Book news

1. Book reviews

● *Geostatistics for natural resources characterization,* edited by G. Verly, M. David, A.G. Journel, and A. Marechal. Hingham (MA 02043, U.S.A.), D. Reidel Publishing Co., 1984.
Pt I: 606 pp. Pt II: 518 pp. U.S.$135,50 per set.

Reviewer: D.G. Krige

These two volumes provide a record of the 65 papers presented at the Second NATO Advanced Workshop on Geostatistics, which was held at Lake Tahoe in September 1983. Following, as it does, eight years after the first meeting in Rome (1975), the Lake Tahoe proceedings present clear evidence of a tremendous surge in the field of geostatistics via the interest displayed, the scope of the practical applications, the research into existing and new techniques and theories, and generally in the critical analyses of the state of the art.

The wide scope of the papers can be gauged from the twelve 'chapters', which cover the following aspects.

1. The variogram, resistant and robust estimation.
2. Precision of global estimation and of recoverable reserves.
3. Kriging, conditional bias, elimination of negative weights via 'positive' Kriging, the presence of faults, and co-Kriging.
4. Indicator Kriging, non parametric geostatistics, and the estimation of local recoverable reserves, and 'probability Kriging'.
5. Recoverable reserves, review of models, selectivity of distributions, changes in support, etc.
6. Spectral analysis, factorial Kriging analysis, and the scope of applications of time series, spectral harmonic and geostatistical analyses respectively.
7. Applications in the petroleum industry, and automatic contouring.
8. Geotechnical applications, risk assessments, earthquake response spectra, Bayesian Kriging, etc.
9. Hydrogeological geochemical applications.
10. Applications in pollution control and soil sciences.
11. Ore-reserve estimation case studies.
12. Simulation of orebodies, simulation case studies, indicator simulation, etc.

The above list of topics cannot but whet the appetite of every geostatistician who is seriously concerned in keeping up to date with new developments in geostatistics and in ensuring that the appropriate techniques are used in every practical application. These two volumes are essential for every academic and practical geostatistician.

● *Magnesium, the international perspective,* by Peter King. London, Financial Times Business Information Ltd, 1984. £120. 147 pp.

Reviewer: D.G. Maxwell

The body of this book runs to 22 chapters, of which 13 chapters and 91 pages are devoted, directly or indirectly, to the uses of magnesium. The review is strong in this area, and provides comparatively detailed studies, not only of current uses, but also of possible future developments. It identifies the desulphurization of steel as the most promising area for future growth in the consumption of magnesium.

In the chapter on new technology and market development, emphasis is placed on the potential of magnesium for energy storage in the form of magnesium hydride. This would provide a source of hydrogen in the so-called possible future hydrogen economy.

In the area of technology, the report is not quite as strong. A number of excellent graphic flowsheets are provided to illustrate the various processes for the production of magnesium. However, the descriptions accompanying the flowsheets indicate an incomplete understanding of the process and are difficult to tie up with the flowsheets.

Later in the review, the section on desulphurization in steelmaking exhibits some confusion over the identities of the blast furnace and the basic oxygen furnace in the steelmaking process.

Another area of weakness is that dealing with production statistics. Three separate tables are provided: one showing total production, one showing production by zone, and one showing production by country. While the totals in the first two agree very closely, this is not so in the third, where the totals show wide discrepancies from those in the first two.

There are also some anomalies in the price statistics. The graph in Figure 26 indicates an increase in the ratio of magnesium to aluminium price from 1,3 in 1971 to about 2,2 in 1983. In Figure 25, however, this ratio can be calculated as being about 1,75 in both 1971 and 1983.

Despite these criticisms, this review offers a wealth of information and statistics that will be of great value to anyone who has the need to study the magnesium industry and market.

2. Mintek reports

The following reports are available free of charge from the Council for Mineral Technology, Private Bag X3015, Randburg, 2125 South Africa.

● **Report M156**

A kinetic study of the reactions of certain gaseous sulphur compounds with iron.

