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Bureau of Air, Permit Section
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Project Summary for a Construction Permit Application from United States Steel Corporation for a Cogeneration Boiler at its Granite City Works

United States Steel, Granite City Works
Site Identification No.: 119813AAI
Application No.: 06070023
Date Received: July 11, 2006

Schedule
Public Comment Period Begins: September 23, 2007
Public Hearing: November 7, 2007
Public Comment Period Closes: December 7, 2007

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I. INTRODUCTION

United States Steel Corporation (US Steel) has submitted an application to construct a cogeneration boiler at its Granite City Works in Granite City. The Granite City Works is an integrated iron and steel mill producing flat rolled steel products. The proposed boiler would be a "cogeneration" boiler because steam from the boiler would be used both to generate electricity for the mill and in manufacturing processes at the mill. The boiler would be designed to fire blast furnace gas (BFG) from the existing blast furnaces at the mill as its primarily fuel. This project would also include construction of an additional flare to ensure adequate capacity for flaring of surplus blast furnace gas and a new cooling tower to support the operation of the new boiler.

US Steel is developing this project such that it will not be accompanied by significant net increases in emissions of New Source Review pollutants, which are addressed by the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21, and Illinois' rules for Major Stationary Sources Construction and Modification (MSSCAM), 35 IAC Part 203. This is because this project will be accompanied by decreases in emission at existing units at the mill. In particular, the new cogeneration boiler will replace ten existing boilers at the mill that are currently fired on blast furnace gas.

The Illinois EPA has reviewed US Steel's application for this project and made a preliminary determination that the application meets applicable requirements. Accordingly, the Illinois EPA has prepared a draft of the construction permit that it would propose to issue for the project. However, before issuing this permit, the Illinois EPA is holding a public comment period to receive comments on the proposed issuance of a permit for this project and the terms and conditions of the draft permit. At the request of US Steel, this comment period will include a public hearing, so that oral comments can also be provided in this matter.

II. PROJECT DESCRIPTION

US Steel is proposing to construct a cogeneration boiler to supply electricity and process steam to the Granite City Works. The new boiler would produce high-pressure steam to power an associated steam turbine generator with a nominal electrical capacity of 78 megawatts. The electricity produced by this generator would take the place of electricity that is presently obtained off the grid. Low-pressure steam would be bled or extracted from the turbine to be combined with low-pressure steam from other existing boilers at the mill to meet the steam requirements of various processes and operations at the mill that use steam.

The cogeneration boiler would be designed to have a nominal capacity of 505 million British thermal units (mmBtu) per hour. The primary fuel for this boiler would be blast furnace gas, which is a byproduct of the two existing blast furnaces at the Granite City Works. Blast furnace gas is a low heat content fuel that is composed primarily of nitrogen, carbon monoxide, carbon dioxide and hydrogen. Natural gas would be used in

the boiler as an auxiliary fuel, making up less than 10 percent of the fuel energy input to the boiler on an annual basis.

The boiler would not be designed to fire fuel oil or coke oven gas. The new cogeneration boiler would replace the steam generating capability of ten existing boilers at the Granite City Works, Boilers 1 through 10, that currently fire blast furnace gas. These existing boilers, which were built during the 1920s, do not produce high-pressure steam as needed for cogeneration of electricity. They will be permanently shut down after the shakedown of the cogeneration boiler is completed.

To support the operation of the new cogeneration boiler, US Steel would also install a new cooling tower and a second flare for blast furnace gas. The flare is needed to be able to safely dispose of surplus blast furnace gas produced by the blast furnaces that cannot be used as fuel. US Steel would potentially need this flare during periods when the cogeneration boiler is not in operation, such as periods of scheduled maintenance. This is because an outage of the cogeneration boiler would be equivalent to the outage of all ten of the existing boilers that are being shut down. Currently, at most only a few of these boilers are out of service at any time so that the existing flare has sufficient capacity to handle any blast furnace gas that cannot be used as fuel. While flaring of blast furnace gas could be higher than at present during outages of the cogeneration boiler, US Steel expects that the cogeneration boiler will not actually cause an overall increase in flaring of blast furnace gas on an annual basis. This is because with the cogeneration boiler some of the blast furnace gas that is currently being flared would routinely be used to produce steam to generate electricity. Essentially, the generation of electricity, as possible with the proposed boiler, would be an additional use for blast furnace gas at the Granite City Works as this fuel would be used to generate electricity as well as to make process steam.

