

FINAL TECHNICAL REPORT  
September 1, 2006, through April 30, 2008

Project Title: **COMPLETION OF STARTUP AND TESTING OF A COAL-FIRED  
BOILER RETROFIT**

ICCI Project Number: DEV06-3  
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ABSTRACT

Bunge installed a coal gasification retrofit to the No. 1 boiler at its soybean processing facility in Cairo, Illinois. Prior to the retrofit, the boiler had to burn a blend of Kentucky coal with a smaller amount of higher sulfur Illinois coal in order to meet EPA air quality permit limits. The intent of the project was to allow the boiler to burn 100% Illinois coal and maintain operation within the air permit limits at the same steam generation level as it achieved prior to the retrofit.

The intent of this project was to complete the startup and testing of the boiler retrofit. The retrofit was considered to be new technology and the risks of failure were understood. During installation and subsequent startup and testing, many deficiencies were discovered in the original process design, equipment selection and installation. Repeated attempts to startup and maintain a continuous run for testing resulted in a number of shutdowns requiring lengthy and costly changes to the system. While many of these changes were made, three separate reports by independent third parties still found fundamental problems with the retrofit's ability to meet the project goals. The findings resulted in Bunge's conclusion that the system has basic flaws which cannot be overcome and therefore Bunge has discontinued startup and testing. Plans are underway to research alternate technologies to retrofit or replace the boiler with the intent of using 100% Illinois coal as a priority.

## EXECUTIVE SUMMARY

The Bunge North America, Inc. Cairo, Illinois facility operates two  $125 \times 10^6$  Btu/hr coal fired stoker boilers to generate the steam for soybean processing. These boilers must meet an Illinois EPA air quality permit of 1.8 lb. / $10^6$  Btu for SO<sub>2</sub> (sulfur dioxide) emissions, a maximum of 0.69 lb./ $10^6$  Btu of NO<sub>x</sub>, (nitrogen oxides) and 0.1 lb./ $10^6$  Btu of particulates (fly ash). A bag house located downstream of the boiler provides the necessary particulate control, but the SO<sub>2</sub> emission limits require the use of a selected premium-priced low-sulfur coal. Coals that meet the specifications are found in Kentucky and/or from as far away as West Virginia, and must be imported to the facility at a price of about twice the cost of the local higher-sulfur Illinois coals.

Bunge, with Grant funding support from the State of Illinois Office of Coal Development, Department of Commerce and Economic Opportunity (DCEO), contracted with a technology provider to design and furnish a modified coal gasification process. This process was purported to be an advanced hybrid of coal gasification / combustion that prevents the formation of SO<sub>2</sub> and NO<sub>x</sub> within the burner / boiler itself.

The purpose of the retrofit was to allow the Cairo facility to burn local Illinois coals and thereby reduce operating costs with improved boiler efficiency, as well as comply with the stringent State and Federal air quality limits for sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) emissions.

The retrofit fell short of expectations, and required redesign and modifications during the final stages of the original installation at significant added cost. When it became apparent that the system had deficiencies that could not be reasonably corrected, Bunge engaged the services of three consultants to perform reviews of various aspects of the mechanical equipment, and process theory. The findings resulted in Bunge's conclusion that the system has basic flaws which cannot be overcome and therefore Bunge has discontinued startup and testing. Plans are underway to research alternate technologies to retrofit or replace the boiler with the intent of using 100% Illinois coal as a priority.

**The remainder of this report contains proprietary information and is not available for distribution except to the sponsors of the project.**