

ADDRESS TO STUDENTS AT
AIESEC CONFERENCE

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THE EXPORT POTENTIAL OF MINERALS OTHER THAN GOLD

I have been asked to tell you today in this rather brief address something about the export potential of South African* minerals other than gold, and to examine the possibilities of these mineral exports making up for our future losses in gold exports. But first a word of warning: I am no prophet. I am by training a mining engineer; in other words, my university course included, in addition to those more typical engineering fundamentals of mathematics and physics, the rather more interesting subjects of mineralogy, geology and extractive metallurgy. Mineralogy is the study of the various minerals which make up the earth's crust and geology is a study of how the earth's crust has actually been formed. Extractive metallurgy is the science of separating minerals one from another; this generally implies crushing and grinding to liberate the particles and then such processes of separation as may be based on the physical or chemical properties of each mineral. These include the dissolution, flotation and smelting and slagging techniques. Thus I claim to know something about the finding of minerals and their extraction but let me make it quite clear, I know little when it comes to making forecasts as to how mankind will live at the end of the century and as to what minerals will be in demand.

Basically, I think we can be fairly certain that most of the demands will be for the same minerals that are produced today. There will be some additions and no doubt also a growing demand for minerals with special qualities - and I quote for example the new wonder metal titanium -

* in this address South Africa is deemed to exclude South West Africa.

high strength, low weight, corrosion resistant and unaffected by temperature. An expensive metal, but worth using in the chemical industry, and for desalination plants, where consumption is expected to reach 100,000 tons per annum in 1980. The supersonic Boeing 2707-300 will, I'm told, be 95 per cent titanium, requiring 200 tons of this metal for each aircraft.

Secondly, it is axiomatic that as the world's population increases and as that population becomes more sophisticated, so much greater will be the demand for all minerals.

Thirdly, we are already realising that the world will be hard put to supply these minerals. The old world - that is Europe and the United Kingdom - have long since relinquished their role of being the major provider of raw materials. They look to Africa and the Americas for their supplies; likewise in the east Japan is ever more dependant on Australia and on the western seaboard of North America for her coal and for her iron and copper ores.

Fourthly, we see in the world today a growing realisation that transportation difficulties can be overcome. Ores and minerals, and now more frequently the concentrates, are being carried long distances by rail and even further by sea. As an example, I might mention the transport of coal, a relatively cheap material, some 400 miles across the Rocky Mountains in Canada to the coast and then by ship to Japan - a further 4,300 miles.

South Africa has ample reserves of several minerals - very large reserves in some cases. Some are high grade, but located long distances from the sea. Others are low grade, or of a chemically complex nature. Some are already being worked, others await the provision of transport or a solution

to some metallurgical problem. Slowly, but surely, these disadvantages are being overcome, the problems are being solved by our South African geologists, metallurgists and mining engineers. These people are now more frequently grouped together under the title of Minerals Engineers. To date the South African minerals engineer has been given great credit for mining low grade gold deposits under conditions of great depth and extreme heat. We are recognized as the holders of world records for shaft sinking but not so much honour has been given to us for the expertise that we have shown in our iron and coal industries where we produce the lowest cost steel and the cheapest electric power in the world. Nor have we been given credit for our great achievements in recovering diamonds from the gravels in South West Africa where in order to get one cup of diamonds we have to mine, load and treat some 10,000 lorry loads equal to 50,000 tons of gravel. The ratio is one part, the diamond, to 100 million parts of gravel. We deserve some praise, too, for the part we play in the recovery of copper at Palabora where it is now possible to work economically down to a grade of under 0.3 per cent copper. Much credit, too, must be given for the skills and technical abilities that South African engineers have demonstrated in Northern Rhodesia, now Zambia, in helping to bring those great copper mines up to such a high standard of efficiency.

We are thus well experienced in handling minerals and metals other than gold and this wealth of experience is backed by the unique features of our group organisation whereby each major mining group has its own very strong consulting engineering, research, geological and other similar technical services. We have thus the experience, the know-how and, through group backing, the finance to tackle successfully

new mining ventures. As an example of this I quote the recent success in bringing a new platinum mine, together with its concentrator, smelter and refinery, into full production within a period of two years. The metallurgical processes involved to produce platinum of over 99.95 per cent purity are most complicated but our metallurgists accepted the challenge with eagerness and a great success has been achieved.

But even more dynamic has been the development of the giant Highveld Steel and Vanadium Corporation. For years it has been known that South Africa possessed vast reserves of titaniferous magnetite but the presence of titanium in this oxide of iron had prevented its use as an ore for the production of iron and steel. Titanium freezes or chokes the standard iron blast furnace since it forms high melting point compounds within the furnace. Dr. Bleloch, a South African metallurgical engineer, was the first to indicate that these ores could be treated under certain conditions in an electric furnace. The Anglo American Group accepted this challenge, realising that in addition to iron and steel an important product would be vanadium. Three steps were necessary :

- (a) to establish and secure adequate mineral reserves
- (b) to investigate the economics of vanadium and steel recovery from the ore
- (c) to conduct a world wide study of existing vanadium ore reserves and operations, and to assess world demand for the future.

