PROJECT FACTS

UNIVERSITY OF KENTUCKY
CENTER FOR APPLIED ENERGY RESEARCH

Improving Densification of Fine Coal Refuse Slurries to Eliminate Slurry Ponds

Project Complete: 2008

PARTICIPANTS

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SPONSORS

US Department of Energy
KSEF

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Increased mechanization in underground coal mining has decreased selectivity and increased the amount of refuse created. Coal preparation separates non-combustible material from coal. Thus, a coal preparation plant separates the material it receives into a product stream and a reject stream, which may be further divided into coarse and fine refuse streams. 20 to 50 % of the run-of-mine material ends up in reject streams. One of the reject streams is a slurry stream. This is a blend of water, coal fines, silt, sand, and clay, which is commonly disposed of in an impoundment. The coal industry monitors impoundments constantly and maintains the dikes holding the slurry. There have been several incidents of impoundment breakthrough. Of these, Buffalo Creek in WVA in 1972 and recently, Martin County Coal in KY, have drawn the attention of federal and state governments and citizens due to loss of life and property.

In this project the paste thickening technology was evaluated on two types of slurries: conventional thickener underflow and; thickener feed, using the Dorr Oliver EIMCO Deep Cone Thickener technology.

The main goal of the study was to produce a paste-type material for both the slurries, which can be stacked at a low angle of repose rather than stored in a pond. Disposal of waste coal slurry in the paste form will completely eliminate the danger of slurry spills due to dam breakage. The research program included basic flocculation studies of the slurries and rheological studies of the flocculated material.

Pilot-scale study of the conventional thickener underflow containing about 25 weight percent solids using the Deep Cone Thickener provided a paste containing 55 weight percent solids. The thickener underflow was treated with about 200 g/t of anionic and 100 g/t of cationic flocculants before being fed to the Deep Cone Thickener. The retention time of the slurry in the thickener was about six hours. Similarly, using a thickener feed containing about 3 weight percent solids after treatment with the anionic and cationic flocculants was thickened to 50 weight percent solids. The yield stress of the thickened material was about 150 pa, indicating the ability to easily pump the paste. The results of the study showed that the Deep Cone Thickener could be used in the coal industry to handle the refuse slurry to produce a paste. Commercial units have since been installed in the U.S.