



POWER GENERATION & UTILITY FUELS

PROJECT FACTS

UNIVERSITY OF KENTUCKY
CENTER FOR APPLIED ENERGY RESEARCH

Novel Approach to Controlling Acid Mine Drainage

Completed: 2008 PARTICIPANTS

UK Center for Applied
Energy Research
Peabody Energy

SPONSORS

Kentucky Science &
Engineering Foundation
(KSEF)

COST SHARING

KSEF \$ 79,113
UK \$ 67,676
Industry \$ 12,000

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The mining and mineral processing of ores, including coal, generate huge quantities of tailings and waste rock containing metal sulfides, particularly pyrite (FeS_2) and pyrrhotite (Fe_{1-X}S). These sulfides undergo atmospheric and aqueous oxidation, producing large quantities of acid-mine drainage, which is responsible for widespread water and land pollution. This project developed a novel approach for minimizing acid mine drainage problems through at-source pyrite stabilization by coating the pyrite surfaces with an inert hydrophobic film that is impermeable to both oxygen and water--the necessities of acid production. The coatings utilized the driving forces of pyrite oxidation and inhibited the production of acid drainage. The inert hydro-phobic coating on the pyrite surface was achieved by application of dilute solutions of an anionic/cationic surfactant.

This surfactant coating on the pyrite significantly reduced acid production for a considerable period. The coating was chemically adsorbed on the surface and was found to be too difficult to remove using harsh abrasive conditions. The study also found that a combination of two surfactants was little better than a single surfactant coating. The research findings will have significant effect in controlling acid mine drainage problems in the coal and sulfide mineral industries.