Despite the fact that they found at that time a huge stockpile of vanadium in the U.S.A., the investigators decided there would be a future demand for this metal and that South Africa could supply it, and the go-ahead was given to the largest single industrial enterprise yet undertaken by a public company in this country. The total cost was R127 million

and last year, three years after the start of construction, steel and vanadium came off the production lines. The initial capacity is some 23 million lb. of vanadium per year, practically all of which is exported; prices vary but in very rough terms this represents a foreign exchange earning of R23 million. Just under half a million tons of steel products are also produced. I believe there is an interesting sidelight to this new business; this is that as the steel users realise that steady stocks of vanadium are available, they are proceeding to adapt their processes to use more and more of it. I therefore venture to suggest that this huge enterprise has a greatly expanding future.

I have quoted this company as an example of how a seemingly intractable mineral deposit can be converted into a valuable ore deposit by the application of scientific principles and by a growing world market demand. What further break-throughs will be made in the future and what new products will be in demand are matters of the wildest conjecture!

To try to foretell the future pattern of our minerals industry over a lengthy period is an impossible task. I only wish I could foresee what the price of copper will be this time next year - or even the price of a copper share on the Stock Exchange by the end of this year! All prognostications have necessarily to be based on assumptions and these are based on the technical abilities and assessments of our minerals engineers, and in the confidence that we have in the continued progress of the world.

One only has to look back to forecasts made some twenty years or so ago to see how reality has differed from the projected figures. The Paley Report is a good example of this. It was compiled soon after the Second World War by a group of

eminent United States economists, backed by the best brains that science could offer at the time; its task was to establish the likely future growth pattern of U.S. raw material requirements over the period 1951/75, bearing in mind the availability of raw material resources and projected industrial growth trends. However, as we see it today the Paley Report widely underestimated the growth of U.S. raw material requirements. Zinc requirements were underestimated by some 40 per cent, copper by 30 per cent, aluminium by 55 per cent, nickel by 74 per cent and steel by 68 per cent. Note, too all these variations have occurred during the first nineteen years of the twenty-five years that were to be covered. We must be careful, though, before we criticise, to remember that there are still six years to go, and some people see frightening signs of setbacks in the U.S.A. The final answer may yet be nearer the estimate!

My brief calls for an even longer forecast; thirty odd years, which, according to the pundits, represents the remaining span of our gold mining industry as the major earner of foreign exchange. I will not completely write off South Africa's gold mines by the end of the century. I am ever hopeful that sooner or later we will get a more realistic price for our metal. If this be a doubling of price the extension of the lives of the present mines will be impressive and a terrific impetus will be given to further prospecting. It is worth while recalling that increases in the price of gold since 1931 have enabled those mines which were working then to produce more than four times the amount of gold that was estimated would have been produced at the pre-1931 price. Nor have we given up hope of finding more gold. We still spend over R1 million a year on gold prospecting within the Republic. Another R4 million a year is spent looking for minerals other

than gold or petroleum. Petroleum exploration is very expensive and last year somewhere between R10 million and R20 million was spent looking for oil in South Africa both on land and off-shore.

Now let us compare South Africa's mineral production of 1969 with that of thirty years ago. This is given in Tables I and II. Gold sales in 1939 amounted to R200 million; other minerals had a value of R20 million, making a total mineral production of R220 million. In 1969 silver and gold output was worth R834 million and other minerals R653 million, giving a total of R1,487 million. We would have said that such increases were out of the range of contemplation way back in '39. The value of our gold production is four times that of 1939, and that of the other minerals more than thirty times. Some of this is due to inflationary increases in the price of metals, for example, in 1939 we priced our gold at R15.50 per ounce. Last year, thanks to the premium, it was R26.55 per ounce. We valued our copper in 1939 at R65 per ton and in 1969 at R835 per ton. Tin was R243 per ton and by 1969 it had reached a price of R2,000 per ton.

The major products produced are similar to those of thirty years ago, with the exception of antimony. Last year our export of this metal rose to 35,251 tons. I expect it to be even higher this year and we are now the world's largest producer of this metal, having recently overtaken China. These days we say that any time anyone strikes a match in the western world, a little South African antimony is burnt. This is only a minor use of the metal. The more important use is as a hardening element in lead alloys, particularly in those used in type-setting. As the tri-oxide, it is used to render fabrics and plastics fire resistant. Incidentally, the price of this metal is still going up; it has doubled in the last

twelve months. This year's export sales should be worth R15 million or more. Our known reserves are not unlimited; they were given as 275,000 tons in 1965 but no doubt the experience gained through mining the present orebodies at Consolidated Murchison will give us more knowledge and lead to further discoveries.

