

# SPOTLIGHT

## on drilling and blasting in surface mines

by A.N. BROWN\*

Rock breakage by drilling and blasting is fundamental to every hard-rock mining operation. The subject was an apt choice for a mining school because many technological changes have taken place since the subject was last presented some ten years ago. However, because of the development of surface mining, it was decided that two schools should be held: one for underground mining, and the other for surface mining. The School on Underground Mining was held at the University of the Witwatersrand in February 1986.

The School on Surface Mining was held at the University of Pretoria from 9th to 13th June, 1986, and was opened by the President of the SAIMM, Mr H.E. James, who emphasized the importance and the growth of the surface-mining industry. Of the 46 delegates who registered for the School, one was from Tsumeb in South West Africa/Namibia and three from the Jwaneng Diamond Mine in Botswana.

### Organization of the School

The Organizing Committee functioned under the chairmanship of Professor A.N. Brown, and Mr P.A. Rossouw served as Committee Secretary and School Manager. The subject matter was split into three divisions. Lectures in the first division dealt with explosives and were organized by Mr K.S. Ireland of AECI. Lectures in the second division featured rock drilling and were arranged by Mr A.P. Dippenaar of SRK Mining Inc. The third division—on rock blasting—was organized by Mr G.A. Fourie of JCI. Valuable assistance was also provided by two other Committee Members: Mr D.J.C. Taylor and Mr P.C. Pretorius, both of Iscor. The lectures were generally of a high standard, and all the lecturers produced comprehensive notes, which were bound

into a handsome volume.

### Lectures

The lectures dealing with explosives included the topics of history and development, physics and chemistry, explosive interactions, explosive energy, initiation systems, packaged explosives, bulk explosives, and transport and storage. The lecturers included Messrs L.M. Zimmermann, B.W. Wallace, M.L. Thomas, B.B. Cretchley, K.S. Ireland, and Q.D. Cruywagen.

The lectures on rock drilling included the topics of drill selection, rotary blast-hole drills, drill bits, and drilling at Sishen Iron Ore Mine. These lectures were given by Messrs G.P. Schivley, C. Marnewick, C.S. Pretorius, and D.R. Brough. Particular mention should be made of Mr George Schivley, of Ingersoll-Rand, who came from the U.S.A. to lecture and participate in the school.

The lectures on rock blasting included the topics of ground vibrations, air blasts, high-speed photography of blasts, blast design, controlled blasting techniques, rock fragmentation, and explosives tests at Sishen Iron Ore Mine. Lectures were given by Drs O.K.H. Steffen and C.H. Page, and by Messrs R. Playle, M.D.J. Bonneau, C.V.B. Cunningham, and H. van Aswegen.

Particular mention should be made of the excellent presentations by Drs Page and Steffen, and by C.V.B. Cunningham of AECI. Case histories by Messrs C.S. Pretorius and H. van Aswegen of Sishen Ore Mine were of special value.

### Visits and Problems

On the Tuesday afternoon the delegates travelled to the Modderfontein Explosives Factory, where a number of demonstrations were held, both on the firing range and at the research centre. These demonstrations were particularly interesting and useful.



From left to right: Dr O.K.H. Steffen (Council Member, SAIMM), Mr G.A. Fourie (Organizing Committee), Professor A.N. Brown (Chairman, Organizing Committee), Mr A.P. Dippenaar (Organizing Committee), Mr P.A. Rossouw (Secretary, Organizing Committee), and Mr G.P. Schivley (visiting lecturer, Ingersoll Rand, U.S.A.)

After the demonstrations, several films were presented, covering the topics of throw blasting, pre-splitting of highwalls in strip mines, and blast evaluation through the medium of high-speed film clips. A computer program that is used for the prediction of throw and the profile of the resulting muckpile was demonstrated.

On the Wednesday, the delegates were divided into two groups. The first visited the Rietspruit strip coal mine, which proved to be an extremely interesting excursion. The second visited the Donkerpoort open pit of the Thabazimbi Iron Ore Mine, which is probably one of the neatest and most impressive open pits in the country. A traditional braai at Hell's Hoogte was the climax of a long but interesting day.

Delegates were set five different problems, which they

attempted to solve on the Thursday afternoon and evening with the aid of the Blast computer program (from SRK Mining Inc). A bank of microcomputers was used for the exercise, which was enjoyed by all the participants. Some interesting solutions were discussed in the feed-back session.

### Social Events

The cocktail party on the opening evening, to enable everyone to become acquainted, was generously sponsored by Bucyrus (Africa) and was enjoyed by all. The farewell luncheon on the Friday, which was sponsored by AECI, was a rip-roaring success.

The general opinion on the School was that it was successful and was enjoyed by all who attended.

## Copper 87

COPPER 87 is an international conference organized by metallurgical and academic institutions of two of the largest producers of copper in the world, Chile and Canada.

The depression of the price of copper during the last decade makes it all the more important to develop new processes to lower the cost of the extraction of copper, and create new uses and applications for the metal. Plant operators, industry and government researchers, and academics will be able to get together and discuss the latest advancements. The Conference will also provide an opportunity for all attendees to discuss the perspectives and future directions of the copper industry.

The Conference will be held from 30th November to 4th December, 1987, in Viña del Mar, Chile.

The Conference is being organized by the Metallurgical Society of CIM, Canada, the Chilean Institute of Mining Engineers, and the University of Chile. It is sponsored by the Chilean Ministry of Mines and the Chilean Copper Commission (COCHILCO). The Chilean Copper Corporation (CODELCO), and the National Mining Company of Chile (ENAMI). Large copper-producing companies in the world have already engaged their participation in the Conference with the presentation of technical and scientific papers.

Further information will be available during 1986, and the registration form listing all papers to be presented at the Conference will be published at the beginning of 1987 and will be sent to those who are interested.

The following topics will be discussed:

### *Perspectives of the Copper Industry*

A global view of the industry; restructuring and cost

adjustment; productivity; tendencies within the market; intensity of use; elasticity of demand and substitution; characteristics of investment—state or private; promotion of uses and applications; new materials and products; a policy for the copper industry.

### *Mineral Processing and Extractive Metallurgy*

Science fundamentals; new processes and technologies; environmental considerations in relation to the development of processes and cost impact; energy and cost considerations in the design and modernization of plants and processes; modelling in mineral processing and extractive metallurgy; advances in the process metallurgy of copper byproducts.

### *Process Control*

Control in mineral-processing plants; applied modern control strategies; simulation as a tool for the design and testing of control systems; modelling for automatic control and control-based models; economic aspects derived from the application of control systems; advances in online instrumentation for automatic control in mineral processing; control-oriented estimation and prediction of variables and parameters in mineral-processing plants.

For more information about the Conference, contact

Dr G.E. Lagos  
Department of Mining Engineering  
University of Chile  
Tupper 2069  
Santiago, Chile.

Telephone: Santiago 710638.