Annex B

MINING

A Report to the Congress on

DEVELOPMENT NEEDS and OPPORTUNITIES for COOPERATION in SOUTHERN AFRICA

United States Agency for International Development/March 1979

MINING IN THE

SOUTHERN AFRICA REGION

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CURRENCY CONVERSIONS

Country	Country	Symbol	Value*
Botswana	Pula	P	P1 = $0.90
Lesotho	Rand	R	R1 = $1.15
Swaziland	Emalangeni	E	E1 = $1.15
Malawi	Kwacha	K	K1 = $1.13
Mozambique	Escudo	ES	ES1 = $0.03
Zimbabwe	Rhodesian Dollar	R$	R$1 = $1.54
Namibia	Rand	R	R1 = $1.15
Zambia	Kwacha	K	K1 = $1.33
South Africa	Rand	R	R1 = $1.15

* as of 7-24-78

ABBREVIATIONS USED IN THE REPORT

AGIP	Italian Agency for Petroleum (Italy)
CDM	Consolidated Diamond Mines (South Africa)
CIDA	Canadian International Development Agency
EEC	European Economic Community
ICI	Imperial Chemical Industries (UK)
INDECO	Industrial Development Company (Zambia)
ISCOR	South African Iron and Steel Industrial Corporation Ltd.
JCI	Johannesburg Chamber of Industries
MINDECO	Mining Development Company (Zambia)
MINDEX	(exploration company of MINDECO)
SOEKOR	(Southern Oil Exploration Corporation) (South Africa)
SWAKOR	(Namibian subsidiary of SOEKOR)
TIKA	Technical and Indistrial Kulubila Associates Ltd. (Zambia)
UNDP	United Nations Development Programme
UNIP	United National Independence Party (Zambia)

INTRODUCTION

1. This report is on the mining sector in Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Zambia and Southern Rhodesia. They, together with South Africa comprise a region of the world which in general is heavily mineralised. The extent to which it has been explored and the detailed knowledge of the minerals which exist in it and their value varies widely among the countries of the region. The Republic of South Africa is relatively well prospected and its mining industry is one of the world's most highly developed. It produces a high proportion of the world output of some important strategic minerals such as platinum, chromium, gold, vanadium, industrial diamonds and uranium. The dependence of industrialised countries of the West on imports from South Africa of such strategic minerals has been considered to limit the ability of these countries to use their economic power to influence South Africa to change or moderate its internal racial policies.

2. The other countries in the region, however, with which this report is concerned, are likely to contain some, if not all of the strategic minerals which South Africa produces. For example, Namibia has large resources of uranium and the largest uranium mine in the world, at Rossing, has been developed there (under the administration of the South African authorities). Southern Rhodesia produces an even higher quality of chrome ore than South Africa. Zambia and Botswana both produce cobalt, and together with nearby Zaire, are expected to have 56% of total world cobalt capacity by 1980. Botswana's output industrial diamonds will by 1980 exceed that of South Africa.

3. Thus the strategic dependence of the West on mineral supplies from the Republic of South Africa can be lessened by the discovery and exploitation of these minerals in other countries in the Southern Africa region. This provides a strong argument for US assistance to be given to the development of the mineral sector in the countries of the region north of the Republic of South Africa.

4. There is an added reason for recommending US assistance to the development of the mineral sector, in the countries of the region. They all have underdeveloped economies with generally poor infrastructure, low average levels of income, education and skills. Because of this, they do not attract private investment, and the political instability in parts of the area is an added impediment to foreign mining companies.

5. Thus the usual reason why aid agencies normally do not consider assistance to the mining sector in developing countries - that the necessary investment and technical expertise is forthcoming from private mining companies - is not valid today in Southern Africa. In addition, strategic considerations call for the development by the West of sources of supply of certain essential minerals to reduce its dependence on South Africa. Moreover the poverty of the people in the region, and in such countries as Botswana and Namibia, the lack of alternative natural resources, provides an additional justification for developmental assistance to the mining sector.

BOTSWANA

ECONOMIC SIGNIFICANCE OF THE MINING SECTOR

6. Botswana's mining sector has grown rapidly since the country attained its independence in 1966. At that time only a small amount of manganese was produced, valued at P40,000 p.a. The government of the newly-independent country placed great emphasis on the development of mining as another productive sector of the economy, since the livestock industry, while providing income and employment to many people and producing beef, the only export of any significance at that time, was subject to periodic and prolonged droughts and occasional outbreaks of hoof-and-mouth disease. Moreover, its contribution to central government revenue was small. Therefore the exploitation of copper deposits which had been discovered just prior to independence was given great encouragement by the new government.

7. The subsequent development of Botswana's mineral sector, from insignificance twelve years ago to its present major role, has transformed Botswana's entire economic prospects. The World Bank describes Botswana as having a "mineral-led economy". The total output of diamonds, nickel, copper, cobalt and coal was valued at P125 million in 1977. It is expected to double by the mid-1980's. Mineral products comprise 57% of all exports. Government receipts from mining total 20% of its revenues. The sector contributes 12% of Botswana's Gross Domestic Product.

8. The rapid development of the mining sector has given Botswana the opportunity for steady economic growth which will lift the population from their present poverty level. It will at the same time enable the country better to cope with the vicissitudes of its unfortunate position, landlocked and virtually surrounded by the minority-ruled regimes of South Africa, Southern Rhodesia and South-West Africa (Namibia), with which political relations are at best strained and yet on which Botswana relies completely for its transport links with the outside world.

EXISTING MINERAL DEVELOPMENT

9. During the late-1960's in the early years of Independence, two major mining projects were developed in Botswana. One was a diamond mine; the other a copper/nickel mine.

10. The world's second-largest diamond pipe (in surface area) was discovered at Orapa in northern Botswana. A mine was developed there by De Beers Mining Company of South Africa, which began production of 2.5 million carats a year in 1971. A complete township, water supply and electric power generating system was built, together with a road link to the nearest main highway. A smaller, though by world standards of diamond mines a significant, mine was opened nearby at Lethlakane by the same company in 1976, producing at an annual rate of 320,000 carats. In 1976 the Government and De Beers agreed on a new tax regime and established a 50:50 partnership in the mining company (Debswana). They also agreed to expand production to 4.5 million carats p.a. by 1978 at Orapa and to 400,000 carats p.a. by 1979 at Lethlakane. In 1977 the diamond output of Botswana was valued at US$60 million. At this level of output, Botswana is producing about 5% of world output of diamonds.

11. De Beers discovered in 1976 another major diamond pipe, this time in south-central Botswana at Jwaneng. This will be mined starting in 1982. 150 feet of sand has first to be removed to expose the diamonds, and it is estimated that the mine will cost P200 to bring into operation. Once again, a new township will have to be constructed for 5,000 - 10,000 people, based on mine employment of 1,000 - 1,500 workers. It will necessitate the construction of a power station, main access highway and the water supply, which may have to be by pipeline from the capital Gaborone 120 km distant. The mine will produce high quality gem stones as well as industrial diamonds. By the early-1980's Botswana exports of diamonds will probably amount to 10% of world production, and will confirm the country's position as one of the major diamond producing countries of the world.

12. The copper/nickel mine was developed at Selebi-Phickwe in north-eastern Botswana at the same time as the Orapa diamond mine. It involved the new administration in much more complex international negotiations than the diamond project, which was left to De Beers to develop, after the initial agreement on the tax regime had been agreed with the government. The copper/nickel mine, on the other hand, involved the two major private shareholders in the mining company, Amax and Anglo-American Corporation of South Africa, their German and South African financiers, and the World Bank, the Canadian and US aid agencies, who were financing the government's construction of the infra-structure for the mine. This comprised a new township, power station, water supply and road and rail links. The total investment cost was P200 million.

13. Technical difficulties delayed the build-up to full production, but in 1977, $50 million was earned from the sale of copper-nickel matte to the US, where it is refined at Port Nickel in Louisiana into its constituent copper, nickel and cobalt.

14. At the same time as the copper/nickel mine was being constructed, an underground coal mine was opened to supply the power station and the mine's smelter. This mine was developed by Anglo-American Corporation of South Africa, and produces currently 300,000 tons per annum, all for internal use. The mine is at present a high-cost produceer, but it could, at higher levels of sales, become a much lower cost open-pit operation.

SOCIAL AND EMPLOYMENT IMPACT

15. While the importance of the mineral sector to the Botswana economy is very great, the number of employees in the sector is relatively small. The estimated number employed in the mining sector in 1976 was 5,000, or 7% of the total formal sector employment. But it is estimated that the secondary and tertiary employment created by the direct employment at the mines is about 2 - 3 times the latter. In addition, the dependents supported by the cash wages of the workers directly and indirectly employed in the industry are five to six times the number actually employed. Nevertheless, these are small figures in total. Mining is a capital-intensive industry and not a heavy user of labour. The Botswana government is intending in future to pursue possibilities of small-scale mining in an effort to increase the numbers employed in the industry.

16. The social impact of the development of the mining industry in Botswana has been quite considerable. All the diamond and the copper/nickel projects have been developed on "gree-field" sites, and have necessitated the construction of completely new townships. This has presented the government with an opportunity to plan their social layout. Attempts have been made, within the limitations necessarily set by the need to attract foreign workers for some time to come in the more skilled occupations, to design socially integrated communities.

17. The working experience of Botswana in the mining industry until recently was gained as migrant workers in the South African gold, coal and platinum mines. Many workers at Botawana's own mines have begun on a "migrant" basis, leaving their families at their home villages to cultivate their lands and to look after the cattle post.

It may be a generation, as it was in the Zambian copperbelt, before a settled mine labour community develops at Botswana's mining towns.

18. The Botswana mining indutry as a whole pays wages which, despite the government's efforts to keep tham in line with its own salary scales, tend to be higher than those in other sectors. So far the priveleged position of workers in the mining sector, in respect of wages and conditions of employment generally, have not been excessive, in comparison with other countries in a similar situation, nor is the organisation and the leadership of labour in the industry yet sufficiently highly developed to take advantage of their bargaining power, bearing in mind the great importance to the economy of the mining operations in Botswana. Nevertheless, this is a possibility for the future.

POTENTIAL FOR NEW MINERAL DEVELOPMENT

19. The potential for new mineral development in Botswana is very good. There are a number of other known deposits of minerals which are currently being explored in Botswana, or which merit further investigation to determine the commercial feasibility of their exploitation. The most extensive known at present are coal deposits, which are estimated to total 40 billion tons. Shell Coal has been carrying out a large exploration program in Botswana since the oil crisis in 1973. The results of these investigations show that the coal is of a quality which can be washed to produce a low-sulfur export quality steaming product. Small quantities are at present used in the country's own power stations but major development of the country's transport system would be required, and might well be justified, to enable exports on a large scale of around 5 million tons per year. This transport development is recommended in paragraph 31 below.

20. Another extensive deposit, which has only been explored to a small extent, is the Soda Ash/Salt contained in the brines of the vast Makgadikgadi Pans in northern Botswana. These contain reserves of hundreds of millions ot tons. Considerable expenditure on exploration and pilot testing have already demonstrated the likely technical feasibility of the project, but the depressed state of the markets for the products at present has limited the interest of companies who might be potential developers of the deposits. The inadequacies of Botswana's transport system have also been an impediment. One of the major Japanese trading houses is trying to put together a consortium of companies to carry out the additional development work needed to establish the commercial feasibility of

the project. The natural trona based soda ash supplies from Wyoming, California and Kenya and the potential Botswana and Tanzanian projects will, in the 1980's, gradually replace supplies from existing plants in the US, Europe and Japan based on the Solvay process which consume large amounts of energy and produce increasingly unacceptable amounts of pollution.

21. Additional very large and good grade COPPER deposits have been proved by United States Steel and Newmont Mining Company in north-western Botswana. These would be dependent for their exploitation on expansion of the existing transport system, involving rail extensions westwards to Gobabis in Namibia, which is the present easternmost point on the line to the port of Walvis Bay. There are also additional copper deposits being explored by Falconbridge Mining of Canada at Matsitama and Bushman Bits in northern Botswana. More copper and NICKEL exists at Selkirk and Phoenix, near the present mine at Selebi-Phickwe. Further north still, there is yet more copper, possibly geologically connected with the Zambian copperbelt.

