

Annual General Meeting of the Institute

The Annual General Meeting of the Institute was held in Kelvin House, Johannesburg, on Wednesday, 30th August, 1972.

Professor D. D. Howat (President) was in the chair.

There were also present sixty-two Fellows, twenty-four Members, two Associates, three Students and eighteen Visitors, making a total of one hundred and nine.

The President declared the meeting open at 4.05 p.m.

OBITUARIES

The President: It is my sad duty to announce the death of six members of this Institute. The first of these is Dr A. J. Orenstein, Honorary Life Fellow, who joined the Institute in 1916 and died on Seventh July. Dr Orenstein became almost a legendary figure in Medicine as a result of his work in the control and elimination of malaria during the digging of the Panama Canal and I believe he was actually engaged working until four days before his death.

The other members who have died are: F. Meyer, died on 8th June; S. D. Loxton, Fellow, died on 13th May; J. Innes, Fellow, died on 10th January, 1970; O. B. Prentis, a Member, died on 4th June, and J. Brits, Associate, died on 27th June.

As a mark of respect to the memory of the deceased and in sympathy with the bereaved may I ask you to rise and observe a few moments silence.

MINUTES

The President: 'The second item on the Agenda, the minutes of the meetings held on March 22nd and May 10th, 1972, as tabled. May I confirm these minutes?' Agreed.

WELCOME TO VISITORS

'On behalf of the Council, may I say how delighted we are to have such a splendid gathering with us on this our Annual General Meeting.

Dames en here vir die omvang van my Afrikaanse woordeskat verdien ek weinig lof, boonop is dit nog Afrikaans met 'n Skotse aksent, wat u asseblief moet verskoon. Tog wil ek sê hoe dankbaar ons is dat sy Edele, die Minister van Mynwese, dr Koornhof en mev Koornhof vandag hier teenwoordig kan wees.

In addition to our own newly appointed Minister of Mines, we are also honoured by the presence of the Minister of Mines of Rhodesia, Mr I. B. Dillon. I think not even our oldest members can recall an occasion on which two Ministers of Mines were present at a meeting of the Institute. It is a particular pleasure to welcome them this afternoon.

I am happy to say that Minister Koornhof is an Honorary-Vice President of the Institute, and Minister Dillon is an Honorary Member.

The presence of your goodselves, gentlemen, with us this afternoon, I am sure underlines the great significance which we believe both countries attach to the economic exploitation of the vast mineral resources of Southern Africa. For over 70 years, this Institute and its members have been making their contribution to this great task of mineral exploitation, and we feel that your presence with us today, is a token of the confidence of your governments in what this Institute and its members have been endeavouring to do.

Also present with us today, is Mr R. C. J. Goode, President of the Chamber of Mines, and Honorary President of this Institute. I was going to say I welcome Mr Goode, but it is rather difficult to welcome a man to his own home, and this is the case with Mr Goode. He is a very distinguished and a very recent past president of this Institute and he remains now, as he has been for as long as I can remember, one of our most active and valuable members.

This I think, ladies and gentlemen, is the second rather unique feature of this occasion this afternoon, because no one else can recollect an occasion on which the President of the Chamber of Mines was also a past president and an active member of our Institute. A special word of welcome, Mr Goode.

Mr Tommy Gibbs, our Government Mining Engineer, is in a somewhat similar position as he is also a member and an old and valued friend of our Institute, — welcome to you, Mr Gibbs.

Mention I think, must be made of the fact that we are very glad to have with us Dr A. J. A. Roux, President of the Atomic Energy Board, and Mr Stanley Craib, President of the Associated Scientific and Technical Societies.

Then, within the great family of the A.S. and T.S., we have the presidents, or the vice-presidents of I believe 13 of the constituent societies. These gentlemen, like all the rest of us, have the rather tiring task of supporting and upholding their fellow presidents on occasions such as this. We particularly appreciate their presence this afternoon and the effort they have made to be with us.

We are happy to have with us: Dr R. E. Robinson, Director-General, National Institute of Metallurgy, Mr E. Boden, Manager, Associated Scientific and Technical Societies, Dr H. G. Denkhous, President, The S.A. Institute of Mechanical Engineers, Mr G. Goedhals, Vice-President, S.A. Institute of Electrical Engineers, Mr E. Dalton, President, S.A. Institute of Certificated

Mechanical and Electrical Engineers, Professor W. J. von Biljon, President, Geological Society of S.A., Mr A. W. Reynolds, President, S.A. Institute of Land Surveyors of the Transvaal, Mr J. H. J. Burrows, President, Mine Ventilation Society of S.A., Mr E. P. Smit, President, Mine Managers Association, Mr V. H. Furlong, President, Institute of Foundrymen, Mr P. D. Santilhano, President, The Institute of Welding, Mr M. R. Gericke, President, S.A. Council for Professional Engineers, Mr J. J. Bruwer, President, Federation of Societies for Professional Engineers, Mr R. R. Gibbs, President, Institute of Mine Surveyors of S.A., Mr E. C. Shiffman, President, S.A. Institute of Chemical Engineers, Mr J. M. Meyer, Chairman, Orange Free State Branch of the S.A. Institute of Mining and Metallurgy.

That, I think concludes the welcome, and the list of our distinguished guests, and on behalf of the Council, may I extend a very warm welcome to you all'.

MEMBERSHIP

The President: I have pleasure in announcing that the names of the following candidates having been published in accordance with By-Law 5.2.2, the Council has elected them to membership in the following grades:

Fellows: Terence Barnes.

Members: Coenraad Boshoff, Reginald James Ferris.

Graduates: Allan Michael Jones.

Students: Anthony Marstan Ehlers, Geoffrey Joubert, Alistair George William Knock, Kenneth John Merz, and Ivan Martin Pleaner.

TRANSFERS

From Member to Fellow: George Rodney Still.

From Associate to Fellow: Eric Collier.

From Student to Fellow: Mohammed Ali Kazemzadeh.

From Graduate to Member: John Philip Wilcocks Bennie.

PRESENTATION OF MEDALS

We come to a much more interesting item on the Agenda, the presentation of the awards. I have great pleasure in calling on Dr F. G. Hill, also a former president and a honorary life member, to present Professor R. P. Plewman and Mr D. W. Ortlepp with gold medals. Dr Hill.

Dr Hill: 'Mr President, Mr Minister Koornhof, Mr Minister Dillon, ladies and gentlemen. It is a signal pleasure for me, at the invitation of our President, to present to you, this afternoon, Professor Robert Plewman and Mr David Ortlepp who have this year been awarded the Society's Gold Medal for their paper entitled, "The development and application of a digital computer method for the solution of strata control problems". I am not going to dwell on the intricacies of the paper, because I know far too little about computers. All I shall say is that the paper has proved a most valuable aid to engineers in solving many involved rock mechanics' situations.

I have said it is a signal pleasure for me to introduce both Professor Plewman and Mr Dave Ortlepp, because I have known them for very many years. Both have made great contributions to local mining knowledge, and from a summary of their careers, you will see that they are men of stature in their profession and worthy recipients of the honour about to be conferred upon them.

First then, Professor Plewman. He and I were members of the Rand Mines' Technical staff in the 1950's. We worked closely together and our investigations covered a wide field, inter alia the application of statistical methods to mining, ways and means of combating silicosis, and intensive studies aimed at lessening the severity and the frequency of rock bursts. He always showed himself to be exceptionally clear thinking, with a marked capacity for sorting the relevant from the irrelevant, and marshalled facts and theories in so orderly a way that it was always very easy to decide on a course of action. To me it is no surprise then to find him here today to receive this high award, the Institute's Gold Medal.

