

Proceedings, Annual General Meeting*

The 89th Annual General Meeting of The South African Institute of Mining and Metallurgy was held at Kelvin House, Johannesburg, on 20th August, 1986. Mr H.E. James (President) was in the chair and declared the meeting open at 16h00.

Obituaries

President: It is my sad duty to announce the deaths of the following members of this Institute: *Life Fellow* D.L. Carson; *Retired Fellows* T.K. Adams, G.E. Carlyon, N.M. Holford, D.E. MacIver, C.J. Morgan; *Fellows* S.K. de Kock, R.R. Porter, Dr G.J. Rees; and *Associate* Sir Lindesay Clark. As a mark of respect to the memory of the deceased and in sympathy with the bereaved, please rise and observe a moment of silence.

Minutes

President: The 88th Annual General Meeting of the Institute was held on Wednesday, 14th August, 1985, and the minutes were published in the September 1985 issue of the *Journal*.

The minutes were confirmed.

Welcome

President: I extend a welcome to our guests Mr E.P. Gush (President of the Chamber of Mines), Mr P.H. Bosman (General Manager of the Chamber of Mines), and Dr A.M. Edwards (President of Mintek). I also welcome senior members of the industry, Honorary Life Fellows, Past Presidents, Presidents of sister institutes and associations, our members, and other guests who are here this afternoon.

Membership

President: The names of the Candidates who have been admitted to membership since the last Annual General Meeting are given in the Annual Report (pp. 357 to 373 of this issue). I welcome the newly elected members to the Institute and congratulate those who have transferred to a higher grade.

Honorary Life Fellowship

Honorary Life Fellowship is awarded by Council to Corporate Members of the SAIMM who have rendered outstanding service to the industry or to the SAIMM. This year it gives me very great pleasure to announce that your Council has decided to award Honorary Life Fellowship to Professor D.G. Krige. Danie Krige is a long-standing member of the SAIMM and has made a very great contribution as a member, as a member of Council, and as Treasurer. In 1984, he received the highest award of the SAIMM, the Brigadier Stokes Memorial Award.

Brigadier Stokes Memorial Award

President: The Brigadier Stokes Memorial Award was instituted in 1980 to commemorate the outstanding con-

tribution to the South African mining industry made by Brigadier R.S.G. Stokes, Honorary Life Fellow and a Past President of the SAIMM. The award consists of a platinum medal and a cash award, and is made to an individual for the very highest achievement in the South African mining and metallurgical industry. It gives me great pleasure to announce that this year the award is to be made to Professor M.D.G. Salamon for his contribution to the advancement of mining technology in general, and the development of mining rock mechanics in particular. Professor Salamon, as most of you know, is currently in the United States. We have received a telegram from him addressed to Dr Wagner: 'Congratulations on your election to the Presidency of SAIMM. I am sorry that I cannot be with you today'. Because Professor Salamon is not here this afternoon, Council has decided to present this award to him on the occasion of GOLD 100, which is to be held from the 15th to 18th September, 1986. Professor Salamon will be presenting one of the plenary addresses at that Conference. The citation will be read out on that occasion and will be published in the October 1986 issue of the *Journal*.

Presentation of Medals

President: This year silver medals are awarded to three papers that appeared in the *Journal* during the past year. The first is for a paper authored by R.E. Collins and A. Smith; the second for a paper by R.J. Davidson, W.D. Douglas, and J.A. Tumilty; and the third for a paper by Professor G.T. van Rooyen. Details of these papers are given in the Annual Report.



Mr R. E. Collins (silver medal), Mr A. Smith (certificate of merit), and Mr H.E. James (President 1985/1986)

Metal Review Series

President: It is my pleasure to hand out a number of special certificates of merit to the authors of papers that have appeared in recent months in the *Journal* in our Metal Review series. These papers were commissioned to review, in a technical sense, the history, occurrence, mining, extraction, and further processing of each of the major metals and minerals produced in South Africa. I

* The photographs accompanying these Proceedings were taken by Carlos Pais. All the captions read from left to right.