22. In the south there are GOLD deposits which merit more investigation.

23. In addition to these known deposits, there is potential for the discovery of other minerals in Botswana. The likelihood of discovering more commercially payable diamond pipes is very good, as Botswana clearly contains a major diamond province. Several companies are looking for RADIOACTIVE MINERALS where the large anomalies are shown on the charts produced by the aerogagnetic survey carried out recently, and now being interpreted, by the Canadian technical assistance authorities.

24. There is potential for major discoveries of MANGANESE and high quality CHRYSTOLITE ASBESTOS, both of which have been mined on a small scale in Botswana in the past. More speculative prospects exist for the discovery of LEAD, ZINC, PLATINUM, CHROMITE, FLUORITE, PETROLEUM AND NATURAL GAS.

25. Small deposits of GYPSUM, TALC, KYANITE, GOLD, ANTIMONY and KAOLIN and larger ones of IRON ORE, GLASS SAND and LIMESTONE are known to exist, and although they do not as yet appear to offer the possibility of large-scale exploitation, they do give prospects for small-scale labour-intensive mining projects.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT

26. Botswana is one of the only two multi-party democracies in Africa. Its President and National Assembly are elected every five years. President Sir Seretse Khama and his Botswana Democratic Party have formed the government since Independence, having been returned to power twice in general elections. Botswana is one of the most politically stable countries in Africa. The government has a liberal policy towards foreign investment. It is sympathetic to the ideology of the West, and willing to co-operate with Western international mining companies in the development of its mineral resources. It bargains with mining companies over the financial regimes to be applied to potential mining projects in a sophisticated and "hard-nosed" way. This is because it considers that Botswana's mineral resources are one of its few real assets. The country suffers from poor soils, erratic and inadequate rainfall, is 1200 km distant from the nearest ports, which are all in foreign and not always friendly countries. The infra-structure is inadequate; the people are largely uneducated. The government sees the use of the revenues which the mining industry can generate as the way to overcome these disadvantages. Obviously the challenge of its mining policy is to extract from the development of the country's mineral resources the maximum financial return for the government to use in investment to improve educational and infrastructural standards, without scaring away the mining companies. In the case of diamonds, the size of Botswana's reserves and production make it essential for De Beers to keep them within the scope of the Central Selling Organisation. This gives Botswana an added advantage in tax negotiations with De Beers.

IMPEDIMENTS TO MINERAL DEVELOPMENT

27. There are several important constraints to the potential expansion of Botswana's mining industry which its geological endowment would justify.

28. The first is lack of transport facilities. These are fully described in the annex on transport. Botswana cannot alter the fact that it is landlocked and 1200 km distant from the nearest port. But its only railway is actually operated by Rhodesia Railways, and while so far an adequate level of service has been provided, the uncertain future in Southern Rhodesia (Zimbabwe) creates a high risk that Botswana's life-line will be jeopardised. All her copper/nickel matte and most of her beef exports go by rail as well as a large proportion of her imports. The internal movement of coal is also on the rail-line.

29. This railway in any case goes only north-south along the eastern border. The whole of the rest of the country is extremely ill-served by either road or rail. As a result, mineral deposits of a grade that would be likely to justify exploitation if a transport link were nearby, lie undeveloped.

30. The second impediment is lack of local manufacturing and maintenance facilities to support mining projects. As a result, equipment and materials have all to be imported at high cost, repairs take a long time and are expensive, and stocks of spare parts have to be correspondingly larger and more expensive.

31. The extremely poor educational facilities which Botswana has had in the past (and still suffers from) has led to an acute shortage of trained, skilled and experienced manpower at all levels of industry, and especially in technical fields. This necessitates the importation on a temporary and extremely high-cost basis of expatriate staff from abroad.

32. The shortage of water in Botswana means that the cost of finding and storing it in adequate quantities for a mining project may often be considerably higher than "normal", and the lack of reliability of supply may increase the risks of the project to high levels.

33. The lack of detailed geological knowledge of Botswana's mineral deposits is a constraint on her mineral sector development. The shortages of water, skilled manpower and the transport inadequacies combine to make this constraint harder to remove. Many mining companies are discouraged by the high cost of proving a viable prospect in Botswana.

RECOMMENDATIONS FOR FOREIGN ASSISTANCE IN BOTSWANA

34. The international community, through multi-lateral institutions and by way of bilateral aid programs, has in the past strongly supported Botswana's development efforts. This has been a reflection not only of their desire to assist a poor country trapped in such an unfortunate geopolitical situation, but also in recognition of Botswana's very efficient use of aid in the past. The country has an appropriately sophisticated approach to economic planning, uses rational bases for decision making and implements development projects rather efficiently. It has also eschewed prestige projects.

35. Despite the high level of aid, without the revenues generated by the mining sector, Botswana could not have provided the local counterpart funds necessary to complement the capital aid made available. It is therefore recommended that the foreign aid community, and the US in particular, should not only continue aid to Botswana, but should extend it to the mining sector direct, in order to accelerate the development of the revenue flow from that sector to the central government which it can then use to expand the industrial base, improve infrastructure and improve the lot of the rural poor.

36. The US government should join in assisting Botswana's attempts to safeguard the standard of service on the existing rail line. This would include provision of equipment (engines, wagons, communications, signalling and maintenance equipment), construction of workshops and offices, and provision of training and technical assistance.

37. Support for the project for a trans-Kalahari railroad. This would necessitate a survey of the route from Gobabis in Namibia, at the head of the line from the port of Walvis Bay, to the Rhodesia Railway line in Botswana. The route should go as close as possible to:

(a) the coal fields of Moropule

(b) the soda ash deposits at Makgadigkadi

(c) the copper deposits at Matsitama and Bushmens Pits

(d) the copper deposits in the Maun-Ghanzi area.

The Shell Coal transport studies for the export project should be orientated to the trans-Kalahari route rather than the Sishen-Saldahna route in South Africa.

38. Increase the extent and coverage of OPIC guarantees available to US mining companies to make their investments there more attractive to them. The mining companies are attracted to the mineral prospects of Botswana, but are discouraged by the political risks of instability in the surrounding area, in countries such as South Africa and Southern Rhodesia through which the supplies for and the products of their mines in Botswana would have to travel. The US government and its agencies such as OPIC could help both the mining companies and the Botswana government by reducing the impact of the political risks to the companies through increased insurance coverage.

39. Reduce the information gap, by bringing mineral prospects in Botswana to the attention of foreign mining companies. The geological information is sparse. Assistance, both in equipment and personnel could assist the government geological survey to develop the information to the point where it attracts the serious attention of exploration geologists in the mining companies. The decisions on investment by mining companies, whether in exploration, feasibility studies or mining development, will be more likely to be positive the greater the knowledge and understanding of local conditions - geological, political, economic and social. The Us government could increase its information gathering and disseminate it more widely, and it could bring together mining company leaders with the leaders of government in the area.

FURTHER STUDIES PROPOSED

40. Some of the ideas, suggestions and recommendations made in this report require additional more detailed study. For example, a full feasibility study should be made of the proposed trans-Kalahari line, in the light of the potential exploitation and export from Botswana of coal, soda ash, salt, copper and nickel and from Namibia of copper and nickel. This feasibility study would have to be done in co-operation with both governments. Since the major part of the new line would be in Botswana (though the existing line from Walvis Bay to Gobabis would have to be upgraded), a start on the study could be made of the Botswana part, evem before the new Namibian government can take responsibility for its part.

41. It is suggested that a study be carried out to try to determine why Botswana needs to import foreign mine-workers, mainly white South Africans, to carry out supervisory functions in the copper/nickel mine at Selebi-Phickwe and the diamond mine at Orapa, at the same time as she sends to South Africa Botswana miners who have had many years experience in the gold and coal mines there. They might well be able to do the work which the imported miners do in Botswana. The study should see if a way could be devised to attract Botswana miners to work in their own mines in preference to going to South Africa. This would, if it happened, reduce Botswana's dependence on South Africa, lessen possible racial tensions in the Botswana mines, improve the profitability of the mines in Botswana and improve the balance of payments.

42. It is recommended that the possibilities of developing local industries to maintain, service and supply equipment and services to the mining industry in Botswana be studied in detail, to determine what assistance the US and other donors might give to help this development.

LESOTHO

ECONOMIC SIGNIFICANCE OF THE MINING SECTOR

43. Mining in Lesotho in the past has virtually been confined to the recovery of diamonds by individual diggers working on a small scale in several areas in the Maluti mountains. Recently, however, the pipe at Letseng la Terai has been opened to large-scale exploitation by De Beers Mining Company. This development will, it is expected, increase diamond output from previous levels which fluctuated between around R250,000 and R1 million, to an expected R10 million in 1977/78 and a projected R20 million annually thereafter. This would make the mineral sector a significant contributor to exports, and to national income. The sector is estimated to have contributed 18% to exports and 1% to GDP in 1974. In 1977/78 it may contribute as much as 40 - 50% to exports and 8% to GDP.

44. Lesotho's natural endowment is sparse; its agricultural potential is limited by the scarcity of fertile land and the great problem of erosion, and its industrial prospects are dimmed by the discouraging effects of the relatively well developed industrial sector of South Africa which completely surrounds it. It has good hydro-electric potential, but formidable problems of transport and access increase the costs of industrial and mining development. Water is plentiful in the Maluti Mountains and a water supply scheme, to store and sell water to the industrial Witwatersrand area of South Africa remains a possible major source of revenue, if the political obstacles to a satisfactory sales agreement could be overcome.

45. Thus though the economic prospects for exploitation of minerals in Lesotho are not very bright, they are important enough to merit the government giving them high priority in view of the lack of better alternatives. The relative importance of the sector in Lesotho's economic prospects is also great enough to justify the United States joining other donors in providing assistance to Lesotho's efforts to develop it.

EXISTING MINERAL DEVELOPMENT

46. The search for diamonds in Lesotho has been tantalizing for the Basotho, who have known for years that diamonds existed in the Maluti Mountains. In 1961 exploration at Letseng le Terai began in earnest, and four large organisations conducting well organised and financed searches over the next 1[illegible] years could not justify large-scale mining projects, despite the discovery by individual Basotho diggers of a high quality 527 carat gem in 1965 and the famous 601 carat "Lesotho Brown" in 1967, one of the twenty largest diamonds ever found. In 1974, the government asked De Beers to assess the pipes at Letseng, in the light not only of the results of the previous company explorations, but also the UNDP Diamond Exploration Project's field investigations during the previous three years. While the average grade of the diamondiferous pipes is low, the percentage of large stones is high, and it was this latter characteristic which persuaded the Anglo-American Corporation President, Mr H F Oppenheimer, to agree to invest in what is a somewhat risky commercial venture. The mine has cost over $50 million to construct, of which 25% is being contributed by the government out of future dividends on its 25% equity holding in the operating company. The mine began operating in 1977 and employs 657 Basotho and 90 ex-patriates, mainly South African. Because the mine is 10,000 feet up in the Maluti Mountains, the company had decided to have no family housing on site. Staff up to the middle level work for 9 days and then have a 5-day break at their homes. Upper management work 4½ day weeks and are flown by company aircraft to their homes in South Africa. This mine is operated on a 24-hour, 7-day a week basis. Up to June 1978, recoveries had not yielded enough to cover operating costs, let alone capital costs. This financial situation can be dramatically changed, however, by a few large stones being discovered.

SOCIAL AND EMPLOYMENT IMPACT

47. In the early 1960's as many as 5000 Basuto diamond diggers were working in the Letseng and Kao areas. These pipes have since then been removed by the government from the areas which are licensed for small scale diggers, the former to allow the De Beers mine to be constructed. The mining industry in Lesotho thus employs less people today, with the $50 million invested in the Letseng mine, than it did 15 years ago with only a hand industry.

