Illinois Environmental Protection Agency
Bureau of Air, Permit Section
Springfield, Illinois

Project Summary for the Proposed Issuance of a Revised Construction Permit for Big River Resources for Its Fuel Ethanol Plant in Galva, Illinois

Site Identification No.: 073045AAV
Application No.: 06070047
Date Received: December 14, 2010

Schedule
Public Comment Period Begins: May 11, 2011
Public Comment Period Closes: June 10, 2011

Illinois EPA Contacts
Permit Analyst: Minesh Patel
Community Relations Coordinator: Brad Frost

I. Introduction

Big River Resources (Big River) has applied for a revision to the air pollution control construction permit for its new fuel ethanol plant in Galva. Big River has requested that the permitted production capacity of the plant be increased by 18 percent, to 130 million gallons per year, from the 110 million gallons per year authorized by the original permit. In conjunction with increased production, Big River has also requested increases in the permitted emissions of various pollutants from certain operations at the plant. However, the plant would still be not considered a major new source of emissions for purposes of the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21.

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

II. Background

Big River operates an ethanol plant, which produces ethanol from corn by fermentation, which began operation in May 2009. The construction permit for this plant was originally issued in June 2007. Ethanol can be used as an octane enhancer in gasoline, an oxygenated gasoline additive that can reduce the carbon monoxide emissions from vehicles, or a non petroleum-based gasoline extender. The plant also produces distillers grains as a byproduct. Distillers grain is used as feed for livestock. There are number of distinct operations at the plant. Emissions from these operations are minimized by either add on control equipment or good air pollution control practices.

Receiving and Storage

Corn is received by rail and truck and screened for rocks and cobs before transfer to storage bins. From the storage bins, the corn is ground to a flour or powder using hammermills and sent to enzymatic processing. Particulate matter emissions from these operations are controlled by filter units.

Cooking, Liquefaction and Fermentation

Water is added to the ground corn and heated to produce a slurry. The slurry is pumped to liquefaction tanks where enzymes are added to convert the starch into sugars. The fermentation process involves adding yeast to the corn slurry, or mash, which gradually converts the sugars into alcohol. Organic material emissions from the fermentation units are controlled by a scrubber.

Distillation

The alcohol/solids mixture from the fermentation process is separated in the distillation process. Ethanol exits the top of the final processing column and the water and solids exit the bottom. The ethanol leaving the distillation process contains a small amount of water which is removed in molecular sieves (the dehydration process).

Solids Separation, Evaporation, and Drying

The solids and water from the distillation process are separated using a centrifuge and evaporator to produce a “wet cake” and “syrup.” The wet cake and syrup are combined and conveyed to natural gas-fired dryers to produce dried distillers grain. The dried distillers grain is conveyed to a storage area for cooling and holding pending shipment via rail car or truck. Organic material emissions from drying operation are controlled by oxidizer/boiler systems. These oxidizer/boiler systems also control emissions from certain units from the mash preparation and distillation process. Each oxidizer/boiler system has status both as an emission unit, as it functions to produce steam, and as a control device, as it functions to control emissions of feed dryers and other process units. Particulate matter emissions from feed handling, cooling and loadout operations are controlled by filter units.

Storage

The ethanol from the distillation process is held in storage tanks where a small amount of natural gasoline is added to the ethanol to “denature” the product prior to being transferred to customers. These tanks are equipped with floating roofs to control VOM emissions from the tanks.

Ethanol Loadout

The loading rack transfers ethanol into tank trucks and railcars for shipment. VOM emissions occur from the VOM-laden air displaced from the tank when material is loaded. VOM emissions are controlled by the flare system.

Other Operations

A cooling tower is used with the heat exchangers at the plant that are used to cool certain process streams and to condense any surplus steam returning to the boiler. Emissions from the tower are controlled by a high-efficiency mist eliminator that minimizes loss of water droplets.

Valves, pumps, flanges and other components of the piping involved in fermentation, distillation, and storage and handling of material are a source of organic emissions when they leak. These emissions will be minimized with a Leak Detection and Repair (LDAR) Program, which requires regular inspections of component for leaks and timely repairs of any leaking components.

Roadways

Emissions of fugitive dust are generated by vehicle traffic and wind blown dust on roadways, parking lots and other open areas at the plant. These emissions are minimized by paving of certain roadways and the parking lots for the plant and by an ongoing Fugitive Dust Control Program.

III. Project Description

Big River has requested an increase in the permitted capacity of its new ethanol plant. The increase will not require construction of new process equipment and/or facilities but rather be achieved through enhancements to installed equipment and improved operating procedures for the plant as achieved at other similar plants.

This increase in plant production would be accompanied by increases in amount of corn processed, feed produced, and ethanol shipped and associated increases in permitted emissions of certain units at the plant. The requested increases in emissions from the plant are not proportional to the increase in production. First, emissions from some units need not be increased as emissions from these units were originally permitted at levels that accommodate operation at the higher level of throughput. For example, the grain milling operations are already permitted for levels of emissions consistent with operation at the request level of production.

Second, Big River has requested increase in emissions for loadout of ethanol and bio-methanators would address both increases in permitted capacity and a greater flexibility. In particular, for loadout of ethanol, permitted emissions are based on worst case operating scenario, i.e., amount of ethanol loaded out to trucks is 130 million gallons per year as oppose to 70 million gallons per year originally permitted. For both loadout of ethanol and bio-methanator, associated flares are also permitted based on continuous operation providing greater flexibility.

