

SPOTLIGHT

on Carbon-in-Pulp for Gold

by J.S. Freer*

Two very successful schools on 'The design and operation of plants for the recovery of gold by activated carbon', were held from 14th to 18th October, 1985, and from 24th to 27th February, 1986, at Mintek. They were arranged by the Institute in close co-operation with Mr Peter Bailey of Gencor, who was course leader. His meticulous attention to detail with regard to the content of the course and to its presentation ensured that delegates and lecturers alike found it a most stimulating experience.

The Schools were opened by Mr H.E. James, President of the Institute. In his addresses he noted that the recovery of gold by activated carbon is probably the most important topic in the field of extractive metallurgy that could be selected at this time for an SAIMM School. Small wonder that the Schools had been over-subscribed and that a third school was being planned for September 1986. He was confident that the twenty-nine lectures to be presented by some nineteen authors, together with the information to be exchanged during both the formal and informal discussions, would provide the basis for an authoritative and comprehensive treatise on the subject, which would be published and marketed internationally by The South African Institute of Mining and Metallurgy.

Programme of Lectures

The programme of lectures was thoughtfully arranged. It gave the delegates a general introduction to the subject and background information on the manufacture and properties of activated carbon. Then came a summary of the theory of adsorption and the application of mathematical models, followed by the many points for consideration in the design of an adsorption circuit, preparation of the feed, the problems of interstage screening and mixing requirements. This was supported by the practical aspects of the adsorption of gold from leached pulps, whether current milled ore or other feed stocks such as retreated tailings from old sands dumps and slimes dams, or leached acid-plant calcine.

A similar pattern was followed for elution, and then for electrowinning and zinc precipitation: a lecture on the theory was followed by design studies and the salient points in the operation of the systems, as well as cathode smelting for the production of bullion.

The point was clearly made that the quality of the fresh carbon is not the main criterion for efficiency. Much more important is the condition of the carbon moving round the circuit, and this condition depends upon the operators' attention to detail with regard to effective elution and electrowinning, proper thermal regeneration, thorough acid washing, and the removal of fine carbon by screening before its return to the adsorption train.

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The programme included lectures on support services such as quality control, on the need for good analytical procedures and on-line analysis, and on the techniques involved in the handling of carbon round the circuit.

Case Studies

During the week, delegates undertook two case studies: one on adsorption, and the other on treatment of the carbon. They also enjoyed the benefit of a visit to the CIP operations of either Ergo or RM3, which gave CIP operators the opportunity of comparing notes and of fixing in mind, from a practical point of view, various aspects that had been discussed during the lectures.

Social Events

On the social side, a cocktail party cum braaivleis was held on Monday evening at the Mintek recreation centre so that delegates and lecturers could relax and get to know one another on an informal basis early in the week. The Institute appreciates the contribution made by Mintek, who not only made their excellent facilities available for the School, but developed carbon-in-pulp as a viable process for the recovery of gold in South Africa. The Institute is grateful to a number of firms for sponsoring the cocktail party and braaivleis in return for the opportunity granted to them by Mintek of setting up a small exhibition of their expertise in carbon technology, which was held in the foyer throughout the week, where delegates could view it during tea and lunch intervals.

Panel Discussion

The week's work was rounded off with a panel discussion between delegates and a panel of lecturers. A number of problems and opportunities for further work were identified, including the following:

- the loss of data from plant tests as a result of poor sampling techniques,
- the attractiveness of the carousel arrangement of adsorption tanks, which has the advantages of highest efficiency, assured carbon distribution, and measurable carbon loss and inventory,
- the need for reliable and effective regeneration systems,
- identification of the compounds that foul carbon, and
- control of the concentrations of cyanide and lime to limit the loading of calcium onto carbon and to significantly reduce the consumption of each.

