Illinois Environmental Protection Agency
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PROJECT SUMMARY FOR A CONSTRUCTION PERMIT APPLICATION FROM GATEWAY ENERGY AND COKE COMPANY, LLC, FOR A HEAT RECOVERY COKE PLANT LOCATED ADJACENT TO UNITED STATES STEEL'S GRANITE CITY WORKS IN GRANITE CITY, ILLINOIS

Gateway Energy & Coke Company
Site Identification No.: 119040ATN
Application No.: 06070020
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Schedule
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Public Comment Period Closes: December 8, 2007

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I. INTRODUCTION

Gateway Energy and Coke Company, LLC (Gateway) has submitted an application for a permit to construct a heat recovery coke plant adjacent to United States Steel's (US Steel's) Granite City Works in Granite City, Illinois. The coke from the plant would be used for the production of iron in the two existing blast furnaces at the Granite City Works or sold for use elsewhere. The proposed coke plant would also recover the waste heat from the coke manufacturing process to produce steam that would be sent to the Granite City Works.

In conjunction with this proposed coke plant, US Steel is proposing to construct a coke conveyance system. This system would handle coke from the proposed Gateway coke plant and transfer it to the Granite City Works. Although this proposed coke conveyance system is the subject of a separate application submitted by US Steel, which is also pending before the Illinois EPA (ID No. 119813AAI, Application No. 06070088), the combination of the proposed heat recovery coke plant and the proposed coke conveyance system are considered to constitute a single project. However, the Illinois EPA has also prepared a separate project summary to addresses its review of the application for the proposed coke conveyance system.

The Illinois Environmental Protection Agency (Illinois EPA) has reviewed the applications from Gateway and US Steel and has made a preliminary determination that the applications for the proposed coke plant and coke conveyance system meet applicable requirements. Accordingly, the Illinois EPA has prepared draft versions of the air pollution control construction permits that it would propose to issue for these facilities. However, before issuing these permits, Illinois EPA is holding a public comment period with public hearing to receive oral and written comments on the proposed issuance of these permits and the terms and conditions of the draft permits.

II. DESCRIPTION OF PROPOSED PLANT

Introduction

The proposed heat recovery coke oven plant will consist of three batteries or banks of 40 ovens each, for a total of 120 ovens. The plant would be designed to process 1.1 million tons of coal per year, yielding approximately 740,000 tons of coke per year. Heat recovery steam generators (HRSGs) would recover the heat energy from the coke manufacturing process as high-pressure steam, which would be sent to a steam turbine generator at the Granite City Works to produce electricity. Other operations at the proposed plant would include coal and coke handling, storage, and processing.

Coke ovens produce metallurgical coke, which is a raw material needed to convert iron ore into molten iron in a blast furnace. Metallurgical coke is produced by "cooking" coal in coke ovens. In the ovens, appropriate coal that is suitable for "coking" is heated at high temperature. This drives off volatile components in the coal, yielding "coke oven gas" as a byproduct. The solid material that remains is the coke, which contains primarily carbon, along with the ash or mineral matter originally present in the coal.

The proposed plant would have heat recovery coke ovens. The design and operation of heat recovery coke ovens, which are wide and relatively shallow, are different than that of traditional byproduct coke ovens, which are tall and narrow. A byproduct coke oven is designed and operated so that the volatiles and combustion products driven off the coal are collected downstream of the oven and processed in a "byproduct plant" to recover chemicals such as benzene, toluene, xylene, coal tar and ammonia. The coke oven gas remaining after the byproducts plant is then used as fuel in the heating system of the coke ovens and in other combustion units at a source. Byproduct coke ovens must be kept at a positive pressure to prevent air from entering the ovens, which would oxidize recoverable products and overheat the ovens. In contrast, in a heat recovery coke oven, coal volatiles are oxidized or burned inside the oven. The ovens are operated under negative pressure, adding air from the outside to oxidize volatile matter and enable combustion to occur in the oven system. As a consequence, byproduct coke ovens and heat recovery coke ovens have substantially different characteristics with respect to their emissions and the requirements for control of emissions.

Detailed Process Description for the Heat Recovery Coke Ovens

Coke production is a batch process, with each oven in a battery at a different stage in the coke production cycle. The cycle begins when a pushing/charging machine opens the door on the charging side of the oven and loads coal into an empty oven. The heat retained in the refractory from the previous batch of coke starts the coking cycle. Because the ovens operate under negative pressure, air is drawn into the oven. This air supports the oxidation of the volatile matter being driven off the coal, which provides the thermal energy that over time completely heats the mass of coal that has been charged or loaded into the oven. Partially combusted gases pass directly into a flue system under the floor of oven where further combustion occurs. The gases then pass into an afterburner tunnel where any remaining uncombusted gases are oxidized. The afterburner tunnel system routes the hot gases to the heat recovery steam generators (HRSGs). When the conversion from coal to coke is complete after a number of hours, the coke is pushed out of the oven onto a mobile, flat push car. The push car then transports the hot coke to the quench tower where the coke is cooled by deluging it with a water spray.

The emission units or process steps in a heat recovery coke oven are as follows:

1. Charging

   Charging is the process of adding coal to the ovens. The door is temporarily removed from one end of the oven and coal is charged using a horizontal flight conveyor.

2. Doors

   A door is located on either side of the oven for adding coal and removing coke. The doors are not potential sources of pollutants as long as the oven pressure is negative.

