Illinois Environmental Protection Agency
Bureau of Air, Permit Section
Springfield, Illinois

Project Summary for a Construction Permit Application from the United States Department of Energy for a Combined Heat and Power Unit at the Argonne National Laboratory in Argonne, Illinois

Site Identification No.: 043802AAA
Application No.: 12120033
Date Received: December 24, 2012

Schedule
Public Comment Period Begins: May 15, 2013
Public Comment Period Closes: June 14, 2013

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

I. INTRODUCTION

The United States Department of Energy (DOE) has requested a construction permit to install a natural gas-fired combined heat and power unit (CHP Unit) to supply electricity and steam for the Argonne National Laboratory. The new CHP Unit will have a combustion turbine and a heat recovery steam generator. In conjunction with this project, an existing gas-fired boiler, Boiler 3, will be permanently shut down.

The Illinois Environmental Protection Agency (Illinois EPA) has reviewed DOE's 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 proposed project. However, before issuing the permit, the Illinois EPA is holding a public comment period to receive comments on the proposed issuance of the permit and the terms and conditions of the draft permit.

II. PROJECT DESCRIPTION

Argonne National Laboratory is one of the DOE's national research laboratories, specializing in research in energy and environmental technology. DOE is proposing to install a natural gas-fired CHP Unit at the existing heating plant at the Argonne National Laboratory that supplies the steam for this facility. The new CHP Unit would supply both steam and electricity for the facility. In conjunction with this project, an existing gas-fired Boiler 3 at the heating plant will be permanently shut down.

The new CHP Unit will have a combustion turbine and a heat recovery steam generator (HRSG). The combustion turbine will power an electrical generator with a nominal electrical capacity of about 6.5 MW. The HRSG will produce steam using the heat in the hot flue gas from the turbine. The HRSG will be equipped with duct burners, which will be used to increase steam output during periods of high steam demand, e.g., cold winter days. The duct burners will increase the steam output of the HRSG by heating the flue gas from the turbine and raising its temperature.

The CHP Unit is designed to normally operate with only the turbine and HRSG without using the duct burners. In supplemental mode, the duct burners would also be used. The HRSG will also be able to operate on a standalone basis entirely on the duct burners to maintain steam output when the turbine is out of service. The turbine will also be able to operate on its own, venting directly to the atmosphere through a bypass stack when the HRSG is out of service.

The principal air pollutants emitted from the CHP Unit will be nitrogen oxides (NO_X) and carbon monoxide (CO). Emissions of these pollutants will be minimized by the design of the burners in the turbine and the duct burners. The CHP Unit will also emit greenhouse gases (GHG), primarily carbon dioxide (CO_2). The CHP Unit will also be a source of emissions of volatile organic material (VOM), particulate matter (PM) and sulfur dioxide (SO_2).

III. PROJECT EMISSIONS

The permitted annual emissions of the CHP Unit, as would be allowed by the draft construction permit, are summarized below. It is expected that actual emissions would

typically be less than the permitted emissions as the CHP Unit would typically operate at less than its design capacity.

Permitted Annual Emissions of the CHP Unit (Tons/Year)

NO_X	CO	VOM	PM/PM_{10}	SO_2	GHGs (as CO_2e)
47.6	55.9	7.4	9.2	1.2	65,775

IV. APPLICABLE EMISSION STANDARDS

All emission sources in Illinois must comply with state emission standards adopted by the Illinois Pollution Control Board. The state emission standard represents the basic requirements for sources in Illinois. The application shows that the proposed CHP Unit will readily comply with applicable state emission standards (35 IAC Subtitle B Subchapter c).

The CHP Unit will be subject to federal emission standards for new combustion turbines, i.e., New Source Performance Standards for Stationary Combustion Turbines, 40 CFR 60, Subpart KKKK. This NSPS sets limits for the NOx and SO_2 emissions of combustion turbines. The burners in new CHP Unit will be designed to comply with the limits for NOx. Because the CHP Unit will only fire natural gas, it will meet the limits for SO_2.

