

## OFS Branch

Committee Meeting held in the Committee Room at the Welkom Club at 4.15 p.m. on Wednesday, 5th March, 1975.

### Present

Mr D. A. Smith (Chairman), Mr G. J. C. Young, Mr E. T. Wilson, Mr A. T. Lewis, Mr A. N. Shand.

### Apology

Mr H. M. W. Eschenburg.

The Chairman declared the Meeting open.

### Minutes

The minutes of the Committee Meeting held on the 12th August, 1974, which had been distributed to Committee Members, were taken as read. Their adoption was moved by Mr Shand and seconded by Mr Young.

### Matters Arising

#### *Appointment of Sub-Committee*

It was reported that the need for the Sub-Committee had fallen away as Council had made provision for amendments to the 'Rules for the Conduct of Branches' to take account of changes to the Constitution of the Institute.

#### *Visit to Tugela-Vaal Water Scheme — 14th and 15th May, 1975*

The Secretary outlined preliminary arrangements made with Mr F. Munro of the Department of Water Affairs and, regarding accommodation, with the Little Switzerland Hotel and Holiday Inn at Harrismith.

Dr D. I. Legge of Council had been contacted, and it was probable that the O.F.S. contingent of about 15 members would be joined by Transvaal-based members.

After discussion it was agreed that:-

- (a) the Secretary should continue to liaise with Dr Legge and assist

with arrangements to include Transvaal members in the visit, provisional accommodation should be secured at the Little Switzerland Hotel for 15 O.F.S. members,

- (b) picnic lunches should be arranged for the first day of the visit, and  
(c) Welkom members should be conveyed to Harrismith by car, rather than by bus.

### Additional Committee Member

It was agreed that the Committee should co-opt a replacement to fill the vacancy created by Mr Goetzsche's transfer from Welkom. After further discussion, it was decided that Mr Z. J. Lombard should be approached in this regard. In the event of Dr Lombard declining, an invitation would be extended to Mr B. J. Drysdale.

### General

The meeting closed at 4.40 p.m.

## Progress in mineral dressing

The National Institute for Metallurgy and the South African Institute of Mining and Metallurgy are to hold a symposium on 17th and 18th September, 1975, entitled 'Recent Progress in Mineral Dressing'. The venue, which will be in Johannesburg, is to be announced later.

Papers are to be presented in the following sections:

- (1) Sorting and sampling
- (2) Comminution and classification
- (3) Concentration
- (4) Flotation
- (5) Automation and modelling.

Further information is obtainable

from: Mrs Jill Knauff, National Institute for Metallurgy, Private Bag 7, Auckland Park 2006, tel. 725-4200; or Miss Jane Theron, S.A. Institute of Mining and Metallurgy, P.O. Box 61019, Marshalltown 2107, tel. 834-1271.

## INFACON 74

This book of over 300 pages is a record of the First International Ferro-alloys Congress, which was held in Johannesburg from 22nd to 26th April, 1974, under the auspices of the Ferro Alloy Producers' Association of South Africa, the National Institute for Metallurgy, and the South African Institute of Mining and Metallurgy. The Congress was attended by over 300 delegates from 22 countries.

The intention of the Congress —

to stimulate technical interchange on all aspects of ferro-alloy production — is realized in these Proceedings, much of which is material that was made available in open publication for the first time. Such exchange of technical information is indeed rare in fields that are as highly competitive as the ferro-alloy industry.

The thirty-two papers that were presented, together with a record of the discussions that followed, are

arranged in the following sections:

- Burden Preparation
- Specific Processes
- Electric Smelting Furnaces
- Fundamental Aspects
- Pollution Control
- Applications and Trends.

Copies of *INFACON 74* are obtainable at R27,80 per copy (including surface mail postage) from The Secretary, S.A. Institute of Mining and Metallurgy, P.O. Box 61019, Marshalltown 2107.

## NIM reports

The following reports are available free of charge from the National Institute for Metallurgy, Private Bag 7, Auckland Park 2006.

### Report no. 1595

*Preliminary tests on low-grade brecciated fluorspar ore from the Ottoshoop district.* (5th Nov., 1973, declassified April 1975).

