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PROJECT SUMMARY
FOR A CONSTRUCTION PERMIT APPLICATION
FROM
INVENERGY NELSON, LLC
FOR AN
ETHANOL PLANT
NEAR ROCK FALLS, ILLINOIS

Site Identification No.: 103814AAD
Application No.: 06120013
Date Received: December 7, 2006

Schedule

Public Comment Period Begins: September 5, 2007
Public Comment Period Closes: October 5, 2007

Illinois EPA Contacts

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I. INTRODUCTION

Invenergy Nelson, LLC (Invenergy Nelson) has submitted an application to construct a fuel ethanol plant at Invenergy's property near Rock Falls. The construction of the proposed plant requires a permit from the Illinois EPA because the plant would be a source of emissions.

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

II. PROJECT DESCRIPTION

Invenergy Nelson has proposed to construct a plant to produce ethanol from corn. The plant would be designed to have nominal capacity of 124 million gallons of denatured ethanol per year. The denatured ethanol produced by the plant would be mixed with gasoline for use as motor vehicle fuel. The plant would produce ethanol by batch fermentation of ground corn, followed by processing to separate out and purify the ethanol. The plant would also produce animal feed from the Stillage material remaining after the fermentation process. The plant would have facilities to receive and ship out products (grain, fuel ethanol, and feed) by both truck and rail. Natural gas would be used as the fuel in the various combustion units at the plant.

The plant would be located on Invenergy's property east of Rock Falls next to Interstate 80. LSP Nelson Energy began construction of a natural gas fired power plant at this property that Invenergy is working to complete.

The proposed ethanol plant would have a grain elevator, at which corn would be received and stored. 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 first milled or ground, 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 the 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), thorough cleaning of the interior of the tanks with automated equipment (to prevent buildup of undesired microorganisms), and charging of the tank with fresh mash. Fermentation would normally be taking place in the other tanks, one tank just beginning fermentation, one finishing up, and the other tank at an intermediate point in the process.

A 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 the feed 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.

The proposed plant would have two feed dryer systems with a total capacity to be able to dry all the feed material produced by the plant. These dryer systems would have the capacity to convert all wet cake produced at the plant into dry feed. The dry feed produced by the dryer systems would then be conveyed to feed cooler for cooling the feed prior to conveying to feed storage area for shipping to the customers. The exhausts from the dryer systems are routed through the cyclone to minimize PM emissions prior to venting to the one of the two oxidizers, which will control emissions (organic material, carbon dioxide, and particulate matter) in the exhaust from the dryers. These oxidizers would also control emissions (organic material) in the exhaust from the emission units in fermentation area and the ethanol loadout operations.

The proposed plant would have four natural gas fired boilers that would generate the steam to supply the heat for the ethanol manufacturing process. Each boiler would have nominal capacity of 92 mmBtu/hr and equipped with low-NO_x burners. These boilers would have the capacity to generate all the steam required to operate the ethanol plant without the need to rely on any steam from the power plant that Invenergy is also working to complete at this property.

III. PROJECT EMISSIONS

The proposed fuel ethanol plant would use appropriate equipment for effective control of emissions from the various operations at the plant. Fabric filters would be used to control particulate matter emissions from the principle grain handling operations at the elevator and from milling of grain. A filter would be used to control particulate matter emissions from the handling and load out of the dried feed.

A scrubber (distillation scrubber) would be used to control organic material emissions from the emission units in mash preparation area and distillation area. 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.

The exhausts from the dryer systems are routed through the cyclone to minimize PM emissions prior to venting to the one of the two oxidizers, which would control emissions (organic material, carbon dioxide, and particulate matter) in the exhaust from the dryers. These oxidizers would also control organic material emissions in the exhaust from the emission units in fermentation area and the ethanol loadout operations.

