Commonwealth of Kentucky
Division for Air Quality

EXECUTIVE SUMMARY

PROPOSED
Title V, PSD, Construction/Operating
Permit: V-13-007
SunCoke Energy South Shore, LLC
South Shore, KY 41175
April 1, 2014
Sandra M. Cooke, Reviewer

SOURCE ID:	21-089-00047
AGENCY INTEREST:	105793
ACTIVITY:	APE200120001

SOURCE DESCRIPTION:

SunCoke Energy South Shore, LLC (SESS), owned by SunCoke Energy, Inc., has applied to construct and operate a metallurgical coke production and heat recovery electrical plant in Greenup County, Kentucky. The facility will be located on an approximately 254 acre site, consisting of coal handling and preparation equipment, heat recovery coke ovens, coal charging, coke pushing and handling equipment, a quench tower, coke storage facilities, various administrative and support buildings, and associated air pollution control equipment. In addition, waste heat recovery steam generators (HRSGs) and a steam turbine will be installed to recover heat from the process gases to produce electricity.

The coking process involves heating coal in ovens to drive off volatile compounds until only the carbon and ash remain. Heat recovery ovens then oxidize (burn) the volatiles to produce heat for creating steam to drive steam turbines that produce electricity.

Coal is received via barges on the river. At the unloading station, the coal is removed from the barge and loaded into a coal hopper, which discharges the coal onto a partially covered conveyor that transports the coal to the storage area on the plant site. At the storage area, coal is placed in one of four piles by a radial stacker arm that adjusts to minimize the drop height of the coal and therefore minimize emissions. A crane or a front end loader moves coal from the piles to a conveyor that transports the coal to the coal crushing building. This equipment is also designed and used to minimize the drop height of the coal. Coal received from the storage piles enters the coal crushing building, where the coal is reduced to the appropriate size for use in the ovens and transferred to the East and West storage bins before coking

A mobile pushing/charging machine is loaded with the crushed coal, which then charges the coal into an oven in one of the two batteries of ovens. There are 120 coke ovens arranged in two separate banks, East and West, with a combined capability of carbonizing up to 1,226,400 tons per year (tpy) of coal and producing up to 831,100 tpy of metallurgical coke. There are two pushing/charging machine (i.e. one for each bank of ovens), each with a maximum loading capability of 10 ovens per hour. The pushing/charging machine is equipped with a traveling hood/baghouse system to control charging emissions that escape from the negatively pressured ovens. The ovens are kept at negative pressure to minimize emissions and allow the intake of additional air to aid in the carbonization process.

Once the crushed coal is loaded into an oven, the coal is heated (temperatures of 1,600°F to 2,400°F) to vaporize combustible volatile compounds. The gases are pulled through sole flues, and the common tunnel, where combustion of the gas is completed to release heat and destroy some pollutants. Natural gas lances may also be used through ports to boost heat in the ovens and/or afterburner tunnel to keep them hot during maintenance activities and during extremely cold weather. The heat released from combusting the gases in the flues and tunnel is routed to Heat Recovery Steam Generators (HRSGs), which use the heat to create steam for running an electricity generating turbine capable of producing 40-75 MW of power. It is possible that the natural gas lances may be needed to augment the heat going to the HRSGs in a non-routine situation requiring extra power production.

The HRSGs also serve to cool the gases to protect the downstream emission control devices placed before the main emission stack. Three HRSGs will be in use on this site to allow for maintenance/repair without direct flue gas release to atmosphere.

At the ovens, the coal to coke cycle takes 48 hours for each bed of 48 to 50 tons or 24 hours for each bed of 28 tons. Once the volatiles have been completely released from the coal, the material bed has become coke and is ready for pushing and quenching.

A mobile machine pushes the hot, coke loaf onto a mobile flat push hot car. The coke then travels to the end of the battery where the bed is transferred to a quench car. The flat push hot car is equipped with a multicyclone to capture pushing emissions. The flat push hot car travels to a stationary quench tower at the end of the oven batteries where the intact coke loaf is drenched with water. Emissions are controlled through the use of water containing a low amount of total dissolved solids and through a special baffle design used in the tower.