Dr Wagner (President 1986/1987), Dr Davidson (silver medal), Mr Tumilty (certificate of merit), and Mr James



Mr James handing a certificate to Mr L.M. Falcon for his review on tin

shall hand out the certificates to the authors in the order in which their papers appeared in the *Journal*: the first paper was on copper by C.O. Beale; the second on vanadium by B.R. Rohrmann; the third on platinum by R.C. Hochreiter, D.C. Kennedy, W. Muir, and A.I. Wood; the fourth on tin by L.M. Falcon; the fifth on chromium by Professor D.D. Howat; the sixth paper on lead by R.A. Snodgrass; the seventh on antimony by Dr D.R. Davis, D.B. Paterson, and D.H.C. Griffiths; and the eighth on gold by P.R. Janisch.

President: I really believe that this series of Metal Reviews has done something quite extraordinary for our *Journal* during the past few months, and we look forward to the continuation of the series.



Mr B.R. Rohrman (author of the review on vanadium) receiving his certificate from Mr James



Mr James handing a certificate to Mr R.A. Snodgrass for his review on lead



Messrs Wood, Muir, and Kennedy (authors of the review on platinum) with Mr James



Mr James with Dr D.R. Davis and D.B. Paterson (authors of the review on antimony)



Mr James with Mr P.R. Janisch (author of the review on gold)

Presentation of Student Prizes

President: This year a prize is to be awarded to a fifth-year technikon student studying for the National Diploma for Technicians in Metallurgy. The recipient is A.M. de Sousa.

Student prizes are awarded annually to fourth-year university students for the best project reports prepared in fulfilment of an engineering degree. The first award is to be made to a student in mining engineering from the University of Pretoria, I.M. Lombaard, and the second to a student in extractive metallurgy from the University of the Witwatersrand, W.W. Stange.



Mr James with Mr I.M. Lombaard, who won a student award

In the category physical metallurgy, there were two students who obtained the same average mark: I. Wolff of the University of the Witwatersrand and J. van Tonder of the University of Pretoria.

The Annual Report contains details of these and other student prize-winners. The other prizes were awarded at various prize-giving ceremonies held at the appropriate university or technikon. Please join me in congratulating all our prize winners, those present and absent. I am sure that the high standards they have set will be an incentive for others in the year to come.



Mr James, Mr W.W. Stange and Mr I. Wolff (winners of student awards), and Dr Wagner



Mr James congratulating Mr J. van Tonder on his receipt of a student award

Annual Report and Accounts

(See pp. 357-373 of this issue.)

President: The Annual Report of the SAIMM and the report by Aiken & Carter on the financial statements for the year ended 30th June, 1986, have been tabled. As explained in the preface to the Annual Report, the format is different from that in previous years. You will notice that each major section starts with a listing of the key performance areas that have been identified as essential to the achievement of the objectives of the SAIMM in the area of activity concerned. This is followed by a listing of the members of the committees responsible for the work, and finally a summary is given of the activities undertaken during the year under review.

It is indeed a very difficult task to single out particular activities for special mention. In the time available, it is clearly impracticable for me to work through the entire text of the report. However, I can assure you that behind every sentence that appears in the report lies a tremendous amount of activity. I therefore propose to highlight certain aspects of the report that I wish to draw to your attention.

The President then proceeded to comment on certain aspects of the Annual Report. Because he referred speci-

fically to the text of the Report and did not introduce any additional material, his comments are not reproduced here.

