

# Industrial Technologies Program

## Using the GranuFlow™ Process in Coal Preparation Plants

### GranuFlow Technology Implementation in Coal Preparation Plants to Improve Energy Efficiency and Reduce Coal Processing Wastes

Over two billion tons of waste coal fines are estimated to be in slurry impoundments, with an additional 50 million tons being added each year. This results in a poor use of land and a loss of energy resources.

These impounded fines are produced during coal cleaning. Although impounded fines may contain 75 percent high-quality coal, much of this energy resource is lost during cleaning and dewatering. This occurs because fines are very difficult to capture with existing cleaning technologies. Even when fines are captured, they present problems. Due to a high surface area to weight ratio, fine-sized coal carries a high moisture load that can cause materials handling problems, such as sticking in bins and freezing in winter, as well as reducing boiler efficiency from heat required to evaporate moisture. Fines can be thermally dried, however, they are very dusty and the process is expensive and energy intensive. A significant proportion of thermally-dried fines can be lost as wind borne dust, resulting in a loss of valuable fuel.

The proposed cleaning technology to be implemented is known as the GranuFlow process. GranuFlow technology involves adding an emulsion of asphalt, or similar binder, to fine-sized coal slurries before mechanical dewatering begins in equipment like vacuum filters or centrifuges. The binder selectively agglomerates the coal, but not the clays or other mineral matter. These larger agglomerated fines are more efficiently captured during cleaning and dewatering, which reduces the size and number of impoundments. In addition, the agglomerated

fines form a more permeable filter cake during mechanical dewatering. This decreases cake moisture and possibly eliminates the need for thermal dryers, resulting in energy savings. Finally, the emulsion can be added before flotation as a collector, providing many benefits from this technology, while reducing or eliminating the need for petroleum collectors.

GranuFlow has a high potential for enhancing the economic competitiveness of the domestic coal mining industry by reducing coal cleaning costs through the reduction of coal loss, the need for thermal dryers, and the size of impoundments. Furthermore, the technology makes fine-sized coal a more acceptable fuel by reducing moisture, improving materials handling characteristics, reducing dusting problems and, possibly, reducing freezing problems. In addition to cost savings, GranuFlow reduces the environmental problems associated with dusty coal, impoundments and thermal dryers.



### Benefits for Our Industry and Our Nation

- *Saves energy by increasing the recovery of coal in the fines circuit by as much as 30% while decreasing cake moisture by as much as 20%.*
- *Reduces or eliminates the use of petroleum collectors in froth flotation.*
- *Diminishes environmental problems associated with dusty coal, impoundments, thermal dryers and the use of transportation fuel to move coal to market.*

### Applications in Our Nation's Industry

The GranuFlow technology has application in recovering coal from existing impoundments, which would reduce the size of existing impoundments. It also will be applicable to all existing and future plants cleaning coal. Furthermore, it has a high potential for enhancing the economic competitiveness of the domestic coal mining industry.

## Project Description

Goal: To demonstrate GranuFlow at commercial-scale in order to provide the performance information and evidence of operability necessary to commercialize the technology.

## Milestones

- Evaluate full-scale operating conditions at three commercial coal preparation plants to determine operating performance and economics.
- Compare the handling, storage, and combustion properties of the coal produced by this process to untreated coal during power plant combustion tests.



**This 6-inch, screen-bowl centrifuge was used by Dr. Wen, U.S. Department of Energy, for POC testing of the GranuFlow Technology.**

## Project Partners

CQ, Inc.  
Homer City, PA

EME Homer City Generation L.P.  
Homer City, PA

PBS Coals, Inc.  
Friedens, PA

Alliance Coal LLC  
Oakland, MD

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



U.S. Department of Energy  
Energy Efficiency  
and Renewable Energy

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