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PROJECT SUMMARY  
FOR A CONSTRUCTION PERMIT APPLICATION  
FROM  
ILLINOIS RIVER ENERGY, LLC  
FOR AN EXPANSION OF  
ETHANOL PLANT  
IN ROCHELLE, ILLINOIS

Site Identification No.: 141050ABP  
Application No.: 06060083  
Date Received: June 13, 2006

Schedule

Public Comment Period Begins: March 6, 2007  
Public Comment Period Closes: April 5, 2007

Illinois EPA Contacts

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## **I. INTRODUCTION**

Illinois River Energy, LLC (Illinois River) has submitted an application for expansion of a fuel ethanol plant in Rochelle. The expansion project would increase nominal design capacity by 55 million gallons per year denatured ethanol (total capacity 115 million gallons per year). The construction of the expansion project requires a permit from the Illinois EPA because the expansion project would be a source of emissions.

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

## **II. PROJECT DESCRIPTION**

Illinois River produces ethanol from corn by fermentation. The denatured ethanol produced by the plant is sold and used as motor vehicle fuel. When added to gasoline, ethanol is an octane enhancer and oxygenated fuel additive, which reduces hydrocarbon and carbon monoxide emissions in vehicle exhaust. The plant produces ethanol by batch fermentation of ground corn, followed by processing to separate out and purify the ethanol. The plant also produces animal feed from the Stillage material remaining after the fermentation process. The plant has facilities to receive and ship out products (grain, fuel ethanol, and feed) by both truck and rail. Natural gas is used as the fuel for the plant.

Grains for the expansion project would be received at existing grain elevator, at which corn would be received and stored. To provide additional storage capacity to accommodate the expansion project, a third storage silo would be constructed to increase the total storage capacity to 1.1 million bushels. The first step in the production of ethanol by fermentation is to prepare the corn. Corn would be transferred from the elevator to the ethanol plant. The corn is then milled or ground in new hammermills, mixed with water, and heated, producing fine slurry. Enzymes are then added to convert the starch in the corn into sugar. The resulting mash is then sterilized before sent for fermentation.

In fermentation process, yeast is introduced into the mash to convert sugar in the mash into ethanol. Fermentation would be performed on a batch basis in fermentation tanks. The fermentation tanks would continuously cycle through the fermentation process. At any time, one tank would normally be undergoing the steps between a batch, i.e., transfer of the tank's content to the beer well (where it is temporarily held while awaiting distillation), through cleaning of the interior of the tanks with automated equipment (to prevent buildup of undesired microorganisms), and charging of tank with fresh mash. Fermentation would normally be taking place in the tanks, one tank is just beginning fermentation, one finishing up, and the other tanks at intermediate point in the process. For the expansion project, a new slurry tank, liquifaction tank and four new fermentation tanks would be installed.

The expansion project would be served by existing distillation system at the plant. The distillation system would be used to separate the ethanol from the beer from the fermentation tanks. The ethanol would be further refined to water-free, 200 proof, ethanol using a molecular sieve. The ethanol would be denatured with natural gasoline, stored in floating roof tanks, and shipped to customers by both truck and rail.

The non-ethanol “Stillage” recovered from the distillation system would be further processed to separate and recover water, which would be reused at the plant, and feed material. First the whole stillage would be processed by centrifuges to mechanically recover solids, with solid rich thick stillage then sent to thermal dryers. The water-laden thin stillage from centrifuges would be further processed with evaporators to separate and recover water, leaving behind nutrient-rich thick syrup. The thick syrup would also be dried with the thick stillage in the dryers to produce animal feed, i.e., dried distillers grain with solubles or DDGS.

To provide additional capacity to produce dry feed the expansion project, two new natural gas-fired dryer systems would be installed. With additional dryers the plant would have total capacity to be able to fully dry all feed material produced by the plant. Like existing dryer system, the new dryer system would have two dryers in series followed by a natural gas fired afterburner or oxidizer. In addition to controlling emissions of from feed drying (carbon monoxide, volatile organic material and particulate matter), the oxidizer would also control function as a furnace for a boiler that would supply the steam needed for the expansion project.