I would like, at this stage, Mr President, to tell you something of Professor Plewman's curriculum vitae. He is a "Vrystater" born in Frankfurt in 1922, but he did not receive his senior school education in his home town, for we find him matriculating from Jeppe High in 1939 with a first-class pass. Academic prowess came easily to him. He was awarded his B.Sc. Mining Cum Laude at Wits. in 1943. Then came three years of war service, and when he returned, his thirst for knowledge had apparently not been quenched. He settled in again at Wits. took a first class degree in Mining Geology, and having been awarded a Rhodes' Scholarship, was at Oxford in 1947/1948 studying for a degree in politics, philosophy and economics.

Early youth, university studies and the war then, carried Professor Plewman to the age of 27 before he started his career as a mining engineer. Though well cast in the academic mould he soon showed his practical ability, and within a few years had risen to the position of an underground manager. But, his background and abilities had marked him out, and in 1954 he was brought on to the staff of the Consulting Engineers at Rand Mines, where he spent three years before being promoted to the position of Assistant General Manager at the Harmony Gold Mines. It was while at Harmony that this highly promising mining career took a perhaps not wholly unexpected change of course. In 1963, the late Professor R. A. L. Black resigned from Wits. University and the problem of a replacement arose. The University and the Chamber put their heads together and the name Plewman came up as a natural for the position, a man steeped in academic tradition, who at the same time had had great practical experience and had proved himself in his profession. So he was approached, and as is known to you all, he today occupies the Chair of Mining at the Witwatersrand University. I may add that he holds this position with great distinction and his particular strength lies in fostering post-graduate research.

We turn now to Mr Dave Ortlepp. Mr David Ortlepp is a man of younger vintage, but he too has won for himself a distinctive position on the Witwatersrand

goldfields. Born in 1932, he matriculated at the Parktown Boys' High and from there went to the Witwatersrand University where he took his mining degree in 1952. After a year in South West Africa, he returned to the Rand and became an underground official at the Durban Roodepoort Deep. Like his co-author, Professor Plewman, he also thirsted after more knowledge and in 1955 he went to McGill University in Canada to do a post-graduate course. His special study there was on the properties of rocks. After being awarded his Master of Engineering degree he returned to Durban Deep in 1957. It seemed clear to his seniors that his interests and abilities lay in tackling and solving problems, in research and investigation rather than in line or supervisory functions. This led to his being invited to the Rand Mines' Head Office Staff in 1958 to join their operations' research team. There he concentrated on and gravitated to his love and speciality, rock mechanics. In this field he rose to become one of South Africa's recognised authorities, and in 1965 it was decided that his expert knowledge could best be put to practical use by appointing him as rock mechanics engineer at the E.R.P.M., a mine more plagued by rock bursts than possibly any other of our deep-level mines. Here he is giving most valuable service, not only to E.R.P.M. but to the other mines of the Corner House Group, as well as to the industry as a whole. Mr Ortlepp's contributions to the paper which has been awarded the gold medal was significant and important.

Before concluding, I should not omit to mention that there was a third co-author to the paper, Dr F. H. Deist, he however, was not a member of our Institute and despite his having played a major role in writing the paper, he was not eligible for an award, Gold Medals perforce therefore go only to Professor Plewman and Mr David Ortlepp. I am sure you will agree, Mr President, ladies and gentlemen, that with their backgrounds of keen research interests and experience, these authors were destined some day to receive special recognition. Their paper on the "Development and application of a digital computer method for the solution of strata-control problems" was stimulating in content and vision. This paper has brought this pending recognition to a head, and today they are receiving the very high honour of the Institute's Gold Medal.

It is a richly deserved honour on which they are to be warmly congratulated, and I have much pleasure in requesting you, Mr President, to present the awards to Professor Robert Plewman and Mr David Ortlepp.

The President: 'Thank you so much, Dr Hill, I have great pleasure in presenting the gold medal to Professor R. Plewman, and to Mr Ortlepp'.

Professor Plewman: 'Mr President, ladies and gentlemen, on behalf of Mr Ortlepp and myself, I'd like to express our appreciation of the award you have just bestowed upon us. We are only sorry, that because he was not at that time a member of the Institute, our co-author Dr Deist could not be similarly honoured. We'd also like to thank Dr Hill for the kind things he had to say. Speaking for myself, I would like to acknowledge that he has, throughout my mining career been both my mentor and my guide and I therefore owe to

him a deep debt of gratitude, and I think I can say the same things for Mr Ortlepp. Once again, our sincere thanks to the Institute'.

The President: 'I now have pleasure in presenting a silver medal to Dr N. P. Finkelstein, for a paper, 'The influence of sulphhydryl and cationic flotation reagents on cyanidation of native gold'. This paper was written jointly with Mr K. Ashurst. Dr N. P. Finkelstein.

The name Professor Plewman occurs with almost monotonous regularity in this programme. My next duty is to present to Professor Plewman a silver medal for his paper entitled, 'The basic economics of open-pit mining' and a medal to Mr O. K. H. Steffen.'

STUDENT AWARDS

The President: 'The next item is the Presentation of Student Awards. The Institute has a number of student awards which are given each year to fourth-year students in Mining and Metallurgy who have submitted outstanding projects, — research projects — in their final year. We have five student awards this year. C. E. Alvey, L. C. Woolacott, J. C. G. J. van der Colf, G. A. Fourie, P. Vos. Only two students are unfortunately present to receive their prizes, Mr L. C. Woolacott and Mr P. Vos'.

PRESENTATIONS

The President: 'I now have pleasure in calling on Mr J. K. E. Douglas'.

Mr Douglas: 'Mr President, Honourable Ministers, Honourable Guests, Ladies and Gentlemen, I have a pleasant duty to perform which is to propose a presentation to Professor Jennings in recognition of his valuable work for the Open-pit symposium which was organised by this Institute in September, 1970.

This was undoubtedly one of the most successful symposia organised by this Institute. It was international in flavour as we had over 19 countries represented and some 450 delegates. Professor Jennings was the father of the idea. He and his co-workers at the university had completed some valuable research work on the stability of slopes in open-pit mines. He approached the Institute with the idea that he should present this for publication and discussion. He also made the suggestion that we should invite a few of the recognised leading experts in this field from overseas.

The response was so enthusiastic that the idea snowballed. Instead of the small symposium we had envisaged, it became an international affair. A lot of empirical work had been done on this subject but prior to this symposium little had been written on the theory of slope stability. The subject is of course of great importance in this country where we have substantial low-grade ore deposits and large open-pit mines are the only answer for economic exploitation.

The symposium made a significant advance in achieving this objective. The discussions were lively and our overseas visitors came here not only to participate, but several presented papers themselves. All who at-

tended played an active part and we can say without hesitation that a significant advance in technology was achieved. The proceedings were published in a book and it is testimony to the success of the symposium that a thousand copies have been sold. We are now printing another 500 copies and without doubt this will be an important text book for a long time to come.

The symposium was a major event for this Institute and comprised one week of discussions and a further week where our visitors had the opportunity of visiting our lovely country. Many of our members of course assisted in the organisation of this symposium and our thanks are due to all of them. However, I am sure you will all fully support the special honour we pay to Professor Jennings tonight. He was not only the originator of the idea but was the guiding hand throughout.

Mr President, I have great pleasure in asking you to make a presentation to Professor Jennings for the major role he played'.

The President: 'I think it is only fitting that we should give to the Professor a real weight of learning. We have very great pleasure in handing over this gift to you Professor Jennings.

It is now my pleasure, and a very real one, to mention the question of the services of Mr D. C. Visser. Mr Visser acted as secretary for our Institute for a number of years, and we had completely forgotten how much we depended upon him until he was promoted away from us to another and a wealthier society. Following on his transfer our Institute had some rather serious secretarial problems, the main problem being that we often had no secretary at all. In these circumstances, Don Visser came very willingly to our help and on many occasions he helped us out of very difficult situations and we were able to carry on. As a mark of our appreciation of the long service Mr Visser gave to this Institute, and the many times he helped us out of our troubles, the Council has great pleasure in presenting him with a gift'.