3. Pushing

Pushing is the process of moving the coke out of the oven. Flat car pushing will be used to remove the coke from the oven at the end of the coking cycle. Flat car pushing is different than pushing at a byproduct coke oven battery. When a byproduct coke oven is pushed, the coke bed falls into the receiving car which breaks the mass of coke in the oven apart and produces the large plume associated with pushing of byproduct coke ovens. With flat car pushing, the coke bed is pushed onto a flat car with a hood that encloses the bed on the sides and top. The hood and air pollution control device travel from the oven to the quench tower. The advantage of flat car pushing, as feasible with a heat recovery coke oven, is that the mass of coke in the oven stays intact and a large plume is not generated that can be difficult to contain and control.

4. Coking

   a. Main Stack - Most of the flue gases from the ovens are exhausted through the main stack. These fully combusted, hot gases are cooled by the heat recovery steam generators (HRSGs) to recover the thermal energy of the hot gases from the coke ovens. The cooled gas then passes through the main air pollution control system for control of emissions of sulfur compounds and particulate. Induced draft fans move gases through the system and maintain negative pressure in the ovens. On an annual basis, more than 96 percent of the exhaust gases from ovens will pass through the main air pollution control system.

   b. Individual Waste Heat Stacks – To operate as designed, the heat recovery ovens must operate under negative pressure. In emergencies, the individual waste heat stacks open and vent the flue gases from 20 ovens directly into the atmosphere. Natural draft from the stacks maintains negative pressure in the ovens. The waste gases still pass through the common tunnel afterburner system, which fully combusts the gases prior to release into the atmosphere. These stacks may also be used during HRSG and air pollution control system maintenance. On an annual basis, less than 4 percent of the waste gases from the ovens will be vented through the waste heat stacks.

5. Quenching

   The hot coke pushed from the ovens must be quenched or sprayed with water to cool the coke. Coke quenching entrains particulate matter (PM) from breakup of the hot coke when it is hit with water. The PM is carried up into the quench tower by the velocity of the hot steam plume that is formed during quenching. In addition, dissolved solids from the quench water may become entrained in the steam plume rising from the tower. These emissions are controlled by catching the PM on a baffle system at the top of the quench tower.

Process Description for Material Handling Operations

Trucks deliver coal to the plant and unload the coal within an enclosure. Wet suppression is used to minimize particulate emissions. Crushing of coal is performed in an enclosure with coal then stored in silos until needed at the coke oven batteries.

The quenched coke from the coke oven batteries is crushed. The crushed coke is then screened and loaded on the conveyor system that transports it to Granite City Works. Crushing and screening operations are conducted inside a building which is vented to a baghouse. The coke is transferred to an enclosure at the neighboring Granite City Works. Conveyor systems are used to move the coal and coke from one area of the plant to another.

Process Description for Roadways and Parking Areas

The units included in the process area are roadways and parking areas associated with the operation of the proposed plant, which may be sources of fugitive PM due to vehicle traffic.

III. PROJECT EMISSIONS

The potential emissions of the proposed coke plant and associated coke conveyance system are summarized in Attachment 1.[1] The actual emissions from the project would be less than the potential emissions as units operate at less than their maximum capacity and emission rates are normally lower than the applicable standards and limitations.

The emissions increases from this project along with contemporaneous changes in emissions are shown in the netting analysis in Attachment 2.[2] Because the proposed plant would be a support facility for US Steel's Granite City Works, when addressing applicability of New Source review rules to the proposed project, Gateway may consider contemporaneous and creditable emissions decreases that have occurred or will occur at the Granite City Works.[3] This netting analysis shows that this project will only result in net changes in emissions that are significant for emissions of particulate matter, both measured as "total suspended particulate matter" or total filterable PM10 and measured in terms of PM10, i.e., particulate matter with an aerodynamic diameter that is no more than 10 microns.

Because the netting analysis shows that project would be accompanied by a significant increase in emissions of PM10, it must be accompanied by other emission reductions for PM10,[4] as will be discussed in more detail later, to compensate or "offset" its PM10 emissions. Emission offsets achieved by vacuum sweeping of certain roads and roadways are currently planned that will be adequate to offset the majority of the PM10 emissions of the proposed project. The remainder of the required emission offsets will be provided from the installation and operation of a system by US Steel to remove sulfur compounds or desulfurize coke oven gas. This system will also act to reduce the PM emissions that occur when this coke oven gas is burned as fuel at the Granite City Works. Construction of this system will occur such that is completed prior to startup of the propose coke plant.

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[1] Attachment 1 is also Attachment 1 of the draft permit for the proposed coke plant.

[2] Attachment 2 is also Attachment 2 of the draft permit for the proposed coke plant.

[3] If a netting analysis is conducted by an applicant for a proposed project, the netting analysis must also include contemporaneous and creditable increases in emissions.

[4] $PM10_0$ is currently treated as a surrogate for fine PM (PM2.5) while specific PM2.5 rules are developed. Offsets of PM10 (as a surrogate for $PM2.5_5$) are needed because Granite City is located in an area that is designated nonattainment for PM2.5 air quality.