Third, Big River has requested greater flexibility for the cooling tower. In particular, water circulation rate and total dissolved solids (TDS) content of the water in cooling tower are requested to be permitted at 3,500,000 gallons per year and 5000 ppm, respectively.

Finally, emissions from certain other units would increase proportional to the increase in production. These units include fugitive emissions from grain handling operation, fermentation operation, feed dryers and oxidizer/boiler systems, feed cooler, and storage tanks.

IV. Emissions

A summary of the future permitted or potential emissions of plant is provided below Table 1. These limits are based on the maximum emissions rates predicted by Big River in the application for operation at the requested level of production. Actual annual emissions of the plant would be less than these limits to the extent that the actual performance of the equipment is better than projected and equipments does not operate at capacity.

Table 1: Summary of Permitted Emissions of the Plant (Tons/Year)

Pollutant	Original Limit	Proposed Limit
NO_x	94.44	98.70
CO	97.30	128.55
VOM	98.00	115.76
PM	98.00	133.36*
PM_{10}	79.59	94.88*
SO_2	82.31	92.69
Individual HAP**	9.79	9.80
Total HAPs	20.59	24.50

* Excludes fugitive emissions from roadways and open areas.

** Acetaldehyde is the individual HAP that is emitted in the largest amount and must be effectively controlled to maintain plant status as a minor source for HAPs.

V. Applicable Emission Standards

All emission units in Illinois must comply with applicable emission standards of the State of Illinois (35 IAC Subtitle B, Subchapter c.)

Certain emission units at the plant are also required to comply with applicable federal emission standards adopted by the United States EPA (40 CFR Parts 60 and 63). The oxidizer/boiler systems are subject to the federal New Source Performance Standards (NSPS), 40 CFR 60 Subpart Db. The storage tanks are subject to the NSPS, 40 CFR 60 Subpart Kb. The equipment components (valves, pumps, flanges, etc…) associated with certain fermentation operation, distillation operations, and handling of ethanol and denaturant are subject to the requirements of NSPS, 40 CFR 60 Subpart VVa. The emergency engine is subject to the requirements of the NSPS, 40 CFR 60 Subpart IIII, and NESHAP 40 CFR 63, Subpart ZZZZ, for engines.

Emission units at the plant comply with these applicable state and federal emission standards as demonstrated by the emission testing required as part of the initial operation of the plant after completion of construction.

VI. Applicable Regulatory Programs

Prevention of Significant Deterioration (PSD)

This plant is not considered a new major stationary source under the federal rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21. In particular, ethanol plants are not in one of the 28 listed categories of sources for which the major source threshold is the potential to emit 100 tons per year or more. This is a consequence of changes to the PSD rules by USEPA, in which the ethanol plants are reclassified as not being “chemical process plants”.

With the requested increase in permitted capacity, the permitted emissions of the plant for CO, VOM, and PM would be more than 100 tons per year. However, due to the changes in the PSD rules as discussed above, the plant still would not considered a major PSD source because the potential emissions after the proposed changes, as limited by the revised permit, would be less than the applicable major source thresholds for PSD rules, which is now 250 tons per year. It should be noted that Big River has not requested to remove any control devices because of this change in the PSD rules. However, requested increase in emissions due increase in production is facilitated by this change in the PSD rules.

Section 112(g) of the Clean Air Act

This plant is not considered a new major source for Hazardous Air Pollutants (HAP), so that the plant is not subject to the requirements of Section 112(g) of the Clean Air Act. For this purpose, the increase in the permitted production of plant is not being considered separately from the plant as originally permitted. HAP emissions from the plant with the proposed changes would still be limited to less than 10 tons per year for individual HAP and less than 25 tons per year for aggregate HAPs.

Clean Air Act Permit Program (CAAPP)

With the requested increase in permitted production and emissions, the plant would be classified as a major source under Illinois’ Clean Air Act Permit Program (CAAPP) pursuant to Title V of the Clean Air Act after the proposed changes. This is because the plant would be permitted to emit more than 100 tons per year for several pollutants. Accordingly, would be required to obtain a CAAPP permit for the operation of the plant, rather than a state operating permit.

VII. Draft of Revised Permit

The revised permit for the plant would contain limitations and requirements for the grain handling, fermentation system, distillation system, feed drying/cooling, ethanol storage/loading, and oxidizer/boiler systems to help assure that the plant complies with applicable regulatory requirements. The permit would also identify measures that must be used as good air pollution control practices to minimize emissions.

The revised permit would includes enforceable limits on emissions and operation of emission units to assure that plant remains below the levels at which it would be considered major for PSD or emissions of HAP. In addition to limiting annual emissions, the permit would also include limits on hourly emissions, annual ethanol production, and annual grain receipts. The permit would also establish appropriate compliance procedures for the plant, including requirements for emission testing, monitoring, recordkeeping, and reporting. Following the requested increase in production, the revised permit requires additional emission testing for certain units.

These measures are being imposed to assure that the emissions of the plant continue to be accurately tracked to confirm compliance with both the short-term and annual emission limits established for them.

VIII. Request for Comments

It is the Illinois EPA's preliminary determination that the application for a revised permit meets all applicable state and federal air pollution control requirements. The Illinois EPA is therefore proposing to issue a revised permit.

Comments are requested on this proposed action by the Illinois EPA and the proposed conditions of the draft permit.