It was agreed that each unit operation in the CIP process can be made to work very well provided capacity is not stunted. All the operations are very important, and must be designed and operated optimally to ensure a

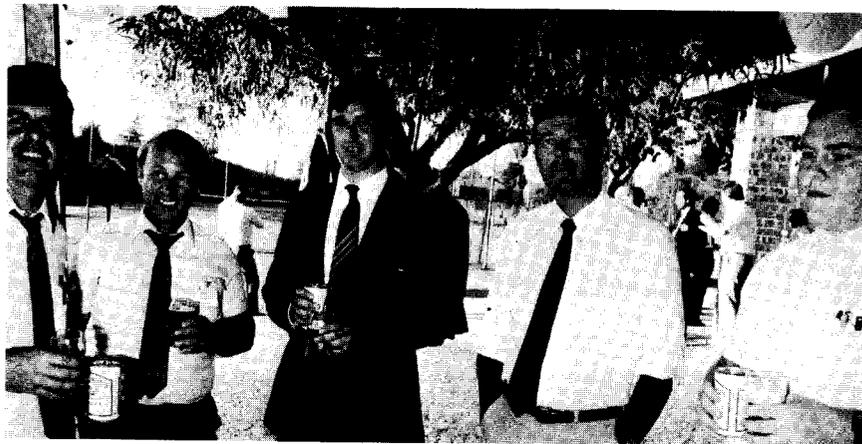
reduction in gold losses, which easily justifies the capital expenditure involved.

Summing Up

Altogether, it was a very well-balanced and integrated School. The set of lecture notes will prove invaluable to

all metallurgists involved in the design and operation of CIP plants. The discussion that was engendered will provide food for thought and continuing refinement of the process for a long time into the future.

The following photographs (by Carlos Pais) were taken during the course of the two Carbon-in-Pulp Schools. They all read from left to right.



Ken McVey (Harmony), Keith Warburton (Bohler Steel), David Minson (Delkor), Fred Diamond (Harmony), and John Steele (Rand Mines)



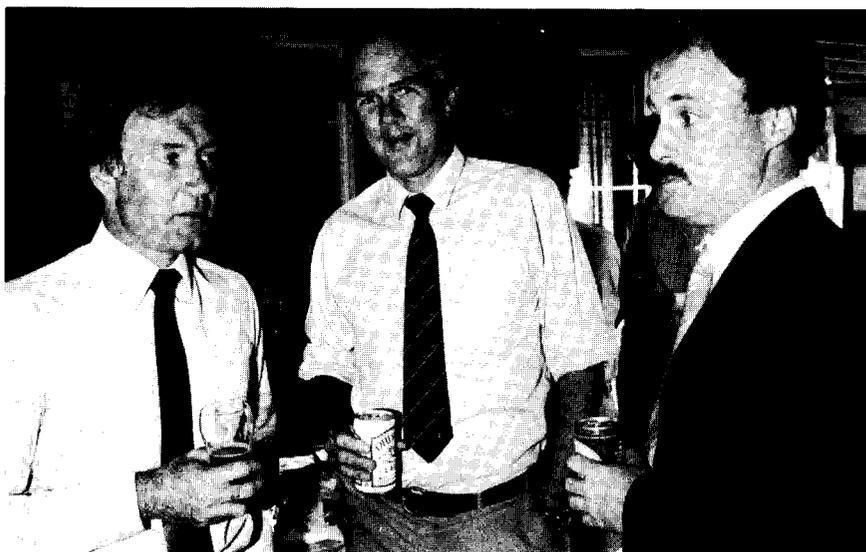
Julian Lurie (Velner) and Bill Park (Wellman)



Michel Cervello (Chemviron, Belgium) and Ron Macaulay (Floccotan)



Front: Silas Ndhlovu (Union Carbide, Zimbabwe), Edmund Chitura (Lonrho, Zimbabwe), Dawn Wickramasinghe (Haycarb, Sri Lanka), Jack Hall (Interland Chemicals Inc., Philippines), Richard Beck (Gold Fields), and Hans von Michaelis (Randol International, U.S.A.). Back: Peter Bailey (Gencor) and Waddy Furusa (Lonrho, Zimbabwe)