IV. APPLICABLE EMISSION STANDARDS

The emission units at proposed plant will be subject to federal and state emission standards. The application indicates that the proposed project will comply with applicable state and federal emission standards. Applicable federal standards include the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40 CFR 63, Subpart L, for Coke Oven Batteries and 40 CFR 63, Subpart CCCCC, for Coke Ovens: Pushing, Quenching, and Battery Stacks. Other federal standards from 40 CFR 60 also apply. For the purposes of these regulations, heat recovery coke ovens are also referred to as "non-recovery" coke ovens .as materials are not recovered by a byproducts plant.

The proposed plant will also be subject state emission standards for coke ovens, material handling operations and fugitive dust from roadways. Certain state emission standards for coke ovens are effectively superseded by more stringent requirements pursuant to the NESHAP. In addition, Illinois' standards for coke ovens, 35 IAC 212.443, were developed to address existing coke oven batteries in Illinois, which are byproduct recovery ovens. Accordingly, certain provisions of these rules cannot be applied to the proposed heat recovery coke ovens. In particular, the provisions for uncaptured emissions from charging of ovens cannot be applied because the proposed ovens will be charged from doors on the sides of the ovens rather than by pouring coal into the ovens through ports or lids on the top of the ovens (35 IAC 212.443(b)(1).). Provisions for maintenance of doors are also not applicable as an inventory of spare door and seals is not needed to prevent emissions from the proposed ovens because they are operated under negative pressure (35 IAC 212.443(d)(2).

Emissions of particulate from material handling operations and fugitive dust from vehicle traffic on roadways at the proposed plant are subject to generally applicable state emission standards. They are also subject to certain "special" standards that apply in three small areas of Illinois that were formerly designated nonattainment for PM10. The proposed plant is subject to these more stringent, special standards because Granite City is located in one of these former nonattainment areas.

V. APPLICABILITY OF NEW SOURCE REVIEW RULES (PSD AND MSSCAM)

The Granite City Works is located in the Greater St. Louis Metropolitan Area, which is designated a nonattainment area for ozone and particulate matter, measured as PM2.5. In an ozone nonattainment area, emissions of volatile organic material (VOM) and NOx are both regulated as precursors for formation of ozone in the atmosphere. Accordingly, it is necessary to address whether this project would be a major modification for emissions of PM2.5, VOM or NOx for purposes of Nonattainment New Source Review, i.e., Illinois' rules for Major Stationary Sources Construction and Modification (MSSCAM), 35 IAC Part 203. As already explained, this project would be accompanied by significant increases in emissions of PM, so the proposed project is a major project for purposes of MSSCAM.[5] Since the project is not accompanied by

[5] To address whether the project is a major modification for emissions of PM2.5, emissions were quantified in terms of PM10 and the significant emission rate for PM10 was used. This is consistent with USEPA's interim

significant net increase in emissions for other New Source Review pollutants, the proposed project is not a major project for either VOM or NOx for purposes of MSSCAM. MSSCAM requires Lowest Achievable Emission Rate (LAER) and emission offsets for emissions of PM and compliance by existing sources and an analysis of alternatives.

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 PM10) from this proposed project are potentially subject to the federal PSD rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21. It should be noted that NOx is a pollutant in its own right, separate from its role as an ozone precursor, so 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 only be accompanied by significant increases in emissions of only New Source Review pollutant, PM, so the proposed project is only a major project for purposes of PSD for remissions of PM10. The PSD rules require a Best Available Control Technology (BACT) determination and an ambient air quality related to emissions of PM10 and other analyses of the projects potential impacts.

VI. BEST AVAILABLE CONTROL TECHNOLOGY (BACT) AND LOWEST ACHIEVABLE EMISSION RATE (LAER)

BACT is demonstrated using a “top-down” methodology. Available control technology options are identified based on knowledge of the source and previous regulatory decisions for other identical or similar sources. These alternatives are then ranked in descending order of control effectiveness (i.e., the “top” option is the most stringent). The feasibility or appropriateness of each alternative as BACT is based on technical feasibility and economic, energy, and environmental impacts. If the top control alternative is technically infeasible or is otherwise rejected as inappropriate after considering site-specific impacts, it is rejected and the next most stringent alternative is then considered. This process continues until a control alternative is determined to be technically feasible and without adverse economic, energy, and environmental impact. This alternative is then selected as BACT.

LAER is the most stringent emission limitation derived from either: 1) The most stringent emission limitation contained in the implementation plan of any state for such class or category of source; or 2) The most stringent emission limitation achieved in practice by such class or category of source. The most stringent emissions limitation contained in a State Implementation Plan (SIP) for a category of source must be considered LAER unless either a more stringent emission limitation has been achieved in practice or the applicant is able to demonstrate that the SIP limitation is not achievable in this case. In addition, LAER cannot be less stringent than any applicable NSPS standard. The LAER analysis for this project determined that there are no

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guidance for implementation of Nonattainment New Source Review for PM 2.5 pending final guidance and rulemaking by USEPA on how states should revise their nonattainment New Source Review rules to address PM2.5.

previous LAER determinations for the heat recovery coke ovens; therefore, LAER was selected from limits in state and federal rules and limits achieved in practice at heat recovery coke ovens facilities in Virginia, Indiana, and Ohio.

A key benchmark for establishing BACT and LAER for the various processes at the proposed coke ovens is the applicable NESHAP standards at 40 CFR Part 63. These standards reflect a determination of Maximum Achievable Control Technology (MACT) for hazardous air pollutants that are emitted from coke ovens as particulate matter. Another important reference for setting BACT and LAER is USEPA's *RACT/BACT/LAER Clearinghouse* (RBLC).[6] This clearinghouse contains information on BACT and LAER determinations that have been made for many types of facilities, and includes information on BACT determinations for heat recovery coke ovens and similar sources.