ANNUAL REPORTS OF THE COUNCIL AND ACCOUNTS FOR THE YEAR ENDED 30th JUNE, 1972

The President: 'I regret that I now come to another very dreary item on the Agenda, item number six, the annual report of the Council and the accounts for the year ending 30th June, 1972.

The presentation of the annual report of an institute is always a boring business, it always reminds me of reading last week's newspaper. On the other hand some account of our stewardship must be given, because the Bible says that even unjust stewards are finally called to give an account. So with reference to our annual report, a copy of which was on your chair when you came in, I am happy to report that our membership has increased by 46 to a total of 1 702 since last year. Of these additional members, 24 are Company Affiliates. This large number of companies makes a welcome addition to our members and initiates a new, and we believe a closer association between the Institute and

those firms engaged in Mining and Metallurgical work, or in producing plant and equipment for use in these industries. Partly as a result of this increased membership, our financial position is much happier than at this time last year. Further information along these lines will be given by our Honorary Treasurer, who I may say is also a happier man than he was a year ago.

Our journal has continued its successful, and I emphasise successful way, 32 papers having been published during the year, and I wish to record our thanks to the programme manager, Mr R. J. Adamson, and to the Honorary Editor Mr H. P. Carlisle for the great work they have done during the year under review.

Reference was made, in our last annual report, to the initiation of the new system of what we call quarterly colloquia, which have replaced the former monthly meetings. Four of these colloquia have been held, and they have obviously met a real need among members. The only real problem appears to be that this hall will not prove large enough to accommodate the numbers attending.

The organisation of these colloquia is undertaken by two committees. That concerned with mining was presided over by Professor R. P. Plewman and that concerned with metallurgy is presided over by Dr R. E. Robinson. These Chairmen and their Committee members have done an absolutely first-class job.

A very special mention must be made of The Tenth International Symposium on the Application of Computer Methods in the Mineral Industry, — I am glad I didn't have to say that in Afrikaans — which was held in the Wanderers' Club in April of this year, and was attended again by nearly 400 delegates, a large proportion of whom came from overseas. Our visitors were most complimentary about the organisation and conduct of this symposium and a special tribute is due to Mr P. W. J. van Rensburg and I think also to his wife, because they were mainly responsible for the arrangements. We anticipate that the volume covering the papers and discussions at the symposium will be in considerable demand throughout the world.

The Chairman of our Excursions' Committee, Mr P. A. Von Wielligh did a wonderful job in organising visits to various plants and mines during the year.

The Council proved, fortunately, to be its usual competent self, and it suffered with commendable patience and restraint, a President who was as scatter brained and as absentminded as academic people are usually supposed to be. Had it not been for my able Vice-Presidents Dr Hugo and Mr van Rensburg, the Honorary Treasurer Mr Maxwell and Mr Adamson, and the Honorary Editor Mr Carlisle, all proceedings might have ended up in complete chaos. But to these Office Bearers and the long suffering Council I tender my sincere thanks.

I did make mention a moment ago about secretarial difficulties, and in spite of the efforts of Mr Boden and of our former secretary Mr Visser, our Institute did have its year of troubles with several changes in the secretariate during the year. But we are hoping that the advent of Miss Jane Theron, who is with us today, will

prove the end of these difficulties. But I would like to pay a special tribute to Mr Boden and Mr Visser for the help they gave our Institute when we were in very real difficulties.

So, ladies and gentlemen, I have much pleasure in presenting and moving the adoption of the annual report for the year, and before calling for a vote, I would like to ask Mr D. G. Maxwell, the Honorary Treasurer to review the financial position. Mr Maxwell.

Mr Maxwell: 'Mr President, Minister Koornhof, Minister Dillon, in accordance with tradition, I shall take this opportunity to enlarge a little on the remarks on the Institute's finances that are contained in the annual report. It is with considerable pleasure and a large sigh of relief that I speak to you this year with the background of a fairly large surplus for the year.

The most important contributors to this surplus are mentioned in the annual report. It is most gratifying to see a substantial profit on the journal after the loss of the recent years. However, I should warn you that with increasing printing costs and falling revenue from advertising, plus the necessity to engage professional help to relieve the burden on the Honorary Editor, the current year is likely to see a drop in that profit.

The next important contributor to our surplus is the item Symposia and Colloquia. It is important to us that these functions should operate at a profit, and we are very grateful to the organising committees for their skilful budgeting.

At this point I should like to add my congratulations to Peter van Rensburg for the fine job he did on the financial side of APCOM.

Another source of funds during this year was the surplus on the sale of publications. For this we have to thank particularly the proceedings of the Open-pit symposium, which has been selling very well, as Mr Douglas told you. I feel confident that we can expect a similar success from the sales of the proceedings of APCOM.

Finally an important source of revenue to us was the subscriptions of Company Affiliates. We are very pleased to be able to welcome members to the Institute in this new category. Judging by the rate at which applications are coming in, we can expect considerably greater revenue under this heading for the coming year.

While profit on the operation of the journal and revenue from symposia and colloquia and sale of publications have been part of the financial picture of the Institute for many years, and I hasten to add that they do not, of course, always result in profits, the subscriptions of Company Affiliates are an entirely new source of revenue. On this point I should like to sound a note of warning. It is not the intention of Council to use this new source of revenue to subsidise the subscriptions of individuals. It is rather our intention to build up our funds which will be used to expand the activities of the Institute and provide more services for members. Therefore, although I started by saying that I heaved a big sigh of relief, I would not like you to get

the idea that we are sitting back complacently watching the funds roll in. I am in no way under the impression that making money for the Institute is an end in itself. On the contrary, it is nothing but a means to an end, the end itself being the provision of the maximum opportunity to members to fulfil the aims of the Institute. I feel confident that we will have concrete evidence to offer you next year of plans to put our new funds to good use.

It is now my pleasant duty to express to Miss Jane Theron, our secretary, as well as to her predecessors and to the Kelvin House staff associated with them, my sincere appreciation of all their hard work during the year. I should particularly like to say a special word of thanks to Mr Trueman, who ensures that our financial figures are available in a digestible form shortly after the end of every month, and of course at the end of the year.

Finally Mr President, I should like to congratulate you on a very successful year of office. With your truly Scottish combination of a finely tuned sense of humour and apparently inexhaustible capacity for hard work, you have ensured that the prestige of the Institute has gone from strength to strength. I now have much pleasure Mr President in seconding the motion for the adoption of the Annual Report and Accounts'. Agreed.

The President: 'We are indebted this year, and I trust in the future years to Mr D. G. Maxwell for the amazing work he does as Honorary Treasurer of this Institute. The President last year said that he was quite sure that Mr Maxwell is the only person who understood the arithmetic behind the gains and losses of the Institute and we are only so happy that this year they are gains'.

DECLARATION OF ELECTION OF OFFICE BEARERS AND MEMBERS OF COUNCIL FOR THE YEAR 1972-1973 — INCLUDING THOSE PAST-PRESIDENTS WHO HAVE SIGNIFIED THEIR WILLINGNESS TO SERVE ON COUNCIL FOR THE ENSUING YEAR

The President: 'I have pleasure in announcing that in accordance with Clause 3.3 of the Constitution, the retiring Council has elected the following as office bearers for the ensuing year.

<i>President:</i>	Dr J. P. Hugo
<i>Vice-Presidents:</i>	Mr P. W. J. van Rensburg Professor R. P. Plewman
<i>Honorary Treasurer:</i>	Mr D. G. Maxwell
<i>Immediate Past President:</i>	Professor D. D. Howat

I now read a letter from the Scrutineers declaring the election of Members of Council for the year 1972/1973:

'We have to report that we have inspected the nomination papers for Members of Council for the 1972/1973 session and have found that the ballot papers sent out to

Corporate Members of the Institute were in order. There was a return of 550 ballot papers with one spoilt paper, representing a 45,6 percent ballot. As a result of our scrutiny, we find that the following members have been elected: Mr H. P. Carlisle, Mr R. C. Espley-Jones, Mr G. H. Grange, Dr D. I. Legge, Mr W. W. Malan, Mr J. B. Mudd, Professor R. E. Robinson, Dr M. D. G. Salamon, Mr L. W. P. van den Bosch and Mr P. A. Von Wielligh. Signed by the six Scrutineers.