III. PROJECT EMISSIONS

The proposed cogeneration boiler and additional flare would be a significant source of emissions of particulate matter (PM), nitrogen oxides (NOx), carbon monoxide (CO) and sulfur dioxide (SO_2). The emissions of PM and SO_2 are attributable to the particulate and sulfur compounds contained in the blast furnace gas, which are minimized by pre-treatment of the gas to remove these materials prior to use as fuel. The CO emissions are a product of incomplete combustion of the CO in the blast furnace gas, which is minimized by combustion practices. NOx emissions are a byproduct of the combustion process, which is minimized by the design of the burners. The cooling tower would be a source of particulate emissions due to mineral material contained in the water circulated in the cooling tower.

The potential annual emissions of the new emission units to be constructed in this project are presented in Attachment 1 of the draft permit. The units' actual emissions would be less than the potential emissions to the extent that the cogeneration boiler and other units operate at less than their maximum capacity and normally operate to achieve emission rates that are lower than the applicable limitations.

The project would be accompanied by decreases in emissions from existing emission units so that it would not result in significant increases in emissions of New Source Review pollutants, as described in Attachment 2 of the draft permit. In addition to the shut down of ten existing boilers, there will be several other contemporaneous emissions decreases at the mill that compensate for the emissions of the new emission units. In particular, US Steel would install a desulfurization system to begin processing coke oven gas, which is produced by the existing byproduct recovery coke ovens at the Granite City Works. The desulfurization system will remove sulfur compounds from the coke oven gas producing a fuel that will have lower emissions when it is burned. Desulfurization of coke oven gas to remove sulfur compounds will result in a substantial reduction in the SO_2 emissions of Granite City Works. Low-NOx burners will be installed in the existing slab furnaces to reduce emissions of NOx. An electric pump would be installed to replace the natural gas-powered engine that currently powers the No. 4 booster pump at the existing coke oven battery at the mill, eliminating emissions of that unit. Overall, these changes mean that the proposed cogeneration project will not result in significant net increase in emissions of any New Source Review pollutants.

IV. APPLICABLE EMISSION STANDARDS

All emission units in Illinois must comply with the Illinois Pollution Control Board's emission standards. The emission standards adopted by the Board represent the basic requirements for sources in Illinois. Emission standards have been adopted for various sources of nitrogen oxides, carbon monoxide, volatile organic material, sulfur dioxide, and particulate matter. The application shows that the proposed new emission units would comply with the applicable Board standards.

The proposed cogeneration boiler would also be subject to federal New Source Performance Standards (NSPS), at 40 CFR Part 60, Subpart Db. However, the boiler would not be subject to any emission standards under this NSPS because it would only fire gaseous fuels and the annual capacity factor for firing natural gas would be less than 10 percent.

Although USEPA adopted a NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters, 40 CFR 63, Subpart DDDDD, the proposed cogeneration boiler would not be subject to these standards. This is because these standards have been vacated by a federal court mandate, pursuant to a request by USEPA, and these standards are no longer in effect. When USEPA completes its adoption of new NESHAP standards for boilers and process heaters, the new boiler would be subject to applicable requirements of such standards[1] with the compliance period provided by the standards, subject to the further refinements of Section 112(j)(6) of the Clean Air Act (CAA). Section 112(j) of the CAA has been triggered because of the vacatur of the adopted NESHAP standards, which means that NESHAP standards for boilers and process heaters

[1] The NESHAP standard that has now been vacated did not establish any emission standards for boilers that were fired primarily with blast furnace gas.

have not been adopted by USEPA in a timely manner. Section 112(j)(6) of the CAA provides that in such circumstances, when NESHAP standards are eventually adopted by USEPA, they would apply to the new cogeneration boiler like other units covered by the adopted standards, unless a case-by-case determination of Maximum Achievable Control Technology (MACT) has been made for these units in the Title V permit for the source. In such case, the new boiler must be provided with a reasonable time to comply with the adopted NESHAP, which may in no case be longer than eight years from the date that the case-by-case MACT determination took effect for these units.