Coke Oven Emission Units or Processes

a. Charging

(1) Proposed BACT: Oven charging takes approximately 4 minutes. Air flows into the oven through the open door during charging, and virtually all the charging emissions are captured and sent to the sole flues and common tunnel during the first 3 minutes. During the last minute, as the ram retracts, some of the charging emissions escape the oven. A traveling hood and baghouse are typically used on heat recovery ovens to control these emissions. Baghouses provide very effective control of dust or filterable PM emissions as would be present during charging. These controls measures are consistent with the NESHAP standards for charging heat recovery coke ovens and BACT requirements for other heat recovery coke ovens in the RBLC database.

(2) Proposed LAER: These controls represent LAER because there are no more stringent rules or limits achieved in practice by heat recovery coke ovens.

b. Doors

(1) Proposed BACT: Doors, i.e., leaks between doors and the ovens, are not a concern for emissions as long as ovens are properly operating under negative pressure. PM emissions are controlled by work practices to ensure that negative pressure is maintained. The pressure in each oven or in a common battery tunnel will be monitored to ensure the ovens operate under a negative pressure. The oven doors will also be observed after charging, with corrective action taken if visible emissions are observed. These work practices are consistent with the NESHAP standards for doors and BACT requirements for other heat recovery coke ovens in the RBLC database.

(2) Proposed LAER: These control measures represent LAER because there are no more stringent rules or limits achieved in practice by heat recovery ovens.

c. Pushing

[6] RACT is an acronym for Reasonably Available Control Technology

(1) Proposed BACT: The control of pushing emissions poses special challenges because of the very high temperature of the coke as it leaves the oven (approximately 2,000°F) and the need to control emissions of the pushed coke as it is then moved to the quench tower. A close-capture hood, which facilitates capture and control of emissions, vented to a high-efficiency multicyclone is the only air pollution control system that is technically feasible for this application. A multicyclone can withstand exposure to hot gases collected by the close-capture hood as well as moisture, as will be introduced during quenching. A multicyclone can also be mounted on a rail car and still be low enough to pass below the ducts that convey hot gases from the individual batteries to the common afterburner tunnel (approximately 20 feet high), meeting the weight and size constraints posed for the control device.. This system is consistent with the NESHAP standards for pushing of coke ovens.

The NESHAP also requires observation of the interior of each oven prior to pushing. This is feasible because of ovens operate under negative pressure. Only if coking is complete, i.e., gassing has stopped and no smoke is observed, can an oven be pushed. This practice prevents so-called "green pushes," which generate substantially more particulate than pushing of fully coked material.

These control measures are consistent with the BACT requirements for pushing at other heat recovery coke ovens in the RBLC database.

(2) Proposed LAER: These controls represent LAER because there are no more stringent rules or limits achieved in practice by heat recovery coke ovens.

d. <u>Coking</u>

(1) Main Stack

(a) Proposed BACT: A fabric filter is technically feasible and will be used to control emissions of filterable PM from the main stack. The fabric filter will be preceded by the spray dryer, which control SO_2 emissions. The combination of a spray dryer and a fabric filter are well suited to control of PM10. This is because the spray dryer will cool the flue gas stream to below 250 °F before it enters the fabric filter and will control emissions of both SO_2 and sulfuric acid mist so as to facilitate control of condensable particulate associated with emissions of sulfur compounds present in the flue gas, well as filterable PM. This combination of control devices is consistent with the BACT requirements for other heat recovery coke ovens in the RBLC database.

(b) Proposed LAER: These controls represent LAER because there are no more stringent rules or limits achieved in practice by heat recovery coke ovens.

(2) Individual Waste Heat Stack

Proposed BACT: The individual waste heat stacks serve as the exhaust point from a battery when the annual inspection and maintenance of each of the six HRSGs is performed and during certain repairs of the spray dryer/baghouse system. During this work on an HRSG, the HRSG would be bypassed so that inspection and maintenance can be performed safely. Emissions that would otherwise pass through the HRSG and the main stack are instead released through the individual waste heat stack. The maximum time that would be authorized for maintenance and inspection of each HRSG is 8 days per year. The spray dryer/baghouse will be designed so that much of the routine inspection and maintenance can be performed while the system is operating. However, some situations will only be able to be properly addressed when this control system is not operating. Continued operation this system without these necessary, periodic inspections and maintenance periods would endanger the reliable operation of this system for the day-to-day operation of the coke ovens. During these periods, the ovens must be kept hot and continue in operation to avoid significant damage to the refractory linings and structure of the ovens.

BACT is proposed as the following for HRSG maintenance:

- Gases pass through the common afterburner tunnel for full combustion prior to release;
- Minimize emissions by taking only one HRSG offline at a time so that 83% of the gas (gas from 5 out of 6 the HRSGs) continues to go through the spray dryer-baghouse system; and
- Limit HRSG maintenance outages to no more than 8 days/year per HRSG (no more than about 2 percent of the time).

