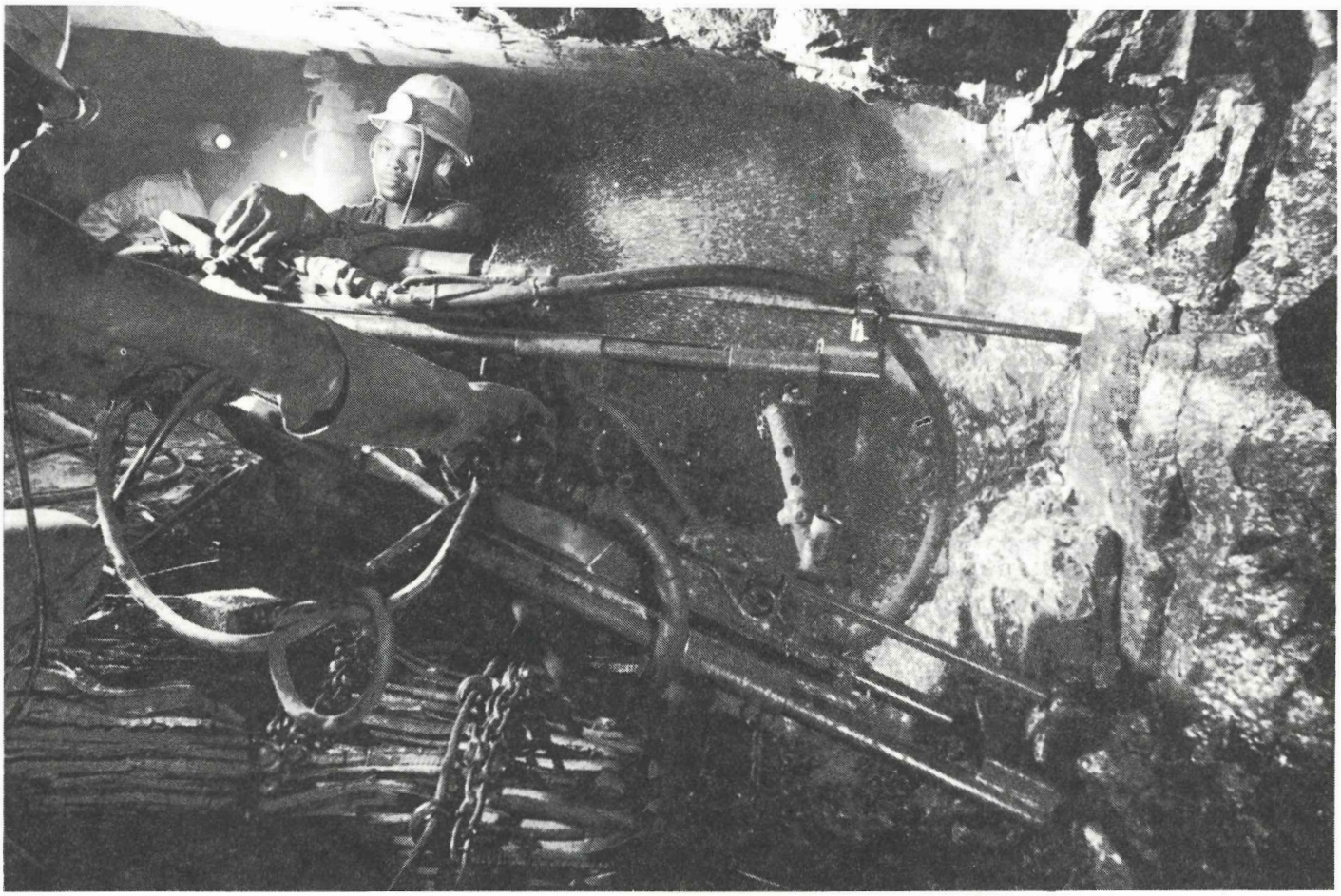
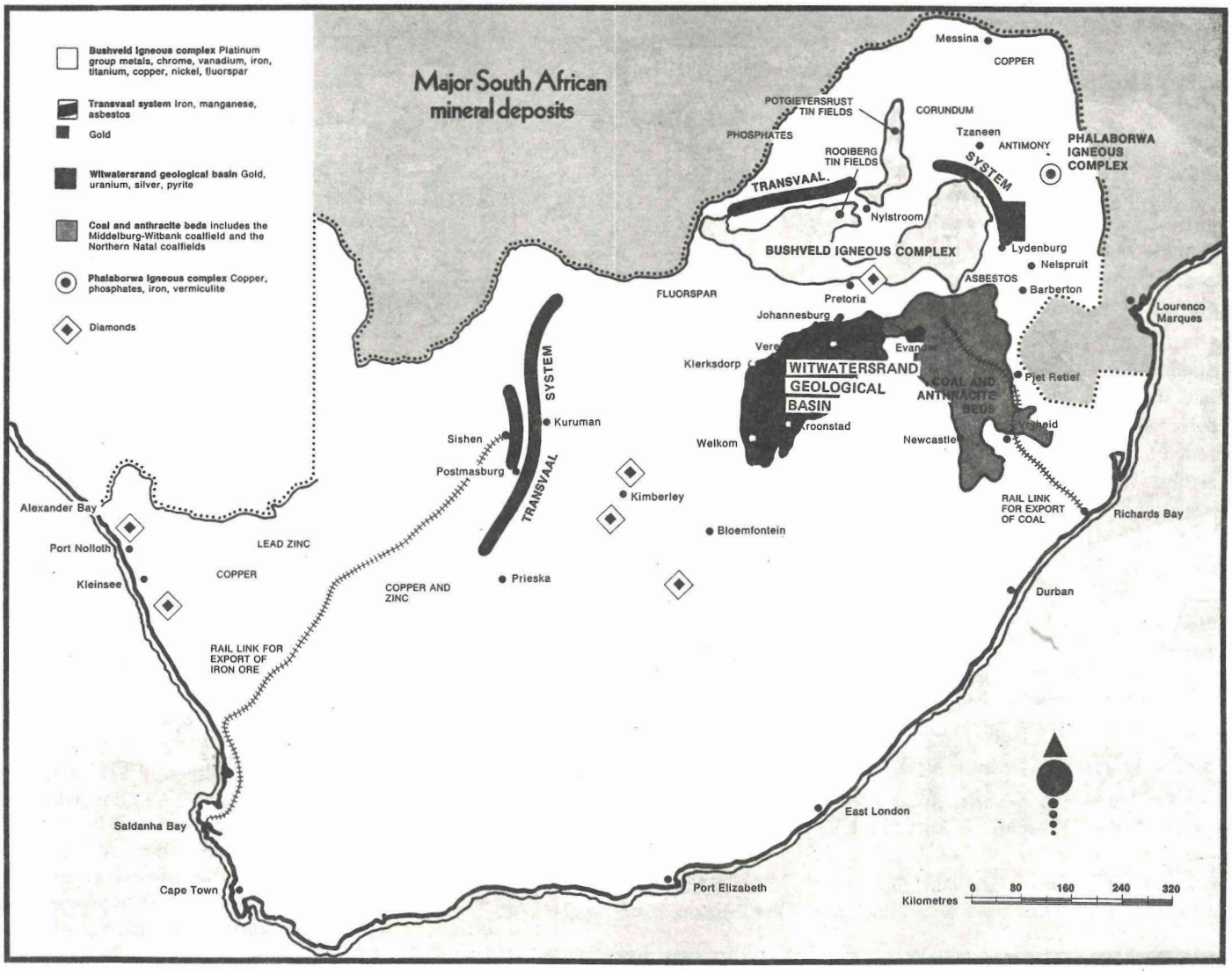



