

Annual General Meeting of the Institute

The Annual General Meeting of the Institute was held in Kelvin House, Johannesburg, on Wednesday, 27th August, 1969, at 4.15 p.m.

Mr. R. C. J. Goode (President) was in the Chair.

There were also present seventy Members, ten Associate Members, two Affiliates, one Student and twelve Visitors making a total of ninety-five.

The President declared the meeting open at 4.20 p.m.

OBITUARIES

The President: "It is my very sad duty to announce the deaths of the following members of the Institute:

Mr James Charles Napoleon Humphreys, a Life Member who joined the Institute on 1st April, 1935, and passed away on 6th February, 1969.

Mr Michael John Worrall, Graduate Member, who joined the Institute in 1960 and passed away on 2nd June, 1969.

Mr Eric Adam Conrad Dickson, Associate Member, who joined the Institute on 13th June, 1952 and who passed away on 8th June, 1969.

Mr Robert Jack, Associate Member, who joined the Institute on 2nd August, 1956, and passed away on 14th June, 1969.

Mr R. A. H. Flugge-de-Smidt, Honorary Life Member and Gold Medallist, who joined the Institute in 1922 and passed away on 17th June, 1969.

Mr John Gordon Craig, a Member who joined the Institute on 23rd August, 1960, and passed away on 6th August, 1969.

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

MINUTES

The President: "May we confirm the Minutes of the General Meeting held on 18th June, 1969, as published in the July, 1969, issue of the *Journal*?"—Agreed.

WELCOME TO VISITORS

The President: "We are honoured this afternoon by the presence of the Institute's Honorary President, Mr R. S. Cooke, President of the Chamber of Mines of South Africa, and by one of our Honorary Vice-Presidents, Mr T. L. Gibbs, the Government Mining Engineer, as well as by the presence of many distinguished guests, to all of whom I extend a most cordial welcome.

We are happy to have present, Mr S. C. M. Naude, Director of the Witwatersrand Technical College, Mr G. A. P. Louw, Vice-President of the Associated Scientific and Technical Societies, Mr R. P. Randall, Senior Vice-President of the South African Institute of Electrical Engineers, Mr W. T. L. Wayman, President of the South African Institution of Mechanical Engineers, Mr D. F. Odendaal, President of the Institution of Certificated Mechanical and Electrical Engineers of South Africa, Mr E. Haacke, President of the Institute of Land Surveyors of the Transvaal, Mr B. L. Loffell, Vice-President of the South African Institution of Civil Engineers, Mr J. F. Leatherbarrow, President of the

South African Institute of Assayers and Analysts, Dr W. S. Rapson, President of the Joint Council of the South African Scientific Societies, Dr P. L. Carman, President of the South African Chemical Institute, Mr F. Jackson, President of the Federation of Societies of Professional Engineers, Mr W. E. Kirkwood, President, S.E.I.F.S.A., Mr J. Steele, President of the South African Institute of Foundrymen, Mr M. Waite, President of the South African Institution of Welding, Mr M. R. Gericke, President of the South African Council of Professional Engineers, Mr G. C. Sowry, Chairman, Witbank-Middelburg Branch, Mr T. Groenewald, Chairman of the South African Chemical Institute (Southern Transvaal Section), Professor O. B. Volckman, Chairman of the South African Institution of Chemical Engineers, Mr H. W. Le Roux, Chairman of the South African Federation of University Engineering Students, Dr R. E. Robinson, Director of the National Institute for Metallurgy, Mr P. H. Anderson, Deputy-Chairman of Rand Mines Limited, Mr E. Boden, Manager of the A.S. and T.S. and Count Folchi-Vici, from Italy, who has lime interests in this country.

I also extend a very special welcome to the lady guests here this afternoon, and to all the visitors."

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, Council has elected them to membership in the following grades:

NEW APPLICATIONS

Members: Stuart Denston Hill, Robert Roy Richardson, Gert Paulus van der Vyver.

Affiliates: Henry Clifford Read, Allen Edward Hooper, Alan Edwin Edkins.

Graduates: Lester Winston Sturgess, Erroll Vincent Bosman.

