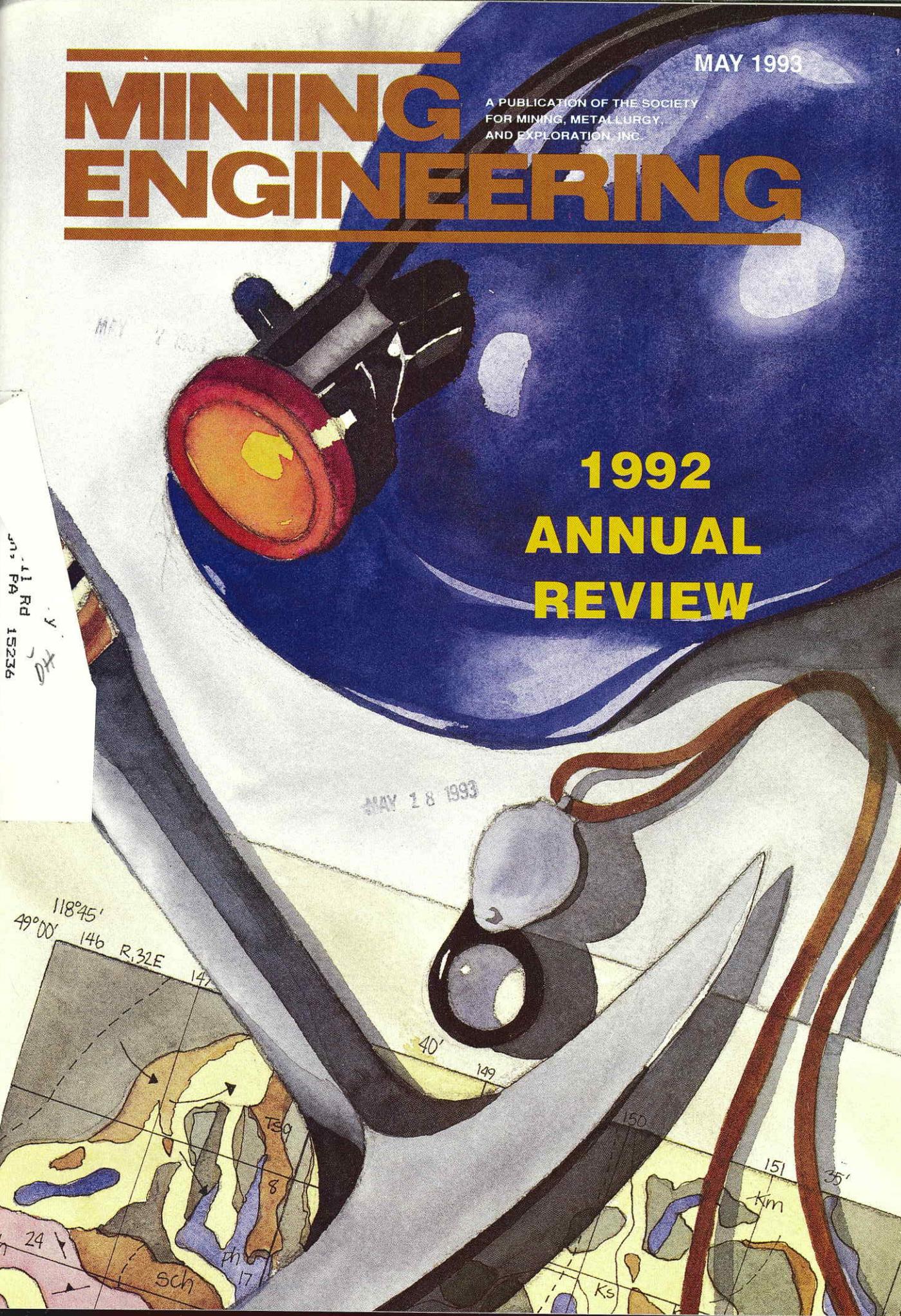


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1992 ANNUAL REVIEW



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DEPARTMENTS

| | |
|-----|-------------------------------|
| 424 | The drift of things |
| 425 | President's page |
| 426 | Washington survey |
| 427 | GEM facts |
| 431 | Letters to the editor |
| 447 | Industry newswatch |
| 518 | New books |
| 519 | Coming events & short courses |
| 522 | Free literature |
| 523 | New products |
| 525 | Reader service card |
| 527 | SME news |
| 533 | Personal news |
| 534 | Employment |
| 535 | Classified ads |
| 535 | Membership |
| 536 | Professional services |
| 546 | Index of advertisers |