The object of the investigation was the provision of an improved understanding of the factors that govern the transfer of sulphur in the rotary kiln.

The kinetics of the sulphurization and desulphurization of directly reduced iron (DRI) were investigated by a thermogravimetric technique. Whereas the sulphurization of DRI was generally found to be reversible, substantial irreversible sulphurization of a certain porous iron was observed at temperatures higher than 988°C (the eutectic temperature of the system Fe–FeS). Results from the literature concerning the sulphurization of iron platelets were confirmed. A difference between the mechanisms involved in the sulphurization of solid iron and that of DRI was detected.

● **Report M157**

Reaction mechanisms in the reduction of Winterveld chrome spinel with graphite and carbon.

The reduction of mixtures of various sizes of gangue-free Winterveld chrome spinel and graphite under an argon atmosphere at 1300°C was studied by use of a recording thermobalance. The partially reduced material was examined by scanning electron microscopy, and the observations were analysed in terms of reaction mechanism.

A four-stage sequence was deduced, as follows. In the first stage, the ferric iron is reduced to ferrous iron with no metallization. This stage is inherently variable and is controlled by the random packing of particles of reducing agent round the chromite. The second stage starts with a burst of metal nucleation, which is inherently variable. This is followed by the reaction of carbon monoxide with the relatively highly reducible oxide at the perimeters of the metal nuclei, and is controlled by the regeneration of carbon monoxide by the Boudouard reaction. The second stage merges into the third, with no change in the form of the product until the removal of iron decreases the reducibility of the remaining oxide to such an extent that the activity of the carbon monoxide is not sufficient for reduction to proceed. Reduction is then accomplished by the carbon dissolved in the reduced metallic product, the rate of reduction being limited by the rate of carburization of the metal. The fourth stage is reached at a reduction of about 50 per cent. In that stage the rate is controlled by the diffusion of chromium ions in the oxide, and the reduced product becomes saturated with carbon as the mixed $(Fe,Cr)_7C_3$ carbide.

● **Report M172**

Computer programmes for the control and data manipulation of a sequential X-ray-fluorescence spectrometer.

Two computer programmes have been written for use on a fully automated Siemens SRS200 sequential X-ray-fluorescence spectrometer. The first of these is used to control the spectrometer via an LC200 logic controller using a Data General Nova IV minicomputer; the second is used for the on-line evaluation of the intensity results and the printout of the analytical results. This system is an alternative to the systems offered by Siemens Ltd, which consist of a Process PR310 or Digital DEC PDP1103 computer and the Siemens Spectra 310 software package.

The multibatch capabilities of the programmes, with the option of measuring one sample or a tray of samples before the results are calculated, give the new programmes a major advantage over the dedicated software and, together with the elimination of human error in calculation, have resulted in increased efficiency and quality in routine analyses.

A description is given of the two programmes, as well as instructions and guidelines to the user.

● **Report M177**

A proposed test for the determination of the grindability of fine materials.

The grindability of ores is generally determined by the Bond standard grindability test. However, this test is not applicable to fine materials such as sands; the grindability of fine materials must therefore be determined by a comparative grinding method, for which a reference material of known grindability is required. Suitable reference materials are not easily obtained, and a grindability test that does not depend on reference materials is needed. This report proposes such a test and records the results of some tests on the validity of the proposed method.

The proposed grindability test uses the Bond standard test mill and a quantity called the 'equivalent energy per minute', which is the energy per minute that would be used by the mill if it were scaled up to a wet-grinding industrial mill of 2,44 m (8 ft) diameter. The value of this quantity, denoted by E, was calculated from the results of Bond standard grindability tests on various materials, and an average value of 1425×10^{-6}kW·h/min was determined. It is suggested that values far removed from this figure indicate that the ores concerned do not conform to the Bond Law of Comminution.

