

Book news

I. Book reviews

● *Mining and metallurgical practices in Australasia*. Melbourne, Australian Institute of Mining and Metallurgy, 1981. \$40 (incl. surface postage).

Reviewer: M. G. Atmore

This tenth volume in the Monograph Series of the Australian Institute of Mining and Metallurgy is a most remarkable production. Conceived as a memorial to Sir Maurice Mawby, the outstanding figure of the Australian mining industry, originally perhaps as a duty, it has in the event turned out to be a labour of deep respect, if not love.

It contains more than three-hundred articles on the current practices in the mining industries of Australia and New Zealand, with Fiji and Christmas Island included. All conceivable minerals and types of mining for the recovery of this broad spectrum are extremely well covered, in each case by an expert in the field; in all, about three-hundred and thirty authors contributed. It is worth remarking in passing that, in spite of this considerable number, there is no discordance in style. The editing must have been a mammoth task. The twenty-two chapters cover all ferrous, non-ferrous, base, precious, energy, and industrial minerals, as well as articles on an outline of the industry, a summary of operating companies, mining and metallurgical research, and mining and metallurgical education.

Of particular interest is the chapter on other metals such as antimony, bismuth, cadmium, selenium, and tellurium. Their modern technology is particularly well described.

To some extent the book is reminiscent in the fields that it covers of the U.S. Bureau of Mines' *Mineral Facts and Figures*, but the treatment in the Mawby Monograph is deeper, broader, and of significantly higher technical quality.

In my opinion it will be a valuable acquisition, not only to libraries, both public and company, but also to individuals. It has been a pleasure to become acquainted with this volume.

● *Coal mine ground control*, by Syd. S. Peng. 1978.

Reviewer: C. F. Engelbrecht

In this clearly illustrated book, the author covers the theories of rock mechanics that are involved in the efficient underground mining of coal.

The book starts with some general definitions and typical layouts for pillar-type, longwall, and shortwall mining. It then gives various theories covering rock properties, as well as the influences of geological disturbances on mining excavations.

The design of underground excavations and the use of roofbolts as a method of support are covered, as are the theories involved in the stresses introduced on pillars that have been left for support.

A chapter is allocated to surface subsidence and all the theories related to this aspect of mining, and the instrumentation normally required by rock mechanics engineers is given detailed treatment.

The statistics and cases referred to are not related to South Africa, but the description of theories and practical applications certainly makes this a book that a rock mechanics engineer would find useful to have in his reference library.

● *Sixth Annual International Conference on Coal Gasification, Liquefaction and Conversion to Electricity, July 31 - August 2, 1979*. Pittsburgh, School of Engineering of the University of Pittsburgh, 1980.

Reviewer: S. T. J. van Rensburg

This book is a useful general reference volume on the topics covered provided a great deal of technical detail is not required from it. It consists of 29 papers, which are arranged under 6 headings.

I. Government Policy and Political Implications

The Carter Administration, the Department of Energy, the Congress, and those involved in the energy industry recognize the need for the development of a synfuels industry. The general public, however, is not as aware of this need, and the environmentalists oppose it.

The President's goal was to produce 2,5 million barrels a day of petroleum substitutes by 1990. To reach this goal the following incentives were proposed:

- an Energy Mobilization Board to strip away institutional barriers,
- an Energy Security Corporation to provide up to 88 billion dollars for financing,
- phased decontrol of domestic crude-oil prices to make synfuels more competitive, and
- a windfalls profits tax to establish fairness and help finance projects.

II. Gasification

There is a large technically feasible market potential in the U.S.A. Initially, the principal users will be steel, chemical, and brick companies. The major barrier to further market penetration is lack of economic advantage and an absence of significant operating experience, environmental policy, and limited credible engineering data for retrofitting industrial plants.

Specific processes — Winkler, Texaco, and U-gas — are discussed. A description is given of a catalytic process for SNG manufacture with the advantage of operating at lower temperature, being able to handle coking coals, and promoting gas-phase methanation equilibrium.

A combination of Lurgi/BGC and Texaco slagging gasifiers reputedly incorporates the strong points of both, i.e., improved methanation, cost benefits, higher thermal efficiency, and reduced byproducts.

III. Generation of Electric Power

The use of coal for power generation is to be encouraged, even in South Florida, which traditionally used only oil.

The fixed-bed coal-derived oil hydrotreater is described. It successfully produces petrol, heating oils, and boiler fuels.