SPECIAL ISSUE: 1992 ANNUAL REVIEW

461 EXPLORATION

| | |
|--------------------|-----|
| Introduction | 461 |
| Geochemistry | 462 |
| Alabama | 463 |
| Alaska | 463 |
| Arizona | 464 |
| California | 465 |
| Colorado | 466 |
| Idaho | 468 |
| Illinois | 469 |
| Indiana | 470 |

| | |
|--------------------|-----|
| Kentucky | 472 |
| Minnesota | 472 |
| Missouri | 473 |
| Nevada | 474 |
| Pennsylvania | 474 |
| South Dakota | 475 |
| Utah | 476 |
| Virginia | 478 |
| Washington | 479 |
| Wyoming | 480 |

ANNUAL REVIEW

Each May, **MINING ENGINEERING** reviews what happened in the minerals industry the previous year. This year, that review begins on page 461 with the exploration section. In the June issue, we will profile industrial minerals activity in 1992.

483 MINING

| | |
|-----------------------|-------|
| Introduction | 483 |
| Geomechanics | 484 |
| Health & safety | 485 |
| Hydrology | 485 |
| | |

| | |
|------------------------------|-----|
| Mechanical mining | 486 |
| Open-pit mining | 487 |
| Operations research | 487 |
| Research & development | 488 |
| Surface mining equipment ... | 491 |

THANK YOU

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493 COAL

| | |
|-----------------------------|-----|
| Introduction | 493 |
| Environmental activity | 495 |
| Health & safety | 496 |

| | |
|-------------------------------|-----|
| Preparation | 496 |
| Research & development | 498 |
| Underground ventilation | 501 |

502 PROCESSING

| | |
|----------------------------|-------|
| Comminution | 502 |
| Concentration | 504 |
| Energy minerals | 506 |
| Flocculation, dewatering . | 507 |
| | |

| | |
|---------------------------------|-----|
| Flotation chemistry | 507 |
| Flotation process analysis ... | 510 |
| Industrial waste treatment ... | 513 |
| Instrumentation & control | 515 |
| Process mineralogy | 517 |

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437 Presidents' Report on the 1992 activities of the Society for Mining, Metallurgy, and Exploration, Inc.

coal used. While the approach is not novel, any research that adds to the knowledge regarding the processing of lignite is a welcome addition to the limited processing information available.

In "The Beneficiation of Martin Lake Texas Lignite," Cronauer et al. (*Fuel* Vol. 71, pp. 65-73) reported that "Martin Lake lignite from Wilcox County, yields a moderate level of ash (11.3%) and combustion has 13% inertinite macerals. Both act as diluents during liquefaction. A beneficiation process comprised of size selection, aqueous sulfur dioxide treatment and sink float separation using heavy media was shown to be effective. With laboratory scale equipment, the combined process gave a lignite product with 2.5% ash. A lignite recovery of 82% was achieved. Petrographic analyses showed that inertinite was concentrated in the high gravity fractions. Liptinite macerals were associated with mineral matter."

In systems where liquefaction of coal is the objective, heating might be considered acceptable. In this context, Rao et al. (*Minerals and Metallurgical Processing*, Vol. 9, pp. 41-47) reported that heating for dehydration raises the calorific value of such coals and improves grindability and mineral liberation properties. They concluded that "an increase in hydrothermal drying temperature promotes vesiculation of resinite. Also, ulminite reflectance increased to 0.92% and ulminite was subject to widespread vesiculation. This resulted in a coke-like structure indicative that the material went through the fluid stage."

Lu and Do presented a paper that would make an interesting environmental technology publication (*Fuel*, Vol. 71, pp. 809-813). The authors reported on an investigation that proposed to use coal washery rejects in the capture of SO_x and NO_x gases that one may generate in the combustion of coal once it is cleaned. They concluded that "there is an optimal micropore structure that makes or breaks the effective usage of this material, after drying, in the absorption of noxious gases." In view of the fact that there are several alternatives to this material for the removal of SO_x and NO_x gases, the study is valuable in proving that the use of such materials is not the most feasible for this purpose.