Students: Terence Vernon van Heerden, David Curtis Lindley.

MEMBERS TRANSFERRED TO A HIGHER GRADE

From Associate Member to Member: Andries Willem van Zyl, Roy Lardner, Nugent Gerald Ward Comyn.

From Student to Graduate: Michael John Worrell (now passed away), Peter John Hamilton Short.

I wish to welcome the new members to the Institute, and to congratulate those members who have been transferred to a higher grade."

ANNUAL REPORT OF THE COUNCIL AND ACCOUNTS FOR THE YEAR ENDED 30th JUNE, 1969

The President: "Ladies and gentlemen,

It is with much pleasure that I present to you the Annual Report and Accounts for the year ended 30th June, 1969. These have been laid on the chairs and before calling for their adoption I would like to make a few comments.

The Accounts show an excess of expenditure over income of R2,124 and our Honorary Treasurer, Mr D. G. Maxwell, will in due course comment on this. The main difficulty has again been the cost of the *Journal* and I think most of you are aware of the changes that we propose to make. I shall be sorry to see the last of our old format but then I have always had rather a conservative outlook.

Our membership shows a slight increase and at 30th June, we had a total of 1,552 members. We have had a busy year; a varied list of subjects were discussed at our monthly meetings and, in addition, a very successful symposium on Pyrites was held in June. The National Institute for Metallurgy played a major part in arranging this, and we are very grateful to them. The papers presented at this symposium will be published in October as Part 2 of our *Journal*.

I think the 75th Anniversary of the Institute was a big success and here I would like to thank those many members inside and outside the council who helped prepare papers and ensured this success. An additional heavy load was placed on a few people who remained behind to do the editing after so many of us had gone overseas to enjoy the Commonwealth Congress.

The Ninth Commonwealth Congress which was held in London in May was a great success and although no indication has as yet been given as to where the next Congress will be I am sure that these gatherings are not about to end. For myself, I think the highlight of the Congress was the presence of Princess Alexandra at the banquet on the opening night when she so delightfully and vivaciously proposed the toast to the Congress. Another memorable occasion was the 'special event' at the closing banquet when the band of Her Majesty's Coldstream Guards marched and counter-marched in full regalia, trumpets blaring and drum sticks flying in the confined space of the Hilton Hotel ballroom. A very interesting series of papers was presented but I think most of us enjoyed more the visits to the various research establishments, factories, industries and mines which were so well arranged for us. Some of us were thrilled to see the Concorde, and others Britain's latest atomic power station at Dungeness, whereas our wives enjoyed the visits through the beautiful English countryside to so many places of great historic interest.

Nearer at home a very important milestone has been achieved and this is the passing of the Act establishing the South African Council for Professional Engineers. I would remind members that an extension of time until 14th September has been made to complete the registration of those engineers who are already in practice but are not in possession of a full university education. The Professional Engineers Joint Council has now been renamed 'The Federation of Societies of Professional Engineers' and they still have a task to perform in looking after the interests of engineers as a whole in South Africa and with particular regard to their training and to that of engineering technicians.

Our Orange Free State branch, under the Chairmanship of Mr J. G. Kirchner, had another good year and I would like to thank Mr Kirchner for the efficient way he and his Committee have handled their affairs.

The Witbank/Middelburg branch has continued to thrive under the direction of Mr C. G. Sowry and may I too offer this Committee our grateful thanks.

The Institute's gold medal was awarded to Dr C. H. Wyndham for his great contribution to physiological research as applied to the mining industry. Silver medals were awarded to Professor D. D. Howat and Mr E. F. Statham for their joint paper with Mr T. J. Coyle (Visitor) entitled 'Some aspects of electrolytic gold refining as applied to South African mine bullion'. We have changed the date for the student competition and in future the qualifying year will be the end of the calendar year.

In conclusion I would like to thank the Council and particularly the two Vice-Presidents, Messrs J. K. E.