48. But the government is anxious to increase the employment in the industry again, and with technical assistance from the UN, it plans to organise 20 man co-operatives in the labour-intensive exploitation of diamond deposits at Lemphane and Liquobong. It will be based on hand digging of the rock which will then be processed centrally, using equipment provided on hire to the diggers co-operative by a government organisation. The Kao pipe may also later be returned to hand digging, it having also been examined by mining companies for the possibility of large scale exploitation without success.

49. The social impact of mining in Lesotho is comparitively small compared to that of the flow of labour which migrates to South Africa to work in their mining industry. This subject is dealt with in separate reports. Nevertheless, the conditions in the mine at Letseng are akin to the migrant system in one respect, that the workers, of all levels up to seniro management, do not live with their families near the mine. They return to them at frequent intervals however.

POTENTIAL NEW MINERAL PROSPECTS

50. Lesotho's known economically exploitable mineral resources are virtually confined to diamonds. The government is carrying out a systematic survey of the country to produce geological maps at a scale of 1:50,000. This survey is at present about two-thirds complete. There are considered to be reasonable prospects of COAL deposits, and URANIUM and OIL finds are possibilities which the government is anxious to investigate, both with its own resources and with the help of foreign mining companies.

51. A coal exploration program is underway, carried out by a team from CIDA working in the government Geological Survey Department. The shallow (100m) drilling program has found no economically significant deposits; the deeper (2,000m) holes are now being drilled in addition to radiometric surveys. This exploration is being confined to the lowlands of Lesotho, as it is considered that high transport costs would make exploitation of any deposits found in the mountains uneconomic.

52. Traces of uranium have been found in several places in the lowlands and the UN is providing the government with a consultant to advise the Geological Survey Department how best to organise the search for these traces, which may be beneath the basalt in the higher land. Geologically it is said that the prospects for finding uranium concentrations are as favourable as they are in

the Republic of South Africa itself. Union Carbide has expressed some interest in exploring for uranium in Lesotho.

53. A US company, Westrans, had begun in 1977 a program of drilling three holes for oil exploration in Lesotho. One hole in the north had been partially drilled, and the second was being sited when the company was reportedly bought by a French group, Acquitaine, who immediately cancelled the exploration program in Lesotho. The government is very unhappy at this and even more at not getting the results of the work which was done. It is anxious to obtain assistance from elsewhere to complete the program that was begun.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT IN MINING

54. The policy of the Lesotho government is to encourage foreign private investment in the mining sector. It wished mining companies to undertake exploration and subsequently to exploit payable deposits. It encourages labour-intensive methods where feasible, hoping to provide in Lesotho employment for as many of its people as possible who are forced by lack of opportunities at home to go to South Africa to seek work. The government appears to prefer to take an equity position in a mining company and to have representation on the Board without wishing to dominate them.

IMPEDIMENTS TO MINERAL DEVELOPMENT

55. Much of Lesotho is mountainous country, rising to over 11,000feet. The Letseng diamond mine is at an elevation of 10,000 feet and is the world's highest diamond mine. The climate is very rigorous with very low winter temperatures and high wind velocities. The construction required an access road to be specially built up the side of a mountain and even now the way most people get to the mine is by plane. These rugged conditions exist over much of the country and are a big impediment to mineral development since they increase the costs of production very considerably.

56. While the Basuto have much mining experience and are noted for their special abilities in shaft-sinking which requires considerable strength and courage, like all colonial peoples their education was sadly neglected and there is an acute shortage of trained and skilled personnel at all levels.

57. There is no industrial development in Lesotho which would support mining projects, so all materials and equipment would have to be imported. Maintenance also would be an expensive business involving foreign facilities and personnel.

RECOMMENDATIONS FOR FOREIGN AID

58. The Lesotho government in general and the Geological Survey Department in particular have received considerable aid from the UNDP. But it needs more in this area which the US could help to provide. For instance, the government is experiencing difficulties in arranging sponsored training for Basotho geologists, chemists and engineers. At present, it has only three geologists, one mining engineer and two chemists who are Basotho. There are 21 on fellowhsips abroad. The Geological Survey Department would benefit from US assistance in this area of training.

59. The Lesotho government needs assistance, both capital and technical, to organise, manage and equip the small-scale mining operations it plans to develop in those diamond fields which do not attract large-scale exploitation by mining companies.

60. The US government should encourage US mining companies to resume the aborted oil drilling program of Westrans and to become involved in the search for uranium in Lesotho.

MALAWI

ECONOMIC SIGNIFICANCE OF THE MINING SECTOR

61. The mining sector is at present of small significance in Malawi, contribution less than 1% to the GDP. The only mineral produced of any significance is limestone, which is used in the local production of cement. Dolomite, agates and sand and gravels are also produced.

EXISTING MINERAL DEVELOPMENT

62. The main mineral production is limestone at Changalume. It is used in the Portland cement industry and in 1977, 117,000 tons were produced. Another deposit 60 km north of Kasungu in the Central region will be mined to supply the new $60 million cement factory.

63. British Gypsum Limited were granted a mining lease for vermiculite at Kapirikamodzi, and in 1977 shipped 90 tons of concentrate to Britain for trials.

64. Gemstones Limited mined and exported some emeralds, agates, aquamarine and smoky quartz.

SOCIAL AND EMPLOYMENT IMPACT

65. The statistics of employment do not distinguish between the mining and construction sectors in Malawi. In these sectors 24,000 people were employed in 1974. Far more were employed as migrant workers in the South African mining industry; 130,000 in 1974, before the ban was instituted. In 1978 the numbers rose again, though not so far to their previous levels.

66. The social impact of the Malawian mining industry is small. Miners live close to the quarries with their families.

POTENTIAL NEW MINING PROSPECTS

67. Mineral exploration in Malawi, mainly under the auspices of the government's Geological Survey Department continues at a fairly high level. During the period 1974-77, a Malawi Mineral Development Section of the South African Chamber of Mines carried out an investigation into selected potential deposits of economic minerals.

68. There are some deposits of COAL in the Northern Province near Songwe, at Livingstonia and at Chiromo in the south. The Chiromo deposit is small in extent and of poor quality. The Livingstonia coal is of somewhat better quality but is a broken deposit on top of a hill. The only possibly exploitable coal is near Songwe, at Ngara, which has been investigated by Japanese geologists. The Malawi government hopes that the Japanese will return to Ngara to drill the deposit and prove the viability of a possible 70,000 tons per year project to provide coal to the Blantyre and Lilongwe areas at prices competitive with the supplies currently being imported from Moatize in Mozambique.

69. A bauxite deposit, extending to some 28.8 million tons grading on average 38% Al_2O_3, exists on the top of Mlanje mountain in southern Malawi. The economic viability of the deposit was investigated by Lonrho Limited in 1969-72. They concluded that if cheap electric power could be provided at the foot of the mountain, the bauxite could be taken over the edge of the mountain in a slurry and economically converted to alumina at the foot of the mountain. Such a project would adversely affect the operation of the tea estates at the foot of the mountain and would have offensive environmental consequences involving the disposal of the "red mud". At present there is little prospect of the necessary cheap power being made available for this purpose.

70. There are several deposits of APATITE. One near Chingale, near Zomba, has been investigated in detail and is in marginal but useable concentration. The government would like to be able to exploit the deposit for fertiliser use in Malawi.

71. Malawi has a variety of CLAY deposits, though none in large concentration. They include kaolin, suitable for use in ceramic products. The government has requested German technical assistance to investigate and establish the feasibility of using some of these clay depostis. KYANITE, which is a material used for refractory furnace bricks, used to be exploited in

Malawi, and British Gypsum Limited still holds a mining lease over a deposit at Kapiridimba.

72. Deposits of RARE EARTHS, monazite, barytes and strontionite at Kangankunde Hill near Balaka are being investigated by Lonrho. They are setting up a pilot concentration as part of their feasibitity studies. The Malawi Geological Survey have reported possible major deposits of RYOBIUM minerals near Lake Chilwa.

73. There are three possible areas of URANIUM deposits which AGIP of Italy is interested in exploring. One area is in the far north, another near Livingstonia, and the third is near Chikwawa in the south.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT IN MINING

74. The Malawi government welcomes foreign investment. It prefers, but does not insist on, some involvement of a government parastatal body in large enterprises. It owuld probably not be difficult for a mining company to agree acceptable terms with the Malawi government for exploitation of a mineral deposit in Malawi.

IMPEDIMENTS TO MINERAL DEVELOPMENT

75. Malawi is landlocked and transport to the sea for exports could be a problem for a bulk mineral porduct. There are direct routes to the Mozambique ports of Nacala and Beira, but at present these can be subject to delays at the ports.

76. The Malawian people are industrious and well-disciplined. They suffer from the serious lack of technical educational facilities. Any mining or industrial development requires the expansion of the output of the technical training establishments, to avoid the burden of large numbers of high-cost imported skills.

77. The country is primarily an agricultural country and is at present deficient also in the industrial infra-structure which is needed to support a mining industry.

78. Power supplies are partly hydro-electric and partly based on imported oil. Expansion of hydro-generating capacity is in process.

RECOMMENDATIONS FOR FOREIGN ASSISTANCE

79. Malawi's potential for alrge mineral development does not appear to be very great. No special programs of assistance to the sector appear to be needed, therefore, other than continued assistance in the technical and vocational education sphere which the US has given to Malawi in the past. Specialist assistance to the government Geological Survey Department for specific investigations should be given on request.

FURTHER STUDIES NEEDED

80. If AGIP (Italy) do not pursue the investigation of the uranium prospects mentioned in paragraph 13 above, the US should encourage its mining companies to carry them out.

MOZAMBIQUE

ECONOMIC SIGNIFICANCE OF MINING

81. Despite Mozambique's great mineral potential, under the Portugese administration there was little contribution to the economy by the mining sector. In 1973 it is estimated to have contributed 2% to the GDP. The minerals produced were coal, bauxite, copper concentrates, gold, columbrite-tantalite concentrates and cement.

EXISTING MINERAL DEVELOPMENT

82. The small mining sector of Mozambique has suffered since Independence in 1975 like the rest of the economy from the exodus of trained, skilled and managerial workers. In addition, the continued effects of the long anti-colonial war, the closure of the border with Rhodesia as part of the UN sanctions policy, floods and the persistent shortage of technicians, equipment and funds has limited mineral porduction.

83. In the case of coal, there was the added problem of accidents. The mine at Moatize, 30 km east of Tete, where proven reserves in the 31 sq. km concession total 400 million tons, production rose from 394,000 tons in 1973 to 575,000 tons in 1975. In September 1976 there was a methane gas/coal dust explosion which killed 95 people and in 1977 an equally serious accident occured. These disasters may reflect the severe loss of experienced supervisory personnel in the industry; West German technicians have visited the mine to advise on rehabilitation and expansion. At present the output of the mine is used for local consumption and for export to Malawi and Japan. Plans had been made to use power from the Cabora Bassa scheme for an electric train system for increased output from both underground and open-pit operations to be exported through Beira and Nacala to Portugal, West Germany and Japan at a rate rising from 1 million to 4 million tons per year.

84. Copper concentrates were produced at the Edmundian Mine in the Manica area of Vila Pery near the Rhodesian border, but the Lonrho mine reportedly closed down after the border closure.

85. Bauxite is produced at the Alumen mine near Manica at an annual rate of about 2,000 tons at 62% Al_2O_3. Reserves of bauxite at this deposit were estimated at 60 million tons at 44% Al_2O_3.

86. Cement production in Mozambique was 611,000 tons in 1973 but reportedly fell to low levels in recent years, despite a capacity of 990,000 tons at the plants at Mataola, Dondo and Nacala, due to shortages of spare parts, technicians and low worker productivity. Plans exist to double capacity, but these are believed to be currently in abeyance.

87. Columbite-tantalite concentrate is produced from small-scale mines in deposits which are believed to represent 10% of the world's known resources.