Before proceeding too far with our discussion of our export potential, perhaps we should give a little more thought to costs and prices. I have already quoted the bigger price changes that we have experienced in the Republic over the last thirty years. In the United States for the period 1939 to 1969, the price of copper has moved from 11 cents to 62 cents per lb. Lead and zinc have risen from 5 cents to 15 cents per lb, and silver from 39 cents to 179 cents. The price of aluminium has not changed so violently; in 1939 it was 20 cents and last year it averaged 27 cents per lb.

Let us now look at the South African consumer price index. Our present index is based on the year 1958 = 100. On this scale the index would have been down to 45 in 1939 and it rose to 128 in 1969, nearly a trebling in the period under review. The western world at this moment is very conscious of the problems of inflation but so far no country seems to have been successful in controlling inflation. South Africa has during the last ten years had an impressive record, but can she hold her annual rise to 2.5 per cent when all her trading partners are suffering from rises of 5 per cent or more? If she can, she will obviously place herself in a very favourable trading position since other mineral producers and manufacturers will in no time outprice themselves.

Then there is the question of supply and demand. The demand for copper has surprised many. The free world production over the last twenty years has doubled, an increase of 4 per cent

per annum. It refuses to be replaced by aluminium and immediately there is any sign of a production setback, up goes the price. Copper producers are still confident of the future. The more civilised the world becomes, the greater the demand for electricity, and hence for copper. Consumption in the United States averages 40 lbs. per head. Asian demand at the moment is negligible and if this could be raised to 2 lbs. per head of population, it would again double the world's requirements. The problem is going to be, where will the copper come from! The future of lead is less rosy; there are suggestions that a great deal less will be required as a petrol additive but the demand for batteries for cars and for electric traction will increase and the overall rate of growth should continue as previously, about half that for copper. Zinc, once threatened with extinction by plastics, continues to show an upward demand. Like copper, its consumption has doubled over the last twenty years. This, too, should continue to the end of the century. As we will see later, there will be a greatly increased demand for platinum. Will such increased demands for the major metals force prices to rise faster than our rate of inflation? I think this is probable, since this is what has happened in the past, with the notable exception of aluminium. Nevertheless, I believe that for the purpose of this particular exercise, and more so as it is so much simpler this way, it would be wise to think only in terms of present-day costs and prices throughout this memorandum.

DIAMONDS

After gold, diamonds are at present our main export. The first diamond was found in 1866 by a fifteen-year-old boy, Erasmus Stephanus Jacobs, on his father's farm near Hopetown on the banks of the Orange River. He liked this shining stone and used it as a marble until someone recognised it as a $21\frac{3}{4}$ carat diamond. Even then, little notice was taken of it

until early in 1869 when a Griqua shepherd boy found the large 83½ carat "Star of Africa" stone. Now the whole world was startled, and there was a "diamond rush" to South Africa. The shepherd boy was rewarded with 500 sheep, 10 oxen and a horse - a fabulous present when you realise that to him the price of a bride was about one ox in those days! The Governor of the Cape Colony declared: "The diamond is the rock on which the future success of South Africa will be built."

The diamond is the hardest substance known. It is a mineral consisting of pure carbon. It has no international price like gold. It is not quoted like copper on the London Metal Exchange; the value of each individual stone varies according to its colour, its brilliance and its beauty - and, of course, its rarity. Most of Africa's diamonds are won from alluvial operations and the Congo was one of the biggest producers though their diamonds were practically all of the industrial type. Contrarywise, nearly all the diamonds from South West Africa are of the gem quality. South Africa produces a fifth of the world's output by weight, but she probably produces two-thirds of the world's gem stone output. I believe we will continue to provide most of the gems. There are still large areas of marine terraces to be worked along our south west coast both north and south of the Orange River mouth. Diamond pipes are scattered throughout Southern Africa and new deposits are still being found. Considerable prospect work has been done off-shore and I am confident that production can be maintained until well beyond the end of the century. What is more, there is little doubt that if gem stones become harder to find, the price will rise in compensation.

PLATINUM

Platinum is probably the most likely mineral to replace

our falling exports of gold. Small amounts of platinum have been found in our gold reefs, in brecciated quartz lodes near Waterberg and in certain dunite pipes in the Northern Transvaal; but our main reserves are found within the Bushveld Igneous Complex. This formation is South Africa's geological wonder. It is a massive intrusion of basic rocks stretching over 100 miles from Lydenburg in the east to Rustenburg in the west and extending northwise to Potgietersrus. It is nearly 2,000 feet thick and contains successive layers of various basic rocks. Chrome seams occur near the bottom and then a third of the way up lies the famous Merensky Reef, a sheet of pyroxenite in which the major platinum values occur. This remarkable sheet or reef persists over a huge area and it outcrops, or can be seen on surface, for a distance of some 150 to 200 miles. Rustenburg Platinum Mines and the newcomer Impala, work this reef in the vicinity of Rustenburg. The platinum is in association with copper and nickel sulphides and the method of extraction is to collect the sulphides by gravity or flotation techniques. The sulphides are smelted to remove the iron and other impurities, and then various complicated metallurgical processes are used to separate the nickel, copper and platinum metals. Significant amounts of palladium, ruthenium, rhodium and iridium are found closely associated with the platinum. As I have stated, it is now possible to complete the whole extraction process in this country, producing high quality metals for export. Reserves have not been fully tested but a recent estimate by Dr. T. F. Muller indicated that we possess a potential 200 million ounces of platinum, which he said would be worth 60 per cent more than our present gold reserves.

