ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

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Project Summary for a Construction Permit Application from Elgin Energy Center, LLC, for Addition of Oil-Burning Capability to Its Peaking Power Facility in Elgin

Site Identification No.: 031438ABC
Application No.: 15070001
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Schedule
Public Comment Period Begins: September 12, 2016
Public Comment Period Closes: October 12, 2016

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I. INTRODUCTION

Elgin Energy Center, LLC (Elgin Energy) has proposed to add oil burning capability to its existing peaking power facility in Elgin. This will enable the facility to provide electricity at times when the supply of natural gas for the facility is restricted or curtailed.

The Illinois EPA has reviewed Elgin Energy's application and made a preliminary determination that the application meets applicable requirements. Accordingly, the Illinois EPA has prepared a draft construction permit that it would propose to issue for the proposed project. However, before issuing this 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

The Elgin Energy facility was developed to function as a peaking power plant. Peaking power plants generate electricity in periods of peak electrical demand and at other times when other power plants are not able to meet the demand for power.

The facility has four simple-cycle combustion turbine generators. The turbines are identical models and each has a nominal electrical capacity of 135 MW. These turbines currently only have the capability to burn natural gas. The proposed project would involve installation of dual-fuel burners in the turbines to also enable oil, i.e., ultra-low-sulfur diesel (ULSD) fuel, to be burned.

The planned addition of oil burning capability to the facility would not change the function of this facility as a peaking power plant. It would enable the facility to provide electricity during periods of very cold weather when the supply of natural gas for the facility is restricted or curtailed. In this regard, in the event that the supplier of natural gas to the facility identifies conditions that threaten or could threaten its ability to supply natural gas to its customers, the supplier must take actions to address the situation and assure adequate natural gas for residential and other high-priority customers. The natural gas supplier may first issue an Advisory Action Order to facilities like Elgin Energy requesting that they reduce usage of natural gas. If this is not sufficient, the supplier will then issue an Operational Flow Order restricting or curtailing the supply of natural gas.[1]

As part of this project, water injection, an add-on control technology for emissions of nitrogen oxides (NOx), would be installed on the turbines for use when burning oil. Thermal NOx is formed thermally by the combination of oxygen and nitrogen in the air at the temperatures at which fuel is burned.[2] Thermal NOx is formed during the operation of all common high temperature

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[1] There are a variety of Operational Flow Orders (OFO) that a supplier of natural gas may issue to a facility. A "No Burn" OFO requires a facility to not burn natural gas whether or not it is available in the pipeline. A "Restricted Buy" OFO requires the facility to burn less than a determined amount of natural gas over a 24-hour period. A "24-Hour Must Buy" requires the facility to commit to buying and using a certain rate and total amount of natural gas over a 24-hour period.

[2] NOx can also be formed from the combination of any nitrogen in a fuel with oxygen in the combustion air. However, this fuel-bound NOx is not significant for burning of natural gas and ultra-low-sulfur diesel (ULSD), which both contain minimal levels of nitrogen.

combustion processes including turbines. Factors affecting NOx formation from a turbine include burner design, fuel, load and ambient conditions. NOx emissions will continue to be addressed with low-NOx combustion technology when natural gas is burned. Low-NOx combustion technology is very effective in preventing the formation of NOx in large, modern turbines burning natural gas. Water injection would now also be used in these turbines when oil is burned. This is because low-NOx combustion technology is not as effective for oil as it is for natural gas. Water injection lowers NOx formation in a turbine by introducing water into the combustion zone of the burners. This lowers flame temperatures, thereby reducing the formation of thermal NOx.

The combustion of fuel in the turbines also results in emissions of carbon monoxide (CO), particulates, volatile organic material (VOM), sulfur dioxide (SO_2) and greenhouse gases. 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 particulates are also emitted as a result of incomplete combustion of fuel.[3] CO, VOM and particulate are controlled by providing proper combustion, i.e., adequate fuel residence time and temperature in the burners in the turbines to ensure complete combustion. SO_2 emissions are generated from the sulfur contained in the fuel but are found only in trace amounts from combustion of natural gas and ultra-low sulfur diesel. Emissions of carbon dioxide and other greenhouse gases are formed when fossil fuels are burned.

As part of the permitting of this project, Elgin Energy has also requested that tuning of the turbines be addressed. Tuning of the combustion systems of the turbines is conducted to adjust for efficient operation in the upcoming operating season. While a turbine is being tuned and adjustments are made to the combustion settings, emissions of a turbine may be higher than during normal operation. The turbines will be tuned while burning natural gas. Tuning will typically be conducted twice a year, once prior to the summer operating season and once prior to the winter season.