SOCIAL AND EMPLOYMENT IMPACT

88. The last available figures show that 6,400 people were employed in the mining sector, of whom 13% were in coal mines, 23% in copper and bauxite and 64% in all the rest. As in many southern African countries, far more workers were employed as migrant workers in the South African mines than in Mozambique's own. 87,000 were there in 1974 and 100,000 in 1975, but the numbers dropped to 56,000 in 1976 and are still falling, to 42,000 in 1977 and 34,000 in 1978.

POTENTIAL NEW MINERAL PROSPECTS

89. Mozambique's potential in the mineral field is quite enormous. There are many known small deposits of IRON ORE, and a team of Russian geologists is looking for a major iron ore body, as well as for MANGANESE and more BAUXITE. ASBESTOS production had been planned for 1976 at Matvita, near Vila Pery. There are large deposits of low grade FLUORITE and smaller ones which are higher grade. U.S. Steel has in the past explored for a major high-grade deposit. TITANIUM and ZIRCON-bearing sands exist; huge deposits of beach sands have been established near Pebane, between Maganja de Costa and Moma. Preussag of Germany had applied in 1975 for a concession to exploit these sands.

90. Exploration for DIAMONDS by De Beers had been successful in finding economically feasible deposits, but nothing is known of plans to develop them. GOLD used to be produced at Mines in the Manica area which were scheduled to be reopened in 1975. Known NATURAL GAS reserves were estimated at 121 billion cubic meters in 1975, and plans existed for a petro-chemical complex to manufacture synthetic fertiliser and gasoline from the Pande field gas. A petroleum refinery exists at Maputo, but it uses imported crude. There are other huge COAL deposits known in the

Zambezi valley near Chicoa and Mancanha, which it had been planned would produce 8 million tons a year for export by the early 1980's.

91. There is or has been active prospecting for URANIUM, especially in the area near the border with Tanzania. There has also been prospecting for NICKEL, APATITE and off-shore PETROLEUM.

92. The known and potential mineral resources of Mozambique are clearly so vast that the mining sector could become a major contributor to national economic activity. It might even be able to provide as many employment opportunities in the industry inside the country as did the South African mines to migrants.

93. By the standards of most of the other coutnries covered by this survey, Mozambique's infra-structure is quite well developed to support mining development. This is really rather fortuitous, since the rail systems, ports and the power generating capacity installed at Cabora Bassa were all designed by the Portugese when administering Mozambique prior to 1975 as facilities for the neighbouring countries of South Africa, Rhodesia, Malawi, Aambia and Swaziland.

94. The Cabora Bassa scheme will be at full development the largest hydro-electric porducer in Africa, with an installed capacity of 3,600 MW. 2,000 MW will be installed by 1979. Much is being sold to South Africa, but there will be plenty to spare for Mozambique's own needs. The dam will impound a lake which will when full provide 250 km of navigable waterway in the upper Zambezi valley. This will allow waterborne shipment of ores from western Tete areas to Moatize.

95. Rail imporvements were made between Moatize and Beira to accommodate both increased coal exports from the Tete District and copper from Zambia, which was to be transported over the imporved road between the border and Moatize, where the railyard was upgraded.

96. At the major ports of Maputo, Beira and Nacala large bulk handling facilities exist for ore, grains liquids and crude oil.

97. Water supplies are plentiful in general. Indeed, at times they are too plentiful, when severe flooding occurs, as happened in 1975 on the three major rivers. The Cabora Bassa Dam will allow some control of the river flow of the Zambezi below Tete.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT IN MINING

98. The Mozambique government, despite the Marxist rhetoric of its political pronouncements, wishes to receive foreign private investment in the mining sector. Some nationalisation, with promised compensation, has taken place in insurance, banking and the petroleum industries. In the mining sector, existing companies are either wholly private or joint ventures with the State. Flr example, Carbonifera de Mozambique, which mines coal, is owned 49% by the South African government agency ISCOR, 41% by Companhia de Mozambique, and 10% by the Mozambique Government. The Companhia Mineira de Tete, formed to mine fluorite, is 90% composed of US, ANgolan, Swedish, Portugese and Italian interests. In December 1977, the Swedish company LKAB International announced plans to investigate the iron ore deposits at Honde in Manica District, which the government hopes will form the basis of a steel industry. But the East Germans and the Russians appear to be doing much of the work so far in the mining industry in Mozambique.

IMPEDIMENTS TO MINERAL DEVELOPMENT

99. The acute shortage of skilled workers and experienced managers is the most serious impediment in Mozambique to the development of the mining industry. The shortages affect the efficiency of every part of the economy, from the transport system to the government itself.

100. The other serious impediment at present is the serious balance of payments problem, which limits the supplies of foreign exchange available for imports of equipment and spare parts.

101. Despite the policy of the Mozambique government to have foreign investment in the mining sector, the political statements of Frelimo probably scare some mining companies. The recent collapse of the foreign owned Sena Sugar Company, amid mutual recriminations between government and mangement, will not help the image of the country among nervous foreign potential investors.

RECOMMENDATIONS FOR FOREIGN ASSISTANCE

102. The obvious areas for foreign assistance are to provide capital aid to support the balance of payments, and technical assistance with skilled manpower of all types. So far it appears that Western countries such as Britain, the US, Sweden and Norway are providing more capital aid to Mozambique than the East. But the Mozambique government is clearly attempting to pursue a "non-aligned" policy to attract as much aid as possible from all sources. It is reported that Sweden, West Germany, Rumania, Russia, East Germany and South Africa have all provided technical assistance to Mozambique's mineral sector.

103. The government's budgetary situation is also a problem at present, and the current allocation of $17.4 million to geology and mining, which is less than 4% of government expenditure, will probably not be spent. Thus the best way in which the US and other countries could help the development of Mozambique's mining industry would be to provide funds and technical aid to the geological departments of government and to reduce the information gap which exists between the countries which have interesting mineral prospects and the mining companies who are in a position to exploit them. This type of assistance is needed by most of the countries covered by these reports, and is elaborated in the summary section dealing with the recommendations for US assistance.

NAMIBIA

104. Accurate data on the economy of Namibia in general and the mining indutry in particular are not available. The South African administration since 1970 has buried the figures of economic activity in Namibia among those of the Republic of South Africa. In addition it has classified as secret certain data pertaining to such minerals as uranium.

105. It seems likely that the contribution of mining to the GDP of Namibia is around 40%. There is no doubt of the very great importance of the sector to the economy. It is estimated that mining products exceed 60% of total exports, and that about 10% of the wage earners in Namibia work in the industry. The present contribution of the mining industry to total public revenues in the country is probably of the order of 50%.

106. The mining production in Namibia is in the hands of companies from South Africa or Britain and the United States. They have developed their projects under the administration of the Republic of South Africa, whose main aim was certainly not primarily the development of the economy of Namibia but rather that of its own country. Thus the mining operations have not been designed to maximise the benefits to the country in which they are situated, but to fit the corporate purposes of the shareholders within the overall policy laid down by the authorities. Nevertheless, the industry is of great importance to Namibia. This is a reflection of the high value of the mineral deposits to be found there. It is certain that when an independent government is in power it will change some of the arrangments in the industry to increase the value to the country of its operations.

107. In any case, the value of the production, the foreign exchange earned, th- employment generated and the taxes paid by the mining industry all combine to provide the country with a substantial amount of economic activity and a sufficient flow of resources to enable Namibia to be able to face the future as an independent country with confidence. The suggestions from South Africa that the economic base of the country did not warrant its independence from the Republic of South Africa are clearly special pleading by those to whom the loss of the economic benefits, as well as the political factors, are the major influences on their judgement.

EXISTING MINERAL DEVELOPMENT

108. Mining output in Namibia is impossible to quantify accurately, but it is clearly considerable. Diamonds have for years been the most valuable. In 1977, over 2 million carats were produced by Consolidated Diamond Mines (CDM), which is a subsidiary of De Beers of South Africa. The diamonds produced by CDM are recovered by a highly mechanised process of removing millions of tons of beach sand and overburden, followed by hand work and mechanical recovery treatment. The company employs about 6,500 people. The production consists as to 95% fine quality gems. It is sorted by De Beers at Kimberly in South Africa and then sold to the De Beers-owned Central Selling Organisation (CSO), in London. De Beers does not disclose the value of the CDM production. However, it has been estimated that the average price per carat for CDM diamonds is $300. This would put the value of the 1977 production at around $600 million.

109. Copper is produced at several mines, some of which have been closed recently due to the prolonged low price of copper. Tsumeb Corporation is owned by Newmont Mining of the US, Amax of the US, and Selection Trust of the UK. It owns four mines in north-east Namibia which produce blister copper, zinc concentrate, smelter silver, refined lead and cadmium, with arsenic and germanium as by-products. The mines have been managed by Newmont Mining since 1947. Tsumenb is famous in mineral history as having paid Newmont, Amax and Selection Trust one of the highest returns on their initial investments ever experienced in the industry. Its lead refinery and smelter and the copper smelter also take in other producers' metals on a toll basis (even from as far afield as the US and Canada). The zinc concentrates are sent to South Africa for refining, and the blister copper is refined in Belgium and West Germany. Plans were announced in 1974 by the O''kiep Copper Company (largely owned by Newmont) to construct a 120,000 ton p.a. copper refinery in Cape Province, South Africa, to process output from their copper mine in South Africa and from Tsumeb's smelter in Namibia. These plans were recently shelved.

110. The Tsumeb operation is run on a "company-town" basis, with almost all the 5,000 African workers recruited on the "migrant worker" contract system, living in crowded compounds, while white workers have rent-free modern houses provided for them and their families. Some progress has been made since 1976 in the construction of some family housing for African workers, but the rates of pay are as discriminatory as between balck and white workers as they are in South Africa. (For details see the companion report on migrant workers).

111. The low copper prices of the past two years have caused the suspension of operations at Kombat and Asis Ost Mines, though during the shut-down the main shaft at Kombat is being extended to allow access to the Asis West deposits, which grades 7.78% copper and 4.33% lead and where production is scheduled to begin in late 1978. Increased copper smelter capacity was installed at Tsumeb in 1976 to treat concentrates from the Otjihase Mine, owned by Johannesburg Consolidated Investments (JCI) of South Africa. The Tsumeb mines are now producing lower grade ores than in the past, though the ores are still rich: 4.25% Cu, 9.04% Pb, 2.39% Zn. Reserves are thought to last 10 - 15 years at current rates of output. Lead ore grades are also falling; zinc grades are stable.

112. Other copper producers are Oamites Mining Company a joint venture of Falconbridge Nickel of Canada (74.9%) and the Industrial Development Corporation (IDC) of South Africa (25.1%). This produces 6,000 - 7,000 tons of copper from 1.2% ore, with 0.54 oz. of silver per ton. Klien Auber Koper Maatskappy, a subsidiary of the South African General Mining and Finance Corporation, produced in 1976 about 9,000 tons of concentrates from its copper-silver ore which grades 2.5% Cu. The $48 million Otjihase Copper Mine owned by JCI (52.5%), Continental Ore of the US (15.8%) and other South African companies produced 30,000 tons of concentrate in 1976 and also recovered important quantities of precious metals at the refining stage, and pyrite concentrates which were sold to the Rossing uranium mine. The Rosh-Pinah mine, owned by the South African state-owned Iron and Steel Corporation (ISCOR), produces lead and zinc concentrates which are processed at the electrolytic refinery of ISCOR's subsidiary Zinc Corporation of South Africa in Springs, South Africa. In 1976 ore production was transferred from the exhausted underground mine to a new open-pit mine.