Major South African mineral deposits
Bushveld Igneous complex Platinum group metals, chrome, vanadium, iron, titanium, copper, nickel, fluorspar
Transvaal system Iron, manganese, asbestos
Gold
Witwatersrand geological basin Gold, uranium, silver, pyrite
Coal and anthracite beds includes the Middelburg-Witbank coalfield and the Northern Natal coalfields
Phalaborwa Igneous complex Copper, phosphates, iron, vermiculite
Diamonds
Messina
COPPER
POTGIETERSRUST TIN FIELDS
CORUNDUM
PHOSPHATES
Tzaneen
ANTIMONY
PHALABORWA IGNEOUS COMPLEX
ROOIBERG TIN FIELDS
TRANSVAAL SYSTEM
Nylstroom
BUSHVELD IGNEOUS COMPLEX
Lydenburg
Nelspruit
ASBESTOS
Barberton
FLUORSPAR
Pretoria
Johannesburg
Lourenco Marques
Klerksdorp
WITWATERSRAND GEOLOGICAL BASIN
COAL AND ANTHRACITE BEDS
Piet Retief
Kroonstad
Welkom
Newcastle
Sishen
Kuruman
TRANSVAAL SYSTEM
Postmasburg
Kimberley
Bloemfontein
RAIL LINK FOR EXPORT OF COAL
Richards Bay
Alexander Bay
Port Nolloth
LEAD ZINC
Kleinsee
COPPER
Prieska
COPPER AND ZINC
Durban
RAIL LINK FOR EXPORT OF IRON ORE
Saldanha Bay
East London
Cape Town
Port Elizabeth
Kilometres
0 80 160 240 320

Drilling in a stope.
Photo from the Anglo American Vaal Reef gold/uranium mine, no 4 shaft underground.

AREA REPORT

Illusions of dependence: South African minerals in the global economy

By Brian Bolton

The article examines the view that South Africa is bountifully supplied with a vast range of minerals and that because these are vital to "western" interests, no action can be taken by the international community in the context of UN resolutions on, for example, the illegal occupation of Namibia. The author poses quite the contrary, that many of South Africa's mineral deposits are low grade, that if does not have resources of many vital metal ores, but that it is largely the actions of mining TNCs that have erected the facade of dependance on South Africa. The article is, in part, an extract from "Illusions of Dependance" by the author, to be published in the UK.

Brian Bolton is at present a research officer with the Transport & General Workers Union in the UK, is a member of the Anti-Apartheid Trade Union Committee. His publications include work on agribusiness for the ICFTU and a book on minerals in Southern Africa, "Exploding the Myths", with Barbara Rogers as co-author.

INTRODUCTION

A modern industrial society relies heavily on a whole variety of minerals. These range from humble stones and gravel, such as cover the beaches of the world, to rare elements that can often only be recovered in the laboratory. The relatively recent economic history of Western Europe graphically portrays the development of a system whereby minerals of all sorts were imported, converted into various manufactures and then exported. The picture is as real today. What has changed are the politics surrounding large scale mineral extraction, conversion and re-export as manufactures.

The general history of the world has in fact been seen often in terms of the way minerals were used: 'Ages' of stone, bronze and iron. Whole cultures developed around primitive mineral extraction and benefication. The trading of ores and derivatives transcended the globe before people were really aware it was a globe. Salt and gold had passed each other across the Sahara Desert a millenium before Africans knew that is what they were called. The "cradle of civilization", the southern slopes of Anatolia, contained super-high grade deposits of copper and tin though the rock malachite was initially traded as a gem in its own right. It was around and upon such bases that the early power structures were built.

The extent to which minerals and other raw materials become political pawns depends on a whole range of factors. The monopoly trading companies of the mercantile era, the Fuggers, the Hansa, and later the East India Company, are examples of control of resources yielding political power. At various times tin, silver, mercury, and now gold and oil, are wielded with unerring accuracy by those that control them as resources.

The successors to the mercantile monopolies, the transnational corporations, are no less successful in cornering mineral supplies and dictating price and availability. The political power that is consequently bestowed may not be so obvious as it was with the old cartels, but it is none the less real. The mining/trading combines of today are just as resourceful as their forebears. Many of the near-monopolies of the 20th century are at least as effective as was the mercury trade of the 16th.

The 'sources' for many of the minerals and ores used today lay largely outside most of the industrialized countries. Increasingly they are extracted in the Third World and for the greater part former colonies of the European powers. Typically the early mining operations in the underdeveloped regions were established by companies stemming from the colonial power and that has handed a legacy to the present. The effort of these concerns has been complemented by the mining companies based in the US and Canada, where a large proportion of the world's proven reserves of minerals lay. More recently there has been added interests originating in countries where mining is a major part of the economy e g Australia.

Indigenous mining development has largely eluded Third World nations, partly because of the cost and partly because of the difficulty in gaining access to the company-run markets. Where Third World countries have nationalized extractive operations they have continued to operate under the tutelage of one or more TNCs. Zairian cobalt, mined, sold and priced by GECAMINES, is effectively traded by Société Générale de Belgique.

To some extent the 'politics' of some of the mining TNCs have mitigated against their selection to assist in mining development and this, coupled with co-operation between developing nations, have added a degree of uncertainty to the normally assured 'rights' of the companies.

A further influential factor, particularly since World War II, was the growth of 'bloc' politics with all their inherent rivalries and the development of war-related industries. These are hungry consumers of metallurgical inputs and the nature of the business has added a 'cold war' ingredient to the activity of the TNCs. The combina-

The mining TNCs often stress the strategic importance of South African minerals. This map was published in "Optima", (Vol 30 no 2, September 1981). Optima is the official publication of the Anglo American and De Beer group of companies.

tion of these various influences has resulted in certain parts of the world being seen as 'secure' and these places have become magnets for TNCs of all sorts, including the mining giants. Between them companies and governments have subsequently developed strategies for altering the "disposition" of the minerals.