V. NON-ATTAINMENT NEW SOURCE REVIEW (NA NSR)

The Granite City Works is located in the Greater St. Louis Metropolitan Area, which is designated a nonattainment area for ozone. In an ozone nonattainment area, emissions of both volatile organic material (VOM) and NOx are regulated as precursors for formation of ozone in the atmosphere. The Greater St. Louis Metropolitan Area is also designated a nonattainment area for particulate matter, measured as PM2.5. Accordingly, it is necessary to address whether this project would be a major modification for any of these pollutants for purposes of Nonattainment New Source Review, i.e., Illinois' rules for Major Stationary Sources Construction and Modification (MSSCAM), 35 IAC Part 203.

For purposes of these rules, as well as the PSD rules, the proposed project is considered to be a separate and independent project from the heat recovery coke plant that Gateway Coke proposes to construct at the Granite City Works. That project is the subject of a separate application submitted by Gateway Energy and Coke Company, Application No. 06070020, ID No. 119040ATN, which is also currently pending before the Illinois EPA. The Cogeneration Boiler project is considered to be separate from that project because it is independent of the proposed coke plant. In particular, US Steel is pursuing the new cogeneration boiler to replace old existing boilers at the mill and the operation of the cogeneration boiler will not rely upon a supply of fuel from the proposed heat recovery coke plant. The proposed heat recovery coke plant is a separate endeavor being pursued by Gateway Coke. It would address the supply of coke to the Granite City Works and would reduce the amount of coke that is currently purchased by US Steel and brought to the mill from off-site sources.[2]

As already explained, the proposed cogeneration boiler project would not be accompanied by significant net increases in emissions of any New Source Review pollutants, so the proposed project is not a major project for purposes of MSSCAM. To address whether the project is a major modification under MSSCAM for emissions of

[2] Although this cogeneration boiler project and the proposed heat recovery coke plant project are separate projects, this project must be addressed as part of the analysis for applicability of New Source Review rules for the coke plant project. This is addressed in Table 2 of the draft permit prepared by the Illinois EPA for the coke plant project (Application No. 06070020, ID No. 119040ATN). Except for particulate matter, that analysis shows that the coke plant project would not be accompanied by significant net increases in emissions of New Source Review pollutants, although the net changes in emissions are different given the added emissions from the coke oven plant project. For emissions of particulate matter, the coke oven plant project would be accompanied by a significant net increase in emissions, so that the coke plant project is subject to the requirements of MSSCAM and PSD for a major project.

PM2.5, particulate matter emissions were evaluated in terms of PM10 and the significant emission rate for PM10 was used. This is consistent with USEPA's interim guidance for implementation of Nonattainment New Source Review for PM 2.5, which is applicable pending final guidance and rulemaking by USEPA on how states should revise their rules for Nonattainment New Source Review to address emissions of PM2.5.

VI. PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

Since the Greater St. Louis Metropolitan Area is designated attainment for criteria pollutants other than ozone and PM2.5, emissions of other New Source Review pollutants (e.g., SO_2, CO, NOx and PM) from this proposed project are potentially subject to the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21. Because NOx is a pollutant in its own right, separate from its role as an ozone precursor, emissions of NOx are also separately addressed for purposes of applicability of PSD. Likewise, emissions of particulate matter measured as PM10 must also be addressed for applicability of PSD. This is because USEPA has adopted separate National Ambient Air Quality Standards (NAAQS) for particulate matter as PM2.5 and PM10 and the Granite City Works are in an area that is designated attainment for PM10. As already explained, this project would not be accompanied by significant net increases in emissions of any New Source Review pollutants, so the proposed project is not a major project for purposes of the PSD rules.

VII. PERMIT CONDITIONS

The conditions of the permit would set forth the air pollution control requirements that the project must meet. These requirements include the applicable emission standards that apply to the project. The permit also establishes enforceable limitations on the amount of emissions for which the project is permitted. In addition to annual limitations on emissions, the permit includes short-term emission limitations and operational limitations, as needed to provide practical enforceability of the annual emission limitations.

The permit would also establish appropriate compliance procedures for the ongoing operation of the proposed new emission units, including requirements for emission testing, monitoring, recordkeeping, and reporting. These measures are imposed to assure that the operation and emissions from the new units are appropriately tracked to confirm compliance with the various limitations and requirements established in the permit.

VIII. REQUEST FOR COMMENTS

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

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