The proposed grindability test was applied to seven samples of ore from industrial secondary grinding mills and to one sample of sand, and good agreement was found between the energy consumption calculated in the laboratory tests and those reported for the operating plants. The energy consumption calculated from the results of the Bond standard grindability test agreed fairly well with the plant data for the secondary grinding circuits, but the correlation for the primary grinding circuit was erratic.

● **Report M186**

A survey of the erosion, corrosion, and abrasion of material-handling systems in the mining and mineral-processing industry.

This survey was conducted so that the degree of corrosive, erosive, and abrasive attack on material-handling systems in the mining and mineral-processing industry could be assessed, and so that the areas of research and development that would be relevant to the needs of the industry could be determined.

Of the 59 different mines that were invited to participate in the survey, 41 returned completed questionnaires, giving a return rate of 70 per cent.

An analysis of the results shows that attack by erosion or abrasion is considered to occur more often than attack by corrosion. However, all three types of attack must be regarded as significant problems within the mining industry, since 52 per cent of the participating mines reported pump failures due to the inability of the materials of construction to withstand the operating conditions, and almost 90 per cent reported piping failures due to corrosion (22 per cent) or erosion and abrasion (78 per cent). The moving of mine waters and slurries was generally judged to be more important than the handling of chemical solutions or other materials.

The materials of construction for pipes and pumps currently used in the mining industry can be summarized as follows:

(a) for waters: brass or bronze impellers, cast-iron pump bodies, and mild-steel piping (over 50 per cent) are used,

(b) for slurries: rubber-lined impellers and casings (over 55 per cent) or Ni-hard alloy pumps (almost 30 per cent) are used with mild-steel (38 per cent), rubber-lined (30 per cent), or plastics (27 per cent) piping, and
(c) for chemical solutions: stainless-steel or rubber-lined systems are generally used.

Corrosion and abrasion were reported to occur more often in piping than in pipe fittings, whereas the failure of pump casings and impellers was felt to be due to abrasive attack alone. Only 20 per cent of the participating mines reported incidents of cavitation. External corrosion was reported by over 50 per cent of the mines, but its occurrence was rated as being low. The most popular cause of failure of pipes and pumps reported was 'abusive service conditions', followed by 'selection of wrong material' and 'poor maintenance'. The majority of comments confirmed that, on non-project replacement items, the section engineer specifies or selects the items concerned; on project replacements, consultants from head office control the specifications. Almost all the plants and mines employ planned maintenance schedules. Successful applications and pipe and pump failures reveal no detectable trend, plastics and rubber-lined piping being rated as successful in 8 and 7 instances respectively, and unsuccessful in 11 instances each.

Over 60 per cent of the mines recommended areas of development concerning the performance of materials, the handling of slurries, or protection against corrosion. It was considered that the results of the survey justified research-and-development work, including the investigation of the corrosive, erosive, and abrasive effects of specific environments (e.g. magnetite) on selected materials, provided that fluid dynamics and particle-size parameters were taken into account.

3. New journal

● **Advanced materials & processes,** issued monthly by American Society for Metals (Metals Park, Ohio 44073, U.S.A.).

This journal is intended for engineers who select metals, plastics, composites, and ceramics. Authors are invited to submit manuscripts and other information on these materials and their related processes.

CIM conference

The combined 24th Annual Conference of Metallurgists and the 15th Annual Hydrometallurgical Meeting will be held in Vancouver from 18th to 22nd August, 1985.

The combined Conference will feature the following:

- *The 15th Hydrometallurgical Meeting: Impurity Control and Disposal*
- *The 24th Annual CIM Conference of Metallurgists*
- *Three International Symposia*
  (a) International Symposium on Statistical Process Control in the Steel Industry, co-sponsored by METSOC of CIM and Iron and Steel Society of AIME
  (b) International Symposium on Continuous Casting of Steel Billets
  (c) International Symposium on Quality Control in Non-ferrous Pyrometallurgical Processes.
- *Special Topic Sessions*
  (a) Pyrometallurgy Processes
  (b) Process Control in Materials Engineering
  (c) Update on Corrosion Research and Applications
  (d) Evolving Technology in the Mineral Sciences.
- *General Topic Sesions*

Basic metallurgical sciences, iron and steel, non-ferrous pyrometallurgy, materials engineering, hydrometallurgy, corrosion, mineral sciences, and metallography.