Douglas and V. C. Robinson for their loyal support during my year of office. I am particularly grateful to Mr Douglas for carrying the burden during May, June and July when I was away overseas. A large debt of gratitude is due to Messrs P. W. J. van Rensburg and A. E. Gilfillan, our Honorary Editors and their assistants, Professor R. P. Plewman and Mr R. E. Leymann. This is a thankless and very time consuming task, particularly in a year such as this when there has been so much work to do. I would like also to thank Mr Denis Maxwell for so carefully looking after our financial affairs.

Finally, once again our thanks must go to the staff of the Associated Scientific and Technical Societies of South Africa for the efficient secretarial services rendered during the year, and I would particularly like to mention the excellent work done by the Manager, Mr E. Boden, our Secretary, Mr D. C. Visser, and his assistant, Mrs J. Vosloo.

This might be an opportune moment to draw your attention to the fact that the A.S. & T.S. is appealing for funds to construct a luncheon room in the basement of this building. I am sure that this is a much needed improvement and one which all members of this great Society should be only too willing to assist.

I have much pleasure in proposing the adoption of the Annual Report, and I now call on Mr D. G. Maxwell, the Honorary Treasurer, to second the adoption."

Mr D. G. Maxwell: "Before seconding your motion, Mr President, I shall take advantage of the traditional opportunity offered to the Honorary Treasurer to comment on financial aspects of the Annual Report.

It is somewhat embarrassing for me to have to report a deficit at the end of my first year in office, particularly when this is compared with the substantial surplus that Mr Adamson provided as his parting gift. However, I do not feel too bad about it when I see that an examination of the details reveals either unavoidable changes or the healthy growth of the Institute. This does not mean that I am complacent about the Institute's finances. In fact I am somewhat less sanguine than Mr Adamson who forecast a deficit for this year as being in line with the see-saw performance of the past. I am afraid that in my opinion this is more than the normal swing of the pendulum and that action will have to be taken to set matters right. You may be sure that, in giving attention to this matter, Council will do all in their power to avoid increases in subscriptions.

The biggest change from last year was the loss on realization of investments of R545, which must be compared with a surplus last year of R2,259. This loss was caused by some desirable adjustments in our portfolio. Another substantial contributor to the deficit was the Journal account which showed a loss of R2,343. You will note from the Annual Report that Council has taken action in connection with the Journal which, it is hoped, will turn this loss into a profit in the future. It would be as well to note, however, that quick results are not expected and we may have to wait until the end of next year to see a profit.

You will note from the accounts that the secretarial fee paid to Kelvin House increased substantially this year. The explanation is given in the Annual Report but it should be noted that only 6 months' extra costs came into this year's accounts and that, therefore, there will be a further substantial increase next year. This is an appropriate point for me to express my appreciation to Mr Visser, our Secretary, and to the Kelvin House Staff associated with him, for all the hard work that they

have put into looking after our accounts and other financial matters. As an example of their diligence may be mentioned the fact that Finance Committee meetings are held only a few days after the end of each month but the month-end accounts are always available for these meetings. In view of the ever increasing work associated with the management of the Institute's affairs we are very pleased that we now have the full time services of Mr Visser and consider that we have very good value for the extra expenditure.

The final important item of extra expenditure this year comes under the heading of 75th Anniversary Celebrations. There can, I believe, be no quibbling about this expenditure. It is small indeed in comparison with the stature that we gained from the functions and publications that were arranged to mark this auspicious occasion. The success of these celebrations Mr President, was due in large measure to your own sterling character and indefatigable devotion to the affairs of the Institute and is a fitting monument to a brilliant year.

On this note, Mr President, I have much pleasure in seconding your motion that the Annual Report and Accounts be adopted."

The President: "Thank you very much, Mr Maxwell, particularly for the personal remarks. I assure you that I led a team, and it was all the help that I received that made things go so well.

May we adopt the Annual Report and Statement of Accounts, please?" (*Agreed.*)

DECLARATION OF ELECTION OF OFFICE BEARERS AND MEMBERS OF COUNCIL FOR THE YEAR 1969/1970—INCLUDING THOSE PAST PRESIDENTS WHO HAVE SIGNIFIED THEIR WILLINGNESS TO SERVE ON THE 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:

President: Mr J. K. E. Douglas

Vice-Presidents: Mr V. C. Robinson, Professor D. D. Howat.