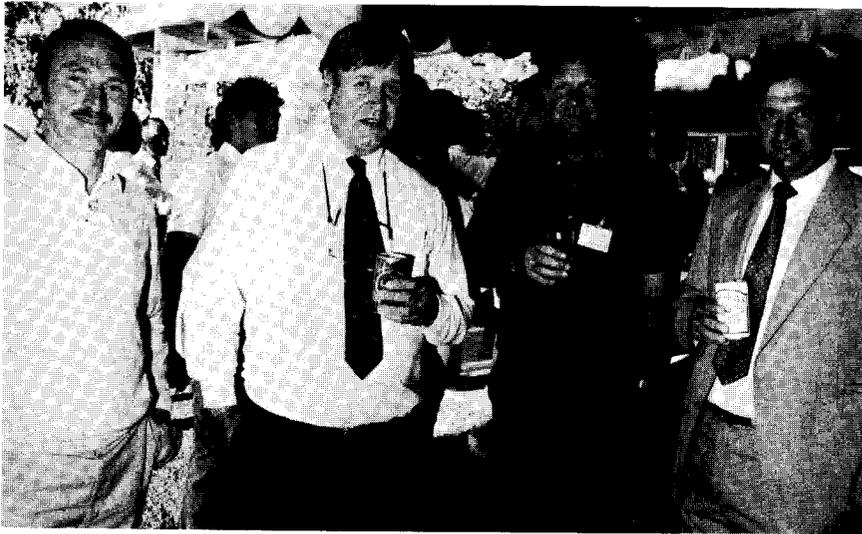
Warren Dale (Aeromix), Chris Fleming (Mintek), and Stuart Clarke (Aeromix)

Richard Beck (Gold Fields), Derrick Alston (Multotec), and Robin Moir (Gold Fields)



Jim King (Placer Development, Canada), Johan Engelbrecht (Multotec), and Wally Lurie (Van Eck & Lurie)

Jim Smith (Floccotan), Geoff Waller (Chemviron, Belgium), and Peter Smith (Anglo American)



Des Bell (OFS South Region), Derek Thixton (GSE), Tex Human (Vaal Reefs), and Errol Amm (Delkor)

Gloria McDougall (Sentrachim), Peter Sampson (Delkor), and Tex Human (Vaal Reefs)





**Tarcisio Carvalho (Gencor, Brazil),
Jem Voges (Gencor), and Clayton
Chappell (Rand Mines)**

**Rein Buisman (Buismet), Ivor Jones
(Western Areas), Roger Bridson
(Ekato), Brian Rainier (Multotech)**



**Ant Marsh (Forbes & Thompson, Zim-
babwe), Michel Boylett (JCI), Neill
Turner-Dauncey (Multotech), and
Ken Tuckey (Multotech)**

Computers and mathematics

APCOM 87, the 20th International Symposium of the Application of Computers and Mathematics in the Mineral Industries, is to be held in Johannesburg from 19th to 23rd October, 1987.

Interested people are invited to submit titles and synopses in any of the following topics or others. Papers can cover theoretical developments, practical applications, case studies, and software and hardware systems.

1. **EXPLORATION**
 - Acquisition and processing of satellite data
 - Selection and investigation of target areas
 - Data acquisition
 - Geological exploration
 - Planning of exploration programmes
 - Management of exploration data
 - Computer analysis of geophysical and geochemical data
 - Graphic displays and image processing
2. **ORE EVALUATION**
 - Ore-body modelling and simulation
 - Grade-tonnage estimates for feasibility studies
 - Geostatistical theories and techniques
 - Computer software for geostatistics
 - Applications of computer graphics
3. **FINANCIAL EVALUATION AND PLANNING**
 - Cost estimation and projection
 - Feasibility studies
 - Risk analysis
 - Planning and control of capital projects
 - Presentation of results
4. **MINE DESIGN AND PLANNING**
 - Open-pit and underground designs
 - Modelling and simulation of mine systems
 - Production scheduling
 - Application of rock-mechanics techniques
 - Reticulation systems
 - Environmental control
 - Handling of materials
 - Interactive graphics techniques
 - Computer-aided design
 - Long-term and short-term planning
5. **MINE OPERATION AND PRODUCTION**
 - Production scheduling
 - Simulation
 - Selection of machines and equipment
 - Data capture
 - Equipment maintenance, scheduling, and control
 - Reclamation and surface environment
6. **MINERAL PROCESSING**
 - Plant design
 - Process modelling
 - Flow sheeting and simulation
 - Selection of equipment
 - Techniques of computer-aided design
 - Simulation languages
7. **PLANT OPERATION**
 - Simulation
 - Process control
 - Dynamic and steady-state simulation
 - Computer control techniques
 - Plant-management systems
 - Material-balance smoothing
 - Analysis of plant data
 - Real-time interfaces
8. **INFORMATION SYSTEMS**
 - Manpower management
 - Maintenance management
 - Financial reporting and control
 - Information management

Titles and synopses (not more than 250 words) should be submitted so as to arrive not later than 1st June, 1986. Draft papers will be required before 1st December, 1986, and, if they are accepted, the final papers will be required by 1st June, 1987. All correspondence and submissions must be addressed to

The Conference Secretary (C.31)
Mintek
Private Bag X3015
Randburg
2125 South Africa.