III. EMISSIONS OF THE PROJECT

The permitted annual emissions of various pollutants from the turbines for burning ULSD and from tuning are listed below. These limits reflect the maximum amount of ultra-low-sulfur diesel that would now be allowed to be burned in the turbines each year and the maximum amount of tuning that would be allowed. The actual annual emissions from these modes of operations would usually be much less than these permitted emissions. This is because peaking power plants do not routinely operate when other power plants can meet the demand for electrical power. When the turbines at this facility are operated, they will normally burn natural gas, not ULSD. In addition, tuning occurs infrequently and is of short duration.

Pollutant	Permitted Emissions of the Project (tons/year)
Nitrogen Oxides (NOx)	39.2
Carbon Monoxide (CO)	13.9
Particulate Matter (PM)	5.1
Particulate Matter$_{10}$ (PM_{10})	5.1
Volatile Organic Material (VOM)	1.3
Sulfur Dioxide (SO_2)	0.4

[3] In addition, a portion of the particulate emissions may be ambient particulate that passes through the inlet air filters on the turbines.

In addition, this project does not increase the permitted annual emissions for the affected turbines pursuant to Construction Permit 00100065, as reflected in the Clean Air Act Permit Program (CAAPP) Permit for the plant, permit 03080009.

IV. APPLICABLE EMISSION STANDARDS

All emission sources in Illinois must comply with State emissions standards adopted by the Illinois Pollution Control Board. The Board's emission standards, 35 Ill. Adm. Code: Subtitle B, represent the basic requirements for sources in Illinois. The facility readily complies with applicable state emission standards and should continue to do so.

With this project, each of the turbines will be modified. As a result, they will become subject to the federal New Source Performance Standards (NSPS) for Stationary Combustion Turbines, 40 CFR 60 Subpart KKKK.[4] The NOx and SO_2 emissions of the turbines are currently subject to the requirements of an older NSPS, 40 CFR 60 Subpart GG. The turbines should readily comply with the more stringent requirements of 40 CFR Subpart KKKK that would now become applicable with this proposed project.

V. NEW SOURCE REVIEW (NSR)

Prevention of Significant Deterioration (PSD)

This project is not a major project under the federal rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21. This is because the facility is not a major source for purposes of PSD and will continue to not be a major source. Accordingly, this project, i.e., the addition of the capability to burn oil to the turbines and provisions to address tuning, is not a major project for purposes of PSD and is not subject to the substantive requirements of the PSD rules. In particular, the key pollutant emitted by the facility for purposes of applicability of PSD is NOx, which is regulated under the PSD rules as it is a precursor to the formation of nitrogen dioxide (NO_2), fine particulate or particulate matter$_{10}$ (PM_{10}) and ozone in the atmosphere. Following this project, the permitted NOx emission of the facility will continue to be less than 250 tons/year so the facility will continue to not be a major source of NOx under the PSD rules.[5,6]

Major Stationary Sources Construction and Modification (MSSCAM)

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[4] The Illinois EPA administers the NSPS for sources in Illinois under a delegation agreement with USEPA.

[5] The permitted annual emissions of the facility for various regulated NSR pollutants would continue to be: NOx - 235.5 tons, CO - 237.0 tons, PM - 42.2 tons, PM_{10} - 42.2 tons, VOM - 11.7 tons, and SO_2 - 2.9 tons.

Actual annual emissions of the facility have been and will likely continue to be much less than the permitted emissions. For example, in its 2014 Annual Emission Report, Elgin Energy reported annual NOx and CO emissions of 28.9 and 37.5 tons, respectively. For 2013, it reported emissions of 22.1 and 30.1 tons, respectively. The actual emissions are much lower than permitted emissions because peaking power plants do not routinely operate since other electric power plants are typically able to fully meet the demand for electrical power. However, owners and operators of peaking power plants apply for permits that will accommodate the higher level of operation that could occur in a year when the demand for peaking power is high.

[6] This project is not subject to PSD for emissions of greenhouse gases. This is because this project is not subject to PSD for pollutants other than greenhouse gases.

This project is also not a major project under Illinois' rules for Major Stationary Sources Construction and Modification (MSSCAM), 35 IAC Part 203. MSSCAM is relevant for the proposed project because the Greater Chicago Areas is designated a nonattainment area for ozone air quality and emissions of NOx and VOM are regulated under MSSCAM as precursors to ozone.[7] For NOx emissions, the existing Elgin Energy facility is a major source under MSSCAM, with potential or permitted annual NOx emissions that are more than 100 tons. However, the proposed project would not be a major project because the permitted emissions from this project for NOx would not be significant, i.e., 40 tons or more per year. For VOM emissions, the existing Elgin Energy facility is not a major source under MSSCAM and the facility would continue to not be a major source for VOM emissions.[8]

VI. OTHER REGULATORY PROGRAMS

Trading Programs for SO_2 and NOx Emissions

As the turbines at the facility are electrical generating units, Elgin Energy is subject to USEPA's allowance trading programs for emissions of NOx and SO_2. This includes USEPA's Acid Rain Program pursuant to Title IV of the Clean Air Act and the USEPA's more recent Cross State Air Pollution Rule, pursuant to 40 CFR Part 97. Pursuant to these programs, Elgin Energy must hold allowances for its actual emissions of SO_2 and NOx.