- *Poster Session*

A poster session is planned for authors wishing to display their research results for small group discussions.

Further information is available from E.B. Hawbolt, Department of Metallurgical Engineering, University of British Columbia, Vancouver, B.C. V6T 1W5, Canada. Telephone: (604)228-2676 (Ext. 3661).

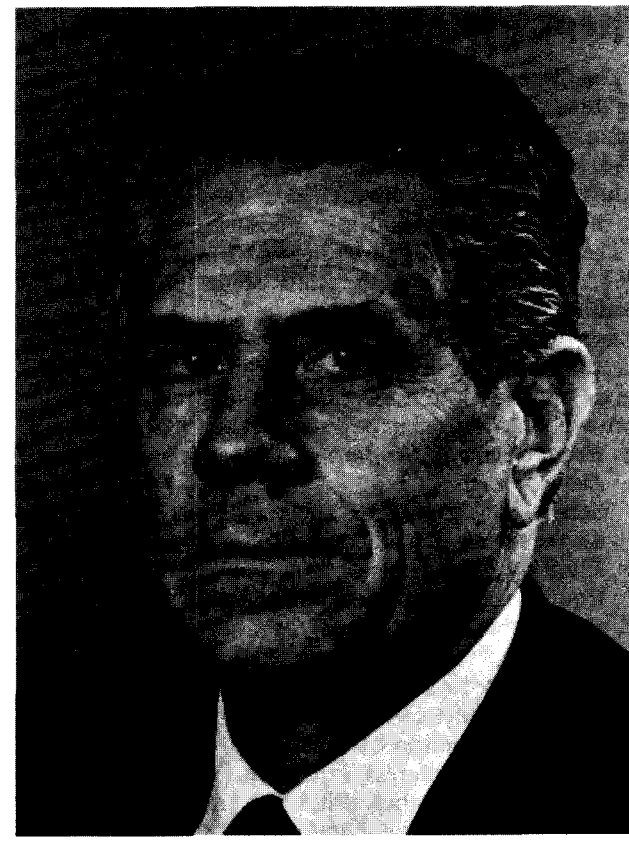
Light metals

The 8th International Light Metals Congress will take place from the 22nd to 26th June, 1987. These meetings, which take place traditionally every few years, are organized by the Austrian Metals Industry Association, the Austrian aluminium industry, and the University for Mining and Metallurgy in Leoben, in collaboration with the Aluminium-Zentrale Düsseldorf.

As on the last occasion in 1981, the meetings will be held in Leoben (Styria) and Vienna. The central theme of the Leoben meetings will be topical problems of material development, solidification, surfaces and surface treatment, heat treatment, alloy technology, deformation and fracture as well as new materials. At the Vienna meeting, importance will be placed on the Bayer process, which will be 100 years old in 1987, and fused electrolysis. Further topics will be technical and economic perspectives of aluminium, secondary aluminium and recycling, processing by casting and forming, and the use of aluminium in packaging, transport, electro-technology, and engineering.

Further details are available from Sekretariat des Arbeitsausschusses: Prof. Dr. F. Jeglitsch, c/o Institut für Metallkunde und Werkstoffprüfung, Montanuniversität, Leoben, A-8700 Leoben, Austria. Telephone: (03842)42555/430. Telex: 33322 Konto.

President of AS&TS*



Mr Arthur Woodington Reynolds (Sam) took office as President of The Associated Scientific and Technical Societies of South Africa on 28th November, 1984. Sam Reynolds was born in Boksburg on 27th December, 1930, and received his education at Christian Brothers College in Boksburg and at St John's College in Johannesburg.