Tunnelling '88

The Institution of Mining and Metallurgy is pleased to announce the holding of 'Tunnelling '88', the fifth international symposium and exhibition in the series, from 17th to 22nd April, 1988, at the Kensington Rainbow Exhibition Centre, London, England.

Details of the Symposium and its associated events are

available from

The Institution of Mining and Metallurgy
44 Portland Place
London W1N 4BR
England.

Telephone: 01-580 3802, telex: 261410 IMM G.

Centenary exhibition and conference

The major trade show to take place in the year of Johannesburg's centenary will be the 7th International Mining and Electrical Engineering Exhibition—ELECTRA MINING 86. The Exhibition, which is also the third-largest mining exhibition in the world, will take place from 15th to 19th September, 1986, at the National Exhibition Centre, Crown Mines, Johannesburg.

Since 1986 is the centenary of the establishment of the gold-mining industry on the Witwatersrand, as well as being Johannesburg's centenary, it is fitting that a major international conference on gold is to take place alongside ELECTRA MINING 86. GOLD 100 is being organized by The Council for Mineral Technology, The School of Business Leadership of the University of South Africa, The South African Institute of Mining and Metallurgy, and The Chamber of Mines of South Africa. The main areas to be addressed by this Conference will include the extractive metallurgy of gold, mining technology, economics and marketing of gold, and industrial uses of gold.

ELECTRA MINING 86 receives the support of the Long Wall Mining Association, The South African Institute of Mining and Metallurgy, the Conveyor Manufac-

turers Association, and The South African Institute of Mechanical Engineers. Apart from a comprehensive display of every type of mining equipment, there will be a large and fully representative section for the electrical-engineering industry.

With eight months to go before the opening of this exhibition, 203 exhibitors had confirmed bookings (excluding the individual companies comprising the Austrian group), and over 20 000 m² of space has been sold. 'Already we have sold as much space as we utilized in total at Milner Park for the last exhibition in 1984', said Bill Bishop, Exhibition Manager. 'Another 7 000 m² is still available which, when filled, will make this the biggest exhibition in the series to date.' Apart from outside exhibits, the exhibition will occupy halls 5 to 10 at the National Exhibition Centre.

For further information on the exhibition, contact Bill Bishop, Exhibition Manager, Specialised Exhibitions. Telephone: (011) 835-2221.

For details of GOLD 100, contact The Conference Secretary (C29), Mintek, Private Bag X3015, Randburg 2125. Telephone: (011) 793-3511.

Mining electrotechnology

The Eighth WVU International Mining Electrotechnology Conference is to be held in Morgantown, West Virginia, U.S.A., from 29th July to 1st August, 1986.

New electrical, electronic, and computer-based devices and systems are boosting safety and productivity in the world's mining industries. These aspects of electrical engineering in mining will be addressed during the Conference, which is sponsored by the West Virginia University as one of its series of sponsored conferences in electrical and electronic engineering associated with mining.

The following topics will be discussed:

- Mine power systems
- Energy conservation
- Power electronics
- Computer-based monitoring
- Mine information systems
- Artificial intelligence
- Control systems
- Robotics in mining
- Mine communications
- Telemetry
- Sensors

- Remote sensing
- Seismic signal processing
- Safety and reliability.

For further details write or telephone

Dr Nigel Middleton
Conference Chairman
Dr Glafkos Galanos
Program Chairman
Dr Robert Swartwout
Exhibit Coordinator
Dr Wils Cooley
Arrangement Coordinator

The Eighth WVU International Mining Electrotechnology Conference
Department of Electrical Engineering
West Virginia University
P.O. Box 6101
Morgantown, WV 26506-6101
U.S.A.
Telephone: (304) 293-6371 or 293-6375.