ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF AIR, PERMIT SECTION
1021 N. GRAND AVENUE EAST
P.O. BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276
217/782-2113

PROJECT SUMMARY
FOR A CONSTRUCTION PERMIT APPLICATION
FROM
AMEREN ENERGY GENERATING CO.
FOR A
PEAKING POWER PLANT, PINCKNEYVILLE POWER PLANT
PINCKNEYVILLE, ILLINOIS

Site Identification No.: 145842AAA
Application No.: 00090076
Date Received: September 28, 2000

Schedule
Public Comment Period Begins: January 06, 2001
Public Comment Period Closes: February 06, 2001

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

I. INTRODUCTION

Ameren Energy Generating Co. (Ameren Energy) has proposed to construct additional equipment at its existing electrical generation facility in Pinckneyville, Perry County. The project would add four simple cycle gas turbines to generate up to 192 MW of electricity to the four turbines already at the source. The construction of the proposed equipment requires a permit from the Illinois EPA because of its associated air emissions.

II. PROJECT DESCRIPTION

The proposed project will include four natural gas fired turbines, two natural gas fired indirect heaters, four reciprocating engines (starting motors) and other ancillary equipment. The additional equipment will be located immediately to the north of the existing facility.

The turbines would be used in a simple cycle configuration, with all power produced by a generator connected to the shaft of the turbine. This facility is designed to function as a peaking station, to generate electricity in the peak demand periods, and at other times when other power plants are not available due to scheduled or unexpected outages. Operation of the facility may occur throughout the year, although the facility is expected to run primarily in the summer months.

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 turbines.

The principal air contaminants emitted from the proposed turbines 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 turbines will be controlled with dry low NO_X combustors. Low NO_X combustors lower NO_X formation by controlling flame turbulence and staging the mixing of fuel and combustion air.

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 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 new four turbines would be limited to 230 tons of NO_X, 178 tons of CO, 53 tons of VOM, 38 tons of PM/PM_{10}, and 8 tons of SO_2. These limits are based on the maximum emissions requested by Ameren Energy. These limits are consistent with the maximum hourly emission rates achieved by the turbines as specified by the manufacturer of the turbines and the potential utilization of the facility as specified by Ameren Energy. Actual annual emissions of the facility would be less than these

limits to the extent that the actual performance of the turbines is better than projected and the turbines are not utilized as much.

Emissions from startup of the turbines would be considered when determining compliance with annual emission limits. During startup of the turbines, it is expected that emissions of NO_X, CO and VOM will be higher than during normal operation. This is because the turbine combustors are not as efficient when fuel is first ignited and cannot immediately operate in low-NO_X mode. This is a short-term phenomenon as the proposed turbines are typically able to be turned on and begin to produce power at normal rated capacity in less than 15 minutes. In this regard, the higher levels of emissions during startup are as much a reflection of the low levels of emissions achieved during normal operation of the turbines, as they are an indication of high emissions during startup.

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 turbines are 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 turbines limiting NO_X emissions to 75 ppm, adjusted for actual turbine efficiency. The project should readily comply with the applicable requirements of these standards. The application indicates NO_X emissions of 15 ppm on an hourly average when operated at normal rated capacity.

V. APPLICABLE REGULATORY PROGRAMS

This project is not considered a major project 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 expansion, as limited by the permit, would be less than the major source thresholds for PSD, i.e., nitrogen oxides, sulfur dioxide, carbon monoxide, volatile organic material, and particulate matter are limited to less than 250 tons/year.

The proposed project would be physically and operationally separate from the existing facility. The project involves General Electric Model 6B turbines, which are industrial or frame turbines, rather than General Electric LM6000 turbines as originally installed, which are aero-derivative turbines. The project will have its own control systems, natural gas regulator station, indirect heaters, transformers, and separate transmission line connection to the electric grid. For this purpose, this expansion is considered a separate project from the original development of the plant. The project only became possible when Ameren was able to acquire four Model 6B turbines from General Electric.

This facility would be considered a major source under Illinois Clean Air Act Permit Program (CAAPP) pursuant to Title V of the Clean Air Act. This is because the facility's potential emissions would be greater than 100 tons/year, which is the relevant applicability threshold under the CAAPP. Accordingly, Ameren Energy would have to obtain a CAAPP operating permit for the facility after shakedown and testing of the turbines is complete. Ameren Energy would also have to permit the facility as an affected source under the federal acid rain program because each turbine generates more than 25 MWe of electricity.

VI. AIR QUALITY IMPACTS

With its application, Ameren Energy submitted an air quality impact analysis for NO_X, CO, SO_2, and PM_{10}. The analysis shows that the proposed expansion would not significantly affect ambient air quality in the vicinity of the plant. This is consistent with the Illinois EPA's experience with other new natural gas fired simple cycle power plants.

VII. PROPOSED PERMIT

The conditions of the draft permit for the expansion contain limitations and requirements for the turbines to help assure that it 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 turbines.

The draft permit includes enforceable limits on emissions and operation for the turbines, indirect heaters, and reciprocating engines to assure that facility remains below the levels at which it would be considered major for PSD (i.e. 250 tons/year for NO_X, CO, PM, SO_2 and VOM). In addition to limiting annual emissions, the permit also includes limits on hourly emissions and limitations on the amount of fuel and/or operating hours for the turbines, indirect heaters, and reciprocating engines.

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

These measures are being imposed to assure that the emissions of the turbines 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.