BACT is proposed as the following for spray dryer/baghouse system maintenance:

- Gases pass through the common afterburner tunnel for full prior to release, to fully combust the gases prior to release;
- Curtail production during system maintenance to an average charge of 42.5 tons wet coal per oven.
- Limit spray dryer/baghouse inspection and maintenance to 5 days/year, with use of appropriate personnel and scheduling to complete work in the shortest practical time,

(b) Proposed LAER: These controls represent LAER because there are no more stringent rules or limits achieved in practice by heat recovery ovens.

e. <u>Quenching</u>

(1) Proposed BACT: The quenching process is necessary to rapidly cool the coke. Water quenching is used at all coke ovens in the United States, with a baffled quench tower and clean water. Gateway will use an improved baffle design – bent steel plates approximately 3 inches apart that impart tighter “turns” to the gas stream compared to conventional rows of wood baffles. This will reduce PM compared to conventional baffles. The other control measure is quenching the coke with clean water rather than “dirty” water, which would be high in solids and potentially other pollutants. The total dissolved solids (TDS) in the quench water will be limited to 1,100 mg/L. These controls

are consistent with the NESHAP standards for quenching and BACT requirements for other heat recovery coke ovens in the RBLC database.

(2) **Proposed LAER:** These controls represent LAER because there are no more stringent rules or limits achieved in practice by heat recovery facilities.

Material Handling

Proposed BACT/LAER: PM emissions will be produced from coal unloading, the coal storage silo, coal conveyors, coal sizing, coke conveyors, coke crushing, coke screening, and the emergency coke storage pile. Attachment 3 presents a listing of these emission units and the BACT/LAER control selected to control both so-called "stack" and "fugitive" emissions for each category of unit.

The proposed BACT/LAER determination for PM emissions from coal and coke handling and processing is intended to require that PM emissions be effectively controlled while still providing appropriate operational flexibility in the manner with which this is accomplished in practice by the plant. This general approach has been taken because of the Illinois EPA's experience with material handling operations and associated control measures at facilities that handle coal and similar materials, which is that these operations change over time as equipment ages and new systems, devices and techniques become available. Accordingly, material handling operations at the proposed plant are most efficiently and consistently addressed from an administrative perspective through establishment of generic BACT/LAER control requirements, rather than with separate requirements for each individual operation.

For this purpose, the draft permit delineates three categories of material handling operations: 1) Dry material handling, other than coal transfer and storage piles, 2) Storage piles for dry materials and coal transfer, and 3) Handling of wet materials. BACT for the first category of operations, handling of dry materials, other than storage piles and coal transfer, is proposed as enclosure to prevent visible emissions. In addition, if PM emissions are aspirated to a control device, a filter or baghouse device must be used unless consideration of operational safety dictates another type of control device, use of a filter-type device is required. This approach has been taken as filtration is generally considered the most effective active control technology for control of dust from material handling operations at power plants. Filters control PM emissions by passing dust-laden air through a bank of filter tubes suspended in the gas flow stream. A filter "cake", composed of captured particulate, builds up on the "dirty" side of the filter. Periodically, the dust cake is removed through a physical mechanism (e.g., a blast of compressed air from the "clean" side of the filter), which causes the dust to fall into a hopper or back into the silo. The proposed approach for this category of operations requires very effective control of PM emissions, as control of fugitive emissions is addressed by the prohibition against visible emissions and control of stack emissions is addressed by the requirements and minimum performance specifications for control devices.

For storage piles of dry materials and coal transfer operations, which are potential sources of fugitive PM emissions, two alternative performance standards are proposed as BACT/LAER, either the absence of visible emissions or a dust control program that achieves at least 90 percent nominal control of emissions. The proposed approach allows a variety of suppression or

elimination techniques to be used to control emissions, including partial or total enclosure, adjustable feeders and drop systems, and compaction and/or chemical or wet suppression, as appropriate to address the storage of and handling of coal and other dry materials. This approach requires very effective control of PM emissions related to storage piles and coal transfer as control of fugitive emissions is addressed by the prohibition against visible emissions or a minimum performance specification for the overall effectiveness of control measures, i.e., 90 percent control

For handling of wet materials, such as quenched coke, the performance standard proposed as BACT/LAER is absence of visible emissions, accompanied by timely collection of any spilled material that could become airborne after it dried. Aspiration of dust to control devices is not addressed as the moisture in the material must be sufficient to prevent direct emissions. As with storage piles, this approach allows a variety of suppression or elimination techniques to be used along with the moisture present in a material, including partial or total enclosure and compaction and/or chemical or wet suppression, as appropriate to address the handling of particular wet materials. This approach requires very effective control of PM emissions from wet material handling operations, as control of fugitive emissions is addressed by the prohibition against visible emissions and the further requirement to take actions to prevent secondary emissions from spilled material.

Roadways and Open Areas

Proposed BACT/LAER: Fugitive dust control for roadways and other open areas would encompass a variety of suppression or elimination techniques including paving (roadways), dust suppression, and sweeper/vacuum trucks. The proposed BACT/LAER determination for roadways is intended to require that these emissions be effectively controlled while still providing appropriate operational flexibility in the manner with which this is accomplished in practice by the plant. This general approach has been taken because of the Illinois EPA's experience with fugitive dust control programs. This experience indicates that dust control programs must be flexible to appropriately respond to changing operation and the weather (rain, hot, dry weather in the summer, and snow and ice in the winter). In addition, dust control programs change and evolve over time as new control techniques and service providers become available to control emissions. Accordingly, like material handling operations, roadways at the proposed plant are most appropriately addressed through establishment of broad BACT control requirements, rather than with detailed, prescriptive requirements for control of emissions.

