Illinois Environmental Protection Agency
Bureau of Air, Permit Section

Project Summary for a Construction Permit Application from Aventine Renewable Energy for Two Natural Gas-Fired Boilers at its Corn Milling and Ethanol Plant in Pekin, Illinois

Site Identification No.: 179060ACR
Application No.: 13090044
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Public Comment Period Begins: November 11, 2013
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Illinois EPA Contacts:

Permit Analyst: Manish Patel
Community Relations Coordinator: Brad Frost

I. INTRODUCTION

Aventine Renewable Energy Inc. (Aventine) has submitted a construction permit application for two natural gas-fired boilers at its manufacturing plant in Pekin. The new boilers will supply steam to existing operations at the plant and for heating.

As part of this project, the three existing coal-fired boilers at the plant would be permanently shutdown. Because of the decreases in emissions that would result from shutting down these existing boilers, the project would not be accompanied by significant net increases in emissions of pollutants that are addressed by the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21, and the new boilers would not be subject to permitting under the PSD rules.

The Illinois Environmental Protection Agency (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 project. Before issuing a permit, the Illinois EPA is holding a public comment period to receive comments on the proposed issuance of the permit and on the proposed terms and conditions of the draft permit.

II. PROJECT DESCRIPTION

Aventine operates a plant in Pekin that manufactures ethanol, animal feed and other products from corn. Aventine is proposing to install two new natural gas fired boilers at the plant, each with a nominal capacity of 370 million Btu per hour (mmBtu/hr).

The principal air pollutants emitted from the new boilers will be nitrogen oxides (NOx), carbon monoxide (CO) and greenhouse gases (GHG). NOx is a byproduct of combustion of natural gas that is formed from nitrogen in the atmosphere. CO is a product of incomplete combustion of fuel. The GHG will be mainly carbon dioxide (CO_2), which is formed by combustion of a fuel that contains carbon. The emissions of NOx and CO in the boilers will be minimized by the design of the burners in the boilers and by use of good combustion practices. GHG emissions will be minimized by the overall design of the boilers as related to their fuel efficiency. The new boilers will also emit particulate, volatile organic material (VOM) and sulfur dioxide (SO_2). The emissions of these pollutants will be minimized as the new boilers will fire natural gas and good combustion practices will be used.

The new boilers will replace three coal-fired boilers, Boilers A, B and C, that currently supply steam for various processes at the plant and for heating. Due to the permanent shutdown of these three existing boilers, this project will be accompanied by substantial decreases in the emissions of various pollutants from the plant, as further described in Attachment 1.

III. PROJECT EMISSIONS

The potential emissions of the new boilers, as would be allowed by the draft construction permit, are summarized below. The potential emissions of the boilers are generally calculated based on continuous operation of the boilers at their maximum design operating rate. The actual emissions of the new boilers will be lower than their potential emissions to the extent that these boilers do not operate at their capacity and they operate with a reasonable margin of compliance with applicable emission standards and permit limits.

Potential Emissions of the New Boilers	
Pollutant	Potential Emissions (Tons Per Year)
Nitrogen Oxides (NO_x)	129.7
Carbon Monoxide (CO)	267.2
Particulate Matter (PM)[1]	8.5
Particulate Matter$_{10}$ (PM_{10})	24.5
Particulate Matter$_{2.5}$ ($PM_{2.5}$)	24.5
Volatile Organic Material (VOM)	17.5
Sulfur Dioxide (SO_2)	2.2
Greenhouse Gases (GHG), as CO_2e[2]	379,232

IV. APPLICABLE EMISSION STANDARDS

All emission units in Illinois must comply with Illinois' state emission standards, which are adopted by Illinois' Pollution Control Board. For sources located in Illinois, the state's emission standards represent the basic requirements for control of emissions. The state rules that would apply to the proposed new boilers would address their emissions of CO and the opacity of emissions. As described in the application, the proposed new boilers should readily comply with applicable state emission standards.