V. APPLICABILITY OF NEW SOURCE REVIEW

This project will not constitute a major project for purposes of New Source Review, i.e., state rules for Major Stationary Sources Construction and Modification (MSSCAM), 35 IAC Part 203, and the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21. For emissions of NO_X, the CHP Unit is not a major project because the project will be accompanied by contemporaneous decreases in NO_X emissions from the permanent shut down of existing Boiler 3. As a result, the net increase in NO_X emissions is not significant, as described in Attachment A. For other pollutants, the emissions of the CHP Unit are not significant and the project does not need to rely on accompanying decreases in emission from the shut down of Boiler 3.

Because of differences in provisions of MSSCAM and PSD that apply to “netting,” DOE provided separate netting demonstrations for MSSCAM and PSD. For MSSCAM, the decrease in NOx emissions was the average actual annual NO_X emissions for a two-year period ending on October 2011. This period is considered more representative of normal operation than the two-year period ending June 2012, when Boiler 3 was taken out of service. This is because this boiler was placed on low fire and used as a reserve/standby boiler beginning in November 2011.

For PSD, consistent with 40 CFR 52.21(b)(3)(i) and (b)(48)(ii), DOE determined the decreases in NO_X emissions from the shut down of Boiler 3 as the boiler’s average actual annual emissions from a 24-month period during the previous ten years. The selected 24-month period ended on December 2004, providing the highest NOx emissions from any 24-month period in the ten-year look-back period.

DOE's netting demonstrations also addressed other creditable increases and decreases in NOx emissions during the relevant time periods. A contemporaneous increase in NOx emissions was conservatively determined considering only the emission increases due to changes in steam load from construction and demolition of buildings at the Argonne National Laboratory during the contemporaneous period and not the decrease in steam load from energy conservation projects at this source. This NOx emission increase was 1.1 tons/year during the contemporaneous period.

The conclusion of these netting demonstrations was that the net increases in NO_X emissions for this project would not be significant for either MSSCAM or PSD. For MSSCAM, the net increase in NOx emissions is 38.7 tons/year. For PSD, the net increase is 36.3 tons/year.

VI. PERMIT CONDITIONS

The conditions of the draft permit would set forth the air pollution control requirements that apply to the new CHP Unit. These requirements include the applicable emission standards that apply to the CHP Unit.

The draft permit would also establish enforceable limits on the amount of emissions for which the project is permitted. In addition to limits on emissions, the permit includes operational limits for the amount of fuel used by the turbine and the duct burners in the HRSG. This will help to make the emission limits practically enforceable.

The draft permit would also establish appropriate compliance procedures for the ongoing operation of the CHP unit, including requirements for recordkeeping and reporting. These measures are imposed to assure that the operation and emissions of the new CHP unit are appropriately tracked to confirm compliance with the various limits and requirements for the CHP unit.

Finally, the draft permit would require existing Boiler 3 to permanently cease operation. Because the new CHP Unit will serve to replace this boiler, the MSSCAM and PSD rules provide that this boiler does not actually need to be permanently shut down until 180 days after the CHP Unit begins operation.

VII. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the application for the proposed project meets applicable state and federal air pollution control requirements. The Illinois EPA is therefore proposing to issue a construction permit for the new CHP unit.

Comments are requested on this proposed action by the Illinois EPA and the conditions of the draft permit.

Attachment A

Net Changes in NO_X Emissions (Tons/Year)

	MSSCAM	PSD
Project Emissions	47.6	47.6
Contemporaneous Decreases[a]	- 10.0[b]	- 12.4[c]
Contemporaneous Increases	1.1	1.1
Net Change	38.7	36.3
Significant Emission Rate	40	40

[a] NO_X emissions decrease from required shut down of Boiler 3.

[b] For MSSCAM, the decrease in NO_X emissions is the past actual emissions based on average actual annual emissions of Boiler 3, from a representative two-year period of normal operation during the five-year contemporaneous period.

[c] For PSD, the decreases in NO_X emissions is the past actual emissions based on average actual annual emissions of Boiler 3, from a 24-month period during the ten-year look-back period.