Flotation tests on the ore ( $\text{CaF}_2$  head grade 8,5 per cent) showed that it is possible to obtain acid-grade fluorspar assaying 97,5 per cent  $\text{CaF}_2$ , with a recovery of over 80 per cent. Dilution of this ore with kokerman or a wad type of ore lowers both the grade and the recovery of fluorspar in the final cleaner concentrate. Preconcentration by gravitational methods proved unsuccessful, but further assessments of this process are considered necessary.

### Report no. 1612

*Flotation tests on sulphide-bearing high-grade brecciated and wad ores.* (20th Mar., 1974, declassified April 1975).

Flotation tests on five samples of ore showed that it is possible to obtain acid-grade fluorspar at recoveries of up to 87 per cent, but that modifications of the normal procedure are required for the treatment of a wad or a high-grade brecciated sample. The settling rate of low-grade brecciated ore was shown to be about twice that of Witwatersrand gold ore.

### Report no. 1643

*Further tests on low-grade brecciated fluorspar ore from the Ottoshoop district.* (12th Jul., 1974, declassified April 1975).

The ore has a grindability approximately half that of a Witwatersrand gold ore, and preconcentration by gravitational means looks unpromising.

When Emigol is used to emulsify the oleic acid at ambient temperatures, the recovery is the same as in the standard procedure for up to 80 per cent  $\text{CaF}_2$ , after which the recovery drops and it is difficult to obtain acid grade.

At the present stage of the investigation, it appears that fairly satisfactory recoveries of fluorspar can

be made at a coarse grind, but retreatments of the coarse rougher concentrate to give an acceptable grade of final concentrate have so far been unsuccessful.

Sodium metasilicate can be added to the mill or the conditioner prior to frother flotation.

The addition of PAX and copper sulphate to the frother float lowers the final recovery slightly. A drop in recovery also results from the recycling of tailings water. This can be partially overcome by the heating of the pulp in the cleaning stages.

Neither causticized dextrin nor polymerized wattle-bark extracts have proved as good as Quebracho. Wattle-heartwood extract looks more promising as a Quebracho substitute, but this extract, it seems, can be overbisulphited.

When mixtures of ores are floated, the recoveries and grades are lower than when the various ores are floated separately.

The results obtained from tests using a sulphonate collector were not as good as those obtained in the standard oleic acid float. A single test on industrial oleic acid obtained from Rand Mines gave a lower recovery and grade than in the standard procedure.

### Report no. 1654

*The determination of osmium in platiniferous media.*

A rapid procedure is proposed for the determination of osmium in platinum-bearing materials and a variety of plant solutions. The osmium is converted to the tetroxide by fusion with sodium peroxide, is volatilized by the addition of nitric acid, and is collected in toluene. The toluene is back-extracted with a 1 per cent thiourea solution, the absorbance of the coloured complex being measured at 480 nm.

The method is directly applicable to mattes and matte-leach residues, to plant solutions containing oxidizing acids and caustic media, and, in conjunction with a collection procedure, to the analysis of ores. Twenty to thirty samples can be analysed per manday, the coefficient of variation for the method being

2 per cent. The procedure can be used to determine as little as 5  $\mu\text{g}$  of osmium and, with certain modifications, 1  $\mu\text{g}$  or less.

### Report no. 1689

*The determination, by atomic-absorption spectrophotometry, of arsenic, selenium, tellurium, antimony, and bismuth on ion-exchange resins.*

A procedure for the analysis of the volatile elements antimony, arsenic, selenium, tellurium, and bismuth on ion-exchange resins is described. It is based on atomic-absorption measurement of a solution of the resin prepared by digestion with fuming nitric acid in a Teflon bomb. No interelement effects were recorded for the levels of noble metals and analyte elements tested. Precision and accuracy were within the required limit of approximately 10 per cent of the true content.

### Report no. 1715

*Flotation tests on various types of ore from the Ottoshoop district.*

Klipspar, two samples of high-grade brecciated ore, and a sample of wad were all found to float satisfactorily. One of the samples of high-grade ore does not behave well, possibly owing to an excess of silica in the ore.

Wattle extracts were found to be ineffective, except when they were used on a sample of deslimed wad. Tests using tailings-dam water on low-grade brecciated material and wad material gave good recoveries at grade, and Ottoshoop borehole water had no detrimental effect on high-grade brecciated ore.