South Africa produced about a million ounces last year and if all this metal had been refined here export earnings of some R100 million could have been earned from the platinum group metals alone. In addition, copper and nickel are pro-

duced in significant quantities. The platinum market has for long been a bit of an enigma but recent statements, particularly in the United States, indicate that modern mankind is demanding an end to pollution, with emphasis on the removal of the smog, the smells and the poisons produced by the internal combustion engine, by factories and by other metallurgical undertakings. Platinum will be required to counter these poisons and this new demand will greatly boost the already steadily rising chemical requirements for this metal. It is an essential metal in the glass industries and in advanced chemical technology. It is used as a catalyst in oil refineries and in acid manufacture. Present free world consumption is about 1.5 million ounces per year, of which South Africa supplies two-thirds, Russia and Canada supplying the bulk of the remainder. Russia apparently now requires all her metal for her own uses and Canada's reserves are limited. There are no other known major deposits and thus it appears that it will be South Africa which will supply the western world's increased needs. My guess is that our output will rise to over 4 million ounces by the end of this century. If averaged over the 30 years this represents an increase of under 5 per cent per annum throughout the period. This output would be worth over R400 million, exclusive of the value of copper and nickel by-products.

NICKEL

Nickel is a very important by-product of platinum mining and it is estimated that last year some 15,000 tons of nickel were produced. Much of it was exported as copper nickel matte, some as stainless steel or other nickel alloys and a little as refined nickel. Refined nickel is at present worth some R2,000 per ton so if all the nickel had been exported in that state export earnings of R30 million could have been made. By the end of the century with a quadrupling of platinum production, nickel output should rise to 60,000 tons worth some R120 million.

CHROME

The other important mineral produced from the Bushveld Igneous Complex is chrome. South Africa's reserves of this mineral amount to 2,000 million tons, three-quarters of the world's reserves. Rhodesian reserves make up the majority of the remaining quarter. South Africa started producing chrome in 1921. Present production is over 1.2 million tons per annum of which 80 per cent is exported and this was worth some R9 million in foreign exchange last year. Admittedly our chrome ores have a high iron content and the grade is not as high as that found in Russia or Rhodesia, nevertheless F. P. Bath has estimated that our production will grow at the rate of 10 per cent per annum for the next five years and then at a somewhat lesser rate. We will also have a growing number of metallurgical plants nearby, with cheap power, and this will ensure that South Africa will gain more of the world market, and I therefore estimate an average growth rate of $7\frac{1}{2}$ per cent per annum up to the end of the century. This means a production of 10.5 million tons by the year 2,000. Accepting last year's prices, and assuming 80 per cent is exported, this would earn R70 million. In practice much of this chrome will have been converted into more sophisticated ferro-chrome or or ferro-silicon material worth considerably more, or into stainless steels.

FERRO-ALLOYS

This brings us to the ferro-alloy industry which is emerging as a giant metallurgical complex in the Eastern Transvaal. Built specifically with the concept of using our low cost power, our large chrome reserves and our cheap coal, the various metallurgical companies are gradually establishing themselves as producers of ferro-silicon, ferro-chrome, and stainless steel products acceptable to world markets. This is a vital step forward in our metallurgical progress in that we now sell a sophisticated article rather than a raw

material. The basic principle is the separate reduction of chromite (the chrome ore) and quartz (silica) using coke and suitable scrap steel to produce "charge chrome" and ferro-silicon and then combining these two to form ferro-chrome. The process takes place in electric furnaces. Nickel and steel can be added in various proportions to the ferro-chrome to produce a variety of stainless steels. In May of last year the Southern Cross Steel Company commissioned its R12 million stainless steel mill at Middelburg. This plant is expected to produce 40,000 tons of stainless steel in 1973 of which some half should be exported. With a growing platinum output more nickel will be available for nickel alloys and stainless steels, and there is no doubt that these alloy exports will increase considerably. It is also known that the South African Railways administration is considering a direct rail route from Witbank to the new deep water harbour at Richards Bay to handle these exports.

