

Underground Placement of Coal Processing Waste and Coal Combustion By-Products Based Paste Backfill for Enhanced Mining Economics

Y.P. Chugh, D. Deb, D. Biswas

Southern Illinois University at Carbondale
Carbondale, Illinois 62901-6603
Correspondence e-mail: ypchugh1@yahoo.com

ABSTRACT

This project has successfully demonstrated that the extraction ratio in a room-and-pillar panel at an Illinois mine can be increased from the current value of approximately 56% to about 64%, with backfilling done from the surface upon completion of all mining activities. This was achieved without significant ground control problems due to the increased extraction ratio. The mined-out areas were backfilled from the surface with gob, coal combustion by-products (CCBs), and fine coal processing waste (FCPW)-based paste backfill containing 65%-70% solids to minimize short-term and long-term surface deformations risk. This concept has the potential to increase mine productivity, reduce mining costs, manage large volumes of CCBs beneficially, and improve the miner's health, safety, and environment.

Two injection holes were drilled over the demonstration panel to inject the paste backfill. About 9,293 tons of paste backfill were injected through this borehole with a maximum flow distance of 300-ft underground. A high-speed auger mixer (new technology) was used to mix solids with water and inject through the second borehole. About 6,000 tons of paste backfill were injected underground through this hole. Underground backfilling using the "Groutnet" flow model was simulated. Studies indicate that grout flow over 300-foot distance is possible. Approximately 20,000 to 25,000 tons of grout may be pumped through a single hole.

The cooperating coal company performed engineering economic evaluation studies for commercialization. They found that the costs for underground management at the mine would be slightly higher than surface management at this time. The developed technologies have commercial potential but each site must be analyzed on its merit. The Company maintains significant interest in commercializing the technology.