# Environmental Comparison of the Heat Recovery Process and Competing Technologies

**By operating under negative pressure, air emissions are avoided with heat recovery ovens. With the absence of byproduct operations, wastewater effluent is also avoided.**

Over the past four decades, Sun Coke Co. (Sun) has made significant improvements in process and environmental control of its proprietary heat recovery coke technology. This process is also referred to as nonrecovery cokemaking, because there is no chemical recovery facility. Coke production for Sun started in 1960 with Mitchell beehive-type coke ovens at Jewell Coal and Coke Co. (Jewell) in Vansant, Va. In 1998, Sun unveiled Indiana Harbor Coke Co., L.P. (IHCC), featuring plant-wide heat recovery, power generation and flue gas cleaning. Heat recovery technology produces high-quality blast furnace coke and electrical power in an environmentally friendly manner. Heat recovery ovens emit extremely small amounts of hazardous air pollutants (HAPs), low criteria air pollutants and no wastewater effluents or hazardous solid wastes. The low hazardous emission rate from heat recovery technology was acknowledged by the U.S. Congress in the Clean Air Act Amendments as the standard for new coke-oven construction, listing the technology as maximum achievable control technology (MACT) for cokemaking.[1,2,3]

In July 2001, the U.S. EPA issued proposed National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coke Ovens—pushing, quenching, battery stacks and a Revised Draft Emission Factor Documentation for AP-42 Section 12.2, Coke Production.

Potential air emissions generated from coking 1,000,000 tonnes of coal using heat recovery and byproduct technology are compared in this analysis. The basis for calculating emissions is the Draft EPA emission factors. Emissions from Sun's operations are also compared to data for state-of-the-art European coke facilities. Both emission comparisons indicate that the use of heat recovery coke technology in replacing existing coke ovens would significantly reduce worldwide coke-oven emissions.[3,4,5,6]

There are little or no data available for the beehive coke process or other competing nonrecovery processes. This lack of data was shown in 1999 when a competing nonrecovery technology used Sun's emission data to develop a permit package for a proposed facility in Ohio. Worldwide, a few operations use technology similar to Sun's process for cokemaking, but none are generating electricity. No attempt has been made to compare potential air emissions from these coke processes.

Figure 1

Three Mitchell test ovens in operation, circa 1960.

## Historical Background

Sun's heat recovery coke technology was initiated in 1960 with the construction of three Mitchell test ovens (Figure 1). The success of these ovens led to the construction of 250 modified Mitchell ovens in 1962. The 1962 ovens included top charging, hot coke pushing, external quenching and increased capacity. Emissions from these ovens differed little from the beehive-type coke ovens used in the U.S. in the early- to mid-1900s


Authors

**Christopher P. Allen**, Senior Engineer, and **Robert P. Huffman**, Construction Manager, Sun Coke Co., Knoxville, Tenn.