113. The Rossing uranium mine is a $300 million open-pit operation to mine very low grade ore (0.03 - 0.04%), which will be one of the world's largest at full production. This is 120,000 tons per day of ore, equivalent to 5,000 tons per year of U_3O_8. It employs 2,400 Namibians and 700 foreign whites. The company is building family housing for all employees having accepted that contract labour is not an acceptable policy for Namibia in the future. The Rossing Uranium Ltd is owned by Rio Tinto Zinc of the UK (46.5%), IDC of South Africa and Total of France. The mine came into production in 1976 and due to prolonged technical difficulties which have necessitated large additional capital expenditures and have caused cash flow problems, planned full output is not now expected to be reached before 1980. This level of 5,000 tons of "yellowcake" would produce an income of about $330 million, assuming an average

price of $30 per pound. It is probable that some of the long-term contracts which the plant has, notably the one for 7,500 tons over five years with British Nuclear Fuels, are priced well below the current "spot" price of $40 per pound but it is presumed that they are above the estimated average cost of production of $20 per pound. Other contracts include ones with Japanese and French companies.

SOCIAL AND EMPLOYMENT IMPACT

114. The mining sector in Namibia provides an estimated 10% of the jobs available in the formal sector of the economy. Because the industry has been operated as though it were in South Africa, the system of employment has embodied all the features of the apartheid policy, such as migrant workers on short-term contract being housed in crowded mine "compounds" without access to their families. There are enormous disparities in pay based on the colour of a man's skin which are found in South African mines.

115. The advent of an independent government is bound to lead to basic changes in the system of recruitment and employment for the Namibian mines, and there will also be changes in pay scales. The abolition of the South African system of job reservation will highlight the need for educational, especially technical, reform.

POTENTIAL NEW MINERAL PROSPECTS

116. Namibia has very promising mineral prospects. In recent years, South African, American, Canadian, French, British, German, Japanese and Spanisg companies have explored for mainly URANIUM, OIL and GAS, and BASE METALS. Oil and gas exploration has been carried out in conjunction with the South African government agency SOEKOR and its Namibian sunsidiary SWAKOR by Chevron, Texaco, Getty, Continental Oil, Phillips Petroleum, Aquitaine, and smaller Canadian and US groups. All have recently relinquished their concessions, possibly as much for political reasons as because of unsatisfactory results, since the discovery of wet gas was reported in 1972.

117. Uranium exploration appears to have been much more successful. General Mining has established with pilot plant work a commercially attractive discovery at Langer Heinrich, Tinkes, east of Swarkopmund. They are reportedly discussing the financial and marketing arrangements with US and other non-South African companies, possibly as an insurance against anti-South African attitudes of the future Namibian government.

Anglo-American Corporation of South Africa, in conjunction with Union Carbide of the US and Aquitaine and Compagnie Francaise des Petroles, has also reportedly discovered payable deposits of uranium west of Swarkopmund. Goldfields of South Africa also has a payable deposit in its concession area at Trekkopje adjacent to the Rossing mine.

118. The low prices for base metals in recent years have combined with political caution to reduce the level of exploration activity for base metals by foreign mining companies in Namibia recently. But the country clearly has very interesting deposits of copper, lead and nickel.

119. The South West African Geological Survey Department (incorporated into the South African Department of Mines) has reportedly done excellent survey work and its maps and reports are widely available and used by foreign companies.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT IN MINING

120. The South African government's policy of encouraging foreign investment in mining is well known, and has been applied to Namibia while it has administered the country. It has has particularly encouraged the searches for uranium and oil and gas.

121. It would seem to be in the best interest of the new government of an independent Namibia also to encourage the further development of the sector, since th- natural endowment of the country as regards mineral deposits is very great and holds out the prospect of producing a substantial flow of revenue to government and to the balance of payments.

IMPEDIMENTS TO MINERAL DEVELOPMENT

122. The major constraint to mineral development in independent Namibia will be availability of water. The rainfall is sparse, erratic and unevenly distributed, and the groundwater is hard and expensive to find. Power needs should be less of a problem. The Cunene hydrelectric scheme in southern Angola was built mainly with South African funds on the basis of a supply being made available from the scheme of power and water to Namibia. The planned power

capacity of 240 MW would be added to the 158 MW from the coal-fired thermal stations at windhoek and Walvis Bay which are linked in a grid, supplying 11 towns and 9 mining operations.

RECOMMENDATIONS FOR FOREIGN ASSISTANCE

123. It is recommended that assistance be given to the training of Namibian nationals in the various technical fields which the mining industry requires. The needs of Botswana in this reagrd are similar and because of the small populations of both countries, training institutions could be established to serve the needs of the mining industry of both countries.

124. While the transport system of Namibia is well developed, compared to some of tis neighbouring countries, the roads and railways have not always been built with the economic development of the country solely in mind. The study and subsequent construction of the link between the rail line from Wavis Bay to Gobabis and the line in Botswana is recommended form of assistance. It would benefit both countries, whose transport systems have been constructed to link them with South Africa only.

FURTHER STUDIES NEEDED

125. The imminent attainment of independence by Namibia after its economic development has for many years been under the control of another country means that there are a number of areas of study which are needed to determine what the new government's policy should be. In the mining sector the most urgent study will need to be made of the legislation as it applies to mining development, and of the existing agreements with mining companies presently operating in Namibia. Both exploration concessions and mining leases will need review and in many cases renegotiation. The tax and other fiscal elements of these arrangements will need especial attention, as well as the degree of local processing and the amount of training of local workers.

126. These areas should be the subject of intensive review by experienced experts who are sympathetic to the new government's needs and aspirations and at the same time aware of the need to develop a long-term relationship with existing and new mining companies in Namibia, albeit on a different basis than that which applied under the South African administration.

127. The sorting, valuation and marketing of diamonds is a specific instance of probably the most important aspect of the present arrangements in the mining industry of Namibia which need to be reviewed by experts. The recent experience of Botswana in developing good arrangements and sound policies could well be emulated by the new Namibian government. To do this it will need to commission a study and report on how the present arrangements should be modified, and then it will need some skilled assistance in the re-negotiation, once it has taken its policy decisions on the basis of the study.

SWAZILAND MINING SECTOR

ECONOMIC SIGNIFICANCE OF MINING

128. The mining industry of Swaziland makes a significant contribution to the country's economy. In 1976 it probably contributee about 13% to the GDP. Yet the country is so well endowed with natural resources that the exhaustion in 1978 of the high and medium-grade iron ore deposits, which in 1971 were contributing 22% of the total exports, has not been the blow which it might have been. Sugar, wood pulp and asbestos export values have risen markedly in recent years to make up the loss. Moreover, there are good prospects that coal deposits can be exploited on a quite large scale, which would give a welcome cushion (since such heavy capital investment would probably only be made on the basis of long-term sales arrangements) to export receipts, which have recently become uncomfortably dependent on wood pulp and sugar exports, the prices of which can be quite volatile, when no long-term sales contracts are available. In 1977 total mineral sales were £24 million.

EXISTING MINERAL DEVELOPMENT

129. Swaziland, which, with an area of 17,400 sq.km. is one of the smallest in Africa, is well endowed with mineral resources. In 1976, mineral exports totalled $33 million, of which asbestos was $16 million, iron ore $14 million and coal $1.5 million. Smaller amounts of granite, kaolin, and tin are mined. Asbestos has been mined at Havelock in the north west since 1939 by a company owned 60% by Turner and Newell of the UK and 40% by the Swazi nation. The fibre production of about 40,000 tons is transported by aerial ropeway across the border to Barberton in South Africa whence it is railed to Maputo, aminly for shipment to the UK, though some goes also to South Africa, Zambia, Denmark and Nigeria. The mine is one of the world's most important sources of long-fibre chrysorile asbestos (the only others being Arizona, Canada, Rhodesia, Chian and Russia). In recent years there have been production difficulties, but these seem to have been overcome. Lonrho Limited (UK) relinquished in 1976 its concession for asbestos exploration adjacent to the Havelock mine, and subsequently the Swazi nation has been negotiating with Turner and Newall on the Terms and conditions under which the additional deposit could be mined by the Havelock Company. It is reported that the Swazi nation wants to increase its equity holding to 50% in the company.

130. Iron Ore has been mined at a rate of 2 million tons per year at the Ngwenya mine since 1964 by a subsidiary of Anglo American Co. of South Africa. The Swazi nation acquired a 20% interest in 1970. The high-grade (63-63.5% Fe) contract with Japan was completed in 1975 and was followed by a medium-grade (60% Fe) , the mining of which was completed in March 1978. Due to transport difficulties caused by congestion at the port of Maputo in recent years, ore which was stockpiled is still being shipped. The remaining low-grade (34% Fe) deposits, estimated to total 576 million tons have been investigated from the point of view of beneficiation, but results have been that it would be commercially unviable. There is, however, a proposal being studied by CRM of Belgium financed by EEC to use benficiated and pelletised iron ore in Swaziland to feed a small charcoal-fired steel plant in Kenya, using low-cost methods developed in Brazil. It is reported that Arbed of Luxemborg, and Thyssen and Mannesman of Germany are interested in the steel plant.

131. Coal is mined in Swaziland at Mpaka by Swaziland Collieries, another subsidiary of Anglo American Corporation of South Africa, at a rate currently of 150,000 tons per year. About 60,000 a year is sold to Swaziland Railway and about 20,000 tons to sugar mills, Swazi Chemicals fertilizer plant, the brewery and local merchants. Of the rest, which is exported, most goes to Bamburi Portland Cement Co. in Kenya, and some to Europe. The output is presently limited by the capacity of the railway to supply wagons; annual output could be increased without major expenditure to 250,000 tons of semi-anthractie and sold competitively in Belgium and the UK. Swaziland Collieries exports are marketed by the South African Anthracite Producers Association. The company has a new anthractie seam in its concession area, as good in quality as that in South Africa the feasibility study for its development is complete, but the company fears it would be made commercially unattractive by the Swaziland Government's probable requirements for greater returns than the present mine provides and equity participation. The Swazi miners have been described as fine miners, who can fill 50 tubs a day in the labour-intensive operation of Swazi collieries. Swazi skilled technicians and artisans are of good quality, but the mine has difficulty in recruiting Swazi mining graduates, who, when qualified, seem to prefer not to go mining but to administer in government.

SOCIAL AND EMPLOYMENT IMPACT

132. The numbers employed in the mining industry rose from 2711 in 1972 to 3344 in 1977. Of these, 266 were classified as skilled in 1972; the numbers had risen to 554 in 1977. This is an increase in the proportion of skilled workers during that five year period from 10% to 17%.

133. The government hopes to increase employment in the industry not only by the starting of new projects, such as the coal and diamond prospects. It also wishes to develop small-scale locally owned mines. Some small-scale mining already exists, producing modest quantities of tin from deposits which do not justify large-scale exploitation.

134. Swazi workers also go to the South African mines on the contract basis as migrant workers. The numbers employed in South Africa through the officially approved recruiting organisation of the South African Chamber of Mines increased from 5,600 in 1974 to 9,300 in 1978.

135. The re-absorbtion of migrant mine workers in the Swazi economy would be made easier by the successful expansion of the Swazi mining industry, since returning mine workers find it hard to reintegrate into the rural economy in many cases.

POTENTIAL NEW MINERAL PROSPECTS

136. Extensive exploration of other coal deposits in the eastern lowveld have indicated mineable reserves of 224 million tons. In addition to the Government Geological Survey and Anglo American Corporation, Johannesburg Consolidated Investments and Shell Coal have held exploration licenses. The latter company which has been working in Swaziland since 1974 and spent nearly $6 million, is now sinking a shaft to explore technical mining conditions, while negotiating with the Swazi Government and Nation the terms of a mining lease. If negotiations are successful, the company would, by using a semi-mechanised, if not hand-labour methods, extract 500,000 tons a year of anthracite with a long-term supply contract. The coal would be exported via the new rail link being constructed. The Swazi Government has for

some years been trying to develop a project to use the much larger quantities of coal, which are semi-anthracitic and suitable for blending, in a large thermal power station which would export the large part of its output which exceeded Swaziland's own requirements to the South African grid. It was never possible to agree on the price for this supply, however, since South Africa wanted it to be competitive with its own costs, which are low by virtue not only of large-scale electricity production but also by government controlled coal prices. Present plans are for a much smaller thermal station, built in stages, of which the first would be 30 MW.