### Report no. 1730

*The chromitite from the Marico occurrence, western Transvaal, its alteration, and possible reasons for its refractory nature.*

The chromite of the Marico occurrence forms shallowly inward-dipping seams in a basin-shaped pyroxene and olivine cumulate assemblage representing the Basal Zone of the Bushveld Igneous Complex. As many as five seams have been recorded from this area, and the present study centres around the LG2 and LG3 seams.

The gangue phase in the chromitite is well dispersed and clearly of secondary nature, consisting of montmorillonite and opal, with minor quartz, illite, and carbonates. The crystals of chromium spinel are intensely brecciated and strongly oxidized, especially along grain boundaries. Unaltered kernels are invariably present in the core areas of the larger grains. Chemically, the original chromium spinels in LG2 and LG3 are not much different from their respective counterparts in the main body of the Complex, and they evidently do not have excessively high  $Al_2O_3$  contents. Where it is in contact with alnoitic rocks of the Goudini volcano, the chromium spinel shows a loss of ferric iron and chromium, minor increases in ferrous iron, magnesium, and aluminium, and major increases in silicon, titanium, vanadium, and nickel.

Possible reasons for the refractory

character of the ore are seen in the distribution of the gangue phase and the oxidized state of the constituent chromium spinel. The oxidized state of the ore means that more reducing agent than normal will be required in the reduction process.

The following, which was originally issued as a restricted NIM report, is in the form of a hard-covered book of about 150 pages that was submitted to the University of the Witwatersrand in 1967 as an M.Sc. thesis. It is available on loan from the NIM library.

#### Report no. 233

*A chemical and mineralogical study of microlite from the Noumas pegmatite.*

Two varieties of microlite, i.e. a brown and a green, occurring in a feldspar-muscovite rock, which represents the latest stage of the Noumas Pegmatite intrusion, are described. It is suggested that the

green variety was formed from the brown variety during the early stages of the consolidation of the pegmatite by a process of self-alteration accompanied by the addition of water and, at a later stage, silicon and copper. This second variety of microlite is classified as a new species of the mineral, owing to the predominance of uranium in the A-group of the  $A_2B_2X_7$  structure, and the name liebenbergite is proposed for it.

The physical properties of the two varieties of microlite are described.

Detailed chemical analyses of the Noumas microlite are compared with some 37 microlite analyses obtained from the literature, which are tabulated. The unit cell formulae were also calculated.

The economic recovery of microlite by methods that include gravity separation, flotation, and chemical leaching are briefly discussed.

## Company Affiliates

The following members have been admitted to the Institute as Company Affiliates.

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## 24th Geomechanics Colloquy

The above Colloquy is to be held on 2nd and 3rd October, 1975, in the Salzburg Congress Hall. This meeting is being organized by the Austrian Society for Geomechanics, and the official languages will be German and English, with simultaneous translation of the papers and discussions.

The themes of the four half-day sessions will be as follows:

1. Geological Forecasts for Tunneling.
2. Foundations in Rock Masses.
3. Economical Construction of Underground Excavations by Applying Geomechanical Findings and Modern Construction

Methods

- (a) General,
- (b) Underground Railways.

4. Failures in Rock Constructions.

Direct any enquiries to the Österreichische Gesellschaft für Geomechanik, A-5020 Salzburg, Paracelsusstrasse 2, Austria.

## Rosenhain centenary

The centenary of the birth of Walter Rosenhain (1875-1934) will be celebrated by an international conference to consider how physical metallurgy has contributed to engineering practice. The value of an applied discipline such as metallurgy can be measured by its effect on practice. Few contributed more than Rosenhain to the development of the modern physical metallurgical approach; few applied it more effectively.

The aspects of engineering that will be considered at the Rosenhain Centenary Conference will include bridges, linepipe, offshore structures, airframe structures, and gas turbines. Definition of engineering needs and how these relate to material characteristics will be followed by discus-

sion on the success of metallurgical development in satisfying the demands made on the suppliers of materials. Finally, there will be a summary of the implications for physical metallurgy and for the education and training of metallurgists that arise from discussions at the conference.