### **III. PROJECT EMISSIONS**

The expansion project would use appropriate equipment for effective control of emissions from the various operations at the plant. Fabric filters (new or existing) would be used to control particulate matter emissions from the principle grain handling operations at the elevator and from milling of grain. A new filter would be used to control particulate matter emissions from the handling and load out of the dried feed.

A new scrubber would be installed to control organic material emissions from the mash preparation and fermentation operations associated with expansion. The organic material laden water from this scrubber would be reused at the plant, so that the scrubber would not be a source of wastewater.

Combustion control, with natural gas fired thermal oxidizer, would be used to control emissions of organic material, carbon monoxide and particulate matter from the new feed dryers, which complete the conversion of wet stillage into dry feed. The new oxidizer, as well as the natural gas fired dryers, would be equipped with low-NOx burners to minimize nitrogen oxide emissions.

In addition to stack emissions, the limits on the source’s emission would address organic material emissions from leaking equipment components, such as valves, flanges, pressure relief devices, pump seals, etc., involved with fermentation and the subsequent handling of product ethanol. (These emissions would be minimized with a Leak Detection and Repair Program, with regular inspections of components for leaks and timely repairs of any leaking components.) The limits for particulate matter emissions also address fugitive dust generated by vehicle traffic and

wind blown dust on roadways and parking lots at the source. (These emissions would be minimized by paving of plant roads and a Fugitive Dust Control Program.)

#### **IV. APPLICABLE EMISSION STANDARDS**

All emission units in Illinois must comply with State emission standards adopted by the Illinois Pollution Control Board (35 Illinois Administrative Code, Subtitle B, Chapter I, Subchapter c). These emission standards represent the basic requirements for units in Illinois. The emission units at the proposed ethanol plant should readily comply with applicable state emission standards.

Certain emissions units at the proposed expansion would also be subject to the federal New Source Performance Standards (NSPS), at 40 CFR 60, which the Illinois EPA administers for source in Illinois on behalf of the United States EPA under a delegation agreement. These units include the oxidizer/boiler systems (40 CFR 60, Subpart Db), product ethanol storage tanks (40 CFR 60, Subpart Kb) and component leaks in the distillation area (40 CFR 60, Subpart VV). These units should also readily comply with applicable NSPS standards and requirements.

#### **V. APPLICABLE REGULATORY PROGRAMS**

The expansion project is not considered a major project subject to the federal rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21. This is because the existing source is not a major source of emissions for purposes of PSD based on its potential emissions, as appropriate for a source that has not begun normal operation. The expansion project would not be a major source based on its potential emissions, as appropriate for a proposed project, as limited by the permit.

#### **VI. PROPOSED PERMIT**

The permit that the Illinois EPA is proposing to issue for the expansion project includes a variety of requirements to ensure that the proposed expansion is properly constructed and operated. The permit contains limitations and requirements for the various operations at the plant to help assure that the source complies with applicable regulatory requirements. The permit also identifies measures that must be used as good air pollution control practices to minimize emissions.

The permit includes enforceable limits on emissions and operation to assure that both existing plant and expansion project would not be major projects subject to the PSD rules. In addition to limiting annual emissions of different operations, the permit also includes short-term limits on hourly emissions and requirements for proper operation of control systems. The permit also includes annual and monthly operational limitations on production of ethanol and feed and usage of grain natural gas.

The permit also establishes appropriate compliance procedures for the source, including requirements for emission testing, monitoring, recordkeeping, and reporting. These measures, which would be established by the permit to specifically address the proposed plant, are being imposed to assure that the operation and emissions of the source are accurately tracked to confirm compliance with all applicable requirements.

The performance of the principal control systems would have to be tested after the expansion project is built. Illinois River would have to conduct operational monitoring and recordkeeping to confirm that the expansion project is properly operated and maintained on a continuing basis. These activities would be overseen by the Illinois EPA, which will review the various reports that the plant must submit and periodically conduct on-site inspections of the plant.

## **VII. REQUEST FOR COMMENTS**

It is the Illinois EPA's preliminary determination that the proposed expansion project meets all applicable state and federal air pollution control requirements. The Illinois EPA is therefore proposing to issue this permit.

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