Atmospheric fluidized-bed combustion and integrated

coal gasifier/combined cycle are advanced generating concepts that hold promise of both reduced power costs and fewer environmental disadvantages.

IV. *Other Influences and Unconventional Sources of Energy*

The Department of Defence plans to conserve oil by using coal, coalgas, solid waste, and biomass; also solar and geothermal energy but to a lesser degree.

An integrated approach to environmental control technology for coal-liquefaction plants is described.

The next ten years will see the production of shale oil in the range 100 to 300 000 barrels per day in the U.S.A.

The performance requirements of coal gasification for both open-cycle MHD and closed-cycle MHD is outlined briefly.

Coalbed methane is an excellent gas-turbine fuel, even if somewhat diluted by mine ventilation air. Mine safety is the controlling issue.

The production of methanol from coal is commercially proven technology and is available today.

V. *Liquefaction*

Coal-to-methanol-to-gasoline, zinc chloride hydrocracking of coal, Exxon donor solvent, and SRC I and SRC II are discussed in detail. Costs, product slate, and pros and cons are mentioned. Numerous graphs and flow diagrams are included. The status of each process is discussed.

VI. *Institutional Barriers and Restraints*

For a successful energy programme to be developed, it is essential that the energy industry and Government should cooperate, each contributing its best efforts and strengths. Private industry must be encouraged to participate by being assured a profit for its efforts.

A new source of air pollution must cause significant deterioration of air quality and must not interfere with the attainment of the ambient air-quality standards.

The Government will have to be involved in the financing of synfuels projects to help bear risks; otherwise, the financial community will not be willing to fund projects.

● *Flotation agents and processes. Technology and applications*, edited by M. W. Ranney. Park Ridge, U.S.A., 1980. \$48.

Reviewer: R. P. King

The patent literature is often a fruitful source of new information that can be used in research and development, and directly in a commercially utilizable form. This book is a collection of technical summaries of patents filed in the U.S. Patent Office since January 1972 in the field of flotation agents and processes. The author

has attempted to include all the technically relevant information, and he has eliminated legal jargon and juristic phraseology. The patents are classified in the book under the following headings: Copper Sulfide Ores; Copper Oxide Ores; Iron Oxide and Nickel; Phosphate Ore; Potassium, Sodium and Calcium Compositions; Clay, Spodumene and Other Related Processes; Tin, Tungsten, Gold and Other Metal Recovery Processes; Other Flotation Processes and Applications; Flotation Machines and Equipment.

The main text is supplemented by an index to the companies, which includes the names of all the companies to which patents have been assigned, an index, to the inventors, and an index to the U.S. patent numbers. Although any classification scheme in a field as varied as flotation is likely to lead to some difficulty, it is not too difficult to locate patents within a particular field of interest. Altogether, 234 patents are described, which, in the main, are associated with the recovery of minerals, although some non-mineral applications are covered as well.

The book reveals a rich kaleidoscope of developments in flotation as recorded in the new ideas that have been patented during the past eight years. This is no mere index of the patent literature, and it is not a book only for the diligent seeker after the latest commercially exploitable ideas. It is a book for the researcher, the engineer, the chemist, and all who are interested in the rich fields of application of flotation. It is a book for the browser as well as the indexer, and it will be no surprise to see much of the material in this book appear in the standard texts on flotation in the years to come.

A particularly pleasing feature of the book is the lucid description of the technical content of each patent. Some examples will illustrate this.

Nagaraj and Somasudaran have investigated the use of chelating agents for the flotation of copper minerals, and, after a useful description of the chelating agents used, the results obtained by the patentees in a flotation test are recorded as shown in Table 1.

Such a copious array of data permits the reader to calculate a good deal about the flotation process—from the rate constants in the cleaner to rough estimates of what could be expected in an operating plant.

Likewise, the patent assigned to English Clays Lovering Pochin and Co. for the flotation of very fine particles smaller than 2 μ m is described in considerably more detail than is currently available in the scientific literature. The description provided would certainly start any researcher who is working on the flotation of fine particles in a fruitful direction.

TABLE I

	Flotation Time (sec)	Weight (%)	Cu (%)	Distribution Cu (%)	Overall Recovery (%)
Feed		100	2.13	100	
Cleaner					
Concentrate 1	0-20	4.7	31.30	69.0	
Concentrate 2	20-60	3.1	8.44	12.42	91
Concentrate 3	60-150	10.1	2.17	10.30	
Cleaner Tailings		31.0	0.35	5.15	
Rougher Tailings		51.1	0.13	3.17	

This reviewer found the section on flotation machines and equipment particularly entertaining. The flow of new ideas to improve the mechanical characteristics of flotation machines does not abate, and some of the new ideas described here are fascinating if nothing else. One can only marvel at the ingenuity of C. Dell, who has invented yet another laboratory flotation machine, this time one that has no fewer than six layers of froth on the pulp.