But it is worth noting the extent to which the same variety of policies and ideas have sought to promote one country above all others; and that country is *South Africa.*

The politics of the mineral industry in South Africa

South Africa's geographic area is modest when compared with say China, the Soviet Union, the USA or Brazil and it is likely that the geological formations that have apparently made South Africa such a storehouse of minerals are not peculiar to that part of the world. The complexes of the Bushveld, of Barbeton and of the Merensky Reef were probably laid down in the Archaean through to the Devonian eons; between 3600 and 400 million years ago. The geological evidence of this much explored part of the world suggests that throughout that period there were some very violent crustal changes occuring over long periods of time and at very high temperatures. For part of the time at least the whole area was very unstable. Some may observe that the recent political history of the area mirrors that geological development.

More to the point it is highly probable that similar formations exist elsewhere on Earth. The principal reason why South Africa features so high in the usual catalogues of mineral suppliers is that mining development has taken place there rather than in other countries. This is despite there being ample evidence for higher grade deposits in other places. It is also however true to say that the development of South Africa has been based on mining and on the mining of gold and diamonds and this is partly reflected in the level of investment there relative to the rest of the World.

Having nearly twelve times the World average of funds invested in its mineral exploitation has something to do with its physical size. It has however far more to do with the position assigned to South Africa on the World political map.

The commercial exploitation of gold in South Africa not only dramatically altered the politics of the country but also the context in which the country was seen. The internal politics of South Africa have been as bizarre as the forces that moulded the geology on which they were founded. Concomitant with their development has been a parallel externality which has fostered and encouraged the politics as well as the illusions about the uniqueness of the geology.

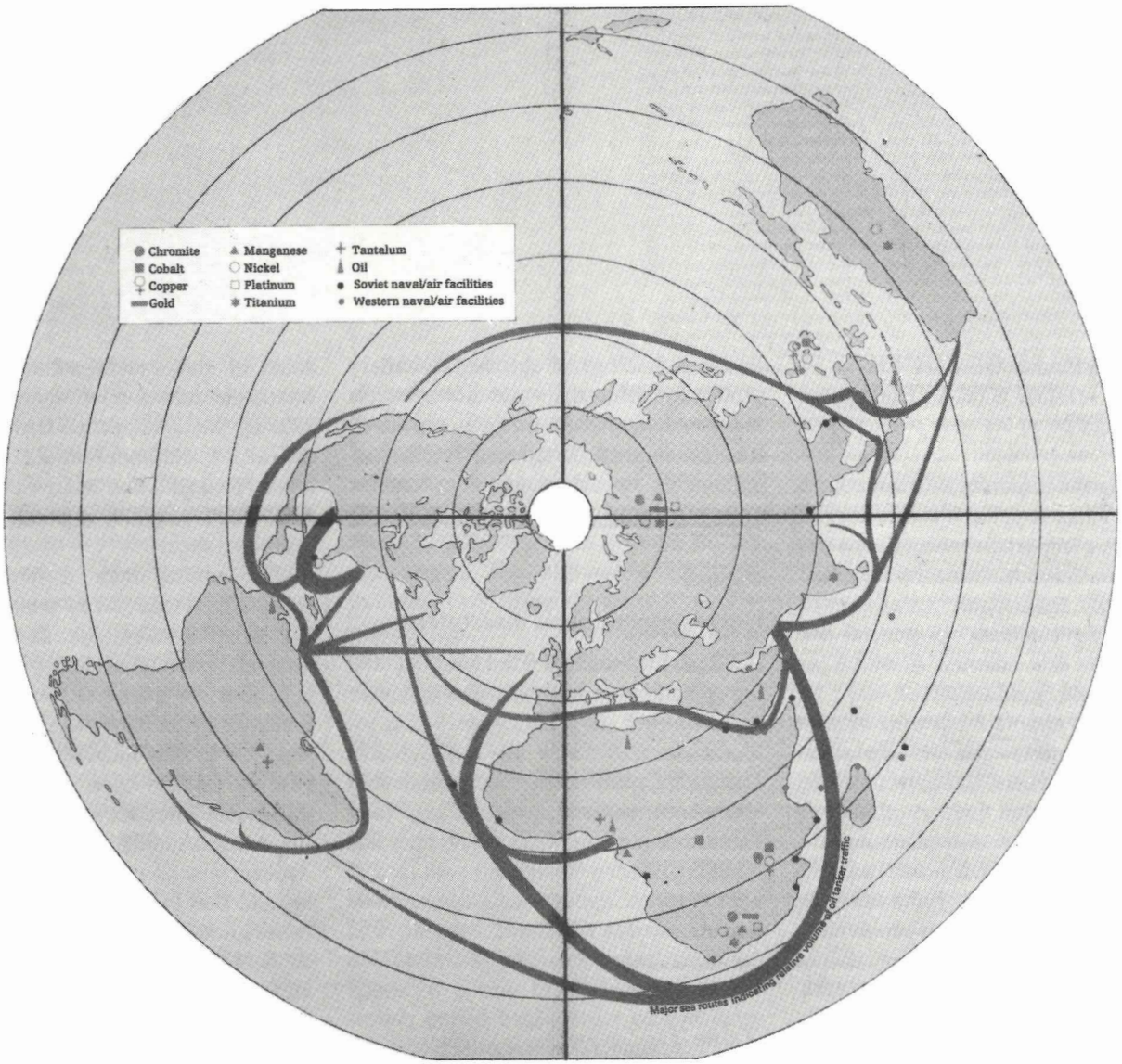
South Africa is, and has been almost since its inception as a selfgoverning country, ruled and run by a small minority for whom racism is more than a political dogma – it is a way of life. And hand in hand with the institutionalized racism that is apartheid has developed a virulent anti-Communism that now borders on paranoia. South Africa's racial policies stand universally condemned by most of the World community but their explicit "pro-western" stance has allowed them to become an economic and political ally of "the West". Various geo-political reasons are advanced as to why the regime in South Africa should be 'our' ally; trade routes, stabilizing influence in Africa[1] (sic), historic connections, cultural links and economic ties.

An important, if often discounted, factor in this has operated at a purely personal level. The 'pro South Africa lobby' is not just the business community or the diplomatic corps, vital though these may be to South Africa's case. There are probably hundreds of individuals, many of whom may have lived in South Africa, who have shares in South African-based companies, or who retain some fond, if obscured memories of the country. It was after all possible for the majority of whites in the country to live in total ignorance of what was in reality happening around them, at least up until the mid-1960s. Most telling of all is the fact that over the years all these factors have combined to produce the illusion of dependance on South Africa as a mineral supplier.

An argument has by whatever route, been established that says that, however much we may dislike South Africa's policies, we cannot afford to cut or reduce the economic ties that support the regime because we need those minerals. The argument has been refined by suggesting that if we did not have access to minerals and ores from South Africa we would be dependant on the Soviet Union. This curious thesis has, even been given a name – 'Finlandization'.

Such a concept was suggested by the Belgian prime-minister Leo Tindermans in June 1978 in the context of discussions concerning the renewal of the Lomé Convention. The evidence shows however, that while the USSR is a major producer of many minerals, and has the power to cause major disruptions in Western monetary circles by releasing its gold stocks, its own industrial needs always dictate prudence. An example was the extremely cautatious use of its gold during the winter 1979/80 price escalation, and thus suggests a reluctance on the part of the USSR to embark on any rash moves on commodity markets.