I have great pleasure in congratulating those members who have been re-elected and welcome the newly elected member to the Council. I have also to mention in terms of Clause 3.2.9 of the Constitution, that Mr A. Bain, in his capacity as Chairman of the Witbank Middelburg Branch will serve on the Council as will Mr C. J. Isaac of the Orange Free State Branch.

I also wish to announce that ten Past Presidents have signified their willingness to serve on the Council for the ensuing year. The presence of these past presidents makes for a great deal of continuity and we greatly value their help and their counsel in the meetings. Our thanks are due very much to the following:

Messrs R. J. Adamson, M. Barcza, H. Britten, J. K. E. Douglas, R. C. J. Goode, P. Lambooy, Professor J. de V. Lambrechts, Dr J. T. McIntyre, Messrs J. F. Reid and V. C. Robinson.

INDUCTION OF PRESIDENT

The President: 'I come now to probably the most important part of the business of today, and that is the induction of the new President.

Our incoming President, Jacques Pierre Hugo is very obviously of Huguenot stock, and I am very forcefully reminded that France and Scotland were united for many years in the past by a treaty which was described in our history books as the Auld Alliance. I fear that this alliance was not founded on any great love between the French and the Scots, but was based really on the deep-seated suspicion and hatred of both nations for the English who lay between them. The Auld Alliance has been revived again in Johannesburg this year, when a very Scottish President enjoyed and counted upon the help and support of Dr Hugo in the administration of the affairs of this Institute. The revival of the Auld Alliance, on this occasion was not characterised by any exclusion of our English-speaking colleagues. In fact, we very gleefully and cheerfully unloaded on them as much of the work as we possibly could. This they cheerfully accepted, although I am perfectly sure that they had more than a sneaking suspicion that they were being made the victims of the Auld Alliance.

This is also a rather unusual occasion in our Institute when of two successive Presidents, both are metallurgists and neither is presently employed by the big mining groups of this country. I think this is a pointer to the new look our Institute has been assuming over the past few years and the new lines along which developments have taken place.

J. P. Hugo, — that's the way in which most of us know him, — has had a distinguished career. Like many of us, he got his hands dirty in the steel industry, in his case he went away to that rather remote place called Sheffield.

Over 20 years ago, the steel industry in Sheffield was certainly no place for weaklings or for anybody who couldn't stand on his own two feet. In fact, the only tougher place for steel making was in Scotland. Probably in J. P.'s case, I think the Sheffield steel-smelters let him down a little bit more easily than usual as he wasn't a native. In fact, I believe, on his own telling, that they used to refer to him as that Colonial. It just shows you how far behind the times they were.

But to serve, even for a short time on the steel furnaces was an essential part of the training of any metallurgist in Britain. J. P. graduated in Metallurgy at the University of the Witwatersrand in 1948 and then he went overseas where he acquired his practical training and was also awarded the degree of Ph.D. by the University of Sheffield. He apparently was so struck on the steel industry that even when he returned to this country he joined Iscor at Van der Bijl Park where for a short time he was a Production Assistant. Then I regret to say he left his first love, the steel industry, and he joined the Mechanical Engineering Research Institute where for six years he was head of the Metallurgy Division.

Then early in 1960 he joined the Atomic Energy Board which promptly dispatched him to the Argonne National Laboratory in the U.S.A. for special training, which extended over a period of 17 months. His career in the Atomic Energy Board has been quite meteoric. He first held the post of Head and Director of the Physical Metallurgy Division, he was then promoted in 1967 to Deputy Director General and in 1970 to the post of Deputy President of the Atomic Energy Board.

J. P. was a well-behaved student at the university, — at least in one respect, he joined the Institute as a student member in 1948, he had a long and distinguished record of service as a member of this Institute, and was the first Chairman of the Base Metals Division. In this capacity he undoubtedly accelerated the trend away from the mining and gold interests to the highly diversified scope of metallurgical work which is characteristic of our Institute at the present time.

This is your new President, ladies and gentlemen, a distinguished South African, an outstanding metallurgist, and leader of men, and one whom I am certain will fill with great distinction the office of President of this Institute.

I have great pleasure in asking you Dr Hugo, to assume the office of President, and I wish you a successful and satisfying year of office'.

Dr Hugo: 'Professor Howat, Minister Koornhof, Minister Dillon, other honoured guests, ladies and gentlemen. It is with really great pride that I assume the office of President of this Institute, but I must add also with great trepidation. I am very conscious of the honour done me by the Institute in electing me to this high office, but

I am also very fully aware of the outstanding achievements of my predecessors. It is in the latter that my trepidation is seated since I have real doubt as to whether I can even vaguely emulate their achievements.

I shall of course, do my utmost for the Institute, and in this I have the assurance of the help and assistance of a really first-class Council.

I am sure you will join me in paying a very sincere tribute to Professor Howat, our immediate Past President. Dave Howat has had a most successful year as we have heard, what with successful colloquia, an outstanding international symposium, all of which has added to the image and the prestige of this Institute. With his good humour, his canny Scottish hard work, wise guidance and a bit of nudging here and there, he has truly steered the Institute along a successful course.

He has also mentioned the most important fact that the Institute has recouped its financial position. I personally find this most gratifying. I certainly have less problems than he had a year ago at this instant.

He has, in fact, left me with a very well oiled and efficiently operating machine. For this I personally, and I am sure all members of the Institute are most grateful. Thank you, Professor Howat.

Dit was vir my nogal aardig dat Professor Howat verwys het na die ou verdrag tussen die Skotte en die Franse. Trouens, ek meen daar is 'n ongeskrewe verdrag, wat baie derglik van aard is, tussen Suid-Afrikanners, en veral Afrikanners, en Skotte. En wel waarskynlik om dieselfde rede, om die Engelse in ons geledere so af en toe effens mak te maak. Maar uit broederskap van dissipline het Dr Howat, soos hy genoem het, en ek ook miskien 'n ander ongeskrewe verdrag gehad te wete albei as grofsmitte, of metallurge. Want ons is tog genoop om die kollegas in ons midde, die van die molwese, — ekskuus, ek bedoel die mynwese — darem af en toe ook tot op hulle hart te druk dat metallurgie daadwerklik 'n egte en gesofistikeerde wetenskap is. Daarin ook het Professor Howat en ek veel genot gehad. Ek merk egter dat die pendule aan die terugswaai is. Soos bewys is deur die feit dat albei die Vise-presidente myners is. Maar ek sal my beste doen om hulle ook mak te maak.

Referring to our Vice-Presidents, I cannot but comment that as you all know we have in them two men of outstanding ability. They have shown their energy and abilities, in many many ways in the past and I am quite sure that I have in them two pillars of strength who will ease my path and that of the Institute in this coming year.

I would also, again, as Professor Howat did, give my thanks to Mr Maxwell for agreeing to remain on as Honorary Treasurer. He not only knows the arithmetic of our accounts, Prof Howat, he somehow even manages to wangle the mathematics. For this Mr Maxwell, I am most grateful. It is good to know that our finances are in the very best of hands.

A word of thanks also to Mr Carlisle for again agreeing to be the Honorary Editor. The outward image of this Institute is largely its journal, and I think every one will agree that our journal has gone from strength to strength,

and in this we owe a big thank you to Mr Carlisle.

I would also like to congratulate the re-elected Members of Council, and in particular, Mr Mudd, the newly elected Member of Council.

Mr Mudd is not quite a new boy. He has had one previous stint on this Council in the past, so I am quite sure he is aware that there is a lot of work waiting for him.

I learnt from Professor Howat in his canny Scottish way, as he said, to pass the work on to others.

