the HAP emitted in the greatest quantity, would be limited to 7.9 tons per year. Accordingly, the boiler will be subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Area Sources for Industrial/Commercial/Institutional Boilers and Process Heaters. The boiler should readily comply with the appropriate particulate matter emission standards of the NESHAP for new boilers using biomass fuel.

V. APPLICABILITY OF STATUTORY AND REGULATORY PROGRAMS

Prevention of Significant Deterioration (PSD)

This proposed plant will not be a major project for purposes of the federal rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21. This is because the potential emissions of the plant will be less than 250 tons per year for each applicable NSR pollutant[1]. The plant is not in one of the 28 listed categories of source for which the major source threshold is the potential to emit 100 tons per year or more. This is because the primary fuel fired in the boiler, biomass, is not a fossil fuel. The capacity of the auxiliary natural gas burner will be less than 100 mmBtu/hr, below 250 mmBtu/hour at which the PSD applicability threshold for which a major source would be 100 tons per year.

Pollution Control Facility

The plant will not be a pollution control facility and will not require local siting approval pursuant to Section 39.2 of Illinois' Environmental Protection Act. The suppliers of wood fuel and other biomass fuel to the plant would be required to provide clean fuel to the plant and Jo Carroll must reject fuel shipments that are

[1]Emissions of greenhouse gases are not currently a regulated NSR pollutant. USEPA has proposed that greenhouse gases from sources firing biomass fuels, like the proposed plant, would only become a regulated NSR pollutant in July 2014.

contaminated with foreign material. No mixed biomass material streams are allowed to be processed as fuel at the plant.

Trading Programs for SO_2 and NO_x

The proposed boiler will be an exempt new unit for purposes of Title IV of the Clean Air Act (Acid Deposition), and the regulations promulgated thereunder because (1) the boiler will not use coal or a coal-derived fuel and (2) the fuel will have a sulfur content no greater than 0.05 percent, on an annual average.

Likewise, the boiler will not be subject to the NO_x Trading Program for Illinois' version of the Clean Air Trading Rule, 35 IAC Part 225, Subparts C, D and E. This is because the nameplate capacity of the generator will not exceed 25 MW and the boiler does not qualify as a cogeneration unit.

Clean Air Act Permit Program (CAAPP)

This plant will be considered a major source under Illinois' Clean Air Act Permit Program (CAAPP) pursuant to Title V of the Clean Air Act. This is because it would have permitted NOx and CO emissions of more than 100 tons per year, making it a major source under the CAAPP program. Accordingly, Jo Carroll will have to obtain a CAAPP permit for the plant.

VI. DRAFT PERMIT

The Illinois EPA has prepared a draft of the construction permit that it would propose to issue for this project. The conditions of the permit for the plant set forth the air pollution control requirements that the project must meet. These requirements include the applicable emission standards that apply to the project. They also include the measures that must be used and the emission limits that must be met for emissions of different regulated pollutants from the project.

The permit also establishes enforceable limitations on the amount of emissions for which the project is permitted. In addition to limits on annual emissions, the permit includes short-term emission limits and operational limits, as needed to provide practical enforceability of the annual emission limitations. A fuel management plan must also be followed to ensure that the wood and other biomass fuel(s) are clean and free of foreign matter.

The permit also establishes appropriate compliance procedures for the ongoing operation of emission units, including requirements for emission testing, required work practices, emissions monitoring (for NO_x, CO and opacity), recordkeeping, and reporting. These measures are imposed to assure that the operation and emissions of the source are appropriately tracked to confirm compliance with the various limitations and requirements established for individual emission units.

For the wood and other biomass fuel, Jo-Carroll must also implement procedures to ensure that only clean fuel is accepted, that is, the fuel is free of foreign matter and contaminants. It must also keep records listing its sources of biomass fuel and detailed records of fuel that must be rejected.

VII. AIR QUALITY IMPACTS

With its application, Jo Carroll submitted an air quality impact analysis for NO_x, CO, SO_2, and PM. The analysis shows that the proposed plant would not cause exceedance of ambient air quality standards.

VIII. REQUEST FOR COMMENTS

It is the Illinois EPA’s preliminary determination that the draft permit would meet all applicable state and federal air pollution control requirements, subject to the conditions in the draft permit. Comments are requested on this proposed action by the Illinois EPA and the conditions of the draft permit.