Rosenhain was a Fellow of the Royal Society and an active member of both the Iron and Steel Institute and the Institute of Metals, which are now combined in the Metals Society. He was also Superintendent of the Department of Metallurgy and Metallurgical Chemistry at the National Physical Laboratory, a post he held for 25 years.

The technical discussions will be held at the Royal Society, London,

but will be preceded by an exhibition at the National Physical Laboratory, Teddington, which will include current work, as well as exhibits specifically relating to Rosenhain and his work. A special feature will be a lecture recalling Rosenhain's specific contributions to science and technology.

The conference, which is entitled 'The Contribution of Physical Metallurgy to Engineering Practice', is to be held on 22nd to 24th September, 1975

Further information is available from the Conference Secretary (Rosenhain Centenary Conference), The Metals Society, 1 Carlton House Terrace, London SW1Y 5DB.

## Iron and steelmaking

The Centre de Recherches Métallurgiques (CRM) and the Verein Deutscher Eisenhüttenleute (VDEh) are jointly to hold the International Meeting on Iron and Steelmaking 1976 in Brussels from 17th to 18th May and in Düsseldorf from 20th to 21st May, 1976. The title of the meeting is 'Automation in Iron and Steel Making'. The first part

(in Brussels) will be devoted to the automation of coking plants, of plants for the preparation of furnace burden, and of plants producing pig iron and steel. The second part (in Düsseldorf) will deal with the automation of rolling mills and subsidiary facilities including testing.

The conference languages will be English, French, and German, and

simultaneous interpretation will be provided.

Information is obtainable from either of the organizing bodies: Centre Recherches Métallurgiques, Abbaye du Val-Benoît, B-4000 Liège, Belgium.

Verein Deutscher Eisenhüttenleute, D-4000 Düsseldorf 1, Postfach 8209, West Germany.

## International Symposium on Mine Surveying

The III I.S.M. is being held in Leoben, Austria, from 28th June to 3rd July, 1976. The official languages are German, English, French, and Russian, and there will be simultaneous translation.

The theme of the Symposium is 'Present and Future Problems in

Mining Surveying', and the following subjects will be dealt with:

1. Mining Maps and Geometry of Deposits.
2. New Instruments and Tools.
3. Ground Movements, Rock Deformations, and Mining Damage.

4. Special Problems.

5. Controls and Direction Finding, and History of Mining Surveying.

More information is obtainable from Prof. Dr-Ing. H. Spickernagel, Montanistische Hochschule, Leoben A-8700, Austria.

## Book review

*Tenth International Mineral Processing Congress*. 1973. London, The Institution of Mining and Metallurgy. 1208 pp. £20.

This Congress was organized by the Institution of Mining and Metallurgy, supported by an International Scientific Committee and Corresponding Members from eleven countries. It was held at Imperial College in London.

After the official opening on 2nd April, 1973, the Tenth Sir Julius Wernher Memorial Lecture was delivered by Professor M. G. Fleming with the title 'Man and minerals — a viable contract' and

is recorded in the congress volume.

Forty-eight papers were presented in sixteen sessions, covering the theory and the practice of comminution (2), screening and classification, gravity concentration, electrodynamic and magnetic separation, flotation (4), process appraisal, plant design and practice, fine-particle processing, computer control, sorting, and chemical processing (2).

The text of the proceedings is in English, but synopses of the papers are given also in French, German, and Russian. Included are the discussions at the end of each session, the authors' replies, a name

index, and a comprehensive subject index.

In answer to its world-wide invitation, the congress organizing committee received over 250 abstracts and faced the arduous task of selecting the one out of every five that would best maintain the reputation of these international congresses.

The resulting volume of transactions is a fine tribute to the referees' careful and judicious decisions, and is worthy of a place in every technical library and in the office of every extraction-metallurgical plant.

H.B.

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## Particles

A course on particle characterization and a symposium on experience in the applications of particle-size analysis will be held during the last week of July in Pretoria and Johannesburg.

The course, covering sampling, particle-size analysis, and determinations of surface area, will be held in the Chemical Engineering Research building of the Council for Scientific and Industrial Research (CSIR) in Pretoria from Monday, 28th July, to Friday, 1st August. The course leader will be Dr T. Allen, University of Bradford, England, who is

an international expert in this field. The course is intended for scientists and engineers facing problems in particle technology in various industries that involve techniques of particle characterization. The course will range from the basic principles to the various instruments available on the market today, and will be supported by demonstrations of these instruments. Registrants will receive a copy of Dr Allen's book as a course manual.