President: In conclusion, I thank my fellow Office Bearers and all members of Council for their support and dedication during my year of office. I also thank our Secretary, Doris Gardner, our Publications Secretary, Pam Binstead, our Conference Secretary, Pat Jacobs, and the other members of our Secretariat for their hard work, loyalty, and friendliness during the past year. I acknowledge the valuable contributions, with regard to the publication of the *Journal*, of the Programme Advisory Board, the panels of referees, the Honorary Editor, Dr H.W. Glen, the proofreader, Mr F.G. Roberts, and Dr Graham Baker and the staff of Scientific & Technical Typesetting. My sincere thanks to John Erasmus, Manager of Kelvin House, and to his staff for their support to the SAIMM during the year. A special word of thanks also to Dr Aidan Edwards, President of Mintek, to my secretary, Alta Gerber, and to my other colleagues at Mintek for their support and understanding during the past year, when my duties for the SAIMM placed tremendous demands on my time. Finally, I thank my wife, Joan, for her unflinching support and encouragement during my term of office.

I now have pleasure in proposing the adoption of the Annual Report, and I call on our Honorary Treasurer, Professor D.G. Krige, to present his report and to second the motion.

Before seconding the motion, Professor Krige commented on the points made in his financial report, which is included in the Annual Report on page 373 of this issue.

Office Bearers and Members of Council for 1986/87

President: I have pleasure in announcing that, in accordance with clause 3.2 of the Constitution, as revised at the Special General Meeting held immediately before this Annual General Meeting, and in accordance with clause 3.3 of the Constitution, the retiring council has elected the following Office Bearers for the ensuing year: *President* Dr H. Wagner; *President Elect* B.C. Alberts; *Senior Vice President* C.E. Fivaz; *Junior Vice President* Dr O.K.H. Steffen; *Immediate Past President* H.E. James; and *Honorary Treasurer* Professor D.G. Krige. In addition, J.D. Austin, who was Immediate Past President during 1985/86, has agreed to serve for an additional year as an Office Bearer. In terms of the election of ordinary members of Council, there is a letter from the Scrutineers stating, 'We have to report that we have inspected the nomination papers for members of Council for the 1986/87 session and have found that the ballot papers sent out to Corporate Members of the Institute were in order. There was a return of 502 ballot papers, representing a ballot of 35,6 per cent, which is the highest for some years. There were 12 spoilt papers. As a result of the scrutiny, we found that the following members have been elected to Council: R.D. Beck, Professor S. Budavari, J.A. Cruise, Professor R.J. Dippenaar, J.S. Freer, J.P. Hoffman, R.W.O. Kersten, R.B. MacGillivray, V.J. Moore, H.G. Mosenthal, B.C. Oberholzer, B.E. Protheroe, R.A. Snodgrass, and P.C. van Aswegen'.

In addition, Dr J. Lurie and Mr A. Killat were elected

unopposed to represent non-corporate members on our Council. And in terms of clause 3.2.8 of the Constitution, Mr B.R. Rohrmann, Chairman of the Witbank/Middelburg Branch, and Mr P.H. Ratcliffe, Chairman of the Orange Free State Branch, will also serve on Council. The following Past Presidents have signified their willingness to serve on Council for the ensuing year: J.D. Austin, Professor A.N. Brown, Dr R.E. Robinson, Dr P.R. Jochens, Mr P.A. von Wielligh, Professor R.P. Plewman, Mr P.W.J. van Rensburg, Mr G.Y. Nisbet, and Professor R.P. King. I congratulate all those elected and thank all those who have agreed to serve for another term of office.

Induction of President

President: We now come to an important part of the proceedings, and it is my pleasure to introduce our new President, Dr Horst Wagner.



Mr James receiving the President's Plaque from the new President, Dr Wagner

Dr Wagner is a graduate in mining engineering from the Mining University, Leoben, Austria. He began his professional career as a junior lecturer in the Mining Department of his *Alma Mater* in 1964. His lecturing activities covered mine ventilation, mine planning, and rock mechanics. In 1968, he was awarded a Ph.D. degree for research on rock cutting. He married Annelore in 1967, and in 1969 they emigrated to South Africa, where he joined the staff of the Chamber of Mines Research Organization. His early research was concerned with all aspects of strata control in coal and gold mines. When he was appointed Director of the Mining Operations Laboratory in 1978, the scope of the work broadened to cover the development of improved stoping methods in gold mines based on drilling and blasting, strata control, mine planning and, later, all aspects of the Chamber's coal-mining research effort. In 1984 he was promoted to the position of Assistant Research Adviser with the Chamber of Mines, and was recently appointed Director General of the Chamber's Research Organization. He joined the SAIMM in 1971, and was elected a member of Council in 1979 and Senior Vice President in 1985.

