

CALUMET ENERGY TEAM
PEAKING POWER PLANT, CHICAGO, ILLINOIS
PROJECT SUMMARY

I. INTRODUCTION

Calumet Energy Team. has proposed to construct an electrical generation facility in the city of Chicago. The facility would use two natural gas fired turbines to generate upto 305 MW of electricity. The construction of the proposed facility requires a permit because of its associated air emissions.

II. PROJECT DESCRIPTION

The proposed project would include two turbines manufactured by Siemens/Wesinghouse, both primarily fired with natural gas and fuel oil as a backup source. 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. Operations of the facility may occur throughout the year, although the facility is expected to run primarily in the summer months. On an annual basis, each turbine is expected to operate no more than 17 percent of the time.

Emissions of carbon monoxide (CO), nitrogen oxide (NO_x), particulate matter/particulate matter <10 microns (PM/PM₁₀), sulfur dioxide (SO₂) and volatile organic material (VOM) result from the combustion of fuel.

The principal air contaminants emitted from the proposed turbine are 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. NO_x can also be formed from the combination of any nitrogen in the fuel with ambient air oxygen component. This is not significant for burning of natural gas, which contains trace amounts of nitrogen. Factors affecting NO_x formation from a turbine include design, ambient conditions, turbine load and fuel types. For fuel oil firing mode, the nitrogen oxide (NO_x) emissions from the turbines will be controlled with water injection into the burners. Water injection lowers NO_x formation by lowering the combustion flame temperature. For gas firing mode, the turbines will have low NO_x burners to control formation of NO_x, in which the burners themselves are specifically designed to minimize the combustion flame temperature. This is a more elective technique that has been developed for the turbines.

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/PM₁₀ are also emitted as a result of incomplete combustion of fuel. SO₂ 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/PM₁₀ are controlled by proper combustion control and firing natural gas fuel which has negligible ash content.

III. PROJECT EMISSIONS

The total annual emissions from the turbines are limited to 240.0 tons of NO_x, 58.6 tons of CO, 9.0 tons of PM, 24.8 tons of SO₂ and 15.5 tons of VOM. These limits are based on the manufacturer's experience with similar equipment and the potential utilization of the generation system. Actual emissions will be less than the maximum emissions, depending on actual utilization and performance.

IV. APPLICABLE REGULATIONS

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

This project 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. This standard addresses NO_x emissions from gas turbines, limiting NO_x emissions to 75 ppm_{dv}, adjusted for actual turbine efficiency. The project should also readily comply with the applicable requirements of these standards. The application indicates NO_x emissions of 25 ppm_{dv} for the turbines for gas firing mode and 42 ppm_{dv} for turbines in fuel oil firing mode.

V. APPLICABILITY OF PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY (PSD) RULES AND MAJOR STATIONARY SOURCE CONSTRUCTION AND MODIFICATION (MSSCAM)

This project is not considered a major project pursuant to PSD. This is because the total emissions from the operation of this facility, as limited by the permit would be less than major source thresholds for PSD, i.e., nitrogen oxides, sulfur dioxide, carbon monoxide, and particulate matter are limited to less than 250 tons/year and volatile organic materials are limited to less than 25 tons/year.

VI. PROPOSED PERMIT

The conditions of the proposed permit for the facility contain limitations and requirements for the turbines to assure that the facility's emission will be less than the major source threshold (i.e. 250 tons/year for NO_x, CO, PM, SO₂ and 25 tons/year for VOM). These limitations include a restriction on the amount of natural gas that may be burned. The permit also establishes appropriate compliance procedures, including inspection practices, recordkeeping requirements, monitoring requirements and reporting requirements.

The proposed permit includes enforceable limits on emissions, operation and fuel consumption to assure that the project remains below the level of major source applicability. A continuous monitoring system and fuel monitoring is required for the turbines to confirm actual levels of operation and compliance with applicable limits.

VII. REQUEST FOR COMMENTS

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