After quenching, coke may be transferred to the coke crushing and screening building, where the coke is sized for different applications. Screening separates the different sizes of coke and the enclosure and baghouse filters help control emissions at this point. Coke that does not go immediately to crushing and screening is transferred to the coke storage pile, where a radial stacker minimizes coke drop height and thereby minimizes emissions. A front end loader moves coke, as needed, from the pile to a conveyor that supplies the crushing and screening building. Undersized coke (breeze) is stored in bunkers. Coke product maybe loaded into railcars or trucks for delivery to purchasers and unsold breeze may be recycled by blending it into coal charge. The site will also have roadways, storage silos, storage tanks, support buildings, and a cooling tower associated with the turbine. Diesel engines will power cranes, emergency generators, and fire pumps.

During Start-up, temporary natural gas burners are used at each oven to begin the heating, dry-out and curing of the silica bricks and cast refractory materials in the ovens, crossover tunnel, HRSG header and emergency stacks. With the loading of a full charge of metallurgical coal, the gas burners are permanently removed and the brick and refractory materials are heated to full operating temperature. Start-up occurs one bank of 60 ovens at a time to accommodate limits on natural gas make-up availability. Start-up can occur only once as coke ovens cannot be shut-down and restarted without shortening the service life of the equipment. Repeated heating and cooling will cause thermal spalling and even structural failure of the ovens.

The new facility is expected to be a source of both stack and fugitive emissions of criteria pollutants Particulate Matter (PM), Particulate Matter 10 microns diameter and smaller (PM_{10}), Particulate

Matter 2.5 microns diameter and smaller ($PM_{2.5}$), Sulfur Dioxide (SO_2), Nitrogen Oxides (NOx), Carbon Monoxide (CO), Volatile Organic Contaminants (VOCs), and Lead (Pb) as well as the Hazardous Air Pollutants (HAPs) including, Hydrochloric Acid (HCl), Mercury (Hg) and various other HAPs in small amounts. Greenhouse gases (GHGs) will also be emitted, and will be comprised of mostly Carbon Dioxide (CO_2). The other GHGs expected from the processes include small amounts of methane and Nitrous Oxide (N_2O). Finally, two pollutants, gaseous fluorides (HF) and hydrogen sulfides (HS), are expected to be emitted below Kentucky ambient air quality standards.

PUBLIC AND AFFECTED STATE REVIEW:

Affected states Ohio and West Virginia were notified of the issuance of the draft permit on December 22, 2013 via e-mail. On December 26, 2013, the public notice on availability of the draft permit and supporting material for comments by persons affected by the plant was published in *The Greenup County News-Times* in Greenup County, Kentucky. The public comment period expired 30 days from the date of publication. No other states are affected by this permit action.

Comments were received from SunCoke Energy, Inc. (through URS Corporation consultants) on January, 24, 2014; the U.S. Environmental Protection Agency on January 27, 2014; and the Sierra Club on January 27, 2014. Attachment B lists the comments received, the Division's response to each comment, and a detailed explanation of the changes made to the permit and Statement of Basis. Minor changes were made to the permit as a result of the comments received.

Additionally, a BACT requirement that the quench tower utilize the advanced baffle design for reducing PM emissions be incorporated and verified has been added to the operational limits for unit EU09. The baffle design, which increases the impact surface of the baffle and enhances PM removal, was suggested as part of the BACT for quenching in the application. It was accepted as a BACT element by the Division, but the requirement was inadvertently left out of the permit. It is mentioned in the description for EU09, but has now been added as an operational requirement. Compliance is through submitting a report verifying the design used, which is a requirement for all design elements accepted as BACT for the facility.

Finally, DAQ established the drift rate and throughput of the cooling towers as BACT. However, as the result of a comment, a TDS limit of 1500 mg/l also has been set to ensure emissions of PM are limited to the 0.6 tpy projected in the application calculations. A requirement to maintain the drift eliminators in accordance with manufacturer's recommendations for proper operation also has been added to monitoring requirements.

Minor changes were made to the permit as a result of the comments received and a requirement added that had been inadvertently left out of the Draft; however the Division has concluded that the proposed operation will comply with all air quality regulations and requirements. Therefore, the Division has made a final determination to issue a proposed permit. A final permit will be issued after the United States Environmental Protection Agency's (U.S. EPA) 45-day review.