ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF AIR, PERMIT SECTION
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PROJECT SUMMARY
FOR A CONSTRUCTION PERMIT APPLICATION
FROM
AMEREN UE
FOR A
COMBUSTION TURBINE UNIT, VENICE POWER PLANT
VENICE, ILLINOIS

Site Identification No.: 119105AAA
Application No.: 01080020
Date Received: August 9, 2001

Schedule
Public Comment Period Begins: September 12, 2001
Public Comment Period Closes: October 12, 2001

Illinois EPA Contacts
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I. INTRODUCTION

Ameren UE (Ameren) has proposed to construct a new combustion turbine unit at its existing power plant at 701 Main Street in Venice, Madison County. The project proposes to use one simple cycle combustion turbine unit with two combustion turbines to generate up to 60 MW of electricity. The unit would be operated to help meet peak power demand. The construction of the proposed project requires a permit from the Illinois EPA because of its associated air emissions.

II. PROJECT DESCRIPTION

The proposed project will include one Pratt-Whitney Twin Pac turbine unit consisting of two combustion turbines connected to one double-ended electric generator. The turbine unit will be fired with natural gas as the primary fuel and fuel oil as a back-up fuel. The turbine unit would be used in a simple cycle configuration, with all electricity produced by a generator connected to the shaft of the turbines. A gas turbine is a rotary internal combustion engine with three major parts: an air compressor, burner(s), and a power turbine. In the air compressor, a series of bladed rotors compresses the incoming air from the atmosphere. A portion of this compressed air is then diverted through the combustors or burners, where fuel is burned, raising the temperature of the compressed air. This very hot gas is mixed with the rest of the compressed air and passes through the power turbine. In the power turbine, the force of the hot compressed gas as it expands pushes another series of blades, rotating a shaft. Much of the mechanical energy produced by the power turbine is consumed to drive the air compressor. The remainder is available to perform useful work and in the case of a gas turbine power plant, the power turbine turns an electric generator and makes electricity.

Emissions of carbon monoxide (CO), nitrogen oxide (NO_X), particulate matter/particulate matter <10 microns (PM/PM_{10}), sulfur dioxide (SO_2) and volatile organic material (VOM) would result from the combustion of fuel in the turbine unit.

The principal air contaminants emitted from the proposed turbine unit would be NO_X and CO. NO_X can be formed thermally by combination of oxygen and nitrogen in the air at the temperatures at which fuel is burned. Thermal NO_X is formed during the operation of all common high temperature combustion processes including turbines. NO_X can also be formed from the combination of any nitrogen in the fuel with oxygen. This is not relevant for burning of natural gas, which contains minimal amounts of nitrogen. Factors affecting NO_X formation from a turbine include design, ambient conditions, turbine load, and fuel types. The NO_X emissions from the proposed turbine unit will be controlled with water injection. Water injection controls (lowers) the combustion temperature of the fuel to lower the NO_X emissions.

CO is formed by the incomplete combustion of fuel. CO is associated with most combustion processes and is found in measurable amounts in turbine exhaust. VOM and PM/PM_{10} are also emitted as a result of incomplete combustion of fuel. SO_2 is found only in trace amounts from combustion of natural gas.

CO and VOM emissions are controlled by providing adequate fuel residence time and high temperature in combustion zone to ensure complete combustion. PM/PM_{10} are controlled by proper combustion control and firing natural gas fuel, which has negligible ash content.

III. PROJECT EMISSIONS

The annual emissions from the turbine unit would be limited to 39 tons of NO_X, 80 tons of CO, 20 tons of VOM, 12 tons of PM/PM_{10}, and 32 tons of SO_2. These limits are based on maximum hourly emission rate as specified by the manufacturer of the turbine and the potential utilization of the facility as specified by Ameren. (For this purpose, NO_X is the pollutant that effectively limits operation of the unit.) Actual annual emissions of the facility would be less than these limits to the extent that the actual performance of the turbine unit is better than projected and the turbine is not utilized as much.

Emissions from startup of the turbine unit would be considered when determining compliance with annual emission limits. In particular during startup of the turbine unit, it is expected that CO and VOM emissions will be higher than during normal operation.

IV. APPLICABLE EMISSION STANDARDS

All emission sources in Illinois must comply with the Illinois Pollution Control Board's emission standards. The Board's emission standards represent the basic requirements for sources in Illinois. The proposed project will readily comply with applicable state emission standards (35 Ill. Adm. Code: Subtitle B).

The turbine is also subject to the federal New Source Performance Standards (NSPS), 40 CFR 60 Subpart GG, for Stationary Gas Turbines. The Illinois EPA is administering NSPS in Illinois on behalf of the United States EPA under a delegation agreement. These standard addresses NO_X emission from gas turbine unit limiting NO_X emissions to 75 ppm, adjusted for actual turbine efficiency. The project should readily comply with this standard. The application indicates NO_X emissions typically would be no more than 25 ppm while firing on natural gas, and 42 ppm while firing on fuel oil.

V. APPLICABLE REGULATORY PROGRAMS

This facility is not considered a major project under the federal rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21, or the state rules for Major Stationary Source Construction And Modification (MSSCAM) 35 IAC Part 203. This is because the potential emissions from the proposed facility, as limited by the permit, would be less than the significant major source thresholds for PSD. With respect to MSSCAM, VOM and NO_X emissions are limited to less than the significant emission thresholds. In particular, emissions of NO_X are limited to less than 40 tons/year.

The turbine would qualify as Electrical Generating Units (EGU) for purposes of Part 217, Subpart W. As EGU, when this program becomes effective, Ameren would have to hold NO_X allowances for the NO_X emissions of the turbine unit during each seasonal control period.

VI. AIR QUALITY IMPACTS

With its application, Ameren submitted an air quality impact analysis for NO_X, CO, SO_2, and PM including its existing plant's turbine unit. The analysis shows that the proposed facility would not significantly affect ambient air quality in the vicinity of the facility.

VII. PROPOSED PERMIT

The conditions of the draft permit for the facility contain limitations and requirements for the turbine unit to help assure that the facility complies with applicable regulatory requirements. The draft permit also identifies measures that must be used as good air pollution control practices to minimize emissions from the turbine unit.

The draft permit includes enforceable limits on emissions and operation for the turbine unit to assure that facility remains below the levels at which it would be considered major for PSD or MSSCAM (i.e. 40 tons/year for NO_X). In addition to limiting annual emissions, the permit also includes limits on hourly emissions, limitations on the amount of fuel that can be used in the turbine unit and their annual hours of operation.

The permit also establishes appropriate compliance procedures for the facility, including requirements for emission testing, monitoring, recordkeeping, and reporting. Continuous monitoring of NO_X emissions is required for the turbine unit to confirm actual levels of operation. Emission testing is required as part of the initial shakedown and operation of the turbine unit after completion of construction. Testing must be conducted at the peak, intermediate, and low points in the normal operating range of the turbine unit to account for the expected variation in emissions based on turbine load.

These measures are being imposed to assure that the emissions of the turbine unit are accurately tracked to confirm compliance with both the short-term and annual emission limits established for them, considering the variation in emissions based on turbine load and ambient temperature.

VIII. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the proposed permit 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.