It is inevitable that some of the patents described are classified in sections that are not appropriate to all readers. For example, we find Professor Niemi's patent of a design technique for flotation plants, which is based on kinetic models and simulation techniques, at the end of the section on flotation machines and equipment. The reader is advised to search several sections for information, and this raises the only serious criticism of this useful volume. A detailed subject index would have made the book vastly more effective as a source of rapidly available specific information.

The book should be on the shelves of all organizations that use flotation in their operations, and of every library that serves the community working in research on flotation in flotation process development, and in the development, manufacture, and marketing of flotation agents.

2. New books

● *Project control manual*, by Sven R. Hed. 250 pp. in loose-leaf binder. U.S. \$147. (Obtainable from the author at Bray Studios, Windsor Road, Windsor SL45 UG, England.)

This manual provides easy-to-use guidelines for all kinds of projects. Its 250 indexed and cross-referenced pages provide detailed procedures for project control that are applicable to all types and sizes of projects (product development, marketing, systems design, etc.). The rules and routines given are based on the minimum requirements for efficiency: to do less might lead to chaos and a possible disaster; to do more involves unnecessary bureaucracy.

● *Manganese deposits*, by Supriya Roy. London, Academic Press, 1981. 400 pp.

This is the first book to present an integrated account and a critical synthesis of all manganese deposits — both those found on land and the more recent deposits to be found in present-day oceans, shallow seas, and lakes. It draws on the substantial literature that has accumulated on individual topics and also includes the author's own research on metamorphosed sedimentary manganese deposits. The first three chapters are introductory, describing the formation of manganese deposits in general and the minerals occurring in them. Subsequent chapters deal with deposits in modern basins and their counterparts in the geological record found on land. The remainder of the book then discusses the various deposits on the continents.

● *Joint preparation for welding* (set of overhead-projector transparencies). Abington (England), The Welding Institute, 1980. £34 per set.

These transparencies provide a valuable aid to instruc-

tors and lecturers: their main emphasis is on arc welding, and the aim is to show the principles behind the various edge preparations rather than simply list recommended procedures. The patented Flipatran binding holds the transparencies in the correct order with interleaved pages of notes, requiring only a simple 'viewer' (projection frame) to hold a complete book on the projector. No special storage is required; the books are just closed between their rigid covers and placed on a bookshelf.

● *Electron micrographs of clay minerals*, by T. Sudo, S. Shimoda, H. Yotsumoto, and S. Aita. Amsterdam, Elsevier, 1980. 228 pp. Dfl.150.

The book comprises three chapters: the first introduces clays and clay minerals and outlines their crystal structures; the second is a detailed guide to electron microscopy of clay minerals; and the principal part, Chapter III, contains electron micrographs and diffraction pictures accompanied by an explanatory text describing the localities, origins, and modes of occurrence of the samples used.

● *Weld pool chemistry and metallurgy*. Abington (England), The Welding Institute, 1980. 357 pp. \$27.

This volume, the proceedings of an international conference, deals with weld pool solidification, welding behaviour, gas/metal reactions, and slag/metal reactions.

3. New journal

For over a century, *Gluckauf* has been offering technical expertise and in-depth coverage of mining development, mining methods and supports, haulage and winding, safety in mines, mineral processing, and energy matters. It is now available in English, the new form being known as *Glückauf + Translation*, at an annual subscription of 396 DM for 24 issues per year. It is available from Verlag Glückauf GmbH, D-4300 Essen 1, P.O. Box 103945, Federal Republic of Germany.

4. Canadian MRI publications

During 1980 the Mineral Policy Sector introduced a new series of reports identified by the prefix MRI. These cover internal studies and analytical works on a wide variety of subjects, that for one reason or another, do not reach the publication stream of the regular series yet may be of interest to readers in this 'unpublished form'. Twenty-four such titles are listed below.