MANGANESE

South African manganese reserves have been estimated at 400 million tons possibly the largest in the world, though not all of the highest grade. They are now believed to be twice this figure. Most of these reserves are located in the Kuruman and Postmasburg districts, i.e. in the heart of the Republic and somewhat distant from the sea. At Hotazel there is a considerable tonnage of high grade ore of 48 per cent manganese or more. Russia supplies some 40 per cent of the world's requirements, South Africa and India 10 per cent each, and Brazil a little less. Little is known of the Russian reserves, India's are known to be declining. Manganese is used in steel production. The world's steel production has nearly trebled during the last twenty years, and recent estimates have indicated faster growth in the future, a doubling every 10 years. Our manganese production and exports would be expected to follow this trend, but I believe

transport will be the limitation, and therefore propose to accept a five per cent growth for the future. Last year we mined some 3 million tons of which two-thirds was exported to bring in a revenue of R21 million, so I would anticipate a production of 13 million tons by the year 2,000, of which some 9.0 million tons would be exported to bring in some R90 million. I would anticipate that within the next 30 years we will have built a new port, at Saldanha Bay, together with a direct mineral line from the port to the Postmasburg district. The port should be capable of taking 250,000 ton ships and would also be used for the export of iron ore. A start has already been made in building our own ferro-alloy plants, and last year the Natal operation exported some 143,000 tons of ferro manganese to earn R11 million. Considerable expansion of this type of operation can be expected.

COPPER

Copper is one of the oldest metals to have been mined in South Africa. There is evidence of copper wire having been produced at Messina and at Palabora over 1,000 years ago. Our production in recent years has grown enormously with the establishment of the Palabora large open pit operation. Last year we exported nearly 100,000 tons of copper worth R83 million. There is much evidence of copper mineralisation in the Eastern and Northern Transvaal and in the Northern Cape and recent finds have been made at Prieska. No official estimates of the potential of these new finds have been given, though grades of 1.5 to 2 per cent have been mentioned and metal outputs of 40,000 tons of copper per annum have been suggested. I believe that since there is so much evidence of copper in this country, there will be further such discoveries and these will be sufficient to replace our existing operations and to expand our output by some 50 per cent. Incidentally, in 30 years' time mining at Palabora will have reached considerable depth and output from this great mine will be somewhat curtailed.

ZINC

Zinc will also be produced at Prieska; and South Africa, a country which has until recently been an importer of this metal will now become an exporter. A zinc refinery has been recently established near Springs to treat zinc ore mined at Berg Aukas and Rosh Pinah in South West Africa. The main use for zinc is for galvanising, that is as a coating for steel sheeting. It is used for die casting and we also use it in the metallurgical process for the refining of gold.

LEAD

There are numerous small deposits of lead throughout South Africa and in due course many of these will be worked, but it is doubtful if they will make a significant contribution to our export potential.

ASBESTOS

The Republic is in the fortunate position of being able to supply the world with the three principal varieties of asbestos: crocidolite or blue asbestos, chrysotile and amosite. The latter variety is mined in the Eastern Transvaal and this is the only source in the world for this rather tough material that does not undergo compaction under vibration. It is used for steam turbine and jet engine insulation. Our blue asbestos is greatly in demand since it has great tensile strength and is strangely resistant to acids and seawater. It is thus used for insulation purposes in the chemical industry and for the manufacture of asbestos piping. There is a large export potential for asbestos piping for water distribution in neighbouring countries. Large deposits, scattered through various layers of the banded ironstone formation, occur throughout the Northern Cape and Northern Transvaal, but it has not been possible to estimate potential reserves. Resources are said to be substantial and adequate for 50 years. In the last 30 years our output has increased more than ten-fold. Considerable local manufacture of asbestos products now takes place and these are steadily increasing. The country is

already the third largest producer of asbestos in the world. Last year our exports were valued at R28.8 million and it is reasonable to assume a doubling of output by the end of the century.

IRON AND STEEL

South Africa's iron reserves are enormous and total some 9,000 million tons of ore having a grade exceeding 60 per cent iron. A large portion of these reserves are located near Sishen in the northern Cape. Last year over 9 million tons worth R30 million were mined and the production approaches that of West Germany. Nearly 3 million tons were exported, mostly to Japan. Our semi-Government steel company, Iscor, started production in 1934 but for the most part the company has been unable to keep pace with demand. Iscor has plans to produce 26.5 million tons of steel per annum by the end of the century. World steel production is increasing rather faster at some $7\frac{1}{2}$ per cent per annum. That is doubling itself over 10 years, and South Africa, I am sure, will do the same. I have already mentioned the newcomer, Highveld Steel and Vanadium Company. Some steel will be exported, iron ore mining for our own requirements will increase greatly and transport facilities will have to be improved. There will be a greater demand to export South African ore to both Europe and Japan. The new harbour at Richards Bay will handle 300,000 ton ore ships and plans are being considered for a new deep water berth near Port Elizabeth but the railways serving these harbours will be overloaded. The alternative route that I mentioned, via Saldahna Bay, will have to be constructed. With such new facilities I believe we can increase our exports of iron ore at 10 per cent per annum to reach 50 million tons of ore by the end of the century. Some of this may well be metallised agglomerates or pellets, i.e. concentrates, from low grade ore, for use in direct reduction furnaces.