Honorary Treasurer: Mr D. G. Maxwell.

Immediate Past President: Mr R. C. J. Goode.

I shall now read a letter from the Scrutineers, declaring the election of members of Council for the year 1969/70.

We have to report that we have inspected the nomination papers for members of Council for the year ending 30th June, 1970, and have found that the ballot papers sent out to Corporate Members of the Institute were in order. There was a return of 536 ballot papers, representing a 46 per cent ballot. As a result of our scrutiny we find that the following members have been elected:

Dr M. G. Atmore, Dr J. M. Bereza, Mr A. R. C. Fowler, Mr G. W. Holl, Dr J. P. Hugo, Mr C. E. Mavrocordatos, Mr J. A. Nixon, Professor R. P. Plewman, Dr R. E. Robinson, Mr P. W. J. van Rensburg.

I congratulate those members who have been re-elected, and welcome the newly elected members to the Council.

In terms of Clause 3.2.9. of the Constitution, Mr J. Meintjes, in his capacity as Chairman of the Witbank-Middelburg Branch, will serve on Council. Under the same clause, Mr N. A. Honnet, Chairman of the Orange Free State Branch, will also serve on Council.

I wish to announce that the following Past Presidents have signified their willingness to serve on Council for

the ensuing year. Messrs R. J. Adamson, M. Barcza, H. Britten, H. E. Cross, P. Lambooy, Professor J. De V. Lambrechts, Dr J. T. McIntyre, Messrs T. C. A. Meyer, J. F. Reid and H. Simon.

I wish to express Council's appreciation of the services of Mr C. J. Irving and Dr W. Bleloch, who served on the Council during the past year."

INDUCTION OF PRESIDENT

The President: "Ladies and Gentlemen, we now come to the most important part of today's proceedings—the induction of the new President. I shall have very great pleasure in handing over the Chair of office to Mr John Keith Elers Douglas. He was born on the East Rand within sight of that great mine, East Rand Proprietary Mines Limited (E.R.P.M.), and it might well be said that he was born under a Rand Mines golden star. He spent most of his younger days in the Eastern Transvaal where, for several years, his father was a mining commissioner, and it was here that he imbibed much of the romance of our great mining profession as he wandered through the glorious Jock of the Bushveld country with its old mining camps, its scattered outcrop workings and its tales of fortunes won and lost in bygone years.

He was educated at Christian Brothers College, Pretoria, and then went on to the Witwatersrand University where he graduated in 1939 with a degree in mining and metallurgy. So distinguished were his results that he was awarded the coveted Chamber of Mines gold medal and scholarship for overseas study. His first intention had been to become a mining engineer and here lies the one blot that I can see in an otherwise impeccable character! After vocational work underground, with his love of nature and other things beautiful, he forsook the mud and slush of the deep dark pit and decided to seek his fortune under the bright blue sky. He chose metallurgy and naturally joined the Rand Mines Group, starting on Crown Mines.

The war was soon upon him and he immediately joined the South African Engineering Corps and saw service through Abyssinia, Palestine, Syria, North Africa and into Italy. How a metallurgist becomes a sapper building bridges and laying railway track, I cannot imagine; but such was his ability that he rapidly became a most efficient officer and was a very popular one too.

After the war he took up his scholarship and made a study tour of mining and metallurgical plants in the United States of America and Canada. He paid particular attention to those forms of mechanization and automation which might be introduced into South Africa. These observations were the basis for a thesis which he submitted to the Witwatersrand University and for which he was awarded a M.Sc. degree. It was at this time he first got to know Dr F. G. Hill, a senior official of Rand Mines Limited and a past President of this Institute. Keith is the first to admit that the interest that 'Pinky' Hill showed in his activities has been a stimulant and happy influence upon his thinking and upon his career. I might add that Pinky has done much the same for several other budding mining and metallurgical engineers and many of them are now coming into their own in this country.