More important, the USSR has reserves and production of virtually every mineral there is, whilst South Africa is a major producer of only a few. Equally South Africa has no production at all of some of the most sought after ferrous metals; cobalt and molybdenum. This is, however, rationalizing out of a dilemma that does not exist. Linking South Africa with the Soviet Union is largely irrational. The majority of South Africa's mining output is exported whereas most of that of the USSR is consumed locally. A more relevant country with which to compare South Africa would be Chile, Zaire, Papua New Guinea or the north of Australia,



given the predominance of extractive exports in national revenues.

But then these comparisons are at most irrelevant and only constructed so as to pose the same dilemma in a different context. If, for example, we were discussing tin supplies it would be possible to say that if 'we didn't have Malaysia we'd need Thailand or Bolivia' and we could then go on to construct an elaborate geo-political argument in support of the original, and rather implausible, thesis. Malaysia, it could be said, was vital in protecting the Straits route and to 'our' strategy in the region. Such a thesis is of course nonsense[2] but no more than the Finlandization argument. But the nonsense has a value to the 'lobby' in that it side-steps one of the real factors of interest and usefully fails to confront another. As will be seen it is companies, rather than countries, that are engaged in the prospecting, mining, processing, transportation, conversion, and consumption of the minerals. It is their inertia which has precluded a search for alternative products and sources and inhibited the public announcement of the new discoveries that have been made. A conspired self denying ordnance on the part of the mining TNCs has at once increased the alleged importance of South Africa well beyond the point where its share of the world's mineral wealth would place it and has artificially developed a dependance in many countries. This factor is then used by the 'lobby' in supporting South Africa's specious pleading and of course it finds a fertile and prepared soil on which to broadcast its seeds of doubt and distortion.

It is a biting testament to historical irony that the ancestors of the racists that rule South Africa today in the name of "christian nationalism" should have themselves been refugees from cultural and religous persecution in Europe. But the white tribe would have long ago degenerated had it not been for the development of the mining industry. The fact that it has maintained and enforced its odious 'superiority' says much for the way Western governments have supported it and assisted companies to exploit it. Rather the companies have exploited the natural legacy of mineral wealth of which the original settlers were blissfully unaware.

In some cases there was direct conflict between miners and settlers, where for example gold was under farmland. Today, lease income from the mines can be a major ingredient in 'farm' incomes and the same 'farmers' are often amongst the most 'verkrampte' supporters of apartheid.

The companies meanwhile maintain their presence under the canopy of state protection, both inside and outside South Africa, and have in turn fostered a 'dependance' on that country as a source of minerals. Yet, however, extensive may be the deposits of ores etc, the degree of dependance that has been created is out of all proportion to South Africa's share of world production and reserves. This disproportionality, this excessive dependance on South Africa, has been and continues to be used as an argument to justify itself.

THE MINERALS OF SOUTH AFRICA – HOW STRATEGIC ARE THEY?

In assessing the importance of any source of raw materials supplies it is necessary to correlate two important ratios. Firstly the relative contribution made by suppliers and secondly the proportions of imports fed by these suppliers. In general one would expect that country 'A' with 8 per cent of world production of, say, tin would satisfy around 8 per cent of most customer's imports, give or take allowances for remoteness, transportation etc. Wild departures from this sort of relationship require some sort of explanation.

In addition to minerals production one is also concerned with finite reserves, proven reserves, deposits and economically recoverable deposits. The only one of these that can be assessed with any accuracy is the first, all the others are dependent variables.

Partly, though not wholly, it will be seen that quite incredible claims are made for South Africa in respect of minerals which are near the top of this list.

Once we move beyond the relationship noted above then availability rests very much on the extent of exploration, current or prospective prices, changes in mining and mine technology and benefication techniques as well as the ever changing mosaic of geo-political factors.

Each of these can have a varying impact both on supply conditions and on the demand side of the equation. There they are joined by considerations such as changes in end uses, manufacturing technology, relative pricing, industrial policy, terms of trade and most important of all, corporate planning.

The net effect is that a very fluid situation exists in which a fixed dependance is ultimately very hard to locate. For example the present level of lead imports by industrialized countries would be drastically cut by the progressive elimination of its use as a petrol additive and by a change in the technology of automotive battery production. Thus the world motor vehicle industry has, overall, a major impact on lead production. A reduced level of requirements would render uneconomic some of the present mining operations but make others relatively more attractive. By the same token alternative minerals (nickel, platinum) would fill the gap left by lead and their relative competitiveness would behove a re-assessment of extraction policy.

The sum of these different components affects changes in mining activity. For a nation that depends so much on minerals revenue as South Africa such equations are anathema. Therefore whilst doing all in their power to assist on the supply side they must also try and influence the demand side.

Because there are so many instances of the demand/supply ratios involving South African mineral exports being contorted beyond that explicable from most of the factors noted above, one is forced to the conclusion that some are being given more weight than others. South Africa itself stresses its geo-political significance, and spokespeople can always be found to support that contention. The other crucial factor of corporate planning would also appear to be particularly strong in South Africa's case.

A few general points need to be borne in mind in considering South Africa's arguments about the strategic importance of its minerals. These are of course in addition to the general discussion of reserves and the role of TNCs:

- Firstly *a significant part of what South Africa claims to export derives from other countries,* specifically those in the Customs Union with South Africa. Botswana is a significant producer of copper and diamonds and in much of the trade data examined diamonds from Lesotho featured. In addition Zambia and Zaire physically export copper and cobalt respectively via South Africa and it is not always clear that the accompanying documentation is as accurate as it could be. Most important, however, in this arena is Namibia.

Namibia is illegally occupied by South Africa and it is a rich source of many minerals. The totality of its output, virtually

Table 1

Non-energy mineral investment

(USD per km^2 stock of fixed assets in mining operations except coal, oil, etc)

World	270
Developing countries	141
Market economies	542
Planned economies	260
USSR	303
USA	543
Canada	382
South Africa	3116

Table 2

Composition of the earth's crust

Selection of finite deposits in parts per million (ppm)

Material	ppm in the crust
Iron (Fe)	62200
Titanium (Ti)	6320
Manganese (Mn)	1060
Vanadium (V)	136
Chrome (Cr)	122
Nickel (Ni)	99
Zinc (Zn)	76
Copper (Cu)	68
Colombium (Co)	29
Lead (Pb)	13
Uranium (U)	2.3
Tin (Sn)	2.1
Tantalum (Ta)	1.7
Germanium (Ge)	1.5
Tungsten (W)	1.2
Antimony (Sb)	0.2
Silver (Ag)	0.08
Palladium (Pd)	0.015
Platinum (Pt)	0.01
Gold (Au)	0.002

all of which is exported is included in the South African trade data. Some European countries likewise do not differentiate between imports from Namibia, which they should not be taking anyway, and those from South Africa. On independence Namibia will be an important and legitimate source of a variety of minerals (tungsten, tin, zinc), in some cases it will be of considerably more importance than the Republic of South Africa. Given the grim history of South African occupation, it is possible that a future legal government in Namibia would prefer to deal with countries and companies other than those which are collaborating with South Africa at the moment in this area.