COAL

Our coal reserves which were once thought to be unlimited, have recently been re-estimated by the Coal Advisory Board at 11,500 million tons. This is now considered by many as a pessimistic estimate. Our production last year was 55 million tons and most of it was consumed in our power stations to produce cheap electricity. Coal for coke is in rather short supply but plans are afoot to replace coke with a locally produced "char". Large quantities of low grade coal are used in our oil, or rather chemicals, from coal plant, Sasol. Increased demands for coal for power, for coke and for the chemical industry are foreseen and it has been estimated that annual consumption might rise to 330 million tons per annum by the year 2,000. If this is so then our reserves may appear too small to permit of large exports. The State has now appointed a commission to investigate this problem. Meanwhile arrangements are being made to ship minor quantities for export and I suggest a figure of 10 million tons per annum is all that can be contemplated for the time being.

ALUMINIUM

An aluminium smelter is being located at Richards Bay with initial capacity of 100,000 tons of aluminium per annum. The alumina feed will be imported initially from Australia. Provided we can continue to maintain our cheap costs of power there is every likelihood that production of aluminium will be increased and we may even use our own low grade deposits of coal ash as raw material. The new smelter will greatly stimulate the aluminium fabrication industry and a considerable local export can be expected.

URANIUM

Uranium is produced mainly as a by-product of gold mining. Thus so long as our gold mines keep functioning we shall be in a position to produce and if necessary stockpile uranium oxide. Production reached a peak in 1959 when out-

put was 6,444 tons. Since then there has been a steady decline partly due to the termination of long term contracts and partly due to the prevailing over-supply position. Production in 1969 was estimated at 3,979 tons and, based on the last published figures, this may be said to be worth roughly R25 million. The price is expected to start escalating in the late 70's after which the demand for South African uranium will increase rapidly, some say at 10 per cent per annum. Two years ago it was estimated that we had 205,000 tons of uranium oxide reserves available at a price of \$10 per lb. In addition uranium will be produced as a by-product at Palabora. We have large low grade potential reserves in our gold mine tailings dams, we still have some unworked gold uranium reefs and there are several other indications of low grade uranium deposits. I believe, though, we will require most of our production for our own future power requirements and I am pessimistic about our long term export potential. The discovery of oil or gas on our shores, or the import from nearby territories of this fuel, would greatly improve the position.

FLUORSPAR

In recent years the world consumption of fluorspar has increased greatly due to the increasing demands of the aluminium, chemical and steel industries. Fluorspar is normally classified into three categories - acid, ceramic and metallurgical. The acid grade contains more than 97 per cent calcium fluoride (CaF_2) and is used in the manufacture of hydrofluoric acid. This accounts for nearly half the fluorspar consumed, and the acid is in turn used to produce fluorocarbon compounds for aero-sprays and refrigeration coolants. Ceramic grades, 90-97 per cent CaF_2 , are used in glass manufacture, and there is a growing demand for metallurgical grade fluorspar (-90 per cent CaF_2) as a flux in the basic oxygen process of steel making.

South Africa is said to possess a half of the world's known resources, some 500 million tons of crude ore. These are to be found in the metamorphosed dolomites to the south of Zeerust in the Eastern Transvaal and also near Naboomspruit in the Northern Transvaal. These two major deposits are being brought into production. Last year we exported over 100,000 tons worth over R2 million. Since we possess such large reserves, we must expect a very much larger share of the world's market and exports of 2 million tons worth R40 million are foreseen for the end of the century.

GRANITE

The first gold mine to be worked in South Africa was at Eersteling in the Northern Transvaal. It was found exactly 100 years ago and when the steam plant and smelter were built, a consignment of Aberdeen granite was imported. The granite smoke stack still stands as a memory to those first gold miners. How the tables have turned! When we start a mine now practically all the equipment is made locally from South African materials. What is more we can produce and export our own 'granite from the vicinity of Pretoria and from Belfast in the Eastern Transvaal. This so called 'granite' is another product of the Bushveld Igneous Complex. Most of it is exported and last year, had a value of more than R4 million. There is considerable scope for further exports of such building materials.

MISCELLANEOUS

South Africa has for many years produced a steady supply of tine, and this is expected to continue. We will have a growing export market for vermiculite, mined near Palabora, and there will be a rising production of phosphates, sillimanite, of which we are the world's second largest producer, limestone, silica and gypsum. Increasing local consumption will enable us to export many of these at competitive

prices. We have large beach deposits of ilmenite and rutile, and sooner or later these will be turned to account.

SUMMARY

In Table III a summary of the estimated production and export potential has been presented, for the years 1990 and 2000. Once again I repeat the warnings given regarding long term estimates. This summary shows the possibilities of our mineral exports rising from R653 million in 1969 to R920 million in 1990 and R1400 million in 2000. Our present gold and other minerals production is R1486 million, so that one can safely predict that our rising mineral exports can counter the expected drop in gold production. The estimates are reasonably conservative, particularly when viewed in relation to the experiences of the last thirty years.