Number 1980	Title	Status
80/1	Lead Smelting Opportunities in Western Canada, Concepts and Economics	D. E. C. King & G. M. Meisel
80/2	Regional Profiles	Mineral Policy Sector
80/3	The Effect of Smelting and Refining on Transportation Requirements of Base Metals	O. Fisher
80/4	Land Use for Mineral Based Activities	S. A. Hamilton
80/5	Canadian Ore Discoveries 1946-1978: A Continuing Record of Success	D. A. Cranstone
80/6	A National Strategy for Byproduct Sulphur	G. H. K. Pearse
80/7	Canadian Mineral Deposits Not Being Mined in 1980	National Mineral Inventory (ISD)
80/8	Imported Raw Materials: Guidelines for Research Policy	Mineral Policy Sector

80/9	Federal-Provincial Mineral Development Agreements - Annual Report 1979-80	Regional Dev. Section, RDD	80/17	The Non-Fuel Mineral Industry to 1990: A Quantitative Outlook	Mineral Policy Sector
80/10	The Effect of Smelter-Refinery Location on Transport Costs for Yukon Lead and Zinc Production	D. D. Brown	80/17F	L'industrie des minéraux non combustibles jusqu'en 1990: Une perspective quantitative	Secteur de la politique minérale
80/11	The Dynamics of a National Mineral Resource Assessment Program	R. J. Shank	80/18	Some Common Regional Constraints to Mine Development	Regional Planning (RDD)
80/12	A Review of the World and Canadian Zinc Industry	Nonferrous Section	80/19	End-Use Consumption of Selected Mineral Commodities Based on Standard Industrial Classification	W. R. Flenniken
80/13	The Canadian Nonmetallic Minerals/Products Sector to 1985	Mineral Policy Sector	80/20	Challenge of Mining in the 80's	W. G. Jeffery
80/14	The Canadian Nonferrous Minerals/Industries to 1985	Mineral Policy Sector	80/12	Non-Fuel Mineral Exploration in Canada to 1985	W. H. Laughlin
80/15	A Review of the World and Canadian Lead Industry	G. R. Peeling	80/22	The Quebec Mineral Industry	Mineral Policy Sector
80/16	World Directory: Lead and Zinc Mines and Metallurgical Works	M. Gauvin & S. Hebert	80/22F	L'industrie Minérale du Québec	Secteur de la politique minérale

Requests for copies should be addressed to Micromedia Limited, 144 Front Street, Toronto, Ontario, M5J 1G2, Canada, for either microfiche or hard-copy reproductions,

Exploration planning

A series of professional advancement seminars for the mineral industry is to be held at Rhodes University from 12th to 20th August, 1981. The series, entitled 'Economic Guidelines for Exploration Planning', will be conducted by Professor B. W. Mackenzie, and the attendance will be limited to 30 participants. The seminars are intended for more senior exploration personnel from the mining industry. Prior experience in economic evaluation practice is not essential.

The seminars have been designed with the practical needs of exploration personnel in mind. They will provide explorationists with an opportunity to study, discuss, and work with economic analysis techniques and their application to economic planning issues associated with exploration. Emphasis will be placed on small-group workshop sessions. The economics and planning aspects of mineral exploration will be considered against a background of basic economic analytical techniques.

Professor Mackenzie is an internationally recognized expert in the field of mineral economics, being Professor in the Department of Geological Sciences at Queen's University, Kingston, Ontario, and Research Associate at the Centre for Resource Studies at Queen's University. He was formerly Director of the Mining Programme at McGill University, where he was responsible for undergraduate and graduate courses in mineral economics as part of the mining engineering curriculum. During the past ten years, Professor Mackenzie has developed and

organized professional seminar programmes in mineral economics at McGill and at Queen's, and has conducted a series of seminars for other institutions in various parts of the world during the same period. He is also at present responsible for more broadly based seminars on mineral economics at the Australian Foundation in Adelaide.

This will be the third series of seminars presented by Professor Mackenzie at Rhodes, and it will be an updated and extended version of the very successful seminars presented in 1979 and 1980.

The provisional seminar topics are as follows:

- Introduction
- The Concepts of Cash Flow and Time Value
- Discounted Cash Flow Methods
- Mining Taxation Considerations
- Establishing Minimum Acceptable Exploration Target Conditions
- Exploration Economics and Strategies
- Evaluating Exploration Projects
- Structuring Exploration Agreements
- Economic Guidelines for Finding and Acquiring Mineral Deposits
- Risk Analysis Techniques
- The Decision Tree Concept for Exploration Planning

Enquiries should be directed to Miss D. Turner, Geology Department, Rhodes University, P.O. Box 94, Grahamstown 6140.

Seminar on Geostatistics

A seminar for mining executives on Geostatistics and Decision Making in the Mining Industry is to be held in Toronto from 23rd to 25th September, 1981. It is being conducted by Dr André G. Journel, of the Applied Earth Sciences Department at Stanford University, and Dr Roland Froidevaux, who is in charge of geostatistical development and applications at David S. Robertson Associates Limited.