Finally, I would like to thank those Past-Presidents who have agreed to serve on Council again in the coming year. It is a real pillar of support to know that men of their experience and wisdom will be there to lean upon. I assure them that I will consult them on many and diverse occasions.

I would now like to ask Mr van Rensburg, the senior Vice-President if he would take his seat on my right please, and the newly elected Vice-President, Professor R. P. Plewman, if he would take his place on the rostrum.

Prof Plewman: 'It is my privilege, and also my duty as the junior Vice-President to express the thanks and appreciation of Mr van Rensburg and myself for the honour which you have done us in electing us to this office.

Mr van Rensburg comes to you as your senior Vice-President, having served the Council faithfully and well for many years including a period as Editor of the journal, which is a thankless task.

I am going to have a lot of difficulty in coming up to the standard that he has set.

Mr President, I would like to associate myself with your remarks about your predecessor, Professor Howat. The Council has enjoyed working under a forthright and firm President, who has, I think, enjoyed a year of office in which the Institute has moved steadily forward.

Finally, both Mr van Rensburg and I are looking forward to serving under your presidency and assure you that we will do our best to help you in your task'.

Mr J. B. Mudd: 'Mr President, ladies and gentlemen, on behalf of those who have been elected to the Council and those who have been re-elected, I would like to thank the members who voted for us, and I'd also like to express our appreciation for the confidence being shown in us.

I am sure my colleagues will join me in pledging to our President for the coming year, our full and every support. To say to him that we will give him within our powers every help to further the interests of this Institute. Thank you'.

APPOINTMENT OF AUDITORS AND HONORARY LEGAL ADVISERS FOR THE YEAR 1972/1973

The President: I propose that Messrs Alex Aiken and Carter be appointed auditors and Messrs Van Hulsteyn

Feltham and Ford be appointed honorary legal advisers to the Institute for the coming year. Is this agreed? Agreed.

GENERAL BUSINESS

The President: 'Does any member wish to raise any point under this item? If not, I ask Mr van Rensburg to take the chair while I subject you to my delivery of my address'.

PRESIDENTIAL ADDRESS

Dr Hugo delivered his Presidential Address entitled 'Atomic Energy — its interactions with mining and metallurgy'.

Mr van Rensburg; Baie dankie, Dr Hugo.

Ladies and gentlemen, today we have heard from an authority of the bright future that lies ahead for our mines, and more particularly the metallurgical industries in the field of nuclear power provision.

You were told how much South Africa had already earned from its uranium production. Ek dink Dr Hugo het gepraat van 'n duisend miljoen rand. — This is a very welcome byproduct of our gold mining industry. Now there is still so very much more to come.

We are indeed grateful to him for the quiet and unassuming manner in which he has presented his outstanding address. Ek moet sê ek verstaan hy was nie altyd so mooi stil nie, maar ons sal dit aan sy universiteit vriende laat staan om agterna weer oor daardie dae te gesêls, daar sal miskien 'n paar ander dan uitkom.

As deputy President of the Atomic Energy Board, Dr Hugo indeed speaks with authority and we can say that today we have had much interesting and very valuable information, and I am sure many of you here who certainly couldn't have kept up with everything that he was saying, will read with great interest his address when it is published in our proceedings, and I am quite sure there are many other people all over the world who will read this with interest.

We can, in fact, say we have had this valuable information expounded straight from the horse's mouth, — not that I would equate Dr Hugo with a horse, but certainly as we know him, we know he is talking horse sense.

One frequently sees and hears bits of information on the subject of nuclear energy and its allied fields, but I doubt that anybody has set out and highlighted the South African scene and particularly the potential for the future as clearly as our new President.

Dr Hugo has briefly, but clearly sketched the brilliant work done to date by South African metallurgists and engineers on uranium extraction, and indeed there are, I believe, a number of them present here today. Now, he confidently refers to the work, which he says has been crowned with success. Julle moet verstaan ek het die Engelse afskrif van Dr Hugo se adres hier en hy het hierdie deel in Afrikaans gesit. Maar hy sê daar so, — he refers to work which he says has been crowned with success, that has brought about the establishment of the Uranium Enrichment Corporation of South Africa. I see

Dr Roux, Dr Hugo, Dr Grant here, sitting with inscrutable smiles like the sphinx and they still just say nothing.

He mentioned the tremendous value the work of that organisation can be to our country; we all keenly await the next act in what might be described as this 'cliffhanger'.

Then he hangs out the carrot to the metallurgist of fuel element manufacture and all that implies. He goes on to list other fields in which the physical and process metallurgist should be involved, and mentioned the attractive opportunities for engineers and metallurgists.

Looking back, for more than a decade, I find that almost without exception every President of this Institute, as well of course as many other leading persons in our industry has had to bring up a major worry of our mining and metallurgical industry, — the availability of skilled manpower. Today, Dr Hugo has reiterated this more strongly.

This is indeed a matter for urgent attention and we hope efforts of a number of organisations working on this problem will indeed bear fruit.

We know our mines can produce the uranium, not only from existing mines, but from new areas being developed and prospected. We are keenly aware of the skills of our metallurgist, it would therefore indeed be unfortunate if we were not able to take full advantage of the potential in this new field of endeavour as has been set out so clearly by Dr Hugo, merely because of manpower problems.

Then our President makes a plea for more expenditure on research and development in the field of science. Certainly a matter of the greatest importance to the development of our country. And, of course he makes criticisms, which are, I am sure, valid, but then at the bottom of the barrel, there again lurks the question of adequate suitable manpower, and of course, the provision of necessary funds. Dr Koornhof will bear that in mind when he talks to his Cabinet colleagues I am sure, and then possibly most important, a meaningful science policy for the country that Dr Hugo mentioned.

We hope that his words do not fall on deaf ears. Dames en here, dit is nou vir my 'n genoeë dat ek op Dr Wally Grant roep om die mosie van dank aan Dr Hugo in te stel'.

Dr W. L. Grant: 'Dit is vir my 'n besondere eer en voorreg om 'n mosie van dank aan die pasverkose President van die Suid-Afrikaanse Instituut vir Mynbou en Metallurgie, te rig.

Dr Hugo het vanmiddag 'n baie interessante blik gegee op die belangrike rol wat energie in ons samelewing speel en het veral gewys op die verwagte bydrae wat kernenergie daartoe sal maak. Aansluitend hierby het hy die belangrikheid van die myn- en metallurgiese nywerhede in hierdie verband geskets en daarop gewys dat Suid-Afrika 'n baie gewigtige taak te vervul het.

Dit mag van waarde wees om 'n wyle by die kwessie van beskikbaarstelling van energie, stil te staan. Ek onthou dat in die jaar 1939, toe ek nog op hoërskool was, daar 'n boek by name 'Science Front 1938' verskyn

het. In dié werk was daarop gewys dat die olie- en gasreserwes van die wêreld skaars tot die einde van hierdie eeu voldoende sou wees, steenkoolreserwes ook maar hulle beperkings het en dat die mens 'n ander plan sou moes bedink om vir die verre nageslagte ekonomiese energie te bekom. In die betrokke boek was gespekuleer oor die moontlike verkryging van kernenergie, maar die skrywer het sy grootste bedenkinge gehad of so iets ooit moontlik sou wees. Dit is tog interessant dat aan die einde van daardie jaar en gedurende 1939, die twee wetenskaplikes Hahn en Strassman, die splyting van uraan-235, wat 'n heel nuwe era sou inlei, waargeneem het.