CONCLUSION

South Africa has been blessed with the provision of more than adequate reserves of the world's more important minerals and metals. As a country we are placed centrally between the major markets of the eastern United States, Europe and the Far East. We have a bouyant economy thanks to our gold production, we have cheap power and excellent labour resources. If we have a disadvantage, it is that many of our mineral reserves are located some way from the sea and from suitable harbours. Canada and Australia have shown that mineral railway lines can be built through the most inhospitable territories, and be operated at a minimum of cost. The transport of some 500 million tons of ores within the Republic, and the export of some 80 million tons, will require heavy investment in the provision of new transport facilities. Single purpose mineral lines will have to be established and new deep water harbours, capable of handling the world's largest ships, must be constructed. Handling facilities at the ports must be second to none, so that the massive ships can be repaired, loaded and sent on their way in a minimum of

time. These facilities will ensure our markets, and if at the same time, we can continue to produce the more sophisticated products such as semi-processed ores, refined metals and special alloys, the value of our exports will climb still further. I am confident that our minerals engineers can supply the know-how; it is now up to the State and to the financiers to provide the capital.

Our mineral industry has for the first five months of this year through its base metals, minerals and their products together with precious stones and jewellery (mostly diamonds) accounted for R307.8 million worth of exports out of a total of R651.3 million - that is 47 per cent of our exports. In addition to this our gold production was a further R330.6 million for this period. These figures confirm the terrific strength of our minerals industry, and indicate how it is already beginning to challenge the gold mining industry as an earner of exports. And gentlemen, from the facts and forecasts which have been given in this memorandum, it would appear that in 1970 we are only on the threshold of exploiting our mineral resources.

TABLE I

MINERAL EXPORTS AND SALES - SOUTH AFRICA
1939

	<u>Exports</u>		<u>Local Sales</u>		<u>Total</u>	
	<u>Tons</u> (1,000's)	<u>R</u> (1,000,000)	<u>Tons</u> (1,000's)	<u>R</u> (1,000,000)	<u>Tons</u> (1,000's)	<u>R</u> (1,000,000)
Gold						197.9
Silver						.2
Total						198.1
Diamonds ¹		5.2				5.2
Antimony		-		-		-
Asbestos	23	1.0		-	23	1.0
Chrome	188	0.7		-	176	0.7
Coal		-		9.6	21,524	9.6
Copper	11	0.9		0.1	12	1.0
Nickel		-		-	-	0.1
Fluorspar	8	0.1		-	11	0.1
Iron Ore		-		0.2	540	0.2
Manganese	356	0.8	30	-	462	0.8
Platinum metals		-		-		0.6
Sillimanite		-		-		-
Tin	1	0.2		-	1	0.2
Titanium		-		-		-
Vanadium		-		-		-
Sundry ²		0.1			?	1.4
Total	587	3.8	incomplete		22,749	22.9
GRAND TOTAL						R221.0m.

1. Diamonds - breakdown of exports and local sales not available.

2. Sundry - includes granite, limestone etc.

Reference: "Industrial Minerals", quarterly information circular October to December 1939. Q.R. 20/MD 811 Feb. 1940, Department of Mines G.M.E.'s Report 1939.

TABLE II

MINERAL EXPORTS AND SALES - SOUTH AFRICA
1969

	<u>Exports</u>		<u>Local Sales</u>		<u>Total</u>	
	<u>Tons</u> (1,000's)	<u>R</u> (1,000,000)	<u>Tons</u> (1,000's)	<u>R</u> (1,000,000)	<u>Tons</u> (1,000's)	<u>R</u> (1,000,000)
Gold						829.1
Silver						4.4
<u>Total</u>						833.5
Diamonds ⁽¹⁾	7,677 ⁽³⁾	103.9	678 ⁽³⁾	-		103.9
Antimony	35	7.6	-	-	35	7.6
Asbestos	258	28.8	16	2.1	274	30.9
Chrome	1,049	8.6	185	1.5	1,234	10.1
Coal	1,356	7.6	55,079	98.5	56,435	106.1
Copper	100	83.2	36	32.3	136	115.5
Fluorspar	114	2.3	16	0.4	130	2.7
Iron Ore	2,768	15.3	6,852	12.3	9,620	27.6
Manganese	2,107	21.3	935	5.6	3,042	26.9
Salt	-	-	314	2.5	314	2.5
Sillimanite	31	1.4	-	-	31	1.4
Tin	1	2.6	1	1.7	2	4.3
Vanadium	28	10.4	-	0.1	28	10.5
Vermiculite	123	1.9	5	0.1	128	2.0
Miscellaneous		11.1		46.2		57.3
Others ⁽²⁾		109.3		34.7		144.0
<u>Total</u>	7,970	415.3	63,439	238.0	71,409	653.3
<u>GRAND TOTAL</u>						R1,486.8 m

(1) Diamonds - value of local sales not available.

(2) Others - includes uranium, platinum group metals and nickel.

(3) Carats - in 1000's.