The new boilers would also be subject to federal New Source Performance Standards (NSPS) for Industrial-Commercial and Institutional Steam Generating Units, 40 CFR Part 60 Subpart Db. For boilers fired only on natural gas, this NSPS sets standards for emissions of NOx. The new

[1] USEPA regulates particulate emissions in different ways under the Clean Air Act. Particulate matter (PM) consists of all filterable particulate. Filterable particulate is present in the exhaust stream of an emission unit as a solid or liquid that can be removed with filtration. Particulate matter$_{10}$ (PM_{10}) and particulate matter$_{2.5}$ ($PM_{2.5}$) consist of smaller particles, i.e., particles with aerodynamic diameters equal to or less than 10 and 2.5 microns, respectively. As well as filterable particulate PM_{10} and $PM_{2.5}$ also includes condensable particulate, which forms due to condensation of gaseous material in the exhaust stream of an emission unit when it enters the atmosphere.

[2] CO_2e or carbon dioxide equivalents are the means used by USEPA to address the combined emissions of the compounds that are regulated under the Clean Air Act as greenhouse gases (GHG). Values for the global warming potential (GWP) of GHG compounds other than CO_2 have been developed to account for the effect that these compounds have on global warming compared to CO_2. For a GHG compound other than CO_2, the mass of emissions of the compound must be multiplied by its GWP to calculate its equivalent mass as CO_2, expressed as CO_2e. The emissions of CO_2 and other GHG compounds in terms of CO_2e are then summed to provide a single value for GHG emissions as CO_2e.

boilers should readily comply with the applicable standard.

The new boilers would also be subject to federal National Emission Standards for Hazardous Air Pollutants (NESHAP) for Industrial-Commercial-Institutional Steam Generating Units, 40 CFR 63 Subpart DDDDD. For boilers fired on natural gas, this NESHAP sets work practice requirements that are designed to reduce emissions of organic hazardous air pollutants. These requirements will be able to be readily implemented for the new boilers.

V. APLLICABILITY OF NEW SOURCE REVIEW

This project will not constitute a major project for purposes of either of the two "New Source Review" (NSR) permitting programs under the federal Clean Air Act, i.e., the federal rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21,[3] and Illinois' rules for Major Stationary Sources Construction and Modification (MSSCAM), 35 IAC Part 203.[4]

The project is not a major project subject to PSD because the increases or net increases in emissions of pollutants subject to regulation under the PSD rules from the project will not be significant. In this regard, although the potential emissions of the new boilers of certain pollutants addressed by the PSD rules, i.e., NOx, CO, PM_{10}, $PM_{2.5}$ and GHG, are significant, the net increases in emissions of these pollutants from the plant with this project will not be significant. This is because of the contemporaneous emissions decreases from the permanent shutdown of the three coal-fired boilers currently operating at the plant. For the purpose of evaluating the net changes in emissions of these pollutants, consistent with 40 CFR 52.21(b)(3)(i) and (b)(48)(ii), Aventine determined the emission decreases from the shutdown of the existing boilers as their average actual annual emissions in a 24-month period during the previous ten years. The selected 24-month period, January 2004 through December 2005, generally provided the highest level of utilization and emissions of the boilers from any two calendar year period in the ten-year look-back period. The existing boilers operate in compliance with applicable emission standards so that the actual emissions of the boilers did not have to be reduced to account for noncompliance. As required by the PSD rules, the netting analyses for the current project also addresses increases in emissions from other projects that would be contemporaneous with the current project. In this regard, Aventine recently submitted an application for two other projects that would be contemporaneous with the construction of the new gas-fired boilers.

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[3] The PSD rules were developed to address the potential air quality impacts from a major project. Only major projects are subject to the substantive requirements of the PSD rules, such as the applicability of Best Available Control Technology (BACT) for the emissions of the subject pollutant(s) from the new and modified emissions units that are part of the proposed project.