• A second aspect of this relates to infrastructure. *South Africa has very extensive transportation networks, including seven ports, as well as a powerful mining industry already in existence.* It is this industry which by paying very low wages to its black employees, most of whom are migrant workers, gives it a competitive edge when compared to many Third World countries. This is compounded, particularly in the case of the land locked ones, by the very lack of transportation systems.

It is thus factors which have little or nothing to do with geology that make South Africa's relatively low grade deposits 'economic' in the sense that the net added value of refining outweighs the costs of production.

Mineral reserves – important but not unique

A factor boosting South Africa's ascribed share of world "reserves" is a related one. The calculation covers only those deposits which have so far been located and prospected in detail, and it is obvious that the intense prospecting activity all over South Africa referred to earlier has led to a very much higher proportion of its available mineral deposits having been identified to date than is the case with many Third World countries.

Added to this is the fact that estimates of 'reserves' are made on the basis of information that is often held as closely kept secrets by a small handful of transnational mining corporations. The corporations minimize known world proven reserves of major minerals in order to keep the price up. They also have a very strong interest in obtaining the most favourable possible agreements – on mineral royalties, tax holidays, etc – from governments with important mineral deposits. Promising, but largely untapped, deposits probably lay in Third World countries which have minimal expertise in their recovery. They are, however, moving to develop this expertise and, crucially in the case of Africa, development of a thriving domestically controlled minerals sector is seen as a priority. The TNCs meanwhile have no interest in allowing governments involved to know the full extent of the wealth buried beneath the ground, since the negotiating tactic is based on minimizing the value of what the country involved has to offer. Nor incidentally have those countries who "follow" Pretoria any real interest in assisting Black African self-sufficiency.

The published estimates of which countries have reserves of any given mineral are much affected by considerations such as these. The South African government, however, has its own considerable expertise in minerals and mining and it is thus not so easy for the companies to manipulate the state there the way they do to others. If anything there may be an argument for exaggerating the value of the deposits so as to justify the levels of investment that by all other criteria could be deemed unwise or even foolhardy.

The profit rates that some observers remark upon are only achieved by doing the Pretoria regime's bidding – by amortizing the investment over a very short period of time, by adhering to inhuman labour laws and by disregarding good practise with regard to depletion. Thus there is massive production and export and the highest grades of ore are extracted at a rate and without regard to the mortgaged future. Together the companies and the state are pursuing a common and short term objective in which each supports the other; the infrastructure and the income, the income and the international support, defence and dependance. It is in this symbiotic way that these illusions of dependance have been created and the propaganda machine fuelled.

Statistics of South Africa's proportion of world "reserves" and current output, therefore, need to be seen in the context of a *deliberate distortion – by the companies of alternative reserves, of the rapid depletion of South African mines by the exploitative extraction policies, and of the question of pricing* which is in many cases the key issue.

The availability or otherwise of most minerals is determined almost entirely by the prevailing price; if the price rises substantially, then more prospecting for the mineral is done and closed mines reopened. Price also determines which minerals are used in the various industrial processes. Some observers operating in the metals markets have gone so far as to say that there is no such thing as an indispensable or 'strategic' mineral: all are substitutable if the price is right and if availability is clear. This may be an oversimplification but it does indicate that even among those who have an interest in the business there is uncharted and disputed territory.

The discussion of these minerals is based not on the grounds that they are important minerals in particular or because South Africa's claims have any credence but because they appear in the production and trade data. South Africa is want to list every mineral they produce even though their share of world production is negligible. Loss of these would have little or no effect in the market place though it could stimulate production elsewhere which may be a positive advantage. But in metals such as cadmium, silver, iron silicon, molybdenum, lead and alu-

minium South Africa either produces none or so little as to be irrelevant yet Pretoria cannot resist the temptation to include it in its lists.

It is obviously necessary to differentiate between those minerals where South Africa's claims at least have some basis and those where they are frivolous. But even in the so-called strategic areas there is a need for a sense of perspective. One should not for example imagine that South Africa's position is unique in this relative sense. There are a number of cases where one country effectively controls the world supply of a particular mineral. Examples include Zaire, with between 40 per cent and 65 per cent of the world's cobalt, Brazil with 80 per cent of columbium, China with 50 per cent of tungsten reserves and 20 per cent of production. Left aside for one moment is the fact that it is usually a few companies, rather than countries that control supply, but South Africa has nothing like the degree of import noted above for virtually any of its supplies.

South Africa's mines

Ownership of the mines before the First World War was largely in foreign hands with South Africans having less than a 15 per cent stake. By 1935 companies such as Anglo-American and Anglovaal held 40 per cent of gold shares. Side by side with the growth of nationally owned mining companies was a gradual lessening of dependance on the mining sector as a contributor to the domestic product. This largely occured after World War II and was effected by the promotion of state assisted and highly protected manufacturing industries.

Nonetheless the mining industry is seldom far from the centre of the stage, even if it now accounts for a lesser percentage of GDP or of export revenue. South African industry is a net importer of basic chemicals, high technology goods and of course oil. This has to be paid for and mineral exports continue to be the dominant source of revenue for such purchases.

Thus mining is at least as strategic to South African policy today as it was in times of yore. The system of controls that the Government has erected over the industry, leases, mining laws, etc, enable them to have a degree of influence over the companies that does not exist in most Third World countries. It is, however, the companies who are the main agencies in the whole process of mineral operations from exploration to benefication and export. Almost all the companies operating in the South African mining industry are TNCs, a few of them South African based.

There is an alliance of interests between the TNCs and the South African government. The companies want to maximize profit and mineral extraction in South Africa attracts 100 per cent capital allowances. When tax is paid, after capital costs have been fully redeemed, it is at a rate of 40 per cent. The South African government wants foreign exchange, the companies a high rate of profit. So the extraction rate is very high and little attempt made to husband resources – the future is indeed mortgaged. One or two leading companies (e g Anglo-American) argue against this profilgate policy but with neither effect nor much example.

In the latter part of the twentieth century, as apartheid becomes more and more a system in crisis, gold continues to dominate the fortunes of the industry. Beneath its gilded facade lay buried the other minerals for which South Africans and their friends make a whole variety of strange, and often insubstantial, claims.

The structure of the industry fits very well into the dual economy of South Africa. It is a major employer of Black workers and particularly migrant labour yet its' revenues benefit almost exclusively the white ruling minority both directly in the form of re-distributed tax revenues and indirectly through the importation of luxury consumer goods. Although mines may have been worked for a long time, many mining communities have a very transitory appearence. Many of the larger companies operating in minerals also straddle other industrial sectors but the net value added from mineral benefication locally is increasing only very slowly. A policy of enlightened self interest dictates a mildly critical stance by the mining companies in relation to the Nationalist government, yet their operational policies provide the economic security that the Nationalists require in order to continue these policies.

