

coupled with heterogeneous gangs, as is normally the case, and is continued over a long period of time.

The findings have also suggested that Bantu production supervisors need training in the utilization of the human resources available to them. In particular, there should be considerable advantage in training supervisors to develop 'team' concepts in their gangs and to capitalize on gang stability.

It has also been shown that relative ethnic homogeneity (at least for Malawians) was conducive to

increased productivity in terms of tons trammed. The reasons for this influence are probably to be sought in the increased extent to which members of the gang were able to communicate with one another, and the greater cultural similarity between members, which would have reduced the need for individuals in gangs to adjust to unfamiliar socio-cultural norms of fellow-workers. If this were the case, benefits should accrue from homogeneous gangs irrespective of the ethnic origin of the men. On the basis of the find-

ings, however, this generalization is unwarranted, and further research is needed on this factor.

#### REFERENCES

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2. MAUER, K. F. The African production supervisor in the South African mining industry. Durban, University of Natal, unpublished M.A. thesis, 1972.
3. EDWARDS, A. L. Experimental design in psychological research. London, Holt, Rinehart and Winston, 3rd edition, 1968.
4. SCHEFFE, H. The analysis of variance. New York, John Wiley and Sons, 1959.

## Notices

### Competition for Student Members of the South African Institute of Mining and Metallurgy

Each year the Institute offers a prize (or prizes should the entries warrant it) of up to R100 for the best paper or dissertation on a topic appropriate to the interests of the Institute. The competition is open to all Student Members of the Institute.

A Student Member who is in full time study at a university may submit the dissertation or thesis he has to write in part fulfilment of his university degree, provided that it is presented in a manner and on a topic suitable for publication in the journal.

Entries for 1973 should reach the Institute by 31st December, 1973.

### Eleventh International Mineral Processing Congress

The above Congress is to be held in Cagliari, Italy, during the first

ten days of May, 1975. Papers will be grouped under the following general headings:

Comminution and agglomeration  
Classification and thickening  
Flotation  
Electric and magnetic separation  
Chemical and biological processes  
Control and testing  
Process design  
Plant management and practice  
Ecological problems and waste treatment.

Abstracts of papers intended for inclusion in the Congress Proceedings should be written in one of the four official languages of the Congress (English, French, German, and Russian), and should be submitted before 31st December, 1973. The authors of approved abstracts will be expected to submit two copies of the completed manuscript before 31st August, 1974.

All correspondence and enquiries

should be directed to Comitato Organizzatore XI IMPC, Istituto di Arte Mineraria, Piazza D'Armi—C.P. 236, 09100-Cagliari-Italy.

### Twelfth Annual International Symposium on Computer Applications in the Mineral Industry

The above symposium is to be held in Golden, Colorado, from 8th to 12th April, 1974. The technical sessions will deal with the following topics:

Exploration  
Geostatistics  
Ore-reserve assessment  
Financial evaluation and planning  
Mine planning and scheduling  
Mine-system design and evaluation  
Mining operations  
Process Modelling.

Enquiries should be addressed to Dr Donald W. Gentry, Mining Department, Colorado School of Mines, Golden, Colorado, U.S.A.

## NEW PUBLICATION

*Bougainville—the establishment of a copper mine.* St. Kilda (Australia), 'Foundations', 1973.

The editors of *Foundations*, Australia's journal of architecture, engineering, and construction, are preparing the above book for publication late in 1973. The story of Bougainville is told and illustrated in 80 articles written by the planners, consultants, designers, contractors, and suppliers who created and brought into full-scale operation (ahead of schedule and within budget) the world's largest copper mine with its essential supporting services.

The book, which consists of 400 pages and costs \$3,50 plus postage and packing, must be ordered prior to publication from *Foundations*, P.O. Box 73, St. Kilda 3182, Australia. Production costs have been heavily subsidized, and the book will not be on general sale after publication.

## NIM REPORTS

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

### Report No. 1503

*Fast-neutron-activation analysis for the determination of oxygen in rock samples.*

The problems associated with fast-neutron-activation analysis for oxygen are considered in detail, and a method is described for the determination of oxygen in rocks. The oxygen contents of a number of

international rock standards were measured with a precision of less than 0,3 per cent. The potential uses of oxygen analyses with this precision are discussed briefly, and possible improvements are suggested.

### Report No. 1514

*The determination by X-ray-fluorescence spectrometry of minor amounts of niobium and tantalum in geological materials.*

The development of a method having a lower level of determination of 0,01 per cent of the oxide is described. Mineralogical effects are eliminated by fusion of the material with nine times its mass of a flux comprising lithium tetraborate, calcium fluoride, and lanthanum oxide; the melt is pressed into a glass disc. Residual matrix effects are corrected by the background-ratio technique, the intensity measurements being evaluated against synthetic calibration standards. The method has been successfully tested on synthetic pegmatite samples of known composition, a coefficient of variation of less than 1,4 per cent being obtained when the concentration of oxide was 0,5 per cent. Possible interferences are discussed, and the effect of the presence of uranium and thorium is assessed quantitatively.

### Report No. 1530

*AUREOL — an X-ray-absorption analyser for the determination of the uranium on loaded resin in ion-exchange plants.*

The AUREOL analyser was developed for the determination of uranium on loaded resin in continuous ion-exchange and resin-in-

pulp pilot plants. Both the on-line and off-line versions gave accuracies within their specifications. The AUREOL systems would be suitable for use on ion-exchange plants for the recovery of any of the 'heavy' metals where shift sampling and analysis are required for plant control.

### Report No. 1534

*The determination, by atomic-absorption spectrophotometry, of noble metals in the presence of sodium, barium, or sulphate ions. A comparison of uranium and lanthanum as releasing agents.*

The effect of lanthanum in 10 per cent (v/v) hydrochloric acid and uranium in 40 per cent (v/v) hydrochloric acid on the interferences caused by sodium, barium, and sulphate ions is compared. When sodium chloride or barium chloride was present, there was no significant difference in 'recovery' (i.e., the percentage of added noble metal that was determined) for all the noble metals whether uranium or lanthanum was used as the releasing agent. The notable exception was in the determination of iridium when lanthanum was used, a significant enhancement being noted. For platinum, recoveries were slightly better with lanthanum than with uranium at high sodium chloride concentrations. Interference from sulphate ions was marked in the determination of platinum, rhodium, ruthenium, and iridium, when uranium was used, and almost completely absent when lanthanum was used in the determination of platinum and rhodium.