On the lighter side of things, Horst appears to have excelled in many branches of sport. He played soccer for the Austrian Junior Team, and in fact played professional soccer for a short while. He is recognized as a top skier, and took up long-distance running and cycling. His practical approach to life was demonstrated when his family moved to South Africa, and he set about building his own home, brick by brick. The building and flying of model aeroplanes is his greatest hobby. He came fourth in the world championships in 1955, and has been European champion several times and South African champion on numerous occasions.

Horst and Annelore have a girl, Katharina, and a boy, Alexander. The year ahead is going to be busy for Horst and Annelore, but I am sure it will also be a memorable one for both of them. They have the backing and good wishes of us all.

Incoming President: I am very proud to assume the office of President of The South African Institute of Mining and Metallurgy, and I am very conscious of the honour. My predecessors have set a very high standard for me to follow but, with the help of the Office Bearers and Council, I hope to be worthy of the honour. I am indeed very fortunate in having Mr Ben Alberts as President Elect, and Mr Gene Fivaz, and Dr Oskar Steffen as Vice Presidents, and I shall rely heavily on their skills and hard work. As in previous years, Professor Danie Krige has agreed to serve as Honorary Treasurer, and I thank him for his continued service to the SAIMM. I offer my congratulations to the re-elected members of Council, and give a hearty word of welcome to Mr John Cruise, Mr John Moore, Mr Bertie Oberholzer, and Mr Peter van Aswegen, who are joining us on Council for the first time. I welcome back to Council Mr John Freer, and I thank the Past Presidents who have agreed to serve on Council. We have always leaned heavily on their experience and wisdom, and I am sure that the coming year will not be different from the past.

I record my thanks and appreciation to the employers who allow their senior staff to participate in the SAIMM's affairs for the benefit of the industry. I wish to record a special word of thanks to the management of the Chamber and my colleagues at the Research Organization for their good wishes and for their support in the coming year. I look forward to working with Doris Gardner and her staff, and with Dr Helen Glen, Dr Baker, and Miss Binstead on the production of the *Journal*. And, with the management of AS&TS, who give us such efficient and dedicated service, the day-to-day running of the SAIMM will be in good hands.

Finally, I am sure that you will join me in thanking and paying tribute to Henry James, our out-going President, for the manner in which he handled the job of President during the past year. In addition to the normal duties of President, Mr James embarked on a long-term strategic plan for the SAIMM and initiated significant changes to the constitution. I am certain that his term of office will be remembered as a milestone in the history of the SAIMM. On behalf of Council, I ask him to accept a shield bearing the crest of the SAIMM as a memento of his year of office.

I now invite Mr Alberts, the President Elect, to take the chair on my right, and Mr Fivaz and Dr Steffen, the

Senior and Junior Vice Presidents respectively, to join me on the rostrum.

Mr Fivaz: Speaking on behalf of Dr Steffen and myself, as the newly elected Junior and Senior Vice Presidents, I express our sincere thanks and appreciation to Council, who have afforded us this honour. We appreciate the confidence expressed in us and shall endeavour to serve the SAIMM to the best of our ability and attempt to maintain the high standards set by our predecessors.

Appointment of Auditors and Honorary Legal Advisers

Incoming President: I propose that Messrs Aiken & Carter be appointed as Auditors and that Messrs Van Hulsteyn, Duthie & Saner be appointed as Legal Advisers to the SAIMM for the coming year.

Presidential Address

Mr Ben Alberts took the chair while Dr Wagner delivered his Presidential Address, entitled 'The challenge of deep-level mining in South Africa'. (See pp. 377 to 392 of this issue.)