A fundamental paper by Li, Yu and Somasundaran (*Colloids and Surfaces*, Vol. 66, pp. 39-43) is worthy of note. The authors described the use of a "film levitation technique" and experiments with polymeric substances that would influence the surface chemical proper-

ties of coal in flotation systems. It is the generation of more fundamental knowledge than the practical consequences of this study that make it attractive. The authors find, essentially, that "at high dosages, the polymers cease to enhance hydrophobicity due to forming micellar aggregates." The similarity is striking of water-soluble polymer behavior in coal flotation as reported here and flocculation as it is known from the published literature. ♦

Flocculation and dewatering

B. J. Scheiner and S. K. Sharma,
US Bureau of Mines

Research in flocculation and dewatering continues to emphasize the development of better techniques to meet the increasing need for process efficiency and environmental regulations.

Hurdle described the criteria for choosing the appropriate dewatering technology. Issues discussed included feed characteristics, operational issues and technology options. The use of screw, belt and filter presses were explained as were centrifuges. Finally, the decision making process was discussed for choosing the right technology (*Fluid/Particle Separation Journal*, Vol. 5, December 1992, pp. 151-157).

Bendixen et al., discussed the use of a pre-coat filter aid that also removes trace metals from the process solution. Clarity of discharged process water has always been an issue. Recent regulations, however, require removal of trace amounts of heavy metal. The filter aid was discussed and its effectiveness for removal of heavy metals was emphasized in four case studies (*Advances in Filtration/Separation Technology*, Vol. 5, ed. Scheiner, Gulf Publication, 1993, pp. 368-376).

In the same volume, Kandrika et al. discussed the effect of metal ions and surfactant additions on vacuum filtration of fine coal (pp. 356-359). Metal ions such as copper, aluminum and titanium are discussed along with the effect of anionic surfactants.

A new method for flocculation of clay waste slurries was patented by Wilemon et al. (US patent 5,014,551, 1992). The technique describes a flocculation system for aqueous and non-aqueous systems.

Moody described the use of polyacrylamides in the mineral industry (*Mineral Engineering*, 1992, Vol. 5, pp. 479-492). The area discussed included

mineral slurries, filtration on belt presses, solid waste and centrifugation.

At the 1992 SME Annual Meeting in Phoenix, AZ, several papers dealt with selective flocculation. Spears et al. discussed the effect of hydrodynamics on polymer conformation (SME preprint 92-93). Behl et al. discussed the enhanced selectivity of polymer adsorption (SME preprint 92-157). The relationships were discussed between polymer adsorption selectivity and separation efficiency.

Misra et al. discussed the selective flocculation of fine coal with hydrophobic mycobacteria (SME preprint 92-87). El-Shall et al. discussed a mathematical model for settling of solid suspensions (SME preprint 92-176). The model was based on first order kinetics.

Hogg et al. discussed the sediment compressibility in thickening of flocculated suspension (SME preprint 92-214). Sharma et al. discussed the kinetics of dewatering clays and showed that PEO-flocculated material falls apart due to spreading of the polymer on the surface of the clays (SME preprint 92-126).

During 1992, several interesting papers appeared in the literature dealing with the fundamental aspects of dewatering and flocculation. Austin, et al., showed that hindered settling could be predicted by classification partition curves (*Minerals and Metallurgical Processing*, November 1992, pp. 161-168). In this paper, the Concha-Almonda batch settling treatment for a concentrated suspension was modified. This modification provides a predictive tool.

Hackenberg discussed the gravitational accelerated motion of spherical particles in the stokes regime (*Fluid/Particle Separation Journal*, Vol. 5, 1992, pp. 199-206). Based on first principles, the paper shows that the estimated motion response time can be calculated.

Sharma et al. discussed the modeling of capillary suction time of kaolin slurry. It was also shown that chemometrics can be used as a tool for predicting dewatering characteristics (*Advances in Filtration/Separation Technology*, Vol. 5, ed., Scheiner, Gulf Publishing, 1992, pp 319-326). ♦

Flotation chemistry

D.R. Nagaraj, American Cyanamid Co.

In 1992, there were more than 300 non-patent publications. The reduced

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