After having obtained a Chamber of Mines scholarship, he attended the University of the Witwatersrand from 1949 to 1952 and obtained his B.Sc.(Eng.) degree in the branch of Land Surveying. He represented the University in swimming and water polo, as well as serving on the Students Engineering Council and the All Sports Council.

After graduation, he served his articles of one year and subsequently worked for a period of two years for the firm Stott, Milton and Hudson in private practice in Port Shepstone, Natal. He returned to University in 1957 for three years to do a part-time Diploma in Town Planning.

He joined the head office of the Electricity Supply Commission in 1955 in the capacity of an Assistant Land Surveyor. He was promoted to Senior Land Surveyor in 1967, and in 1969 took charge of the newly formed Land Survey Division of the Rand and OFS Region of Escom. He was promoted to Principal Land Surveyor of the Rand and OFS Region in 1971. In 1977 he was seconded to Escom Head Office and promoted to Chief Land Surveyor of Escom, the post he still holds today.

He was elected to the Council of the Institute of Land Surveyors of the Transvaal in May 1968 and served as Honorary Secretary for three years. He also served as President of the Institute in the 1972 – 1973 session and was again elected President in 1977 – 1978. He served on the Institute Council for 16 years, and represented the land surveyors on the Controlling Executive of the Associated Societies from 1968 until 1983.

He was elected to the Central Council of Land Surveyors of South Africa in 1978 and served as the Transvaal Additional Member from 1979 until August 1984.

*Released by AS&TS, P.O. Box 61019, Marshalltown 2107, Transvaal.

World mining

Sweden, Finland, and Norway expect representatives of all mining countries in May–June 1987 to the 13th World Mining Congress in Stockholm. The Swedish Mining Association, the Finnish Association of Mining and Metallurgical Engineers, and The Association of Norwegian Mines will organize the Congress, together with the International Organizing Committee of the World Mining Congress. The Congress and the Exhibition will take place at the Stockholm International Fairs and Congress Center in Stockholm.

The 13th World Mining Congress will deal with the improvement of mine productivity and total economy by modern mining technology, including mechanized mining, and the use of geological and geomechanical information and computers in mine planning and operation. The papers and discussions will be supplemented by round-table talks.

The 13th World Mining Congress and the International Mining Exhibition will take place in the halls directly adjoining the Congress Center and in the outdoor area situated next to the halls.

The Exhibition will give a survey of the present state of the art in the international mining industry. Special emphasis will be given to installations and equipment for complete automation and rational mechanization. This Exhibition will show examples of how a better economy of mining operations can be reached, and of how the physical work of miners can be made easier and safer.

About 80 papers will be presented in the five official languages of the Congress (simultaneous interpretations into English, French, Russian, Spanish, and German). The text of the papers will be published at the Congress. Papers will be forwarded prior to the Congress to the registered participants upon request.

People wanting to present papers are asked to submit a synopsis of their proposed papers (up to 500 words), in three of the official languages of the Congress, to the General Secretariat by 30th April, 1986, at the latest.

For more information about the Congress, write to the Organizing Secretary, 13th World Mining Congress, University of Luleå, S-951 87 Luleå, Sweden.

For more information about the Exhibition write to: Stockholm International Fairs, S-125 80 Stockholm, Sweden.

Sheet metal

The German Group of the International Deep Drawing Research Group (IDDRG) will be organizing the 14th Biennial Congress of the IDDRG on 21st to 26th April, 1986, in Cologne and Munich. All interested experts from industry and research are invited to a technical exchange on sheet production and manufacturing.

The open sessions will be held on 21st to 23rd April, 1986, in Cologne with the main topic 'Sheet Metal—Requirements and Solutions'.

As an introduction, invited papers will be presented on manufacturing processes, corrosion protection, lightweight construction, noise damping, and recycling. Solutions will be discussed in papers with the following topics:

- *Production and Properties of Materials, Status, and Development*
  Steel sheet, nonferrous sheet products, coated products, metal–plastic composites
- *Forming Operations*
  Equipment and automation, computer-aided techniques, tool design, special technologies, quality control, scrap recycling
- *Testing Methods for Sheet Metal*
  On-line testing, coated products, metal–plastic composites, prediction of sheet metal performance.