[4] The MSSCAM rules were developed to address the potential effects that a major project in a nonattainment area may have on efforts to bring the area into attainment. Only major projects are subject to the substantive requirements of the MSSCAM rules, such as applicability of the Lowest Achievable Emission Rate (LAER) for the emissions of the subject pollutant(s) from the new and modified emissions units that are part of the proposed project.

The net decreases in emissions of NOx, CO, PM_{10}, $PM_{2.5}$ and GHG that are expected with this project are described in Attachment 1. For most of these pollutants for which "netting" is being conducted, there will be a substantial net decrease in the emissions of the plant with the proposed project. This is what one would reasonably expect since the new boilers will fire natural gas and the total capacity of the new boilers (740 mmBtu/hr) will be less than the total capacity of the existing coal-fired boilers (817 mmBtu/hr).[5]

For emissions of all other pollutants regulated by the PSD rules, the potential emissions of the boilers are not significant. The permitting of this project does not need to consider the decreases in emissions of these pollutants from the permanent shutdown of the coal-fired boilers. In particular, the potential PM emissions of the boilers, 8.5 tons/yr, are less than 25 tons/yr so the project's PM emissions are not significant. The potential VOM emissions of the new boilers, 17.5 tons/yr, are less than 40 tons/yr. Accordingly, the project is not subject to PSD for either PM or VOM.

Applicability of MSSCAM is relevant for the proposed project because Pekin is in an area that has been designated nonattainment for SO_2 air quality.[6] The proposed project is not a major project and is not subject to the substantive requirements of MSSCAM for SO_2 because the potential SO_2 emissions of the new boilers are not significant. The boilers' potential SO_2 emissions, 1.9 tons/year, are far less than the significant emission rate for SO_2, 40 tons/year.[7] In addition, the project will result in a very substantial reduction in the SO_2 emissions of the plant considering the decreases in emissions from the permanent shutdown of the three existing coal-fired boilers at the plant.[8]

In summary, for the proposed project, the increases or net increases in emissions of different pollutants regulated by PSD and MSSCAM are below the applicable significant emission thresholds. Accordingly, the project is not considered a major project for any pollutant regulated by PSD or MSSCAM. As a consequence, the substantive requirements of these rules do not apply to the project for any pollutant.

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[5] The rated heat input capacities of existing Boilers A, B and C are 242, 242 and 333 mmBtu/hr, respectively.

[6] On October 4, 2013, USEPA designated the "Pekin Area," consisting of Cincinnati and Pekin Townships in Tazewell County and Hollis Township in Peoria County, as nonattainment for the 2010 SO_2 National Ambient Air Quality Standard (NAAQS). (See 40 CFR 81.314.)

The 2010 SO_2 NAAQS addresses the one-hour concentration of SO_2 in the ambient air and is set at 75 parts per billion (ppb), daily maximum. This NAAQS is met if the three-year average of the annual (99th percentile) of the daily maximum one-hour average concentrations is less than or equal to 75 ppb. (See 40 CFR 50.17.)

[7] The significant emission rate for SO_2 in both the MSSCAM and PSD rules is 40 tons/year. Accordingly, the SO_2 emissions of this project also would not be significant under the PSD rules.

[8] Aventine's three existing coal-fired boilers significantly contribute to the current nonattainment status of the Pekin Area for SO_2. The permanent shut down of these boilers in conjunction with this project will provide substantial benefits for SO_2 air quality in the Pekin area. It will be critical for bringing the Pekin Area into attainment for SO_2 air quality.

VI. DRAFT PERMIT

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

The permit also establishes enforceable limits on the amount of emissions for which the boilers are permitted. Limits are established for the emissions of pollutants from this project to ensure that the project is not subject to PSD or MSSCAM. In addition, to limiting annual emissions, the permit includes short-term emission limits and operational limits, as needed to provide practical enforceability of the annual emission limits.

The permit also establishes appropriate compliance procedures to accompany the emission limits, including requirements for emission testing, required work practices, emissions monitoring, operational monitoring, 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 limits and requirements established for individual emission units.