Reference: "Minerals" - "A Report for the Republic of South Africa" -
Department of Mines - Quarterly Information Circular,
Oct.- Dec. 1969 - OR. 128
M.D.811

TABLE III

ESTIMATED MINERAL PRODUCTION AND EXPORTS

YEARS 1990 AND 2000

	1990			2000		
	PRODUCTION Tons (millions)	EXPORTS Tons (millions)	R (millions)	PRODUCTION Tons (millions)	EXPORTS Tons (millions)	R (millions)
Diamonds	-	-	100	-	-	100
Iron Ore	48.0	19.0	105	108.0	48.0	260
Manganese	8.0	5.5	55	13.0	9.0	90
Chrome	5.1	4.1	34	10.5	8.4	70
Coal	200.0	10.0	56	340.0	10.0	56
Asbestos	0.7	0.5	57	0.7	0.5	57
Fluorspar	1.3	1.0	20	2.5	2.0	40
Granite etc.	13.1	0.6	13	21.0	1.0	21
Tin Concentrates	-	-	3	-	-	3
Antimony	-	-	10	-	-	10
Copper ¹	(200)	(50)	42	(150)	(33)	28
Vanadium ²	-	-	50	-	-	75
Platinum ³	(2.5)	(2.5)	250	(4.0)	(4.0)	400
Uranium	-	-	25	-	-	25
Nickel	-	-	75	-	-	120
Miscellaneous	?	?	25	?	?	45
Totals			920	495.7	78.9	1,400

1. Copper - thousand tons

2. Vanadium - sold as pentoxide and slag

3. Platinum - millions of ounces.

N.B. Export values based on present day prices.

Steeply climbing imports

With imports climbing to unprecedented heights, and exports, including gold, barely higher than a year ago, July ended with a visible deficit of R26.4m. Allowing for net invisibles of about R30m (the average seasonally adjusted monthly figure for the previous six months), the current account deficit for July could have been over R50m.

The Reserve Bank's holdings of gold and foreign exchange fell, however, by R36m over the month, so it seems that the net capital inflow was not more than about R20m. This is about half the average monthly figure of January-June.

Leading the import boom were machinery and electrical equipment: 32 per cent higher in May-July than in the corresponding three months of 1969. Imports of transport equipment and base metal products also rose strongly.

Merchandise exports totalled R126.9m in July, only R3.5m higher than in July 1969. Taking averages for the three months to July, only raw materials (base metals, mineral products and vegetable products) showed any significant growth over 1969 figures. Exports of precious stones were sharply down.

	July 1970	Change on July 1969	Jan- July 1970	Change on Jan- July 1969	3 months to July 1970	Change on same period 1969
IMPORTS						
Machinery, electrical equipment	61.9	+16.8	391.4	+98.2	175.3	+42.6
Transport equipment	42.3	+4.6	274.3	+40.8	134.8	+31.6
Base metals & products	16.6	+5.4	103.6	+28.8	47.4	+14.5
Vegetable products	3.8	-2.4	34.1	+8.1	11.3	-2.9
Chemicals & allied products	14.5	0	86.2	+11.7	39.7	+3.1
Paper & products & paper equipment	7.6	+1.9	49.5	+11.0	22.0	+4.4
Artificial resins, plastics & rubbers	9.2	+2.2	56.1	+11.6	26.0	+5.5
Optical, photographic, musical equipment	8.4	+1.3	53.2	+8.5	24.5	+3.6
Mineral products	9.6	-1.8	81.3	+12.7	37.4	+5.6
Other categories	47.6	+5.3	295.2	+18.8	131.4	+10.3
Total	221.5	+33.3	1 424.9	+250.2	649.8	+118.3
EXPORTS						
Base metals & products	24.3	+3.3	152.7	+18.6	70.7	+11.8
Precious & semi-precious stones & jewellery	12.6	+2.9	138.4	+1.7	46.2	-6.7
Mineral products	18.0	-0.7	132.7	+13.4	58.2	+9.0
Prepared foodstuffs, beverages, tobacco	15.5	-1.8	91.0	+5.8	42.8	-2.2
Machinery, electrical equipment	7.2	+0.2	45.9	+3.4	21.5	+2.0
Chemical & allied products	4.6	+0.3	31.1	+1.2	13.9	+1.1
Live animals & products	2.2	-0.1	18.4	+0.1	8.0	-0.1
Paper & products & paper equipment	2.9	-0.3	19.6	-2.0	8.7	-0.6
Vegetable products	14.2	-2.4	98.7	+4.0	43.6	+8.9
Textiles & products	4.2	-0.7	63.8	-12.9	19.8	-6.8
Other categories	21.2	+2.8	118.4	+8.5	57.0	+4.0
Total	126.9	+3.5	910.7	+41.8	390.4	+20.4
Trade deficit	-94.6	-29.8*	-514.2	-208.4*	-259.4	-97.9*
Gold production†	+68.2	+1.3	+467.8	+22.4	+204.7	+8.3
Surplus / Deficit	-26.4	-28.5†	-46.4	-186.0†	-54.7	-89.6†

*Minus indicates an increase in the deficit

†Minus indicates a decline in the surplus for the 1969 year, into deficits in 1970.

‡Excluding any premiums on gold sales.

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