The companies that operate in gold, Consolidated Gold Fields, Anglo, Gencor Barlow Rand etc, tend to dictate the pace of the whole mining sector. This is obvious because gold is such an important revenue earner. However, gold's leading position should not obscure the important developments taking place elsewhere.

TNC control of the South African mineral industry

To assess the true measure of transnational control over the South African mining industry is only part of the issue. There is also the question of TNC control over the marketing of the minerals extracted. The details below are an attempt to estimate as accurately as possible these twin halves of the equation. It is convenient, and easier, to set this out commodity by commodity but this must not obscure the telling fact that emerges – that a few TNCs have control over both production and marketing.

Aluminium Silicates

These comprise andalusite, kyanite and sillimanite. Kyanite production is largely in the hands of *Rand London Corp,* 51 per cent owned by the UK firm Burnett & Hallamshire whilst *Amcoal* (Anglos) is the main producer of refractory clays. The French firm Pechiney Ugine Kuhlmann is the main TNC engaged in the marketing side.

South Africa is a major producer of coal, which is exported in exchange for oil. Photo from the Amcoal loading terminal at Kleinkopje.

Antimony

One company accounts for all South African production, *Consolidated Murchison*, part of the Anglovaal group. Part of the output is used by Antimony Products, a joint venture between CML, the Chemetron Corp of the US and Johannesburg Consolidated Investment (JCI or "Johnnies"). Lead Industries Group, UK, would seem to be the main marketing agents.

Asbestos

The principal producers in South Africa are Gefco, owned by Gencor, the UK companies Turner & Newall and Lonrho and Associated Asbestos owned by US Steel. Central Asbestos, an affiliate of Gefco, does much of the overseas trading though some is done by Imetal (France), Amalgamated Metal Corporation (UK/Holland/Germany) and Bestobell (UK).

Chrome

This is one of four alloying agents used in steel making and one of the 'strategic four' minerals which South African supporters claim the 'West' cannot do without.

There are three basic types of chromite ore. Metallurgical chromite, which accounts for over half the ore mined globally, comes in two basic grades: high-grade, such as that found in Zimbabwe, and low-grade such as that of South Africa. Chromium found in these grades accounts for nearly three-quarters of the metal and all but about 1 per cent is converted into ferro-chrome. That one per cent is used to make non-ferrous super alloys for use in jet engines.

The remainder of the ore is characteristically divided half and half into the chemical grades, such as those of the Philippines, and refractory grades like those in Turkey. The development of new conversion processes has to some extent blurred the boundaries between the metallurgical and non-metallurgical grades.

Refractory grades are used for making high temperature bricks and as foundry mould sand and the chemical grades are used in tanning products and paints while some is converted into chromic acid where it forms part of the process of chromium plating.

There is a great deal of confusion about the way in which South African statistics on chrome trade, as in many other commodities, are put together. This then leads to highly exaggerated claims. For example the claim has been made that the US is dependant on South Africa for 90 per cent of chrome imports. US trade data shows that 83 per cent of *all* andalusite mineral consumption are covered by total imports and in 1980, for example, South Africa only supplied 13 per cent of the top grades of chrome imports as such.

The significance of the USA as a market is that Union Carbide runs four chrome mines in South Africa, including one of the two largest. The other US companies involved are US Steel, Texasgulf and International Minerals & Chemicals. Gencor, Barlow-Rand and Anglo American are the major South African TNCs involved along with Samancor.

Coal

Total South African mine output is 117 Mt/year. 35 Mt, 30 per cent of this is produced by *Amcoal*, part of Anglo-American, whilst the *Gencor* subsidiaries produce 30 Mt. The next largest producer is *Barlow Rand* with about 20 per cent so three companies control the vast majority of production. South African coal is subject to export quotas which in 1980 were limited to 20 Mt though this is being increased fourfold. Amcoal exports 6 Mt but a similar amount is exported and marketed by the oil companies BP, Total and Shell in what has become known as the 'coal for oil swap'. Gencor and Barlow-Rand are the local 'agents' in this but a private British company, Burnett & Hallammshire also has an interest in Rand London, another and smaller South Afri-

The mining TNCs have made important investments in Namibia.
An arerial view of the Consolidated Diamond Company's mine at Oranjemund.

can mining company, which is exporting coal to Europe via a terminal in Ghent part of the financing for which came from the Belgian government.

Copper

A minor fraction of the South African industry is locally owned and none of the extensive copper operations in Namibia. The table below shows the web of interests in Namibia and of these Tsumeb is the most important being the most significant employer in the country after CDM (diamonds) and Rössing Uranium.

In South Africa the one local company Messina has reserves of 4 Mt out of a total of over 800 Mt. The biggest operation, *Palabora,* is a 39 per cent-owned affiliate of RTZ in which Newmont Mining Corp (US) has a 29 per cent stake. Marketing is in the hands of the RTZ company Mandoval.

Prieska Copper is 50 per cent owned by Anglovaal and 46 per cent by US Steel while *O'Okiep* is 49 per cent owned by Newmont, and 22,5 per cent by GFSA (Anglo). Both mines are near to exhaustion with Prieska due for closure in 1985.

Black Mountain Mineral Development Co is a joint venture between Phelps Dodge and GFSA (Anglo). Most of the overseas sales of copper concentrates from these mines are handled by a Kennecott subsidiary, Quebec Iron and Metal Sales.

Diamonds

Another Anglo group company, *De Beers,* controls, through the Central Selling Organization (CSO) based in London, 80 per cent of sales of diamonds throughout the world. De Beers owns all the diamond operations in South Africa as well as the far more lucrative gem diamonds culled from Namibia. CDM, the Namibian subsidiary, together with its own associates, represents the major source of income in the territory, accounting for 50 per cent of GDP. Declared gem sales of around 500 M USD/year by the company mostly accrue to Namibian sources and for a country with a population of 1 million this is significant.

Table 2
Copper operations in Namibia

Tsumeb Corporation Ltd (TCL)	Operates at Kombat and Berg Aukas. Newmont 29.6 per cent, Gencor 7.3 per cent, BP 14 per cent (via Seltrust), O'Okiep 5 per cent (with management contract), Gold Fields of South Africa (Anglos) 42 per cent, Kiln Products 2.4 per cent (from SWACO).
Koper Maatskappy Bpk	Klein Aub, producing also silver, FVB 90 per cent.
Lorelei Copper Mines	Warmbad. Diamond Mining & Utility 33 1/3 per cent.
Minerts Development Pty	FVB 50 per cent (via Fedmar), Continental Ore Corp 50 per cent. (a Luxemburg-registered subsidiary of International Minerals and Chemicals, US).
Otjihase Mining Co[1]	A joint venture between Minerts (51 per cent) and JCI (49 per cent). In 1980 Tsumeb acquired a 70 per cent interest with JCI retaining 30 per cent. Copper ore is sent to Tsumeb for processing.
Vendrome Pty	Penarroya (ERAP).
Phelps Dodge	at Outjo.
African Triangle	AAC 20 per cent, Angovaal 51 per cent (via Mid Wits), US Steel 15 per cent, Tsumeb 20 per cent.
Sentrust Bpk	Joint venture between JCI and Gencor.
Oamites Mining Co[2]	Also produces silver. Falconbridge 75 per cent, IDC of South Africa 25 per cent.
Khan Mine (Rossing)	Olthaver & List (joint venture between Olthaver Gruppe (D) and South African Breweries (JCI).
Ongangi	Two operations run by Granby Mining and Navarro Exploration, both subs of Zapata Corp. (US).