In 1949 Keith took charge of the uranium pilot plant on Blyvooruitzicht, but before the main plant was complete he was transferred to the Northern Lime Company in the northern Cape, where he was soon to

establish the very successful new plant at Silver Streams. After this accomplishment he was transferred, in 1956, to the Head Office of the Rand Mines Group as a Consulting Metallurgist. He has shown a great versatility in extractive metallurgy, having played a major part in the construction of the new gold plant at E.R.P.M., he has extended other reduction plants and has had a hand in building uranium and acid plants. He has been associated with the development of ferro-chrome and with the research into aluminium production and scrap copper refining. Last, but not least, he has found time to serve on several committees of the Chamber of Mines, of the Government Metallurgical Laboratory (now the National Institute of Metallurgy) and of the Atomic Energy Board. At all times he has been a hard worker and more than ready, as I well know from my experience within our Institute, to shoulder more than his share of the burden. His talents have not gone unrecognized and he is at present a Manager of the Industrial Division of the Rand Mines Group and is particularly proud to be Chairman of the Northern Lime Company. I prophesy a still greater future for him.

Keith has a wide range of interests from music to fishing and golf. He has a very charming wife and they have been blessed with three sons, the eldest of whom is already a civil engineer.

Ladies and gentlemen, I have very great pleasure in handing over the task of leading this institute to Keith Douglas. I know he will fill this position with sincerity, with charm and with great distinction. Mr Douglas will you please take the Chair.

Mr Douglas: "Mr Goode, ladies and gentlemen, may I first say that I am very deeply conscious of the great honour you have bestowed upon me in electing me your President. I am also very aware of the responsibilities and duties in this position and I hope I can justify your confidence. I shall certainly do my best.

I can only repeat what Mr Maxwell has said that Mr Goode has had a brilliant year of office. It has been stimulating to be associated with him. In this 75th year in the Institute's history Jeff Goode has as our President led us with distinction and competence. His papers and speeches on the Institute's history were I am sure you will agree, quite outstanding and have brought great credit to our Institute both here and more recently at the congress in London. All this demanded an enormous amount of backroom work and in our committees Jeff has led us with firmness but always with the courtesy and sense of humour which typifies the man. On behalf of the members of this Institute we thank you very sincerely Jeff Goode. (*Applause.*)

I would like to congratulate Victor Robinson on his appointment as senior vice-president. We in the mining industry have learnt to appreciate his calm efficiency and tremendous sense of humour. To Professor David Howat my heartiest congratulations on his appointment to junior vice-president. He has always been a hard worker for our Institute apart from being an active contributor of papers. With these two able lieutenants my job will be a great deal easier. I am very grateful to Denis Maxwell for once again accepting the rather thankless task of treasurer and to Peter van Rensburg for continuing as honorary editor. This must be the most onerous job in the Institute and Peter does it very well indeed. I hope we may be able to lighten his task by the recent arrangements with Kelvin Publications and by the appointments of six or seven honorary assistant editors.

I am very pleased to see that so many of last year's Council have been re-elected. I would like to welcome the two new members Dr R. E. Robinson and Dr M. G. Atmore. Members have chosen wisely in electing these two well-known and competent gentlemen to our Council. Dr Robinson has been president of the Chemical Institute and his knowledge of Institute affairs will no doubt be of great value. I have little doubt that these two newcomers will make a big impact.

I am very grateful to the past presidents who have signified their agreement to serve on Council this year. Their experience and knowledge of Institute affairs are of great value and will keep us on the right path. Last but not least I would like to add my thanks to our able secretary Don Visser for his hard work this last year. It was not until he took ill that I realized just how much he did for us. Don we do hope that you are well on the way to full recovery.

Finally I would like to thank Jeff Goode most sincerely for his very kind words when introducing me. I am not quite sure whether I recognize myself in all he said but it certainly made me feel very good. Thank you Jeff.

Mr Robinson, would you please take up the seat on my right. Dr Howat, may I ask you to come up to the rostrum, please."

