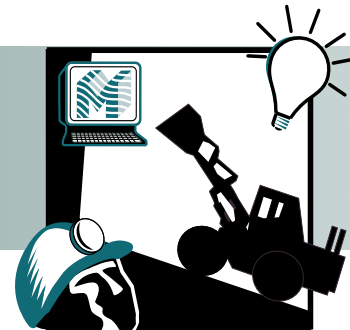


MINING

Project Fact Sheet



SELECTIVE FLOCCULATION OF FINE MINERAL PARTICLES

BENEFITS

- Decreases energy use per unit of material recovered
- Recovers valuable fines that are currently lost to waste
- Decreases tailings production

APPLICATION

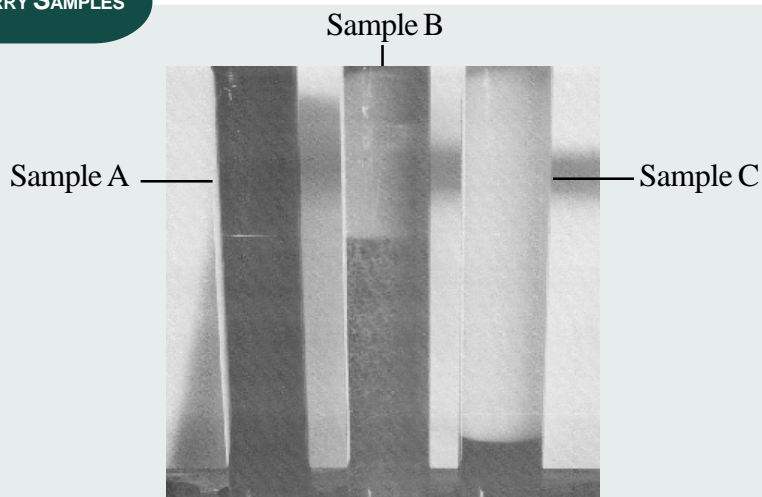
Selective flocculation technology developed in this project could be adapted for use by many separations plants that lose valuable minerals that are too fine to be recovered with other technologies.

SEPARATION TECHNOLOGY WILL INCREASE RECOVERY OF FINE MINERALS LOST TO WASTE

Selective flocculation will improve fine particle recovery and increase energy efficiency in the minerals processing industry. An additional benefit is a significant decrease in tailings production. Flocculation may be used to separate two or more finely divided minerals in a dilute slurry. Currently, flocculation is used in dewatering and clarification unit operations and a variety of flocculants and methods are available for bulk or nonselective flocculation. Selective flocculation, the flocculation of one mineral constituent from a slurry of several dispersed mineral types, has been used sparingly in industrial practice. Its widespread application has been limited by the difficulty in controlling the parameters that affect selectivity and by high reagent costs.

Successful selective flocculation technology for one mineral system will form the basis for future investigations of process modifications; this will enable transfer of the technology to other mineral systems. Research includes development and improvement of selective flocculation as a beneficiation method for fine phosphate and coal. Reagents, equipment, and procedures are being screened, modified, and designed to take advantage of slurry characteristics that are common to all mineral systems.

DILUTE SLURRY SAMPLES



Selective flocculation may be used to separate two or more finely divided minerals in a dilute slurry. With appropriate reagents under the right conditions in the dispersed slurry (sample A), one of the constituents flocculates (dark aggregates in the bottom of sample B) and settles or is otherwise separated from the unflocculated constituents that remain in suspension (sample C).



Project Description

Objective: Develop successful selective flocculation technologies that improve recovery of fines in mineral and coal beneficiation processes.

The second year of work will focus on continuation of bench-scale testing to reach targets set by the industrial partners, and optimization of the processes developed. In the case of bituminous coal, targets have been met and a continuous process will be demonstrated in the second year. Phosphate materials are responding positively to processes developed and testing will be continued. Investigations are focusing on low-anionicity flocculants of various molecular weights, and staged processing to clean the product. If warranted, the processes will be scaled up for in-plant demonstrations.

Progress and Milestones

This project completed the following activities:

- Phosphate and coal samples were thoroughly characterized in the first year to determine chemistry, mineralogy, size distribution and surface properties.
- A standard selective flocculation bench-scale test procedure was developed and implemented with three types of materials: bituminous coal, Florida phosphate clays, and Western phosphate processing fines.
- Bench-scale flocculation test identified good conditions and reagents for concentration of the desired products from all three materials. Flocculants, dispersants, pH conditions, stirring and smelting conditions were evaluated.

This project includes the following activities:

- Continue sampling and bench-scale flocculation testing
- Continue development of process control for phosphate selective flocculation
- Scale up to pilot-scale level
- Demonstrate pilot-scale circuits
- Publish results



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November 1999
(revised December 2000)