137. The small production of barites ceased recently, due, it is said, to inefficient operation, and the government hopes to re-open the operation on a larger scale after further proving of the deposit at depth. Tin is mined on a small-holder basis.

138. De Beers have found a diamondiferous Kimberlite pipe which they describe as marginal and also a sedimentary deposit, but refuse to do more exploration until a fiscal regime for a mining license is agreed with government. Negotiations are still continuing, though at such a slow pace that De Beers exploration efforts in the meantime have been described as "half-hearted."

139. Gold used to be mined, notably in the Piggs Peak area, and there are hopes that it might be restarted and that further discoveries might be made.

140. The Geological Survey Department is, with technical assistance from Britain, Canada, the UNDP and Germany, carrying out various surveys to complete the mapping program, stream-sediment reconnaissance, regional gravity surveys and ground water surveys, particularly in the lowveld for agricultural needs. The geologists of the Department consider that the mountainous northwest corner of the country has promising potential for nickel, copper, chrome, asbestos and molybdenum. The high hopes which the government has for as many as three or four coal mines of one-half to one million tons per annum output owe much to the comprehensive evaluation of coal resources carried out in the Geological Survey Department with British technical assistance. The Department has been a catalyst for development of iron ore, reopening of gold and tin mines and coal deposits in the past and could continue this role in future, provided it can get the same extensive assistance form aid agencies and can continue to attract competent geologists and engineers to join the Department to ensure its future development on a permanent basis.

141. The mineral resources of Swaziland are varied, of good quality and an important source of national revenues and employment opportunities. The Geological Survey Department has been well staffed and supported by foreign financial assistance, and has played an important role in mineral development. There should, therefore, be no reason why the sector should become an even more important and stable element in Swaziland's economic development than it has in the past, except for the question of the negotiation of mining concessions.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT IN MINING

142. The early concessions, for asbestos, iron ore and coal were not particularly favorable to the government, especially in relation to the improved terms which other developing countries were able to negotiate at a later date. As a result, several concession agreements were modified. These changes usually involved the Swazi Nation obtaining an equity participation in the operating company, and were not radical by the standards of agreements in other countries.

IMPEDIMENTS TO MINERAL DEVELOPMENT

143. However, the existing foreign mining companies and potential new entrants know that change is in the air and are wary. And the indeterminate relationship between the Swazi Nation, its Minerals Committee and the traditional treasury (Tibiyo Taka Ngwane), on the one hand and the modern government with its ministries of Finance and Mines on the other, make negotiations that much harder for mining companies. These uncertainties are a potential cause of delay in development, for example, of diamond mining. It is not a question of the Swazi authorities needing expert advice. The Swazi Nation has its own New York lawyer and the Ministry Secretariat technical assistance group.

RECOMMENDATIONS FOR FOREIGN ASSISTANCE

144. The best assistance which it would seem the US authorities could give Swaziland's mineral industry is to help train local mining technicians, engineers, geologists and metallurgists, both by assistance to local institutions and by greater financial help to increase the number of Swazi's who can train in the US.

Help with equipment and personnel for the Geological Survey and the Ministry of Mines should also be given when requested. Swaziland would also benefit from a program of bringing regularly to the attention of US mining companies the interesting deposits which the developing countries of the southern African region have and wish foreign companies to exploit.

ZAMBIA

ECONOMIC SIGNIFICANCE OF THE MINING SECTOR

145. Zambia's economy is overwhelmingly dependent on the mining sector. 95% of total export earnings come from sales of minerals. The mining industry normally provides almost half of the government revenues, though since copper price movements have a more than proportionate effect on the government's taxes and dividends from the industry, the current low level of copper prices has caused Zambian budget revenues to be severely reduced. The mining industry normally constitutes about 35% of Zambia's GDP, though this also is largely affected by price movements.

146. The importance of Zambia's copper mines and their capacity to generate such a large part of Zambia's national product, budget revenues and foreign exchange has enabled the government to spend large sums on economic development, to incur heavy losses through maintaining sanctions against Rhodesia, to bear a heavy burden of military expenditure, to support large numbers of refugees from neighbouring countries, to withstand the effects of unsuccessful programmes of agricultural and rural development and to support an expensive dual bureaucracy of party and government at local, regional and national level. But the industry is weakened by the instability of prices which currently, and not for the first time, has completely ruined the financial basis of the Zambian economy. As a result, the Zambian Government has had to appeal for support from the international community, which will probably be forthcoming in quite inadequate amounts.

147. Part of Zambia's problem of the high degree of economic dependence on copper production is the multiplier effect which changes in the LME copper price have on profits, dividends, government taxes and royalties, balance of payments and funds available for development, both of the copper industry itself and other sectors of the Zambian economy. This multiplier effect is so important that it has been estimated by the World Bank that a 10% fall in copper prices would lead to increases of 168% in capital requirements over a 15-year period. Obviously such extreme sensitivity to prices, over which Zambia has no control, means that the single most effective way of helping Zambia's economic development would be to stabilise the price it receives for its copper.

EXISTING MINERAL DEVELOPMENT

148. Zambia's copper production is a significant part of world production and trade; the contribution was 9.2% and 14.9% respectively in 1975. It is a well-established industry, having existed for nearly 50 years, and it employs over 50,000 Zambian and around 4,000 foreign workers (of whom in 1975 about one-third had been working in Zambia for more than 5 years and 15% for more than 10 years). Most of Zambia's mining operations are in the "copperbelt", a 7,700 sq. km. area in the north-central area, bordering the Shaba copper province of Zaire. The orebodies in both countries are part of the same complex. The copper mining is mainly in the hands of two mining groups, which were formerly foreign-owned and took their present form in 1970, when the Zambian Government acquired 51% equity ownership in exchange for 6% dollar bonds, originally repayable over 15 and 20 years respectively. The bonds were redeemed in full in 1973, at the same time as the management contracts, which the original shareholders were given in 1970, were terminated with compensation. Also in 1973 the government set up the Metal Marketing Corporation of Zambia as the sole marketing agent for all metals and minerals produced in Zambia.

149. Ore is produced from both underground mines (70%) and open pits (30%) and fully processed into the sales products (refined cathodes, refined wirebars, blister and residues) at the mines. There is some transfer of semi-processed products between plants. Existing production facilities are sufficiently well balanced to cope with the controllable and uncontrollable variations in processing requirements for an output of 700,000 - 750,000 tons of contained copper per year, provided, of course, that adequate sums are spent on their maintenance. About $200 million need to be spent each year to maintain and perhaps slightly expand existing capacity. However, the low copper prices and the adverse effect on the mining companies' cash flow of the transport delays have caused cuts and postponements in capital expenditures which will affect current production capacities.

150. The experience of the past few years demonstrates the difficulties with which the Zambian copper mines have had to cope. The Mufulira disaster in 1970 was so serious that the mine will probably never again attain the 1969 level of production of 176,000 tonnes. The need to mine ore at deeper levels underground, to mine lower grade ores, to hold higher inventories, and the lower productivity of labour (due partly to overmanning and partly to a greater turnover of expatriate labour with a consequent decline in the average level of experience)

caused higher costs of production. It has been estimated that real unit production costs have risen at an annual average rate of 2.7% since 1970.

151. Transport difficulties have been a constant problem for Zambia's copper industry. After the closure of the Rhodesian border in 1973, the capacity of the road route through Tanzania was limited by weight limitations on trucks to prevent break-up of the road. Then in 1975 the Benguela railway was closed to Zambian copper which negated a large part of the advantage of the opening of the Tazara rail route to Dar es Salaam. Congestion at Dar es Salaam in mid-June 1978 was so bad that the amount of copper in transit between the copperbelt and Dar was 76,000 tonnes bigger than normal. The value of this is about $100 million, which would have accrued to Zambia (it had to declare force majeure on contracts because of transport difficulties), and is a measure of the magnitude of the effect of transport problems on Zambia's economy.

152. Zambia's Second National Development Plan had a target or 900,000 tons of copper production by 1978. It was an unrealistic target, since it assumed no current production problems nor any technical difficulties with expansion programmes. In fact, there were technical difficulties, which, added to the financial stringencies, have limited output to virtually the same level throughout the plan period. The investment climate has also been severely hurt by the delays in overseas payments caused by shortage of foreign exchange. Thus expansion of Zambia's copper mining capacity is dependent upon the general economic and financial difficulties, caused mainly by low copper prices, being overcome.

153. The copper industry produces significant amounts of cobalt as a by-product, and the recent substantial price increases in this metal have stimulated plans to recover much more in the near future. Lead and zinc are refined at the mine site at Kabwe and small amounts of silver are recovered from that operation.

SOCIAL AND EMPLOYMENT IMPACT

154. Zambia's copper industry was started in the 1930's. It was developed mainly with engineers, technicians and administrative personnel imported from the UK and South Africa and experienced miners from South Africa. At first Zambian miners came from all over the country, as well as Malawians, Tanzanians, Zairois and others from even

further afield. But after a generation, a settled mining community had developed on the "copperbelt".

155. Wages were high, though there were racially based discrepancies a la South African practices, and they were quite out of line with what the rest of the economy could afford to pay. Housing was also provided by the mining companies, of a far higher standard than that found in the rural areas, though again there were big distinctions between the standards of the facilities provided for "European" and "African" workers.

156. Thus the economic and social impact of mining in Zambia prior to Independence in 1965 was to create an enclave or prosperity in a basically poor under-developed country.

157. After Independence, racial distinctions in pay and amenities were no longer tolerated and their removal meant that the "African" levels were moved upwards. This increased still further the gap between the Zambian miners and the rest of the largely rural population.

158. These tendencies have continued to this day, and have resulted in Zambia's copper mines becoming one of the world's highest cost producers. They have also exerted an upward pull on Zambian government wages, which in turn set the tone for the rest of the economy. Thus the labour cost levels in any enterprise in Zambia are very high. The failure to develop agricultural production in Zambia is partly due to the high statutory minimum wage.

159. This seemingly intractable problem is one of the most serious and fundamental difficulties facing the Zambian government.

POTENTIAL NEW MINERAL PROSPECTS

160. The Government Geological Survey Department is responsible not only for the basic resource survey and mapping work in the country, but the evaluation, up to the exploration stage, for industrial minerals and also, because of its strategic importance, of uranium. The rest of the minerals, once they have had deposits targeted by the Geological Survey, are evaluated by Mindex, the exploration company of MINDECO the parastatal body in the mining sector (which is, however, no longer responsible for the government interests in the two copper mining groups).

161. After evaluation by Mindex, commercially promising prospects are offered to private mining companies to exploit, probably as a joint venture with the Zambian Government, though this is not mandatory.

162. The Geological Survey Department has been systematically extending the coverage of the geological mapping of the country which it is publishing at the 1:250,000 scale. It is also working on maps at a scale of 1:100,000. It uses both airborne and ground sciences to map a broad picture of the resources of the country, in order to attract the interest of foreign mining companies. The department still has 95% expatriate staff at the professional level, mainly because Zambian geologists, when qualified, are more attracted to the mining groups and Mindex which pay higher salaries than government. Some of the foreign staff have been with the department for 15 years and thus have an extremely good knowledge of the Zambian mineral prospects.

163. The least explored part of Zambia, because of its sand cover, is the Western Province. Geologically it has good potential for uranium, coal and copper. The Survey has done gravity and airborne magnetic surveys there and now wants to do a seismic survey for stratiagraphic information (both in the Western Province and in the Luangwa Valley). The first stage of this 5-year programme has been estimated to cost $50 million and would include 10 holes, each to 1,000 meters, per year.

164. Russian geologists, providing technical assistance to Zambia, are planning to look for diamonds in the Kimberlites of the Luangwa Valley and also west of Lusaka. De Beers of South Africa have had prospecting licences over most of Zambia, and are still working in some areas but have relinquished most of the ground. Nevertheless the De Beers minimum grade in Zambia may have been higher than that which the Russians would propose or the Zambian Government would accept, were any interesting deposits to be discovered.