Dit is 'n onweerbare feit dat energie die mens se mees universele bate is. Dit word gebruik in die produksie van voedsel, die produksie van allerlei produkte en vir 'n verskeidenheid van die mens se behoeftes. Dit word verder op groot skaal gebruik vir vervoer asook in byna alle instrumente waarmee ons vandag ons waarnemings doen — hier op die aarde en ook in die sterreheem. Ons gebruik dit vir alle rekenaars asook ander hulpmiddels ter verligting van die mens se velerlei take. Kortom, sonder energie kom ons beskaving tot stilstand en aangesien 'n mens bekommerd is oor die beskikbaarstelling daarvan, wil jy tog graag seker wees dat daar in die toekoms voldoende goedkoop energie beskikbaar sal wees. Sonenergie het wel sy toepassings, maar is 'n baie moeilike energiebron om ekonomies te benut. Hier speel kernenergie sy belangrike rol en is 'n hoogs gekonsentreerde energiebron wat op verskeie wyses benut kan word. Die splyting van ^{233}U , ^{235}U en plutonium-239 gee aan ons 'n belangrike energiebron en daar word ook reeds hard gewerk aan die versmeltingsproses wat deur die samevoeging van deuteriumkerne eweneens groot hoeveelhede energie kan vrystel. Die versmeltingsproses is egter nog nie 'n praktiese moontlikheid nie, maar ek is daarvan oortuig dat die mens ook hierdie doelwit sal verwesenlik en dat met hierdie twee energiebronne tot ons beskikking, naamlik die splyting van uraan en die versmelting van deuterium, die wêreld verseker sal wees van ekonomiese energie vir miljoene jare. Dit is die taak van die wetenskaplikes en ingenieurs van die toekoms, om hierdie energiebron ten beste te benut.

Dr Hugo het reeds die belangrikheid van die verwerking van ons minerale aangeroer. Trouens, ek meen dat vir die algemene ontwikkeling in enige gemeenskap, daar 3 belangrike komponente nodig is om die mens se werksaamhede sinvol te kan voortsit, nl. dat

eerstens energie beskikbaar moet wees, en hierna het ons reeds hierbo verwys.

tweedens materiale beskikbaar moet wees vir energie-opwekking en ook vir die vervaardiging van die groot verskeidenheid implemente wat die mens benodig, en

derdens die tegnologie asook bekwaamheid en durf van die mens beskikbaar moet wees om voornoemde twee komponente te ontgin en sinvol aan te wend.

Hoewel dit duidelik is dat die beskikbaarstelling van energie vir die verre toekoms, nie meer 'n ernstige probleem is nie, is die kwessie van die beskikbaarstelling van boustowwe egter nie só eenvoudig nie. Teen die

huidige tempo van verbruik, kan die produksie van die belangrikste minerale nie in terme van miljoene jare gemeet word nie, trouens in baie gevalle, skaars in terme van honderde jare. Dit bring die belangrikheid van die effektiewe gebruik van minerale, baie duidelik na vore en beklemtoon die beroep wat dr Hugo gedoen het dat beskikbare materiale uiters doeltreffend aangewend moet word en verder dat daar in die toekoms moontlik veel meer aandag aan die daarstelling van nuwe boustowwe geskenk sal moet word en hier dink mens veral aan die plastieknywerheid.

Ten slotte wil ek net graag die een en ander sê oor die tegnologie wat benodig word om bogenoemde twee bronne effektief aan te wend. 'n Rukkie gelede het ek in 'n wetenskaplike tydskrif gelees dat die Voorsitter van 'n groot Italiaanse nywerheidsinstansie daarop gewys het dat 'n nuwe imperialisme vandag die wêreld oorval in die plek van die ou magspolities; naamlik die imperialisme van die tegnologie. Die nywerheidsontwikkeling in die wêreld is aan almal welbekend en die tegnologie wat daarmee saamgaan, word al hoe meer ingewikkeld sodat die gaping tussen die onkundiges en die kundiges al hoe groter word. Trouens, ek wil graag 'n kort gedeelte aanhaal uit 'n toespraak van dr V. A. Sarabhai, Voorsitter van die Atoomenergiekommissie van Indië verlede jaar by die Vierde Geneefse Konferensie oor die vredes-tydse aanwending van kernenergie.

"The gap between the economically advanced and the developing nations is steadily growing. In the long run, this widening gap poses a threat to the security of the world far greater than the proliferation of nuclear weapons, the prevention of which has attracted so much attention in recent years. Can we now afford to ignore the urgent need to revise our approaches, national and international, to development? Should a developing country follow, step by step, the same path as was taken by countries now amongst the economically advanced nations or can it jump certain phases of technological development? Realising that when problems are large we need the best available means, should it rule out advanced technologies such as are involved in atomic energy, merely because the same solutions are either only concurrently being applied in the economically advanced nations or have yet to be tried out in them? Is the importation of black boxes from abroad adequate to insure continuity of the developmental process?"

Hierdie vrae van dr Sarabhai dra 'n ondubbelsinnige boodskap aan ons oor en tensy ons ernstig in die ontwikkeling van die tegnologie verdiep raak, gaan ons agterbly en ook wegsink in die welsand van tegnologiese agterlikheid. Vir ons in hierdie land sien ek egter wel 'n baie belowende toekoms mits ons dit reg aanpak. Dit is onmoontlik om op die hele spektrum van die tegnologie te ontwikkel; Suid-Afrika is vanweë sy beperkte brein- en mannekrag net eenmaal te klein om dit te kan vermag, maar ons kan sekerlik selektiewe gebiede betree en daarin ontwikkelingswerk tot 'n groot hoogte voer om onself sodoende in 'n baie sterk posisie, selfs t.o.v. die groot nywerheidslande, te plaas. Dit is duidelik dat die mynbou- en metallurgiese bedrywe juis so 'n gebied is en daarom is dit so paslik dat dr Hugo hieraan aandag

geskenk het. Om dit egter te bewerkstellig, vereis uiters bekwame mense en ek is seker dat dr Robinson juis hierdie aspek verder sal wil uitbou.

Ten besluite, weer eens 'n woord oor ons pasverkose President: Dit is voorwaar vir ons as Suid-Afrikaners 'n vooreg dat mense, soos dr Hugo, hulle weg oopsien om van hulle tyd beskikbaar te stel om die amp van President van die S.A. Instituut vir Mynbou en Metallurgie te aanvaar. Ons wil hom nog eens bedank vir sy baie stimulerende en interessante voordrag en namens ons almal stel ek baie graag 'n mosie van dank aan dr Hugo voor.

Baie dankie'.

Dr Grant. 'It is a great honour and privilege for me to address a vote of thanks to the newly elected President of the South African Institute of Mining and Metallurgy.

Dr Hugo has presented us today with a very interesting picture of the important role that energy plays in modern society, and has drawn particular attention to the contribution which nuclear energy is expected to make. He has outlined the importance of the mining and metallurgical industries in this connection, and has pointed out that South Africa has a very weighty task to discharge.

It may be of some value to dwell for a moment on the question of providing energy. When I was still a high school student in 1939, a book appeared bearing the title 'Science Front 1938'. In this book it was pointed out that the oil and gas reserves of the world could scarcely last to the end of this century, that coal reserves are limited, and that man would have to discover another economic source of energy if posterity was to be provided for. In the book in question there was speculation on the possibility of obtaining energy from the nucleus of the atom, but the author was extremely doubtful whether this would ever be achieved. It is, therefore, all the more interesting to note that at the end of that year and during 1939, the two scientists Hahn and Strassman detected the fission of uranium-235, an event which marked the beginning of a totally new era.

It is an irrefutable fact that energy is man's most universal asset. It is used in the production of food and many other commodities, and serves man in most of his needs. It is furthermore used extensively in transport, as well as for nearly every instrument with which we make our observations today, be it here on earth or in the universe. We use it for computers and in easing man's many exacting tasks. In short, without energy our civilization would come to a standstill. Is it any wonder then that we are concerned about its availability now, and preoccupied with ensuring its availability in the future? Solar energy has its applications, but it is a difficult source to tap economically. Nuclear energy has come into its own as a highly concentrated form of energy which can be utilized in many ways. The fission of ^{233}U , ^{235}U and ^{239}Pu is an important source of energy, and fusion, the process of combination of deuterium nuclei, from which huge quantities of energy can be released, is being actively investigated. Despite the fact

that the fusion process is not yet a practical reality, I am convinced that man will master this energy colossus. With these two sources at our disposal, viz. the fission of uranium and the fusion of deuterium, the world will be assured of economical energy for millions of years. The task of the scientists and engineers of the future is clear: the fullest possible exploitation of nuclear energy.