For this purpose, the draft permit proposes two types of BACT/LAER requirements for roadways, an opacity requirement and a number of work practice requirements. First, control measures must be used such that opacity of emissions from truck traffic on roadways and windblown dust does not exceed 5 percent. Second, the required work practices for control of fugitive dust must include: 1) paving of regularly traveled roads; 2) treatment of roads for very effective control of emissions; and 3) handling of collected dust in a manner that prevents it from being release back into the environment. This approach requires very effective control of PM emissions from roadways, as control of emissions is addressed both by a numerical opacity standard, which may be readily enforced by any qualified opacity observer, and by specific requirements and performance standards for the fugitive dust control program.

VII. IMPACT ANALYSES

Air Quality Impact Analysis

Because this project is considered a major project for emissions of PM10 under the PSD rules, an air quality analysis has been completed for the impacts of the project on PM10 air quality. This analysis included:

- Development of a detailed emission inventory for the project,
- Processing of five recent years of representative meteorological data,
- Modeling of the project and associated contemporaneous emissions changes,
- Modeling all relevant sources in Illinois and Missouri, and
- Comparing the results to the appropriate standards and allowable concentrations.

The analysis was conducted using the latest USEPA-approved dispersion model, AERMOD, with the meteorological data processed using the AERMOD Meteorological Preprocessor. The analysis shows that the PM10 impacts from the project will meet the National Ambient Air Quality Standards (NAAQS) and PSD increments, as shown below.

Results of Analysis for the PSD PM10 Increments ($\mu g/m^3$)

Averaging Period	Maximum Modeled Concentration	PSD Increment	Does Impact Exceed Increment
24-hour	28.8	30	No
Annual	11.9	17	No

24-hour Concentrations are highest-second-highest value.

Results of Analysis for the PM10 NAAQS ($\mu g/m^3$)

Averaging Period	Maximum Modeled Concentration	Background	NAAQS	Does Impact Exceed NAAQS
24-hour[a]	71.00	54	150	No
Annual	21.97	26	50	No

[a] 24-hour impact is highest-sixth-highest value over the five-year period.
Aggregate impacts are 125.0 $\mu g/m^3$ 24-hour and 47.97 $\mu g/m^3$ annual.

Visibility Analysis

To assess the potential affect of the proposed project on visibility, i.e., the distance at which distant landscape or structures can be clearly discerned or are obscured by pollutant haze in the atmosphere, the VISCREEN model was run for the increased particulate matter emissions. Using an existing background visual range of 20 kilometers, there was little demonstrated impact to visibility when using conservative assumptions of the model and comparing the levels to Class I or pristine impact thresholds. It is more likely that given the nature of the area in which the project is located and the reduction in emissions of SO_2, sulfuric acid mist and NOx, which react

in the atmosphere to form particulate capable of scattering light and reducing visibility, that the proposed project will have at most a negligible impact on visibility.

Soils and Vegetation Analysis

An Ecological Risk Assessment (ERA) was performed to assist USEPA in conducting consultation about the proposed project with the United States Fish and Wildlife Service pursuant to the federal Endangered Species Act. The ERA evaluated whether the project would likely cause adverse affects on endangered and threatened species that would potentially be in the surrounding area. (decurrent false aster, pallid sturgeon, bald eagle, least interior tern, gray bat, and Indiana bat). The results of the ERA screening evaluation indicated that the proposed plant is unlikely to either directly or indirectly adversely affect these species.

Additional Impacts Analysis

The application included an additional impact analysis discussing the emissions impacts resulting from general residential, commercial and industrial growth associated with the proposed project. Anticipated growth associated with construction and operation of the proposed plant is expected to be low, as are the emissions resulting from this growth. Most impacts would be temporary, resulting from the work force required during the construction phase. Gateway predicts that the operation of the plant would require a staff of about 70 people. This would only result in additional secondary employment and associated economic activity if these positions could not be filled from the current work force in the MetroEast and St. Louis area. The secondary air emissions (i.e., e.g., increased vehicle traffic) from construction activity and any long-term growth are not expected to significantly impact air quality in the area or in the immediate vicinity of the plant.

VIII. OTHER REGULATORY REQUIREMENTS

Emission Offsets

As a major project subject to MSSCAM, this project must be accompanied by emission offsets for the increase in PM10 emissions. That is, the PM10 emissions of the project must be accompanied by decreases in PM10 emissions from existing sources in an amount equal to the permitted increase in emissions from the project. For this project, 267.77 tons/year of emission reductions must be provided as these are the permitted PM10 emissions of this project (as shown in Attachment 2,). The majority of the required emission reductions are planned to be provided by improved control of fugitive dust from roadways, including vacuum sweeping of additional segments of public roads in the vicinity of the Granite City Works (236.03 tons/year). This is expected to be of particular benefit to local air quality for PM as it involves control of emissions that would otherwise be released at ground level. The remainder of the required emission offsets (31.74 tons/year) are planned to be provided by the installation and operation of a system at the Granite City Works for desulfurization of coke oven gas. This system will also reduce the PM emissions associated with the subsequent use of coke oven gas as fuel.