Prof. D. D. Howat: "Mr President, the new boy, in the shape of the junior Vice-President, appears before you with great trepidation. It is easy and truthful to say on behalf of the Senior Vice-President and myself how greatly we appreciate the honour conferred on us by this august Institute. My trepidation arises from the thought of what faces Vic Robinson and me in the near future.

In our retiring President—Jeff Goode—we have a man who has set extremely high standards of presidential work and service to this Institute. In Keith Douglas who has just assumed office we have a man who will maintain these standards—I hardly believe that even he will be capable of improving on them. He is a man who will make very heavy demands—not least of himself. I have a horrible fear that Vic Robinson and I will experience a lot of backwash of these demands. Nevertheless, Mr President, we, who are about to be overwhelmed by overwork salute you and pledge that we will do our best—than which no man can do more."

Dr M. G. Atmore: "Mr President, as one of the newly elected members on the Council, I would like to pledge my loyalty to yourself and the Council in the coming year."

The President: "Thank you, Dr Atmore. We now come to the next item."

APPOINTMENT OF AUDITORS AND HONORARY LEGAL ADVISERS FOR THE YEAR 1969/1970

The President: "I wish to 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 that agreed?" (*Agreed.*)

GENERAL BUSINESS

The President: "Is there anything that members wish to raise under the heading of 'General'? If not we shall proceed to the next item on the agenda."

PRESIDENTIAL ADDRESS

The President: "I would like to ask Mr Robinson to take the Chair while I deliver my address."

The President, Mr J. K. E. Douglas, delivered his address, entitled "Lime in South Africa".

Mr Robinson: "Ladies and gentlemen, this is a Presidential address which, I am sure you will agree with me, will take its rightful place among the many important and significant addresses given in this Institute and recorded in our records.

Mr Douglas has invested a very mundane, very humble mineral with a garment very cleverly decorated with historical, scientific and economic facts. It is also important, I think, to note how he traces the influence, the chain-reaction, as it were, of gold mining—the beginning of mining in this industry—on the other industries which had to follow, notably that of lime. Lime probably was one of the very first metallurgical industries, because we are told that Van Riebeeck burned seashells to get the lime which he used in building the Fort.

There is one of its many uses which he has not touched on, and this is a reflection on the rather deceptively simple chemistry of lime, and I just want to remind you of this use of lime.

You know, no doubt, of a famous Dr Harvey Crippen, who, in the early part of this century, for purposes best known to himself, killed his wife and cut her up into convenient portions. Dr Crippen, being a doctor and not a scientist or a metallurgist, then proceeded to wrap these pieces in quick-lime, but being a doctor, and as I say not a chemist, he then slaked the lime by pouring water over it. These are historical facts, ladies and gentlemen, that I am giving you, and not advice.

Now I would like to ask Dr Rapson to propose a vote of thanks to Mr Douglas for his address."

Dr Rapson: "Mr Chairman, ladies and gentlemen, it is indeed a very great pleasure to have the privilege of proposing a vote of thanks to Mr Douglas for his outstanding address this evening.

The proceedings on the occasion of our 75th Anniversary earlier this year, and the very fine commemorative volume of the South African Mining and Engineering Journal that appeared on that occasion, emphasized for me, and I think it must have done for a number of other people, the tremendously important role which base mineral production is beginning to play in our mining and metallurgical scene in South Africa.

I think, therefore, that it is very appropriate indeed, that Mr Douglas should have chosen to address us on the subject of lime. Lime is, as he has demonstrated, one of the basest of minerals, and yet at the same time, perhaps the most basic.

We are particularly fortunate that this address should have come from someone who is in a position to deliver it with such a background of authority. He has demonstrated to us the depth of his knowledge, and one is, of course, led to meditate on the extent to which he has derived some portion of his authority from the very long line of chairmen which Northern Lime cherishes.

On the Commonwealth Mining and Metallurgical Congress this year, I had the pleasure and privilege of visiting two lime production installations in Yorkshire. The one was the mine at Tunley—a big I.C.I. operation—it was open-cast. The other was an underground pillar and stall operation, a feature of which was that we were driven right down the mine in a big motor bus.