The official Congress languages will be German, English and French; there will be no translation service. At the beginning of the Congress, the Proceedings will be provided.

The closed Working Group sessions will be held on 24th to 26th April, 1986, in Munich.

Further details are available from Verein Deutscher Eisenhüttenleute (VDEH), P.O. Box 82 09, D-4000 Düsseldorf 1. Tel. (02 11) 88 94-285/292. Telex: 8 58 70 86 vst d.

Safety in mines

The 21st International Conference of Safety in Mines Research Institutes is to be held in Sydney from 20th to 25th October, 1985.

This international conference is held biennially and deals primarily with achievements of research into mine safety. On this occasion, some papers dealing with the practical application of such research will be included.

A Safety and Technology display will be held in conjunction with the Conference. Also, in association with the Conference, a major mining exhibition is to be held at the Londonderry Occupational Safety Centre.

Underground coal mining has traditionally been the Conference theme, but at Sydney open-cut mining will be included and there will be papers of interest to those in non-coal mining. Full sets of papers in English will be issued to delegates prior to the Conference. The English text of each paper will be accompanied by an abstract in each of the other five official Conference languages: Chinese, French, German, Japanese, and Russian.

Further information can be obtained from M.R. Lloyd, Chairman, Organising Committee, 21st International Conference of Safety in Mines Research Institutes, Private Bag No. 12, Penrith, N.S.W. 2750, Australia. Telephone: 047-774261. Telex: LISC AA 75729.

ILAFA conferences

The Instituto Latinoamericano del Fierro y el Acero (ILAFA) has scheduled the following congresses for 1985.

(1) Ilafa Congress on Steelworks Maintenance in Times of Crisis, April 21–24, Rio de Janeiro (Brazil).
(2) Seminar on Environmental Control Technology, June 10–11, Rio de Janeiro (Brazil) organized jointly with the International Iron and Steel Institute and the Instituto Brasileiro de Siderurgia.
(3) ILAFA-26 (Latin American Iron and Steel Congress), October 20–23, Mexico City (Mexico).
(4) ILAFA Congress on Metallics in the Iron and Steel Industry, November 10–13, Caracas (Venezuela).

For any additional information, contact ILAFA's General Secretariat, P.O. Box 16065, Santiago 9, Chile. Telex: 340348 ILAFA CK.

Mechanical testing of materials

The Deutsche Gesellschaft für Metallkunde, together with the Deutschen Verband für Materialprüfung and the Fachhochschule Osnabrück, is holding a course on the methods used for the mechanical testing of materials at Osnabrück from 9th to 11th September, 1985. The course is principally for those concerned with quality control, assurance, and inspection, as well as for those who are connected with laboratory testing.

This course is designed primarily for people who have no specific training in this area. Furthermore, the course offers trained participants the opportunity to refresh and deepen their knowledge. The course material will be presented in the form of papers and practical laboratory work. The opportunity will be given to discuss specific individual problems concerned with mechanical testing.

This course is being run by Prof. Dr. K. Reiff, Fachhochschule Osnabrück, and Prof. M. Helten, Fachhochscule Osnabrück.

Further information is available from Deutsche Gesellschaft für Metallkunde e.V., Adenauerallee 21, D-6370 Oberursel 1, West Germany. Tel.: 06171/40 81.

Mine ventilation

The Second U.S. Mine Ventilation Symposium will be presented from 23rd to 25th September, 1985, in Reno, Nevada, by the University of Nevada–Reno's Mackay School of Mines and Division of Continuing Education. Optional pre-symposium short courses and post-symposium field trips are also available.

For further information, contact Leanne Stone, Program Coordinator, Division of Continuing Education, College Inn, Room 332, University of Nevada–Reno, Reno, NV 89557-0032, U.S.A. Telephone: (702) 784-4046.