Due to this emission control equipment and other equipment and control measures that would be

used at the plant, Invenenergy Nelson has proposed to control emissions of the plant so that it would not be a major source for purposes of the Clean Air Act Permit Program (CAAPP). Annual emissions from the plant would be limited to no more than 98 tons of each criteria pollutant (particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), etc.), 9.52 tons of any single hazardous air pollutant¹ and 17.75 tons of total hazardous air pollutants.² These limits are based on data for the maximum emissions of the proposed plant and represent its permitted emissions. Actual 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 the plant does not operate at its capacity.

In addition to stack emissions, the limits on the plant'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 plant 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 boiler systems (40 CFR 60, Subpart Dc), product ethanol storage tanks (40 CFR 60, Subpart Kb), engines (40 CFR 60, Subpart IIII), 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

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. This is because the potential emissions from the proposed plant, as limited by the permit, would be less than the applicable major source thresholds under these rules. For this purpose, the proposed ethanol plant is being

¹ While most of the organic material emissions of the proposed plant would be ethanol, the plant would also have emissions of organic compounds, such as acetaldehyde, formaldehyde and methanol, which are listed as hazardous air pollutants by Section 112(b) of the federal Clean Air Act.

² The draft permit would limit emissions from the plant to less than the thresholds for a major source under the Clean Air Act Permit Program (CAAPP), e.g., annual emissions of 100 tons or more of an individual criteria pollutant, with a margin of compliance to assure that the actual emissions of this plant are both enforceably and practically constrained to levels below those at which it would be a major source required to have a CAAPP permit.

considered by itself, separate from the power plant that Invenergy is also working to develop at this site.³ The proposed ethanol plant and the proposed power plant would not be considered a single source under the three criteria that define a single source under the PSD rules. While the ethanol plant and power plant would share a single piece of property and be under common operational control or ownership, they would not meet the final criterion to be considered a single source, common industrial grouping as categorized by the *Standard Industrial Classification Manual*. The power plant would be classified under Standard Industrial Classification Code 49, as an electric power plant, while the ethanol plant would be classified as a grain processing process (SIC 20) or a chemical plant (SIC 28). There would not be a support facility relationship between the plants that would supersede this classification. This is because the ethanol plant would be constructed to operate on its own, without steam or electricity needing to be supplied by the adjacent power plant.

Independent design of the proposed ethanol plant is needed as a practical matter because natural gas combined cycle power plants, like the proposed power plant, do not operate continuously. For example, the generating unit at a similar, existing power plant in Illinois that operated for the greatest amount of time in 2006 only operated 21 percent of the time. In addition, the natural gas usage and electrical output of the power plant, even if only one turbine generating unit were running (roughly 2.5 million scf of natural gas per hour and approximately 250 MW of electricity) far exceed the fuel usage and energy needs of the ethanol plant. Accordingly, the power plant would supply much less than 50 percent of its output to the ethanol plant. The ethanol plant would also receive much less than 50 percent of its energy input from the power plant. Finally, the operating schedule of the power plant would be determined by the market for electrical power, independent of the energy needs of the ethanol plant, which the ethanol plant will be able to meet on its own.

VI. CONTENTS OF DRAFT PERMIT

The construction permit that the Illinois EPA is proposing to issue for the proposed plant includes a variety of requirements to ensure that the plant is properly constructed and operated. The permit contains limitations and requirements for the various operations at the plant to help assure that the plant 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 this project would not be a major project 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

³ The construction of the natural gas fired power plant was begun by LSP Nelson Energy pursuant to Construction Permit 98080039, issued in January 2000. Construction of the power plant was about halfway completed when LSP Nelson Energy went bankrupt, interrupting further construction on the plant. Invenergy purchased the project and is working to complete development of a power plant that would be half the size of the original plant proposed by LSP Nelson (two turbines instead of four turbines). Because of the duration of the interruption in construction activity for the power plant, the construction permit for the project must be reissued for Invenergy to proceed with further construction on the power plant. Invenergy has submitted a separate application to the Illinois EPA for reissuance of the construction permit for the power plant project, which is still being reviewed by the Illinois EPA.

monthly operational limitations on production of ethanol and feed and usage of grain and 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 plant is built. The Invenegy Nelson would have to conduct operational monitoring and recordkeeping to confirm that the plant 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 application for the proposed 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.