I was very impressed by both these operations, and particularly by the size of the open-cast operation at Tunley. I must confess, however, that if I had known then what I know now, about the lime industry in South Africa, I would have been very much less impressed. How many of us, for example, were aware before this evening, that there was, in the wilds of the Northern Cape, the third biggest lime operation in the world; and up till quite recently, the biggest capacity rotary kiln production unit for lime? How many of us knew, for example, that our cement industry had grown to the stage where it consumes already, over 7,000,000 tons of limestone a year? And also, how many of us, in our conscious thoughts in any case, were aware of the diversity and the magnitude of the uses for limestone and the demands for lime in so many industries in South Africa today?

There was a time when people were inclined to measure the industrial capacity or the industrial stature of nations by the amount of sulphuric acid they consumed. The fashion has changed more recently, and there is a tendency now, to measure it in terms of power production. Mr Douglas has demonstrated this evening, that there is a third approach to this matter, and that is that one could very easily today, measure the industrial stature of a country in terms of its lime production.

Lime and limestone are, however, of interest not only from the point of view of industry. There are other aspects to limestone and lime. If you take, for example, the segregation of limestone by marine organisms and particularly by the coral polyps to form coral, this is of more than passing interest both in a biochemical and in a human sense.

You have also the susceptibility of limestones and dolomites to formation of caves and cavities. We have been made well aware of this. Such caves and cavities have, so far, presented only problems, but I am sure that future generations of South Africans are going to use these water-bearing caverns of our dolomite formations as reservoirs of high-quality water.

We have also, as Mr Douglas has mentioned, the use of the compact, more crystalline limestones as mediums of expression for sculptors and architects over many, many generations. Without such limestones, what portion of our cultural heritage might we not have lost?

I think, out of a subject which on the surface is a very mundane one, we have had put before us this evening, what has been a veritable feast, and I would like, on your behalf, to congratulate Mr Douglas for his excellent, authoritative and comprehensive address and for the way in which he has broadened our appreciation of the position of lime in the South African economy.

Mr Chairman, ladies and gentlemen, it is with very great pleasure indeed, that I propose a hearty vote of thanks to Mr Douglas for his distinguished address this evening."

The Chairman: "Thank you very much, Dr Rapson. I now have pleasure in calling on Dr R. E. Robinson to second the vote of thanks."

Dr. R. E. Robinson: "Mr Chairman, ladies and gentlemen, I consider myself very privileged to be asked to second the vote of thanks to Mr Douglas. I must, however, first take this opportunity of conveying my congratulations to him on his election as President of this Institute, and to express the hope that his year of office will prove to be not only as successful as we all anticipate, but, more important, enjoyable and rewarding.

I found his address to be most fascinating. Probably in common with most of you, on hearing the subject of his address, my first reaction was to wonder whether there was very much to be said on the subject of Lime. Such preliminary misgivings have been completely dispelled, and I have listened with complete fascination to a story which, as Mr Douglas has pointed out, is the story of the oldest chemical reagent known, and which is a story that has been extremely well told.

It is to me a fascinating thought that probably the first use of lime, by prehistoric man, was to dip his moist finger into the white "ashes" of his fire and smear a crude drawing on the wall of his cave. White lime-washes are still used today to paint the walls of our houses, and it is only very recently that plastic based, titanium-oxide-pigmented paints have made serious inroads in the use of lime washes for such purposes. From an artistic point of view, when one sees some of the modern art, one wonders also whether there has, in fact, been any cultural advance over the efforts of the primitive caveman.