165. The uranium prospects discovered by the Geological Survey and by AGIP, the Italian Oil Company, appear worth commercial exploitation. The Japanese explorers, PRC, came up with nothing interesting in the north of Eastern Province. The Zambian Government is discussing plans for exploiting the uranium in the government's concession area in Southern Province with German companies, SEBAG and INTERPLAN, and the German Government, while AGIP is looking for a partner with

$50 million for its Solwezi deposit. U.S. Steel, Noranda and Union Carbide have all expressed some interest in this project, which is for a production of 1,000 tons of uranium "yellowcake" (U_3O_8) annually from ore reserves equivalent to 10,000 tons U_3O_8.

166. Following suggestions of Russian geologists, Mindex has been prospecting since 1975 in the Eastern Province and has located a substantial zinc-copper sulphide deposit at Nyimba. K400,000 per annum is being spect on this programme involving 7 geologists. Five holes have been drilled so far. An airborne electro-magnetic survey costing about $100,000 has been planned over the area of 1,500 sq. km. Preussag of Germany, BRGM of France and U.S. Steel have all considered a joint venture to prospect this area, but no arrangements have been concluded.

167. US.S Steel are also interested in a zinc prospect at Kabwe West, similar to the Boken Hill mine already operating there.

168. Mindex has other geological prospecting teams evaluating gold deposits at Matala and near Chipata, base metals at Lusangwa in the Eastern Province and in some selected areas in the vicinity of the Tazara railway line, where there is also some precious metal potential.

169. Emeralds have been known to exist in the Copperbelt for a long time, but were thought to be of poor quality. Recently, however, it has been realised that there are deposits which are of high quality, and as prices in the Far East in particular have risen substantially, there is considerable interest in their exploitation. The Zambian Government has an agreement until December 1978 with Jardine Matheson Co. from Hong Kong to set up a joint venture (70% Mindeco, 25% Anglo American Co. of South Africa and 5% Jardine Matheson). Midex has a concession at Mupata, in an 800 sq. km. area which was declared a protected under the Mines and Minerals Act. Several villages are located in the area, however, and in addition at Kafulsu Mindeco Small Mines has a concession under which a small production is carried out; the stones lie near the surface, so smuggling is an intractable problem. The Zambian Government would like to extend the agreement with Jardine Metheson and with their help start a lapidary in Zambia. Jardine Matheson, however, before signing a further agreement decided to have more stones sent to Hong Kong for cutting and marketing, to evaluate the project further.

170. Mindeco Small Mines Division also operates some tin producing co-operatives at Choma in Southern Province, copper at Chifumpa in Northwestern Province and gold at Luivi, West of Lusaka. There is also a very small managanese operation at Mansa.

171. Mindex has a gold exploration programme at Matala and at Madzimongo, near Chipata, and a tin prospecting programme at Namuswa in Southern Province.

172. There is an iron ore grading about 60% Fe, near Solwezi which is the basis for an ill-fated venture to set up an iron and steel plant. A company was formed (Technical Industrial Kulumbila Associates Limited - TIKA) as a joint venture between UNIP, the political party and the Yugoslav Energoprojekt, in 1973. A K50 million project was planned, and several contracts were let. In December 1977 Puman Swidor of Pennsylvania were appointed prime consultants and as contractors for the iron making section. Soberi of Belgium replaced Energoprojekt as the mining contractor. Demag of West Germany took the steelmaking contract and arranged with Kreditanstalt fur Wiederaufbau and AKA for finance, backed by a Hermes guarantee. By now the cost of the project had increased to $480 million, and the initial doubtful viability of the whole project had been compounded by the incompetent and haphazard implementation of the contractual arrangements. The President recently took the project from the company and instructed the Ministry of Industry and Mines to take responsibility. A report has been prepared proposing a new course of action, but the doubt as to the wisdom of proceeding with the project remains.

173. The government is seeking a mining company to investigate the mining possibilities of molybdenum deposit in the Eastern Province.

174. The coal deposits near Mmaamba, which are worked at present for internal consumption, are estimated to contain 80 million tonnes of proved reserves. The government would like some nitrogen chemical projects based on this coal. There are considered to be good prospects of other coal deposits in the Luangwa Valley and in the Western Province, where some deep drilling is being planned.

175. There are several wothwhile industrial mineral deposits in Zambia, which could support viable projects for import substitution and possible export to neighbouring countries. There are deposits of strucural clay for bricks and ball clay and china clay for ceramics.

A plant for sanitary ware, wall tiles and insulation cups is being studied by a British consulting firm as the basis for a possible joint venture between Indeco and English China Clays Limited.

176. Fluorspar and feldspar are mined in small quantities by Mindeco for the glass plant at Kapiri Mposhi. It could be a much bigger operation and will be assessed next year. There is good potential for talc production from substantial deposits, both near Lusaka and elsewhere. Limestone and gypsum are presently mined for the cement factory near Lusaka. There are estimated to be 30 million tons of low-grade phosphates in hills in the Southern and Eastern Provinces and in the Luangwa Valley, which could be used in fertilizer production.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT IN MINING

177. Zambia's policy towards foreign mining companies is ambiguous. The history of its relations with Roan Selection Trust, later Amax, and Anglo American Corporation of South Africa (AAC) is one of gradually reducing their influence over the mines to the minimum which the government feels it needs, to ensure the continued technical backing of the companies. The copper, cobalt and other products are sold by a government agency.

178. Thus although the Zambian government welcomes the interest of foreign mining companies to develop new prospects, it is clear that it wishes to retain a majority of the equity in any operating company and would wish to dominate policy making.

179. In the case of the uranium prospects, it is significant that Zambia has been discussing their exploitation with government agencies of Japan, Italy and Germany. This is partly because of the strategic interest which governments have in supplies of radio-active minerals, but it also probably reflects Zambia's more easy relationship with government bodies than with large multi-national mining companies.

IMPEDIMENTS TO MINERAL DEVELOPMENT

180. There are several severe constraints on the development of the Zambian mining sector. These have all been mentioned already, and can be summarised as:

(a) Transport difficulties

(b) Geopolitical uncertainties in Central Africa

(c) The financial fragility of the Zambian economy, especially the balance of payments

(d) The ambivalent attitude of the Zambian government to foreign investment, especially in mining.

181. The results of these difficulties are to:

(a) Limit the amount of geological survey work, because of budgetary constraints

(b) Limit the follow-up of geologically promising prospects with costly proving programmes, because MINDEX has limited resources, and because mining companies are unwilling to risk their funds

(c) Limit the interest of mining companies to invest in exploitation of economically viable mineral prospects.

RECOMMENDATIONS FOR FOREIGN ASSISTANCE

182. No sector of an economy can develop when the economy as a whole is extremely weak, as is that of Zambia at the present time. The mining sector, which has such long construction periods for new projects, needs such large amounts of funds and is subject to such large price fluctuations for its products, must have a strong economic base for its successful development.

183. Therefore the most effective way in which foreign governments such as the US could give assistance to the Zambian mining sector would be to give financial assistance to improve budgetary and balance of payments situations. Both these are directly and heavily affected by the reduction in the receipts of the copper mines, due to the low prices for copper which have persisted for the last two years. Thus assistance which increased directly the receipts of the Zambian copper industry would have an immediate and generalised beneficial effect on the country's overall economic position. For this reason, the following proposal for US government assistance is made.

184. The U.S. Government has established a target for its stockpile of copper for strategic purposes at 1,299,000 short tons. The level of the stockpile as at 6/30/78 was 21,690 tons. It is proposed that the government of the U.S. agree to purchase direct from Zambia a certain amount of its target stockpile amount, say 500,000 tons (of copper). This purchase could be spread over a period and made at an agreed price which was consistent with the long-term trend price. This action would have a direct beneficial effect on the balance of payments and budget, and a stabilising effect on Zambia's economic development planning and implementation. Finance for expansion of the industry itself would be more easy to obtain. But even more significant might be the favourable effect of the announcement of the U.S. decision, let alone of its actual implementation, on the world price of copper. Together with other purchases for the stockpile, the scheme could well impart a substantial cushion to future price movements over the period of the purchases. It might be possible to agree on an international buffer stock scheme during this time, or even to include the purchases for the U.S. stockpile in the arrangements for setting up the (separate) buffer stock scheme.

SOUTHERN RHODESIA (ZIMBABWE)

ECONOMIC SIGNIFICANCE OF MINING

185. Mining and smelting of ores took place in Africa from the time of Christ onwards, and there is evidence of iron and copper workings in Central Africa. It was the lure of minerals which brought European traders to Southern Rhodesia at the end of the 19th century. Until the Second World War the mining sector contributed the biggest share to the GDP, though thereafter agriculture and later manufacturing became more important.

186. Since UDI in 1965, accurate statistics have not been published, but it is estimated that mineral production rose from R$64 million in 1965 to R$230 million in 1976. This production from a range of 50 different metals and minerals contributed about 8% to GDP. The mining industry consumes some 20% of the total electrical energy generated, contributed 20% of the revenue of the railway system and a sizeable part of the capital formation of the economy went into the industry.

EXISTING MINERAL DEVELOPMENT

187. It is thought that the most important minerals in terms of value produced are copper and nickel. The next were asbestos, chrome, iron ore, coal and gold. Some fo the coal is consumed internally in thernal power plants, and iron ore in the iron and steel plants, but the rest of the output of the industry is exported.

188. It is believed that 90% of the mining assets are owned by foreign companies, mostly British, South African and US multinationals. There are, however, a large number of mostly small, privately-owned mines. Of the multinationals, the biggest holdings in Southern Rhodesia are those of AAC, producing nickel, copper and coal. The strategically important chrome mining of Rhodesia used to be controlled by US companies, but though Foote Mineral Company sold the chrome mines controlled by its subsidiary Rhodesian Vanadium Corp. in 1973 to AAC, Union Carbide still has its subsidiary Rhodesian Chrome Mines. Messina (Transvaal) Developemnt Company (MTD) of South Africa dominates copper mining in the country, while the British firm of Turner and Newall dominates asbestos mining. Other major multinationals in the mining industry in Zimbabwe are Rio Tinto Zinc (RTZ) of the UK, in gold chrome, nickel and copper, and Lonrho (UK) in gold and copper.

189. Chromite production in Southern Rhodesia is thought to be about 10% of the total world output, or about 200,000 tons chromium equivalent; reserves are estimated to be 23% of total known world reserves; they are 86% of the world's known reserves of high chromium chromite. The major use of chromite is to produce chromium alloys and chromium metal for the steel industry; it is also used to produce sodium dichromate for the chemical industry and direct in the refractory industry. Southern Rhodesia has three ferro-chromium smelters, at Gwelo, owned by Rhodesian Alloys (AAC); at Effel Flats near Gatooma owned by Rio Tinto and at Que Que owned by Union Carbide.

190. Copper reserves in Southern Rhodesia are claimed to total 1.2 million tons. The MTD group operates mines at Manguala, Silver-side, Norah, Molly, Gwai River Shackleton, Alaska, Hans, Angwa and Avondale. Their combined output is in the range of 30 - 35,000 tons of copper, which is smelted at the Alaska smelter near Sinoia. The Lonrho-owned Coronation Syndicate operates mines at Linyati and Munel near Salisbury which feed a refinery, from which 6 - 7.000 tons of copper and some gold and silver were produced in each of 1973 and 1974, but production difficulties as well as low copper prices recently may have reduced output.

191. Nickel mining, which was only 780 tons in 1965, has grown fast since then, though exact information is not available. AAC is the biggest producer; it operates, through the Rhodesian Nickel Corp-oration, mines at Bindura, Madziwa and Epoch whose concentrates are smelted and refined at the group's complex at Bindura. This has an output reported to be 14,000 tonnes of 99.95% nickel cathodes per year, which includes concentrates from the new SHanghai mine (equivalent to 5 - 6,000 tons Ni p.a.) owned 55% by Johannesburg Consolidated Investments and 37% by RhoNick (AAC). RTZ operates mines at Empress and Perseverance, as well as a smelter, refinery and cobalt recovery plant which are reported to have an annual capacity of 3,500 tons of refined nickel. $40 million is believed to have been invested in nickel mining between 1973 and 1976. Total known reserves of Southern Rhodesian mines are estimated to contain 365,000 tons of nickel, in addition to that contained in the Great Dyke igneous complex, where the sulphide ores are estimated to contain 3.5 million tons of nickel and the oxide ores to contain 1.4 million tons.

