Commercial-scale test of new technology to recover coal from sludge successful

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A new technology for removing water from ultrafine coal slurry has been successfully tested at the commercial scale at an operating coal cleaning plant. The technology offers the possibility of reducing the coal slurry impoundment problem from the source. A peer-reviewed paper on this new technology was presented Sept. 15 at the 13th Australian Coal Preparation Society Conference, Cairns, Queensland.

Cleaning coal after it has been mined is done with water. The bulk of the coal mined is relatively coarse in size and, therefore, can be readily washed of impurities and subsequently dewatered. However, a portion of mined coal is smaller than approximately 30-40 microns - something like the size of talcum powder - and is difficult to dewater after cleaning, said Roe-Hoan Yoon, the Nicholas T. Camicia Professor of Mining and Mineral Engineering in Virginia Tech's College of Engineering. As a result, finer coal is often discarded to slurry impoundments. There are hundreds of sludge impoundments in the U.S., mostly in Appalachia, creating environmental and safety concerns, said Yoon.

Yoon presented the paper in Australia with co-author Wally Schultz, executive vice president of Decanter Machine Inc. of Johnson City, Tenn., the largest supplier of screen-bowl centrifuges internationally.

Yoon, Gerald Luttrell, Massey Professor of Mining and Mineral Engineering, and their colleagues at the Center for Advanced Separation Technologies (CAST) at Virginia Tech have developed a hyperbaric centrifuge that was patented by Virginia Tech Intellectual Properties Inc.

and sublicensed to Decanter Machine. "The new technology compliments what Decanter already has," said Yoon.

Encouraged by the results of a pilot-scale test conducted in 2009, Jim Walter Resources Inc. of Brookwood, Ala. (Walter Energy Inc.) tested a full-scale commercial unit successfully. "Everything has performed as promised by Decanter," said Joel Franklin, preparation engineer for Jim Walter Resources.

In the pilot-scale test, coal slurries consisting of ultrafine coal were dewatered to less than 20 percent moisture. "The product coal feels like dry powder when you touch it because the water left with the coal is spread so thinly across its large surface area," Luttrell said.

According to a National Research Council report, the U.S. coal industry discards annually 70 to 90 million tons of fine refuse to slurry impoundments. "The dewatering technologies developed by CAST will help coal companies recover all of the mined coal. The technology can also be used to recover the coal in existing impoundments, which can help clean-up the environment and create jobs in the coal producing regions like Southwest Virginia," said Congressman Rick Boucher (D-VA 9th District), who has supported funding for CAST and other energy projects.

"We are very optimistic," said Decanter Machine Inc. President Ken Robinette.

The centrifuge technology is the most recent of the advanced technologies developed by CAST. Microcel™ flotation column was the first major separation technology developed. It uses microbubbles to separate fine coal from mineral matter that becomes ash when burned at power plants and from other impurities, and is used widely in Australia.

As part of a project funded by National Energy Technology Laboratory (NETL), CAST has developed two other advanced dewatering processes. One is the novel dewatering aids that are currently marketed by Nalco Company. The other is a technology that may be more useful for recovering and dewatering the ultrafine coal from existing impoundments, according to Yoon. Virginia Tech has applied for a patent for this new technology.

In June 2010, Yoon testified before the subcommittee of the West Virginia Legislature's Joint Standing Committee that was charged with addressing the issues concerning coal slurry impoundments. Yoon suggested that the CAST research funded by NETL can offer technological solutions.

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