The most fascinating aspect of Mr Douglas' address was, as far as I was concerned, his description of the processes and equipment used in the production of lime from limestone. I have never before been involved in the technical aspects of lime production, and particularly fascinating was the consideration that, in this lowest-priced of all chemical products, there existed the degree of technical sophistication that Mr Douglas has described. I have often been involved in the problems of roasting, calcination, or heating of ores and minerals. For example, when we are giving detailed consideration to the possibility of the production of Alumina from non-bauxitic sources, it was very soon evident that the vital step in converting flint clays, syenites, or other aluminium silicates to alumina was the high-temperature roasting process with (believe it or not) lime. At high temperatures, the calcium oxide combines with the silica to form, usually, dicalcium silicate, thus releasing the aluminium as the aluminium oxide. This reaction takes place usually at temperatures well above 1000 deg C, and we gave detailed consideration to the best type of equipment to use, the thermal efficiency, and the cost. After detailed technical consideration, we considered that a rotary kiln was almost certainly the most efficient unit, but that to assume a thermal efficiency of more than 50 per cent would be quite unrealistic, and that calcining costs alone would be of the order of R5.00 per ton. It was obviously of very great interest to learn of the Seeger lime kiln, producing 270 tons/day, with a thermal efficiency at an almost unbelievable level of 85 per cent, and presumably at inclusive production costs similar to those in South Africa of approximately R4.70/ton (I have subtracted the railage cost as quoted at R5.00 from the quoted delivered price of R9.70).

One would like to have much more information regarding these vertical kilns. One wonders if information is available on the residence time distribution of particles inside this kiln, and whether there is evidence to indicate the flow pattern of solid material, and whether detailed information is available regarding heat transfer coefficients. I am sure that such details would be of very great interest to other problems one encounters in pyrometallurgical processing.

Another very interesting aspect of this presentation was the reference to the fluidized bed kiln for treating the fine crystalline limestone. It would appear from the description that this unit is a multistage countercurrent fluidized bed unit, and presumably it is operating satisfactorily, and at a competitive cost. A unit of this kind

is something that we have often wished for, since the advantages of continuous countercurrent operation for many metallurgical roasting operations are often of great importance, not only in achieving good heat balances, but also in being able to drive reactions in the correct direction. An example would be the reduction of uranium trioxide to uranium dioxide with hydrogen where an equilibrium between UO_2 , UO_3 , H_2O , and H_2 can be established and where very precise temperature control is required. Fluidized beds are used for this purpose, but, to my knowledge, there have been single-stage reactors because of the problems and difficulties in maintaining stable operation of multistage units.

There are many other examples of instances where we obviously could learn a great deal from the lime industry, particularly as regards low cost metallurgical processing. One wonders if here isn't a worthwhile lesson to be learnt from this Presidential address, and even perhaps a pattern to be followed in the next year's activities. One is naturally inclined to follow with great interest the advances made in exotic fields of metallurgy.

The mining and processing of the precious metals, or the space age metals such as niobium, tantalum and zirconium, always attracts the fancy of the young scientist or metallurgist. On the other hand, one could imagine the reaction of a group of aspirant Ph.D.'s if one were to suggest that lime burning would be a worthwhile topic for their researches. Yet, after listening to this address, I am convinced that there is much to interest the postgraduate researcher, particularly the Chemical Engineer, and moreover, the results of such work will have application to many other metallurgical processes. Perhaps the Institute, in arranging its programme of activities, could devote more attention to the so-called base minerals, limestone, lime, dolomite, etc., to emphasize the engineering and scientific interest in these materials, and to demonstrate that these minerals are not base in the sense of being mean and lowly, but rather the foundation of our chemical and metallurgical industry.

The Chairman: "Ladies and gentlemen, before asking your President to resume the Chair, I would like to ask him if he wishes to reply to the votes of thanks."

The President: "Ladies and gentlemen, lime manufacture comprises both mining and metallurgy. It was therefore most appropriate that two of our most eminent scientists, one in the mining and the other the metallurgical field, should propose the votes of thanks. I felt sure that they would contribute to and enhance the value of my address and in this we have not been disappointed. Dr Rapson has perhaps made lime more glamorous than this rather earthy material deserves. Dr Robinson has raised some interesting technical points and I am sure he is right when he says there could be mutual advantages in an exchange of information and collaboration in the research work he is carrying out. I thank you both most sincerely for your very thoughtful votes of thanks."

The Chairman: "Will you please take the Chair, Mr President."

CONCLUSION

The President: "We have now come to the conclusion of the meeting, and before we disperse I would like to thank all the members and visitors for coming here tonight and listening so patiently to my address. I hope you enjoyed it. I now declare this meeting closed."

The meeting closed at 6.25 p.m.