The Symposium on Experience in Applications of Particle Size Analysis will be held on Thursday, 31st

July, in the Main Hall, Kelvin House, Johannesburg. It will take the form of 10- to 15-minute presentations followed by discussion. The talks will define an industrial problem that required particle-size analysis and will indicate the degree of success gained with the various techniques applied.

More information on the course and the symposium can be obtained from the Conference Division, CSIR, P.O. Box 395, Pretoria 0001 (telephone 74-6011, ext. 2077 or 2070).

## A.S. & T.S. Trust

The A.S. & T.S. Trust was formed on 24th March, 1972, to mark the Golden Jubilee year of the Associated Scientific and Technical Societies, with the object of advancing science and technology in South Africa. Since its inception, the Trust has received over twenty-one thousand Rand in donations from both constituent societies of A.S. & T.S. and from individual Members. The trustees have expressed their gratitude to all donors for their generosity, and the list given below is of members of the South African Institute of Mining and Metallurgy who have contributed funds to the Trust.

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## Second International Congress of Engineering Geology

The Proceedings of the above Congress, which was held in Sao Paulo, Brazil, from 18th to 24th August, 1974, are now available.

Volumes I and II contain the 210 technical papers accepted for publication, the general reports, and

the contributions of the panelists. Volume III, which contains a brief analysis of all the papers presented and a final report by the general reporters, will be distributed later.

The price of the three volumes is 65 U.S. dollars, including the cost

of surface mail. They are obtainable from Associacao Brasileira de Geologia de Engenharia, Instituto de Pesquisas Tecnologicas, Caixa Postal 7141, 0100 — Sao Paulo — SP, Brazil.

# GUIDE TO THE PREPARATION OF PAPERS FOR PUBLICATION IN THE JOURNAL OF THE SOUTH AFRICAN INSTITUTE OF MINING AND METALLURGY

The following notes have been compiled to assist authors in the preparation of papers for presentation to the Institute and for publication in the *Journal*. All papers must meet the standards set by the Council of the Institute, and for this purpose all papers are referred to at least two referees appointed by the Council.

Although the worldwide readership of the *Journal* results in a preference for papers in English, the Council treats papers in Afrikaans on an equal basis, but, to meet the needs of the majority of readers, an English summary of some 500 to 750 words should be provided.

## STANDARDS FOR ACCEPTANCE

To merit consideration, papers should conform to the high standards that have been established for publication over many years. Papers on research should contain matter that is new, interpretations that are novel or of new significance, and conclusions that cast a fresh light on old ideas. Descriptive papers should not be a repetition of well-known practices or ideas but should incorporate developments that would be of real interest to technical men and of benefit to the mining and metallurgical industry.

In some cases, a well-prepared review paper can be of value and will be considered for publication. All papers, particularly research papers, no matter how technical the subject, should be written with the average reader of the *Journal* in mind, to ensure wide interest.

The amount of textbook material included in a contribution should be the minimum essential to the argument. The length of a paper is not the criterion of its worth, and it should be as brief and concise as possible, consistent with the lucid presentation of the subject. Only in very exceptional circumstances should a paper exceed 15 pages of the *Journal* (15 000 words if there are no tables or diagrams). Six to ten pages is more normal.

**NOTE:** Papers in the *Journal* are printed in 10 point type, which is larger than the 8 point type used on this page. For special publications, Council may decide on page sizes smaller than A4 used for this *Journal*.

The text should be typewritten, double-spaced, on one side only on A4 size paper, leaving a left-hand margin of 4 cm, and should be submitted in triplicate to facilitate the work of the referees and editors.

## LAYOUT AND STYLE

### *Orthodox sequence*

Title and author's name, with author's degrees, titles, position.

Synopsis, including a brief statement of conclusions.

An Afrikaans translation of the synopsis.

### Introduction.

Development of the main substance.

Conclusions, in more detail.

Acknowledgements.

References.