Dr Hugo has spoken of the importance of the processing of our minerals. In fact, I am of the opinion that, for the general development of any community, three components are necessary to give purpose to man's continued activities:

- in the first place, energy must be available as referred to above;
- secondly, materials must be available for the generation of energy, and also for the manufacture of the large variety of equipment required by man; and
- thirdly, the technology, proficiency and enterprise of man must be available to develop the two aforementioned components and to apply them meaningfully.

Although it is clear that the availability of energy in the distant future is no longer a serious problem, the question of adequate material resources remains serious. At the current rate of consumption the supply of the most important minerals cannot be measured in terms of millions of years, but scarcely even in terms of hundreds of years. This emphasizes very clearly the importance of the effective use of minerals. It underlines the appeal made by Dr Hugo that the available materials be applied as effectively as possible, and that in future much more attention be devoted to the exploitation of new materials: one thinks particularly of the plastics industry.

Before concluding I should like to say something about the technology on which the effective application of the sources of energy and materials depends. I read recently in a scientific journal that the Chairman of a large Italian industrial organisation had pointed out that a new kind of imperialism is today swamping the world in the place of the former power politics; namely technological imperialism. Everyone is aware of industrial development but the technology going hand in hand with this development is becoming more and more complex. Thus it is that the gap between the layman and the expert is gradually widening. I should like to quote briefly from a speech given by Dr V. S. Sarabhai, Chairman of the Atomic Energy Commission of India, at the Fourth Geneva Conference on the Peaceful Uses of Nuclear Energy last year:

'The gap between the economically advanced and the developing nations is steadily growing. In the long run, this widening gap poses a threat to the security of the world far greater than the proliferation of nuclear weapons, the prevention of which has attracted so much attention in recent years. Can we now afford to ignore the urgent need to revise our approaches, national and international, to development? Should a developing country follow, step by step, the same path as was taken by countries now

amongst the economically advanced nations or can it jump certain phases of technological development? Realising that when problems are large we need the best available means, should it rule out advanced technologies such as are involved in atomic energy, merely because the same solutions are either only concurrently being applied in the economically advanced nations or have yet to be tried out in them? Is the importation of black boxes from abroad adequate to insure continuity of the developmental process?'

The questions posed by Dr Sarabhai convey an unequivocal message to us. Unless we involve ourselves seriously in the development of technology, we shall be left behind to sink in the quicksands of technological mediocrity. As far as South Africa is concerned, I foresee a very promising future, provided we square up to it correctly. It is impossible to develop equally over the whole spectrum of technology; because of South Africa's limited brain and manpower, she must be content to concentrate on selected areas and to carry development in these areas to a high level. In this way we can place ourselves in a strong position, even if compared with large industrial nations. The mining and metallurgical industries constitute precisely such an area. It is therefore most fitting that Dr Hugo has devoted attention to these industries. Very competent people are required for the development of the relevant technology. I am sure Dr Robinson will enlarge on this aspect of the problem.

In conclusion, one more word about our newly chosen President: it is our privilege as South Africans that people such as Dr Hugo see their way clear to give of their time to accept positions such as that of President of the S.A. Institute of Mining and Metallurgy. I thank him once again for his very stimulating and interesting paper. On behalf of all here present I wish to propose a vote of thanks to Dr Hugo.

Thank you.'

Mr van Rensburg: Baie dankie, Dr Grant. I now call on Dr R. E. Robinson to second that vote of thanks.

Dr Robinson: Mr Chairman, honourable ministers, ladies and gentlemen. It is of course a very great pleasure for me, and a privilege to offer my congratulations to Dr Hugo on his election as President, and also to join Dr Grant in extending to him our congratulations and thanks for his very authoritative review of the nuclear activities in South Africa.

I would like to just tell you a little bit about my first real introduction to Dr Hugo as a colleague on the staff of the Atomic Energy Board, because I think it's rather appropriate. I'd met him on several occasions before, but the first occasion I really got to know him was when he befriended a rather lonely travel-weary visitor from South Africa, myself, and introduced him to the grand American game of bowling alley, over a weekend, and this did a lot of good to me.

The feature I want to mention is the fact, as you well know that this game of bowling alley involves taking a big black ball and hurling it down a long wooden alley

to a row of pins I think, a symmetrical arrangement of pins and breaking them. If you succeed in achieving this strike, there is much glee and jubilation. I thought this is an appropriate introduction to somebody who has made such a tremendous contribution and risen to such eminence in an organisation whose main concern is taking neutrons and hurling them at uranium atoms, splitting them up into fragments, with much release of energy.

In his address he has made generous reference to the work of the National Institute for Metallurgy, and the mining industry towards establishing a situation where South Africa is recognised as a world leader in the extraction of uranium from low-grade ores.

In a very comprehensive review he has had little opportunity to elaborate on details, and I should like to take this opportunity to expand somewhat on this particular portion of his address.

The nuclear age first had its impact on South Africa in 1945, when a research programme to develop methods for extracting uranium from the gold ores was initiated, as a joint undertaking between scientists and metallurgists of the United States, the United Kingdom and South Africa. The successful development of the processes for uranium extraction (which were copied subsequently throughout the world) had a tremendous impact on the technical development in this country in several different ways.

It provided South Africa with the opportunity to become a 'foundation member' of the International Atomic Energy Agency, and it brought about a period of collaboration with overseas research organizations which has proved invaluable over many decades.

In addition, the opportunity that was provided for South African scientists to work side by side with their counterparts in the major industrialized countries and to participate in a major technical development of this kind, inspired a measure of confidence which has led to many other developments in the metallurgical field in this country.

The development of the uranium extraction process ushered in a new era in metallurgical processing, and represented the first important departure from the old conventional methods of mineral processing.

The new techniques of ion-exchange and solvent extraction which had been developed specifically for uranium, are now finding application in the processing of many other minerals and have become of very great importance recently because of the antagonism towards the atmospheric pollution brought about by the old type smelting plants.

Thus the introduction of the first large-scale uranium extraction plants in South Africa gave the scientists of this country a unique opportunity to jump to the frontiers of the new developments in extraction metallurgy. A great deal of work has been undertaken in this country in applying these new techniques to the processing of copper, nickel, the platinum metals and many other important metals, and there is a very small group

of enthusiasts who are trying very hard to apply these new techniques and knowledge to as many problems as can be tackled. Unfortunately the number is far too small for a country such as South Africa with such a large stake in its mineral resources and I am not sure that we have taken full advantage of the opportunities that were offered in the introduction of the nuclear age to this country. I must therefore endorse Dr Hugo's remarks concerning the critical shortage of technically-trained manpower in mining and metallurgy. He has referred to a report of the Minerals Manpower Committee of the National Institute for Metallurgy, and since its report is not yet officially published I should like to make brief reference to some of its main findings. The report concerned was an independent survey on manpower requirements in Extractive Metallurgy. It showed that the existing shortage of metallurgists among the firms surveyed was 85 out of existing staff complements of 215. The *additional* requirements for metallurgists over the next five years amounted to 145.

The present output from Witwatersrand and Pretoria universities combined (the only schools of metallurgy in the country) is only approximately 18 graduates per annum, and a very small proportion of these are interested in extraction metallurgy.

The situation as regards metallurgical technicians is very similar, and if one compares our output of metallurgists with that of Australia (i.e. 18 graduates from S.A., 98 in Australia) it can be realized why the Minerals Manpower Committee of NIM was formed and how important its efforts should be. This committee includes representatives of this Institute and the Chamber of Mines.

