ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF AIR, PERMIT SECTION
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PROJECT SUMMARY
FOR A CONSTRUCTION PERMIT APPLICATION
FROM
UNIVERSITY OF ILLINOIS
FOR A
COMBINED CYCLE TURBINES
URBANA, ILLINOIS

Site Identification No.: 019010ADA
Application No.: 01010053
Date Received: August 5, 2003

Schedule
Public Comment Period Begins: 09/22/2003
Public Comment Period Closes: 10/22/2003

Illinois EPA Contacts
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I. INTRODUCTION

University of Illinois (University) has proposed to revise its construction permit of an electric/steam generation facility in Urbana, Champaign County. As previously permitted the University would use two turbines each equipped with duct burner and CO catalyst to generate electricity and steam for the University. Existing construction permit also allowed the University to install low nox burners for the existing boilers (boiler 2, 3, and 4). The proposed revision will allow the University to install low nox burners on two of the existing boilers (boilers 2 and 3) and reduce operation of existing boiler 4. The construction of the proposed facility requires a permit from the Illinois EPA because of its associated air emissions.

II. PROJECT DESCRIPTION

The proposed project will include installation of low nox burners on the two existing boilers, reduced operation of one existing boiler, and installation of two turbines fired with natural gas and no.2 fuel oil each equipped with gas fired duct burner and CO catalyst. The turbines would be used in a combined cycle configuration.

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 and duct burners.

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.

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. The CO emissions from the proposed turbines and duct burners will be controlled with CO catalyst. 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.

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 increased from the project would be limited to 39.2 tons of NO_X, 94.8 tons of CO, 8.5 tons of VOM, 13.2 tons of PM/PM_{10}, and 14.4 tons of SO_2. These limits are based on the maximum emissions requested by University. NO_X and CO limits are based on achievement of average annual hourly emission rate as specified by the manufacturer of the turbines and the potential utilization of the facility as specified by University. 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.

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 this standard. The application indicates NO_X emissions typically would be no more than 25 ppm.

V. APPLICABLE REGULATORY PROGRAMS

This facility is not considered a major modification 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 project, as limited by the permit, would be less than the major source thresholds for PSD, i.e., nitrogen oxides and carbon monoxide are limited to less than 40 and 100 tons/year respectively.

VI. PROPOSED PERMIT

The conditions of the draft permit for the facility contain limitations and requirements for the turbines, duct burners and existing boilers 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 turbines and duct burners.

The draft permit includes enforceable limits on emissions and operation for the turbines, duct burners and existing boilers to assure that facility remains below the levels at which it would be considered major for PSD. 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 turbines and duct burners.

The permit also establishes appropriate compliance procedures for the facility, including requirements for emission testing, monitoring, recordkeeping, and reporting. Emission testing is required as part of the initial shakedown and operation of the turbines, duct burners, and existing boilers after completion of construction.

These measures are being imposed to assure that the emissions of the turbines, duct burners and existing boilers are accurately tracked to confirm compliance with both the short-term and annual emission limits established for them.

VII. 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.