**Title:** This should be as brief as possible, yet give a good idea of the subject and character of the paper.

**Style:** Writing should conform to certain prescribed standards.

The Institute is guided in its requirements by:

Collins, F. H., *Authors & Printers' Dictionary*—Oxford University Press.

Hart, H. *Rules for Compositors and Readers*—Humphrey Milford (familiarily known as the *Oxford Rules*).

Fowler, H. W. & F. G., *The King's English*—Oxford University Press.

**General:** A few well-selected diagrams and illustrations are often more pertinent than an amorphous mass of text. Overstatement and dogmatism are jarring and have no place in technical writing. Avoid the use of the first person, be objective, and do not include irrelevant or extraneous matter. Avoid unnecessary use of capitals and hyphens; punctuation should be used sparingly and be governed by the needs of sense and diction. Sentences should be short, uninvolved, and unambiguous. Paragraphs should also be short and serve to separate basic ideas into compact groups. Quotation marks should be of the 'single' type for quotations and "double" for quoted matter within quotations.

Interpretations in the text should be marked off by parentheses ( ), whereas brackets [ ] are employed to enclose explanatory matter in the text.

Words to be printed in italics should be underlined *singly*. For small capitals they are to be underlined **DOUBLY** and for large capitals **TREBLY**.

If there is any problem in producing formulae accurately by typewriter, they should be handwritten in ink.

Abbreviations and symbols are laid down in *British Standard 1991*. Abbreviations are the same for the singular and plural, e.g., cm for centimetre and centimetres, kg for kilogram and kilograms. Percentages are written in the text as per cent; the symbol % is restricted to tables. A full stop after an abbreviation is used only if there is likely to be confusion of meaning.

**Metric System:** The *Système International d'Unités (SI)* is to be used for expressing quantities. This is a coherent system of metric units derived from six basic units (metre, kilogram, second, ampere, kelvin, and candela), from which are derived all other units, e.g., the unit of force is the newton (N) for kilogram metre per square second (kg m/s<sup>2</sup>). Always use the standard metric abbreviations.

The comma must be used as a decimal indicator and must not be used for separating groups of digits. For ease of reading, digits should be grouped in threes counting from the decimal indicator towards the left and right. However, where there are only four digits to the left or right of the decimal indicator, there should be no grouping.

**Illustrations:** Drawings and diagrams are to be in black India ink and should be about 18 cm wide. When submitting graphical representations, avoid a fine grid if possible. Curves should be in heavy line to stand out. Lettering too should be bold, as a reduction in size is often involved in the printing process.

Numbering of tables should be in Roman numerals: I, II, etc., and figures in Arabic numerals: Fig. 1, Fig. 2, etc. (Always use the abbreviation for figure.) Photographs should be black and white glossy prints.

As a guide to the printer, the author should indicate by means of notes in the typescript where tables and figures, etc. are to appear in the text.

**Paragraphs:** A decimal system of numbering paragraphs may be used when the paper is long and complicated and there is a need for frequent reference to other parts of the paper.

**Proof correction:** Galley proofs are sent to authors for the correction of printers' errors and not for the purpose of making alterations and additions, which may be expensive. Should an author make alterations that are considered excessive, he may be required to pay for them. Standard symbols as laid down in *British Standard 1219C* should be used.

## SYNOPSIS

It is most important that the synopsis should provide a clear outline of the contents of the paper, the results obtained, and the author's conclusions. It should be written concisely and in normal, rather than abbreviated, English, and should not exceed 250 words, except when an English summary of an Afrikaans paper is involved. While the emphasis is on brevity, this should not be laboured to the extent of leaving out important matter or impairing intelligibility. Summaries simplify the task of abstractors and therefore should present a balanced and complete picture. It is preferable to use standard rather than proprietary terms.

## FOOTNOTES AND REFERENCES

Footnotes should be used only when they are indispensable. In the typescript they should appear immediately below the line to which they refer and not at the foot of the page.

References should be indicated by super-script, thus . . . <sup>1</sup> . . . <sup>2</sup>. Do not use the word *Bibliography*. When authors cite publications of other societies or technical and trade journals, titles should be abbreviated in accordance with the standards adopted by this *Journal*.

## GENERAL

The Council will consider the publication of technical notes taking up to three pages (maximum 3000 words).

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