The draft permit would also require that the existing coal-fired boilers be permanently shutdown after the new gas-fired boilers begin routine operation. During the transition period from the coal-fired boilers to the new boilers, when both new and old boilers are in service, there should not be any net increases in emissions. During this period, the plant will not need and would not be able to utilize more steam than normally needed for the operation of the plant as supplied by the existing boilers. Thus steam produced by the new boilers, with their lower emission rates, would displace or take the place of steam produced by the existing boilers with their higher emission rates.[9] However, the draft permit would require Aventine to keep records to confirm that the operation of the new and existing boilers during the transition period is such that net increases in emissions do not occur during this period.

[9] For pollutants for which netting is being conducted, the actual emissions of the existing coal-fired boilers that will be replaced and the potential emissions of the new gas-fired boilers reflect the following emission rates:

Pollutant	Emission Rates (lb/mmBtu, fuel heat input)	
	Existing Boilers	New Boilers
NOx	0.2918	0.040
CO	0.1926	0.0824
$PM_{10}/PM_{2.5}$	0.1239/0.0515	0.0075
GHG, as CO_2e	210.0	116.7

VII. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the application for an air pollution control construction permit for the proposed boilers meets all applicable state and federal requirements, subject to the conditions in the draft permit. The Illinois EPA is therefore preparing to issue a construction permit for this project. Comments are requested on this proposed action by the Illinois EPA and the conditions of the draft permit.

Attachment 1: Net Changes in Emissions with the Project (tons/year)[1]

Pollutant	Potential Emissions of New Boilers	Contemporaneous Changes in Emissions		Net Change	Significant Emission Rate
		Decreases[2]	Increases[3]		
Pollutants with Netting					
NO_x	129.7	891.2	12.1	- 749.4	40
CO	267.2	328.5	16.7	- 44.6	100
PM_{10}	24.5	235.8	24.0	- 187.3	15
$PM_{2.5}$	24.5	108.8	16.0	- 68.3	10
GHG, as CO_2e	379,232	595,594	17,340	- 199,022	75,000

Notes:

1. This table only addresses the changes in emissions of pollutants for which the permitting of the new gas-fired boilers would rely on netting. This project would be accompanied by decreases in emissions of other pollutants from the coal-fired boilers. In particular, there would be a reduction of over 13,000 tons/year in the plant's SO_2 emissions, comparing the baseline SO_2 emissions of existing coal-fired boilers that would be permanently shutdown, 13,154 tons/year, and the potential SO_2 emissions of the new boilers, 2.2 tons/year.
2. The emissions decreases are the "baseline" actual emissions of the existing coal-fired boilers as determined in accordance with 40 CFR 52.21(b)(48).
3. The emissions increases account for the increases in emissions from the two contemporaneous projects. They reflect evaluations of the greatest emissions for which these projects, for which Aventine only recently submitted an application, would be permitted. In this regard, the permitted increases in emissions from the proposed enhancements to the grain handling operations at the plant should be at most 80 percent of the significant emission rates for PM_{10} and $PM_{2.5}$. For the proposed enhancements to the yeast process, the permitted increases in emissions of PM_{10} and $PM_{2.5}$ should also be at most 80 percent of the significant emission rates. The increases in emissions of NOx and CO would be no more than the current permitted NOx and CO emissions of the yeast process since Aventine is not requesting any increase in their permitted emissions. The increase in GHG emissions would not exceed the potential GHG emissions of the yeast process since Aventine is not requesting an increase in the capacity of the burner in the natural gas-fired spray dryer in this process.

Project	Project Emissions(tons/year)				
	NOx	CO	PM_{10}	$PM_{2.5}$	GHG, as CO_2e
Proposed Enhancements to Grain Handling	-	-	12.0	8.0	-
Proposed Enhancements to the Yeast Process	12.1	16.7	12.0	8.0	17,340
Total	12.1	16.7	24.0	16.0	17,340