However, quite apart from the shortage of metallurgists as such, there seems to exist a complete lack of interest among the many other scientific disciplines in doing work on minerals. There are a host of opportunities of undertaking original, exciting and sophisticated work on minerals and mineral-processing problems for chemists, physicists, mathematicians, electrical engineers, and many other scientific disciplines, but there seems to be an almost incredible ignorance among the scientific community in South Africa of the unique opportunities offered in a country which must surely rate as the finest mineral laboratory in the world.

I am quite convinced that the sophisticated techniques generated for the nuclear industry will play a prominent role in our national economy as a whole, and more particularly in our mineral industries.

I must compliment Dr Hugo on the way he has highlighted this contribution.

Ladies and gentlemen, it gives me very great pleasure to ask you to join myself and Dr Grant in extending to Dr Hugo our most sincere thanks and appreciation for a most authoritative address. Thank you Dr Hugo.

Dr R. E. Robinson: „Dit is vir my 'n baie groot voorreg en genot om dr Hugo geluk te wens met sy verkiesing tot President en hom net soos dr Grant te komplimenteer

met sy gesaghebbende oorsig oor die kernbedrywighede in Suid-Afrika.

Hy het in sy rede goedgeefs verwys na die werk van die Nasionale Instituut vir Metallurgie en die Mynboubedryf met betrekking tot die skepping van 'n toedrag van sake waar „Suid-Afrika erken word as 'n wêreldleier wat betref die ekstraksie van uraan uit laegraadse ertse”.

Daar was in die uiters onvattende oorsig wat by gegee het, min geleentheid om op besonderhede in te gaan en ek wil graag van hierdie geleentheid gebruik maak om oor hierdie besondere deel van sy rede uit te wei.

Die atoomere het in Suid-Afrika eintlik in 1945 'n aanvang geneem toe daar, as 'n gesamentlike onderneming van wetenskaplikes en metallurge van die Verenigde State, die Verenigde Koninkryk en Suid-Afrika, begin is met 'n navorsingsprogram om metodes vir die ekstraktering van uraan uit die goudertse te ontwikkel. Die suksesvolle ontwikkeling van die prosesse vir uraanekstraksie (wat later dwarsdeur die wêreld nagevolg is) het op verskillende maniere 'n geweldige uitwerking op die tegniese ontwikkeling in hierdie land gehad.

Dit het Suid-Afrika die geleentheid gegee om 'n stigterslid van die International Atomic Energy Agency te word en het 'n periode van samewerking met oorsese navorsingsorganisasies ingelui wat al dekades lank blyk van onskatbare waarde te wees.

Daarbenewens het die geleentheid wat Suid-Afrikaanse wetenskaplikes gekry het om sy aan sy met hul teenhangers in die vernaamste nywerheidslande te werk en aan 'n belangrike tegniese ontwikkeling van hierdie aard deel te hê, 'n mate van vertroue ingebalsem wat tot talle ander ontwikkelings op die gebied van metallurgie in ons land gelei het.

Die ontwikkeling van die uraanekstraksieproses het 'n nuwe era in metallurgiese prosessering ingelui en verteenwoordig die eerste belangrike afwyking van die ou konvensionele mineraalprosesseringsmetodes.

Die nuwe tegnieke van ionuitruiling en oplosmiddel-ekstraksie wat spesifiek vir uraan ontwikkel is, word tans in die prosessering van baie ander minerale toegepas en het in die jongste tyd van die allergrootste belang geword vanweë die antagonisme teen die lugbesoedeling wat die our soort smelterye tot gevolg het.

Die daarstelling van die eerste grootskaalse uraan-ekstraksieaanlegginge in Suid-Afrika het die wetenskaplikes van ons land 'n unieke geleentheid gebied om die voortou te neem net nuwe ontwikkelings op die gebied van ekstraksiemetallurgie en dit sou my groot genoë gedoen het om te kan meld dat ons hierdie geleentheid ten volle benut het. Ongelukkig is dit nie die geval nie.

Daar is inderdaad 'n baie klein groepie entoesiaste wat hul uiterste bes probeer om hierdie nuwe tegnieke en kennis op soveel probleme as wat hul kan aanpak, toe te pas, maar hul getalle is veels te klein vir 'n land soos Suid-Afrika wat so ryklik met minerale bedeed is.

Ek moet dus dr Hugo se opmerkings in verband met die kritieke tekort aan tegnies opgeleide arbeidskragte in die mynbou en metallurgie onderskryf. Hy het verwys na 'n verslag van die Nasionale Instituut vir Metallurgie se Mineralearbeidskracomitee en aangesien

die verslag nog nie amptelik uitgegee is nie, wil ek graag kortliks na 'n paar van sy vernaamste bevindings verwys. Die betrokke verslag het 'n selfstandige opname gemaak van die arbeidskragbehoefte vir ekstraksie-metallurgie. Die opname het aan die lig gebring dat die bestaande tekort aan metallurge by die firmas wat by die opname betrek is, 85 uit 'n bestaande personeelsterkte van 215 is. Die *addisionele* behoeftes aan metallurge in die loop van die volgende vyf jaar beloop 145.

Witwatersrand en Pretoria universiteite (die enigste universiteite in die land wat opleiding in metallurgie bied) lewer op die oomblik saam maar ongeveer 18 gegradueerdes per jaar en slegs 'n klein persentasie van hulle is in ekstraksiemetallurgie geïnteresseerd.

Die toestand wat betref metallurgiese tegnieke is min of meer dieselfde en as mens ons opbrengs aan metallurge vergelyk met die van Australië (d.w.s. 18 gegradueerdes in S.A., 98 in Australië) beseft sy waarom die Minerale-arbeidskragkomitee van NIM in die lewe geroep is en hoe belangrik sy werk behoort te wees.

Maar afgesien van die tekort aan metallurge as sulks, bestaan daar blykbaar by baie ander wetenskaplike vertakings 'n algehele gebrek aan belangstelling om werk in verband met minerale te doen. Daar is 'n menigte geleenthede vir skeikundiges, fisie, wiskundiges, elektrotegniese ingenieurs en talle ander wetenskaplikes om oorspronklike, opwindende en gesofistikeerde werk in verband met minerale en mineraalprosesseringsprobleme te doen, maar daar bestaan blykbaar 'n byna ongelooflike onkunde by die wetenskaplike gemeenskap in Suid-Afrika oor die unieke geleenthede in 'n land wat sonder enige twyfel as die uitnemendste mineraallaboratorium in die wêreld beskou kan word.

Ek is vas oortuig dat die gesofistikeerde tegnieke wat vir die kernbedryf ontwikkel is, 'n prominente rol in ons landse ekonomie as geheel, en meer bepaald in ons mineraalbedryf, sal speel.

Ek moet dr Hugo felisiteer met die wyse waarop hy hierdie aspek na vore gebring het en namens u almal bedank ek hom vir die uiters interessante en deskundige rede'.

Mr van Rensburg: 'Thank you very much Dr Robinson, I trust my American wife understands what an important part this game of bowling plays in the South African Nuclear Energy field apparently. I will ask Dr Hugo if he wishes to say a few words before he resumes his seat'.

Dr Hugo: 'Dankie mnr die Voorsitter. Gee my net die geleentheid om my hartlike dank aan my ou vriend en kollega, dr Grant uit te spreek vir sy baie mooi woorde. Ons loop al etlike jare op of oor dieselfde of oor vreemde paaie en ek hoop dit gaan lank so aan. Baie dankie Wally.

Thank you also Dr Robinson for your kind words. I am sure you have convinced my boss, who is in the audience, that I spent most of my training period in America on the bowling alleys. Thank you both for your very kind comments.

Ladies and gentlemen, the time is late. You have been subjected to a lot of words and are quite groggy by now, I am quite sure. So this brings us to the conclusion of our activities. It only remains for me to thank you for your attendance, and also to remind you that the cocktail party will be held in this hall at 6.30 this evening.

Thank you again for your attendance and good night'.

The meeting closed at 6.10 p.m.