Notes:
These operations also comprise other minerals including silver, iron, lead and zinc and TCL itself produces a vast range of products.

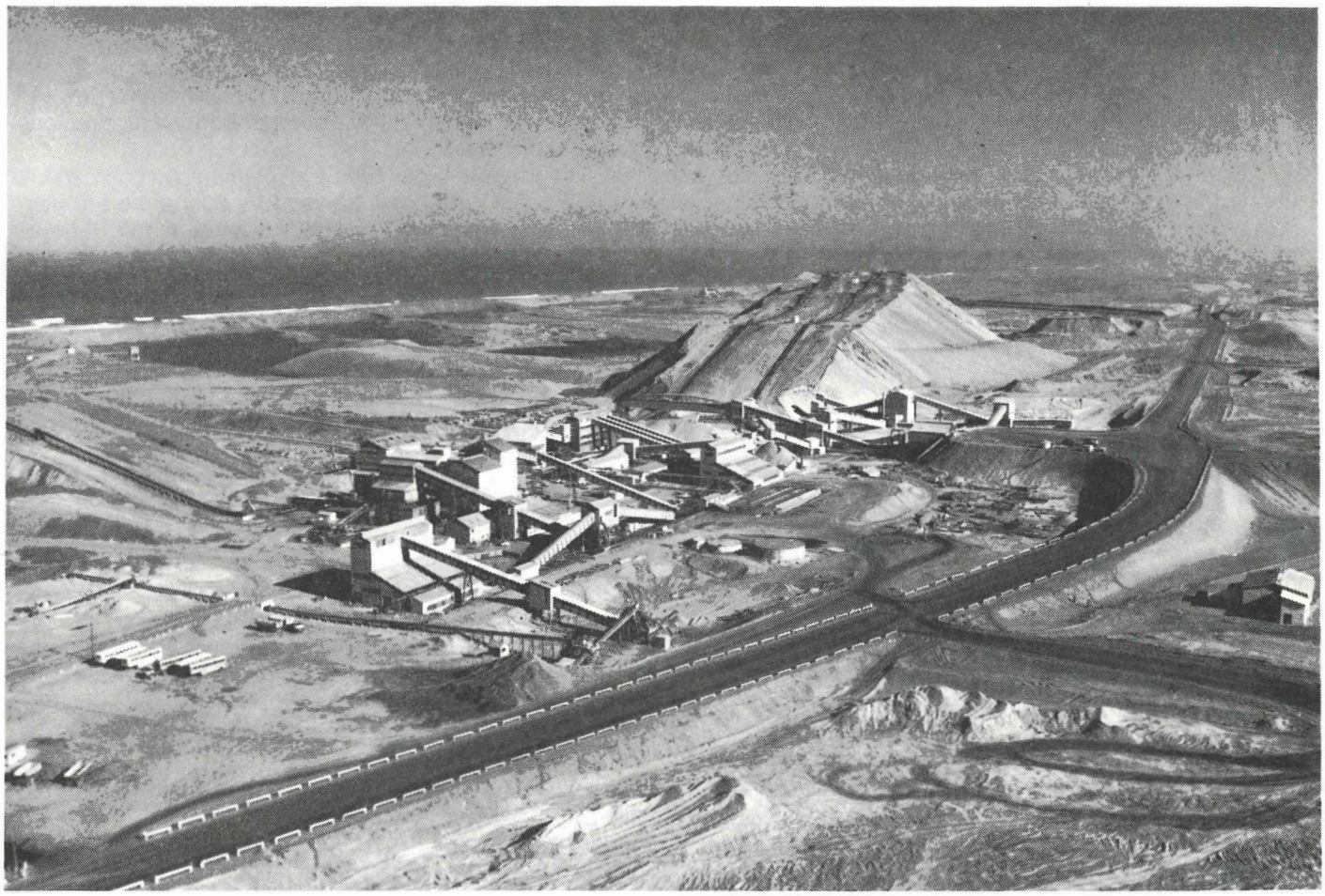
[1] Otjihase's output is being expanded to produce 1 kt of blister copper and 7 kt of pyrites as well as gold and silver.

[2] Production was cut by over 20 per cent early in 1981 when the recently opened Swartmodder mine was closed.

Ferro-alloys

Between 50 per cent and 90 per cent of the South African ferrous metal production is converted locally into alloys much of which is then exported. The proportions being beneficated into basic alloys is being increased as a matter of policy. There are six principal companies engaged in the business in South Africa and four of them, including the two biggest are all but foreign controlled.

Tubatse Ferrochrome is 49 per cent



owned by Union Carbide and 51 per cent by Gencor though the former manages the operation. *Feralloys* is 45 per cent owned by US Steel and 55 per cent by Anglovaal. *Samancor* and *Highveld Steel* were mentioned before and the state company Iscor also engages in export. *Barlow-Rand* and *Gencor* both have ferro alloy producers the former in conjunction with Union Carbide, and Johnnies manage a joint venture in which the US company Allegheny Corp are involved.

The significance of exports of ferro-alloy products by these companies is not solely in the arena of 'dependence', though in the case of ferrochrome there is an attempt to use that argument. Another, and equally important issue is that of substitution. Most, if not all, Third World countries are constantly trying to persaude mining companies to move upstream so as to create higher value added in the country of origin. Often a vast panorama of reasons are raised as to why this is not possible and one of these is that of employment loss in the TNCs home base. Yet those, largely but not solely, US corporations operating in South Africa but exporting to their 'home' markets must of necessity be displacing domestic production. On top of this a handful of major trading companies, or trading arms of manufacturing TNCs have developed a thriving business in the marketing of South African ferro alloys.

The principal traders are Klöckner, *Metallgesellschaft, Mitsubishi, Marubeni, Phibro, Engelhard, Imetal, Société Générale de Belgique, Coutinho Caro* (a direct Oppenheimer as distinct from Anglos interest) and *Pechiney Ugine Kuhlmann.* These companies are also involved a basic ferrous metals trading as well as the alloys derived thereof.