The requirement related to emission offsets will be generally addressed in both the permit for the coke plant and in the permit for coke conveyance system. The permit for the coke conveyance system would be used as a means to set forth specific requirements related to vacuum sweeping of public roadways, as US Steel will expand its current road sweeping program to address these road segments. Although US Steel is expected to take the principal role in day-to-day implementation of the measures to provide emission offsets, the obligation to maintain the requisite emission offsets applies to both Gateway and US Steel.

Compliance by Existing Sources

Another requirement for a major project subject to MSSCAM is "existing source compliance." The owner or operator of a proposed major project must demonstrate that all existing major sources that such person controls (or that are under common control of such person) that are located in the state in which the project would occur are in compliance or on a schedule for compliance with all applicable emission limitations and emissions standards pursuant to the Clean Air Act.

Gateway has stated that neither it nor its parent company, SunCoke Energy, Inc., currently owns or operates any major sources in Illinois.

US Steel has determined that this requirement has been satisfied except for certain matters involving the Granite City Works that are currently at the Office of the Illinois Attorney General. These matters would have to be resolved before a construction permit could be issued for the proposed project, either by US Steel coming into compliance, by entry of a judicial consent order or decree that establishes a compliance schedule, or by establishment of a schedule for compliance by other enforceable means. The construction permit for the coke conveyance system would be used, as appropriate, to recognize any compliance schedule that is established for US Steel and to generally facilitate fulfillment of this requirement.

Analysis of Alternatives

Gateway has provided an analysis of alternatives to the proposed project, as required by 35 IAC 203.306. This analysis concludes the benefits of the proposed heat recovery coke plant would be significant and outweigh other alternatives to the proposed project (such as building the proposed plant elsewhere). In particular, the proposed plant would provide significant economic benefits for US Steel's Granite City Works as it would stabilize the cost of coke, a necessary raw material for operation of blast furnaces. At present, only 45 percent of the coke needed by the Granite City Works is manufactured on-site. Accordingly, the proposed plant would support the continued economic viability of this steel mill, which is important to the economic well-being of its employees, suppliers and service providers and the community and the region as a whole.

The Illinois EPA has also broadly considered alternatives to this project. The project has benefits that clearly go beyond financial benefits for Gateway and United States Steel. United States Steel's Granite City Works is important to the economic well-being of the State of Illinois. In addition, steel is essential to modern society and a reliable and affordable supply of coke is

important for production of new steel from iron ore. The proposed project would also have features that would minimize potential negative impacts. The plant would use newer heat recovery coke oven technology, rather than byproduct coke oven technology. The operation of the plant would be accompanied by changes at the existing Granite City Works that would reduce its emissions of SO_2 by over 1,000 tons per year. Although the plant would be permitted to emit approximately 270 tons/year of PM, PM emissions would have to be controlled to BACT/LAER levels. Emission offsets would also have to be provided and maintained for the permitted PM10 emissions of the project. The soonest the plant could likely begin operation would be July 2009. This provides time for the actual operation of the plant to be coordinated with other measures that are underway to reduce emissions and bring the Granite City area into attainment of the National Ambient Air Quality Standard for PM2.5.

IX. EMISSIONS OF MERCURY

While the State of Illinois has not adopted standards for mercury emissions from coke ovens, the Illinois EPA recognizes the need to address the mercury emissions of the proposed plant. The Illinois EPA is proposing to require Gateway to design the proposed plant with equipment to specifically control mercury emissions. The proposed coke plant will use a spray dryer/baghouse system for control of emissions of SO_2 and PM from the coke ovens. Although the performance of this type of system for control of mercury emissions from a heat recovery coke plant has not been tested, information from testing at coal-fired utility boilers indicates a spray dryer/baghouse system can be very effective for mercury removal. A heat recovery coke plant is not a coal-fired boiler, but some of the flue gas characteristics are similar (e.g., SO_2, oxygen, and moisture). This enables spray dryer/baghouse technology developed to remove SO_2 and PM from the flue gas of coal-fired boilers to also be used for this purpose on coke ovens. However, other differences in the flue gas characteristics (e.g., particulate and carbon loading or levels of chlorine and sulfur level) may affect the effectiveness of this technology for removal of mercury.

Because of this uncertainty, it is appropriate for the spray dryer/baghouse system for the coke ovens to be equipped to inject activated carbon into the flue gas. Activated carbon injection technology has been demonstrated to be very effective in controlling emissions of mercury from coal-fired utility boilers. While there is also uncertainty associated with applying the data for activated carbon injection technology collected at utility boilers to heat recovery coke plants, it is likely that mercury removal with activated carbon injection at a heat recovery coke plant will provide similar benefits as at a coal-fired boiler. Accordingly, Gateway has complied with the Illinois EPA's request that it install an activated carbon injection system at the plant and evaluate mercury control. This system must be able to inject activated carbon a normalized rate of up to 10 pounds per million actual cubic feet of exhaust gases and be operated at this rate unless the ovens and their control systems are demonstrated to have a mercury removal efficiency of at least 90 percent. A period of time will be needed to evaluate mercury removal under the specific conditions of heat recovery coking (e.g., type of carbon, coal type, injection rate, etc.) and establish appropriate limits on the mercury emission of the plant.

X. PERMIT CONDITIONS

The conditions of the draft permit would set forth the air pollution control requirements that the proposed coke plant must meet. These requirements include the applicable emission standards that apply to the project. They also include the measures that must be used and the emission limits that must be met as BACT and LAER for emissions of PM10. The permit also establishes enforceable limitations on the amount of emissions for which the plant 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 limitations.