Clean Air Act Permit Program (CAAPP)

The facility is subject to Illinois' Clean Air Act Permit Program (CAAPP) pursuant to Title V of the federal Clean Air Act. This is because it is subject to the federal Acid Rain program and has permitted annual NOx emissions of more than 100 tons. Elgin Energy has a CAAPP permit, Permit 03080009.[9]

VII. ANALYSIS OF AIR QUALITY IMPACTS

With its application, Elgin Energy submitted analyses of the air quality impacts of the facility with the capability to also burn oil, as now being proposed. These analyses show that the emissions of the facility would not cause exceedances of the National Ambient Air Quality Standards (NAAQS) adopted by USEPA for NO_2, CO, SO_2, PM_{10} and particulate matter$_{2.5}$ ($PM_{2.5}$). The projected maximum air quality impacts of the facility for CO, SO_2, PM_{10} and NO_2 (annual average) are not significant, as defined under the PSD rules. For NO_2, (1-hour average), for which the facility's modeled impact is significant, and

[7] When the Elgin Energy facility was originally permitted in 2000, applicability of MSSCAM did not extend to emissions of NOx, only VOM emissions. In 2006, as a result of the Greater Chicago Area being designated nonattainment for the National Ambient Air Quality Standard (NAAQS) for ozone as adopted by USEPA in 1997, emissions of NOx began to be regulated under MSSCAM as a precursor to the formation of ozone. Thereafter, applicability of MSSCAM for NOx has had to be addressed for proposed projects in the Greater Chicago Area.

[8] In addition, the permitted emissions for VOM of this project would not be significant, i.e., emissions will not be 40 tons or more per year.

[9] CAAPP Permit 03080009 expires on September 26, 2019. However, once the capability to burn oil is added to the turbines and required performance testing is conducted to verify compliance with the new limits that would apply to the turbines for emissions of NOx and other pollutants, Elgin Energy would need to apply for a revision to Permit 03080009 to reflect the new requirements that would apply to this facility.

for $PM_{2.5}$, further assessments of the facility's impacts on air quality were conducted. The maximum predicted impacts of the facility were added to background concentrations, i.e., monitored levels of air quality representative of current air quality in the area in which the facility is located. This showed that the addition of oil-firing capability to the facility would not threaten the NAAQS for NO_2 (1-hour) and $PM_{2.5}$.[10,11]

VIII. DRAFT PERMIT

The Illinois EPA has prepared a draft of the construction permit that it would propose to issue for this project. The conditions of the permit set forth the air pollution control requirements that the project must meet. These requirements include the applicable emission standards that would now apply to the turbines when they have the capability to burn natural gas and oil (ultra-low-sulfur diesel). They also include the measures that must be used and the emission limits that must be met for emissions of different regulated pollutants from the turbines.

The conditions of the draft permit for the project contain limits and requirements to assure that the facility complies with applicable regulatory requirements. The draft permit includes enforceable limits on emissions, operation and fuel usage of the turbines to ensure that the NOx emissions from burning oil are below the levels at which it would be considered a significant modification under MSSCAM. The permit also establishes additional compliance procedures for the facility, including requirements for recordkeeping and reporting. Continuous monitoring of fuel usage is already required for the turbines to track actual operation. Operational monitoring is also required for the water injection systems. These measures are imposed to assure that the operation and emissions of the facility are appropriately tracked to confirm compliance with the various limits and requirements established for individual units.

IX. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the application for the proposed project meets all applicable state and federal air pollution control requirements, subject to the conditions in the draft permit. Accordingly, the Illinois EPA is proposing to issue a construction permit for this project.

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

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[10] For NO_2 on a 1-hour average, the maximum predicted ambient concentration with this project is 133.75 $\mu g/m^3$, compared to the NAAQS of 188.12 $\mu g/m^3$. This concentration reflects a maximum 1-hour impact from the modified facility of 44.75 $\mu g/m^3$ plus an hourly background concentration of 89.0 $\mu g/m^3$.

[11] For $PM_{2.5}$ on a 24-hour average, the maximum predicted ambient concentration with this project is 22.66 $\mu g/m^3$, compared to the NAAQS of 35 $\mu g/m^3$. This concentration reflects a maximum predicted 24-hour impact from the modified facility of 0.86 $\mu g/m^3$ plus a background concentration of 21.8 $\mu g/m^3$.

For $PM_{2.5}$ on an annual average, the maximum predicted concentration is 10.02 $\mu g/m^3$, compared to the NAAQS of 12.0 $\mu g/m^3$. This reflects a maximum predicted annual impact from the modified facility of 0.11 $\mu g/m^3$ plus a background concentration of 9.91 $\mu g/m^3$.