Geostatistics is receiving increasing attention in the

mining industry but its fundamentals, applications and limitations are not yet appreciated fully. This seminar is designed for executives and managers in mining who wish to learn the benefits of geostatistics and how to apply it to their own projects as a decision-making tool.

Enquiries should be directed to David S. Robertson & Associates Limited, 65 Queen Street West, Toronto, Ontario M5H 2M7, Canada.

Course on Geostatistics

A course on Geostatistics for Exploration and Production Planning is to be presented in Rustenburg, Transvaal, by the Centre for Operations Research and Statistics of the University of South Africa from 9th to 14th August, 1981. The instructor will be Dr André G. Journel, Associate Professor, Applied Earth Sciences Department, Stanford University.

This course is aimed at geologists and mining engineers, and more generally at professionals in earth sciences concerned with quantitative evaluation of natural resources and its impact on production planning.

The basic tools of Geostatistics (variogram for analysis of spatial continuity — kriging for computing best

inbiased linear estimates and their corresponding degree of reliability) will be presented, as well as the more advanced technique of Conditional Simulations for elaborating numerical models of ore deposits (as well as oil reservoirs, forests, water tables). Special stress will be given to past applications and possible future applications. Extensive use will be made of real case studies through visual aids.

Further information is available from Centre for Operations Research and Statistics, University of South Africa, P.O. Box 392, Pretoria 0001. Telephone: (012) 440-1105.

Textures of materials

The Sixth International Conference on Textures of Materials, sponsored by the Iron and Steel Institute of Japan, will be held in Tokyo from 28th September to 3rd October, 1981. A technical tour will be held on 5th and 6th October, 1981. The conference is being sponsored by The Crystallographic Society of Japan, Japan Institute of Light Metals, The Japan Institute of Metals, and The Society of Materials Science, Japan.

The topics discussed at the Conference will include the following:

- Deformation Textures
- Taylor's Model
- Deformation and Recrystallization Textures

- Transformation Textures
- Low-carbon Sheet Steels
- Stainless Steels
- Silicon Steel and Magnetic Properties
- Hexagonal Metals
- Minerals, Non-Metals
- Properties
- Elastic Properties.

Further information is available from The Conference Secretariat, ICOTOM 6 (1981), The Iron and Steel Institute of Japan, Keidanren Kaikan 3rd floor, Otemachi 1-9-4, Chiyoda-ku, Tokyo 100, Japan.

Surface science

A Symposium on Surface Science and Its Industrial Applications is to be held in Pretoria on 26th and 27th November, 1981. It is being held under the auspices of the Solid State Physics and Materials Science Subgroup of the South African Institute of Physics and the Vacuum Society of South Africa, in collaboration with the National Physical Research Laboratory of the CSIR.

The symposium is intended to provide a forum for scientists and engineers of various disciplines and backgrounds who have a common interest in physical and chemical processes taking place on the surface and interface of materials, as well as in thin films and coatings. In this context materials comprise metals and alloys, electronic materials, ceramics and minerals, and glass and polymers.

There will be both invited and contributed papers. Those providing a broad perspective of recent developments and techniques with a description of their future scientific and industrial potential will be particularly welcome. In order to provide a suitably balanced programme within the limited period of the symposium, papers will be selected both on technical and scientific merit and for their general appeal to a multidisciplinary audience.

Areas of interest would include the following:

- Surface (including interface) structure, microscopic

and macroscopic

- Surface defects
- Surface processes, physical and chemical
- Methods of surface characterization
- Methods of surface creation (e.g., machining) and preparation (e.g., lapping)
- Methods of surface modification (e.g., hardening)
- Surface states
- Thin films and coatings
- Adhesion and adhesives
- Abrasion, friction, fretting, erosion
- Corrosion and oxidation
- Catalysis
- Surface properties of minerals and ore flotation

Intending speakers are invited to submit an abstract (in English or Afrikaans) of a maximum of one type-written page (A4 size) to the Secretariat for selection purposes. Instructions on the preparation of papers for inclusion in the Symposium Proceedings will be sent to the authors. The deadline for the submission of abstracts is 1st June, 1981, and for the submission of the manuscripts is 1st October, 1981.

Further information is available from the Symposium Secretariat S.246, CSIR, P.O. Box 395, Pretoria 0001. Telephone: (012) 86-9211 ext. 2077.