192. Asbestos production is thought not to have fallen much below the 1965 level of 160,000 tons since then. Most of the output comes from the Gaths and Shabanie mines of the Rhodesian and General Asbestos Corporation, a subsidiary of Turner and Newall, and the Pangani and Vanghard mines. Southern Rhodesia is the fourth or fifth largest producer of chrysotile asbestos in the world.

193. Gold is produced in a large number of small mines; about 370 were listed in 1976. The total 1976 output was estimated at 18 - 20 tons. Lonrho (2.3 tons), Galcon Mines (1.7 tons) and a Falconbridge Nickel subsidiary (0.6 tons) are the largest operators in the industry, which was given government assistance when low gold prices forced many closures.

194. Coal has been mined at Wankie in the northwest of Southern Rhodesia for 55 years. The company is owned by AAC who modernised it between 1971 and 1976 at a cost of about $40 million. At that time production capacity of the coking plant was doubled to 140,000 tons per month. Both underground and open pit methods are used in mining. Sales are believed to be around 3 million tons per year; sales prices are controlled by government to give the company a return on capital employed of 12.5 - 15%, except for export sales, where it is limited to 5%. Total reserves at Wankie coalfield are estimated at 900 million tons, of which 300 million tons are extractable. Southern Rhodesia as a whole is estimated to have total extractable reserves of 744 million tons, of which 440 million tons are coking quality, and 220 million tons of steaming quality.

195. Iron ore production, primarily from the Buchwa mine, is believed to be about 1 million tons a year and goes to the iron and steel plant at the Radcliffe complex near Que Que, owned by the Rhodesian Iron and Steel Co., which has South African and British shareholders as well as the Southern Rhodesian Government.

196. There is a small production of pyrites at the Iron Duke mine near Mazoe, owned by AAC, which is used in sulphuric acid production for smelters and in fertilizer manufacture. Tin is produced at seven mines and tungsten from 30 mines. Phosphate is produced from apatite at the Dorowa mining complex of African Explosives and Chemicals Ltd. (40% AAC, 40% ICI of UK) to make superphosphate fertilizer sufficient for Rhodesia's requirements. Gas is produced in a 5-million BTU per hour plant from coke produced at Wankie Colliery. Lithium and platinum are also mined.

SOCIAL AND EMPLOYMENT IMPACT

197. According to official statistics, the mining industry employs 65,000 people. These workers comprise 6.6% of the African labour force and 3.3% of the "European". There are great disparities in the wages paid based on racial differences, although the big difference

in the educational background of most people in the two groups means that "Europeans" tend to be better qualified for the senior posts. The average annual wage in mining for an African in 1976 was R$567 and for a "European" R$7,590. The comparative figures for 1967 were R$308 and R$3,581, which shows that the ratio of "European" to African wages in mining on average increased from 11.6:1 in 1967 to 13.4:1 in 1976.

198. The differences in educational qualifications between Africans and "Europeans" in the mining industry reflects the differences in the expenditure on education by the government on the two groups. In primary schools, in 1975, the average expenditure per head was R$293 for "European, Asian and Coloured" and R$23 for African children. In secondary schools, the difference in the average annual amount spent was less marked, though still very great - R$497 compared with R$188. But in secondary schools, the method of discrimination was in numbers enrolled. 66% of the "European, Asian and Coloured" children between the ages of 12 and 18 attended secondary school. For African children the percentage was 4%.

POTENTIAL NEW MINERAL PROSPECTS

199. An independent Zimbabwe will have extremely bright prospects for its mining industry, which will be a very important sector of the economy. It has a good transport network internally and excellent international links to several ports in Mozambique, Tanzania, South Africa and Angola. It has plentiful and cheap power from the integrated hydroelectric system of Zimbabwe and Zambia. It has a well-developed industrial base to provide maintenance support and an experienced labour force. Even the spectre of unstable metal prices is less of a nightmare for the country than it is for, say, Zambia because of the diversification of the industry. The prospects for expansion of existing mines and for the opening of new ones are equally favourable. Further exploitation of chrome and platinum resources are to be expected, and the copper/nickel ore bodies are capable of much greater development. The high quality coal resources could support some major export contracts.

GOVERNMENT POLICY TOWARDS FOREIGN INVESTMENT IN MINING

200. The successive Southern Rhodesian governments' encouragement of foreign private investment in mining has resulted in the present situation, where it is estimated that 90% of the industry's assets are owned by foreigners.

201. The Government Geological Survey Department has in the past carried out competent systematic investigations, cataloging and mapping of mineral resources. Departments of Mining Engineering and Metallurgy assist mining companies with development work, free of charge, while also ensuring compliance with mining, explosives and safety regulations. An Institute of Mining Research was also maintained by the government. A Mining Promotion Corporation was established in 1977 to assist mining companies with technical and financial matters and was also empowered to engage itself in production in the absence of private development.

202. It is possible that the government of an independent Zimbabwe will be more interested in a greater national involvement in the ownership of the industry, which may mean a government participation in some degree.

IMPEDIMENTS TO MINERAL DEVELOPMENT

203. The major constraint on the mining industry in Southern Rhodesia since 1965 has been the UN sanctions resolutions, which though honoured more in the breach than the observance, have lowered considerably the prices received by Southern Rhodesia, since buyers and middlemen have charged highly for their illegal assistance to Southern Rhodesia's sales efforts. Nevertheless, the unwavering support of the South African Government and the mining houses, especially AAC, plus the UK firms ICI and RTZ, have been responsible for the spectacular growth of copper, nickel and phosphate mines in particular during the past 10 years.

RECOMMENDATIONS FOR FOREIGN ASSISTANCE

204. The need for U.S. assistance to Zimbabwe's mining industry, other than the benefit it would derive from the industry-wide proposals developed for the region as a whole in this report and to be found in paragraphs is likely to be confined to help with training Zimbabwean geologists and engineers, and technical assistance to the Geological Survey and Mining Promotion Department.

SUMMARY OF RECOMMENDATIONS FOR FOREIGN ASSISTANCE TO THE MINING SECTORS OF THE COUNTRIES OF THE SOUTHERN AFRICA REGION

205. The following paragraphs summarise the recommendations made in the individual country sections of the report. In addition, proposals are made in the following section for assistance to be provided on a regional basis for the development of mining.

206. BOTSWANA

1. Safeguard the standard of service on the existing rail-line.
2. Support the trans-Kalahari rail project.
3. Increase extent and coverage of OPIC guarantees for mining investment.
4. Reduce information gap.

LESOTHO

5. Sponsor training for geologists, engineers and chemists.
6. Capital and technical aid for small-scale mining.
7. Encourage US companies to search for oil and uranium.

MALAWI

8. Assist technical and vocational education.
9. Encourage US search for uranium.

MOZAMBIQUE

10. Balance of payments support.
11. Technical asistance and equipment for geological survey department.
12. Reduce information gap.

MALAWI

13. Set up technical training institutes.
14. Support trans-Kalahari rail project.

SWAZILAND

15. Training and technical assistance and equipment for geological survey department.

16. Reduce information gap.

ZAMBIA

17. Balance of payments support.

18. Purchase 500,000 tons of copper for stockpile

SOUTHERN RHODESIA

19. Training of geologists, engineers, chemists and metallurgists.

20. Technical assistance to geological survey and mining promotion departments.

GENERAL RECOMMENDATIONS FOR U.S. ASSISTANCE ON A REGIONAL BASIS TO THE MINING SECTOR OF THE COUNTRIES OF THE SOUTHERN AFRICA REGION

207. In the country sections of the mining sector report, specific recommendations have been made for U.S. assistance to the governments to assist in the orderly development of this sector, as justified by its relative importance in the economies of the respective countries. These recommendations are summarised above. In addition, there are some ways in which the U.S., often in co-operation with other interested bilateral, regional and multilateral agencies, could assist on a regional or sub-regional basis in the economic development of minerals. The proposals made in paragraph 2 for training institutes fall into this category. In addition, it is recommended in paragraph 3 and 4 that the U.S. Government should itself institute certain measures and procedures which would have a direct benefit both for mineral development in Southern Africa and for the U.S. mining companies. Of course, if other countries, such as Germany, Britain, Japan or France were also to institute similar programmes of their own it would increase the benefit to Southern African mineral development, though it would share out the benefits more among foreign mining companies.

208. All the countries of the region with existing or potential mines require to educate and train nationals in the various specialist fields of the industry, in order to reduce their reliance on expensive personnel coming from foreign countries who are temporary workers in the mines. Geology, mining engineering, metallurgy and mineral economics are the most important areas and it is proposed that discussions be held by the U.S. authorities and other interested international agencies with the various governments to set up, for the region a school of metallurgy in, say, Zimbabwe, a school of geology in either Mozambique or Swaziland, a school of mining engineering in Zambia (which already has a Department of Mines at the University of Zambia) and an institute of mining economics in either Botswana or Namibia.

209. It is proposed that the mineral attache's office of the U.S. Embassy in South Africa should issue a report at monthly or bi-monthly intervals to all U.S. mining companies above a certain size (who might therefore have the ability to invest in the region), detailing the interesting mineral prospects in each country which the governments would like U.S. companies to consider developing. This report should be prepared in consultation with the governments and should give as much detail as is available and relevant to encourage interest. It should repeat and up-date information with each issue. It is lack of knowledge on the part of the industry of pertinent information which can hold up development. (The recommendations to 'reduce the information gap' made specifically for Botswana, Mozambique and Swaziland reflects the judgement that they are particularly prone to be neglected by the mining companies due to ignorance of their prospects. If the regional recommendation made above is not acceptable in its entirety or were to be implemented in stages, it is proposed that these three countries should be covered first.)

210. As part of the same programme of regular detailed dissemination of pertinent information to carefully chosen recipients, the U.S. authorities should sponsor occasional meetings on specific projects or topics related to mineral development in the region, which could be done at the request either of governments of the region, or mining companies or perhaps the State Department or Bureau of Mines. OPIC and Ex-Im Bank should be involved in such a programme on a regular basis and the project finance departments of the larger commercial and investment banks could also be included.

211. The U.S. Government should be prepared to sponsor the visit to U.S. mining companies' U.S. headquarters and plants at home and overseas, of government (and national mining agency)officials from the

region. Too often the visits are one way only, mining company officials to Southern Africa, and the mutual knowledge and understanding essential to development of resources in a good spirit of partnership is lacking.

212. The general and worldwide lack of investment in mining projects in developing countries has been a subject of concern to the U.S. Government, mining industry and financial sector for some time, and considerable discussion has taken place in various forms. It is proposed that, to help mineral development in the Southern Africa region, the scope of OPIC's investment and loan guarantee schemes be broadened to cover more risks to encourage a greater flow of resources into the sector from the U.S. mining and financial institutions.

213. The Zambian section of this report proposes that the U.S. should purchase some part, 500,000 is suggested, of its stockpile requirement direct from Zambia at a remunerative price consistent with the long-term trend price. It is argued that this will both benefit Zambia directly and contribute to a strengthening and stabilisation of the world copper price over the proposed five-year period. It is also considered that a study be made of the potential benefits to commodity (particularly mineral commodity) price stabilisation of the management of U.S. stockpiles of commodities (particularly mineral commodities) in such a way as deliberately to seek greater price stability. Clearly the impact on stabilisation of prices of a buffer stock scheme would be substantially increased if the U.S. stockpile of that commodity were managed in such a way as to be integrated where possible and in any event to be supportive of the efforts of the buffer stock manager. This study would be best done taking particular commodities as examples and it is proposed that copper and nickel should be the first examples studied.