Mr Alberts: It is now my pleasure to call on Mr W.W. Malan to propose a vote of thanks to Dr Wagner.



Mr and Mrs D. Malan

Mr Malan: It is my great pleasure to thank you, Dr Wagner, as incoming President of The South African Institute of Mining and Metallurgy for a stimulating address on the challenges of deep-level mining in South Africa. It is appropriate that this address was made by you as newly appointed Director General of the world's largest mining research institute, the Chamber of Mines Research Organization, and that you should have chosen this Institute's Annual General Meeting to have made it.

Your address is timely, not only because it was delivered in the centenary year of the gold-mining industry that pioneered deep-level mining, but also at a time when there have been signs of optimism generated by a higher gold price in both rand and dollar terms. It is always worth while at a time like this to step away from the euphoria and to return to the fundamentals, so that we can squarely face the true challenges confronting us in the mining industry. And these challenges in the final analysis are associated primarily with the long-term

viability of mining at depth in the circumstances that pertain to South Africa. You, Mister President, have made some cogent points in your analysis of the effects of a changing socio-economic and political climate on deep-level mining operations. The socio-economic and political well-being of South Africa is closely linked to the viability of the gold-mining industry.

In 1985, for instance, gold sales valued at R15 300 million accounted for 59,1 per cent of the country's total mineral earnings and 67,9 per cent of its export revenue. However, a number of challenges will have to be overcome if the viability of the South African gold-mining industry on its present scale is to be guaranteed in the future. I shall touch on some of these challenges later, but first let me pause to illustrate how South Africa's dominant role as the world's major gold producer is being rapidly eroded.

South Africa's contribution to total world production decreased steadily from 79 per cent in 1971 to 67 per cent in 1981, and even lower—to 56 per cent—in 1985. It is expected to drop to as low as 47 per cent in 1991. South Africa's gold output peaked at 1000 tons in 1971. Since then it has dropped consistently, reaching a low of 656 tons in 1981—the lowest figure since 1959. Production in 1985 amounted to 672 tons.

Some important observations can be made on the production statistics. In regard to the performance of the industry over the past six years, working costs in rands per ton milled have more than doubled, the actual increase being 127,9 per cent. South Africa's Consumer Price Index has increased by 119,2 per cent—slightly less than the increase of costs in rands per ton milled. Working costs in rands per kilogram, however, have escalated at the staggering figure of 215,8 per cent, and this is the figure that ultimately determines the viability of a mine and its vulnerability to price fluctuations.

The gold price in dollar terms in 1985 is virtually the same as it was in 1979—hence, my selection of the past six years for comparative purposes. But in rand terms it has increased by 175,5 per cent, which still does not compensate for the increase in working costs expressed in rands per kilogram. Productivity, on the other hand, expressed as tons per man per month improved by a mere 5,5 per cent. Furthermore, the decrease in recovery grade from 13,3 grams per ton in 1970 to the 6,1 grams per ton recorded in 1985 is also worthy of note. The 1986 figure, incidentally, is 5,79 grams per ton.

I believe that the main observation to be made from these statistics concerns the relationship between the gold price expressed in rands per kilogram and the working costs expressed in the same terms. The other important factor is a very low increase in productivity in recent years. In this regard, Dr Wagner made a very important point in his address when he said that the prosperity enjoyed by the industry in recent years was largely due to external factors, such as the tenfold increase in the dollar price of gold since the early 1970s and the benefits to the mining industry of a depreciated rand, rather than the result of improved technical and cost performance. He went on to say that continued economic strength could be maintained only if the industry freed itself from its almost complete dependence on external factors.

I share Dr Wagner's views that this can be achieved

only by determined and sustained effort to control costs and to improve productivity. Productivity is undoubtedly the key element and, as Dr Wagner stated, a short-term improvement in this field can be achieved primarily through better mine management, supervision, and training. In the longer term, however, real improvement can be brought only by better mining methods and new technologies. The mining challenges for the achievement of increased productivity were adequately covered by Dr Wagner when he discussed the mechanization of stoping operations, the underground environment, strata control, and safety. What is significant is that the challenge we face cannot be examined or solved in isolation, for there is a great degree of inter-dependence between various factors, and the solutions to different problems are often complementary.