The permit also establishes appropriate compliance procedures for the ongoing operation of the plant, including requirements of emission testing, required work practices, operational monitoring, recordkeeping, and reporting. These measures are imposed to ensure that the operation and emissions of the plant are appropriately tracked to confirm compliance with the various limitations and requirements established for individual emission units.

The draft permit would also address other applicable requirements for the proposed project, including the obligation to provide and maintain emissions offsets for the permitted PM10 emissions of the project

XI. REQUEST FOR COMMENTS

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

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

Attachment 1: Project Emission Summary (Tons/Year)

Operation	NO_x	CO	SO_2	VOM	PM	PM_{10}	Lead	H_2SO_4
Gateway Coke Oven Project								
Charging	---	1.53	0.16	1.10	8.06	8.06	0.00006	---
Pushing	10.40	34.49	53.66	10.95	31.41	31.41	0.0084	2.74
Main Stack	547.50	114.65	997.33	24.57	157.68	157.68	0.085	10.17
Individual Waste Heat Stacks	19.50	4.08	355.21	0.87	30.24	30.24	0.06	18.12
Quenching	---	---	---	---	65.70	24.09	0.048	---
Coal/Coke Hand. & Storage	---	---	---	---	6.97	3.32	---	---
Coke Crushing/Screening	---	---	---	---	9.39	9.39	---	---
Roads	---	---	---	---	16.03	3.13	---	---
SUBTOTAL:	577.40	154.76	1,406.36	37.49	325.47	267.32	0.2	31.02
USS Conveyor Increase	---	---	---	---	0.95	0.45	---	---
SUBTOTAL:	577.40	154.76	1,406.36	37.49	326.42	267.77	0.20	31.02
Significance Threshold:	40	100	40	40	25	15	0.6	7
Greater Than Significant?	Yes	Yes	Yes	No	Yes	Yes	No	Yes

Attachment 2: Netting Analysis (Tons/Year)

	Date	NO_x (NA NSR)	NO_x (PSD)	CO	SO_2	VOM	PM	$PM_{10}/PM_{2.5}$	Lead	H_2SO_4
Project Emissions		577.40	577.40	154.76	1,406.36	37.49	326.42	267.77	0.20	31.02
Contemporaneous[a] Increases										
BFG Boiler/Flare (06070023)		124.74	124.74	338.36	451.14	0.92	232.25	232.25	---	---
NG Enrichment (04110018)	2/2005	17.22	17.22	5.17	0.04	0.34	0.73	0.62	---	---
Slab Furnaces (06070022)		---	---	26.77	---	1.75	43.43	43.43	---	---
Contemporaneous[a] Decreases										
Boilers 1-10 (06070022)	(c)	-278.89	-278.89	-313.61	-789.43	-1.22	-228.06	-228.06	---	---
Coke Oven Gas Desulfurization (06070022)	(c)	---	---	---	-2,107.95	---	-94.15	-94.15[b]	---	-63.11
Slab Furnaces (06070022)	(c)	-427.94	-427.94	---	-174.15	---	---	---	---	---
No. 6 Galvanizing Line (06070023)	(c)	-38.48	-38.48	-10.36	-0.07	-0.68	-0.94	-0.94	---	---
No. 4 Coke Oven Gas Pump (06070023)	(c)	-77.30	-77.30	-117.97	-0.02	-0.99	-0.64	-0.64	---	---
Net Emissions Change		**-103.25**	**-103.25**	**83.12**	**-1,214.08**	**37.61**	**279.04**	**220.28**	**0.20**	**-32.09**
Significance Threshold:		40	40	100	40	40	25	15	0.6	7
Greater Than Significant?		No	No	No	No	No	Yes	Yes	No	No

Notes:

a. The contemporaneous time period for PSD pollutants is April 2002 through July 2008. The contemporaneous time period for NA NSR pollutants is July 2001 through July 2008.

b The COG desulfurization project (excludes Boilers 1-10 shutdown and Slab Furnaces) results in a contemporaneous PM/PM_{10} emission decrease of 94.15 tons. 31.74 tons of this decrease is being relied upon for use as an offset. This portion of the decrease is no longer available, e.g., future netting transactions.

c. Future decrease in emissions; date not yet established..

Attachment 3. List of Material Handling Emission Units and Proposed BACT/LAER Controls

Emission Unit	Description	Emission Control
Coal Unloading	Coal is delivered to the plant and unloaded.	Enclosure, wet suppression
Coal Storage Silo	Coal is stored in a silo to minimize dust and maintain proper moisture content.	Work practices
Coal Conveyors	Conveyors move the coal from one area of the plant to another.	Enclosed transfer points and covered belts (with exception of those connected to the tripper which are unenclosed/un-covered for safety), moisture content
Coal Sizing	Coal enters the plant in various sizes. Crushing/Screening sorts the coal into preferred sizes.	Enclosure, moisture content
Coke Conveyors	Conveyors move the coke from one area of the plant to another.	Enclosed transfer points and covered belts (with exception of those at coke wharf which are unenclosed/un-covered for safety), moisture content
Coke Crushing	Coke, which has been removed from ovens and quenched, is crushed.	Enclosure, baghouse
Coke Screening	Crushed coke is screened to provide required size.	Enclosure, baghouse
Emergency Coke Storage Pile	An emergency coke storage pile is available in the event processing through the screening and crushing area is not available.	Work practices