Effective rock-burst control, for instance, is a complementary prerequisite for successful and meaningful stope mechanization. Furthermore, backfill that is required to ensure effective rock-burst control because of its excellent local support characteristics is also important in improving the environment by minimizing the heat flow from worked-out areas.

In conclusion, I want to emphasize the significance of improved stope face advance in meeting the mining challenges for improved productivity. Better mining methods and new technology are undoubtedly the solution to the industry's problems, but these can be achieved only by greater emphasis on research and development and the active co-operation and ingenuity of our mine managers.

The Chamber's Research Organization under the direction of Dr Wagner and individual mine managements therefore have a crucial role to play in enhancing the future viabilities of the South African gold-mining industry.

I congratulate Dr Wagner on his appointment to the high office of President of the SAIMM, a position that I believe he will fill with distinction. I thank him again for his thought-provoking Presidential Address, which will undoubtedly receive the attention that is due to it by his colleagues in the mining industry.

Mnr Alberts: Dit is vir my 'n voorreg om mnr Malan te bedank vir die kort maar baie toepaslike mosie van dank wat hy aan die President gerig het.

Conclusion

Dr Wagner then took the chair and declared the meeting closed at 18h05.



Mrs and Dr Wagner



Dr J. Lurie and Mr A. Killat



Mr R. MacCauley and J. Greig

Pyrometallurgy '87

'Pyrometallurgy '87', the first in a proposed series of international symposia to be organized by the Institution of Mining and Metallurgy in association with the Institute of Metals, will be held at Imperial College of Science and Technology, London, England, from 21st to 23rd September, 1987.

The processing of materials at elevated temperatures is the theme of Pyrometallurgy '87. The subjects to be covered include roasting, sintering, agglomeration, reduction, smelting, and refining.

The objective of the Conference is to provide a forum for the presentation and discussion of *new work* that is being undertaken both in the theory and the practice of pyrometallurgy. The metallurgical industry worldwide urgently needs to improve its competitiveness to ward off materials substitution. Pyrometallurgy has a vital role to play in the defence of the metals industry.

Pyrometallurgy '87 will seek to present papers that reflect the current status, future prospects, and challenges in the extraction of metals by pyrometallurgical means. The Organizing Committee will be pleased to consider papers that deal with any of the following:

- plant operation
- pilot-scale investigations
- process modelling
- novel iron- and steelmaking
- vacuum degassing to improve product quality
- plasma-furnace technology
- direct oxygen smelting of sulphides
- polymetallic smelting of complex sulphides.

Abstracts (200 to 300 words) of proposed papers should be submitted for consideration *before* 1st October, 1986, to the

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

Completed manuscripts of approved papers will be required in March 1987, and a preprinted volume of papers will be sent to registrants in advance of the conference.

Further details of the symposium will be given in the *Second Circular*, which will be available early in 1987.

Resources of Southern Africa

The second conference on the Resources of Southern Africa, organized by the Associated Scientific and Technical Societies (AS&TS) in collaboration with the Council for Scientific and Industrial Research, is to be held in Johannesburg from 12th to 14th November, 1986.

The theme of the Conference is a re-evaluation of Southern Africa's resources in the light of developments over the past decade and the potential contribution of science and technology in the utilization of those resources to the benefit of the peoples of the region. The objective is to review the findings and recommendations of the Conference 'Resources of Southern Africa—Today and Tomorrow', which was held in 1975.

Leaders in the following fields should attend the Con-

ference:

- Commerce and Industry
- Educational Establishments and Research Organizations
- Government Departments and Agencies
- Development Corporations.

Further information is obtainable from

The Symposium Secretariat S.400
CSIR
P.O. Box 395
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