Fluorspar

The greater part of fluorspar mining in South Africa and Namibia is in the hands of TNCs. *Chemspar* is owned by Phelps Dodge, *Marico* by US Steel and Barlow Rand, *Zwartkloof* by Gold Fields, part of Anglos, *Buffalo* by Gencor, *Otavi Minen* by Metallgesellschaft, *Mintex* by Bayer and *Di Gamma* by Bethlehem Steel and Anglovaal. The predominance of US steel companies in production indicates why the US should take 44 per cent of South African exports and this is maybe the clearest instance of manipulation of world markets by TNCs. A product of this manipulation is a heightened dependance on South Africa and this 'enforced dependance' I call the 'fluorspar syndrome'.

Germanium

A by-product of the zinc industry and the 9 per cent that South Africa claims comes largely from Namibia care of Anglos and Newmont.

Gold

There is a view, supported by the author, that the role of gold within the world monetary system is not only over-rated but that it is a 'manufactured' role which reduces the power of democratically elected governments to control movements within and across their economies. It is a complicated argument and one on which there is not complete agreement but it is clear to everyone that the principal beneficiary of the 'Gold Lobby' is South Africa. Over 98 per cent of gold produced in that country is controlled by six companies who in turn run the mines. *Anglo-American* has 35 per cent, *Consolidated Gold Fields,* the UK company that is very much part of Anglo has 20 per cent, *Gencor* 14 per cent, and *Barlow Rand, Johan-*

nesburg Consolidated Investment and *Anglovaal* the remainder.

Mine output is sold to the refinery at Germiston and bullion gold is then bought by the Central Reserve Bank. Industrial gold is marketed abroad by companies like Derby & Co, 27 per cent owned by Anglo, Degussa GmbH and the six firms that 'fix' the price of gold daily in London. Krugerrands are marketed by Intergold, a subsidiary of the South African Chamber of Mines which is itself run by the companies.

Iron

The greater part of South Africa's iron mine output is consumed by the domestic steel industry. However, much of the ore that is exported comes from one of the largest mines, the state-owned Sishen complex. TNC involvement in iron mining and export is minimal, reflecting the greater importance they accord to the ferro-alloy trade. However, Rand London, Barlow Rand, RTZ -magnetite from Palabora being exported via Maputo, and Gencor all benefit from some export income.

Lead

Again Namibian output has been as significant as that of South Africa in bolstering the export figures of the latter. The Black Mountain copper complex in South Africa is now the major lead producer and most of the Namibian operations have been closed. Most South African exports from BMDC and the residues from Namibia are handled by Lead Industries and Fry's Metals, UK firms and by Otavi Minen of Germany.

Manganese

Samancor, the South African Manganese Corp, is said to be the largest manganese and ferro-manganese producer in the world. It is 25 per cent owned by Anglo and produces two-thirds of South Africa's output. It owns Wessels, the largest underground mine in the world and, until its closure in 1983, ran Roane Ltd, one of the major manganese producers in the USA. Other mines are owned by Gencor, Barlow Rand and Rand London and Associated Manganese, the country's second largest producer, is a joint venture between Anglovaal and US Steel. A principal exporter is a subsidiary of the German TNC Krupp.

Nickel

Most of South Africa's production is as a by-product of platinum refining though Anglos own Bindura Nickel which mines it as a primary product. Both AMAX and Falconbridge trade extensively in the nickel matte produced by the platinum companies. AMAX used to ship it to the US until Rustenberg's new refinery was opened but Falconbridge still ships the matte from Western Platinum to its refinery in Norway.

Phosphates

South Africa's deposits are very low grade and 90 per cent of output is consumed locally. TNCs such as Gencor, RTZ and the US firm International Minerals & Chemical Corp, do however produce and market for export.

Platinum

The platinum group metals are used in a variety of industries, though they were only isolated commercially in 1923. Platinum is cited by South Africa as one of those minerals for which the 'West' is 'critically dependent' on South Africa – one of the so called 'strategic four'.

99 per cent of the platinum produced outside the Soviet Union is in the hands of seven plants controlled by *Rustenberg* and *Impala* in South Africa and by *Inco* in the US and Canada. Rustenberg Platinum is itself 10 per cent owned by Inco and 23 per cent by Anglo and 33 per cent by JCI. The company is part of a joint venture with Johnson Matthey, 28 per cent owned by Charter Consolidated, another part of the Anglos empire.

The venture, *Matthey Rustenberg Refiners* operates alongside Ayrton Metals as the trading agent for Rustenberg's output. Ayrton is a subsidiary of Impala Platinum also 10 per cent owned by Inco and 50

Sales of Krugerrand gold coins in an important source of income for South Africa. Advertisement from the US business press.

per cent by Gencor, and between them Rustenberg and Impala effectively fix the world price of platinum.

The other two producers in South Africa are *Western Platinum,* Lonrho 50 per cent, Falconbridge 25 per cent, Superior Oil 25 per cent, and *Lebowa Platinum,* US Steel 50 per cent, Anglovaal 50 per cent.

Marketing agents overseas, aside from MRR and Ayrton, include Derby & Co, Associated Metals and Minerals (US), Degussa, Metallgesellschaft AG and Société Générale de Belgique, all of whom have links within South Africa.

Tin

Again Namibia rather than South Africa itself is the main contributor to the latter's 'export' figures and the decline in these figures, down 40 per cent between 1977 and 1980, probably is a reflection of the mine closures in Namibia. Preussag AG (Germany) is still however the major marketing agency for the South African companies. These are Union Tin, owned by Gold Fields (Anglos), Rooiberg Minerals, owned by Gold Fields and Consgold (Anglos) and Zaaiplaats Tin, the smallest operation and without any substantial TNC involvement.

Titanium & Zirconium

While not actually related the ores from which these are obtained, respectively ilmenite and rutile and zircon and baddeleyite, are mined and processed in South Africa by the same companies. These are *Tisand Pty* and *Richards Bay Iron & Titanium.* The former is a three way joint venture between the State, Gencor and Quebec Iron & Titanium (itself 2/3 owned by Kennecott and 1/3 by Gulf & Western) and the latter is 40 per cent owned by Kennecott. It should also be noted that in Australia, the major source of zirconium, Consgold (Anglos) has a stake in two of the producers, Renison and Mount Lyell.

Uranium

The most celebrated TNC engaged in uranium mining in the area is *Rio Tinto-Zinc,* at Rössing in Namibia. It is now well established that the operation is in clear violation of international law, as is RTZ's control over the marketing of its output. The company also produces uranium in small quantities from the Palabora copper mine in South Africa itself. Marketing of uranium in South Africa is supposedly under the control of a state corporation, *UCOR,* but more important is *Nuclear Fuels Corporation (Nufcor)* a consortium made up of Anglo-American, Anglovaal and Gencor. RTZ is not party to either of these but it is through UCOR/Nufcor that France, South Africa's major customer, gets much of its supplies. French government loans helped finance the Millsite complex near Johannesburg nominally run by Johannesburg Consolidated Investments (JCI or "Johnnies"). RTZs own marketing operation, Minserve, is based in Switzerland with an office in London and it is through this that the contracts are established.

Because of the nature of the world uranium business, with countries such as Australia and Canada refusing to sell to non-signatories of the non-proliferation treaty, the role of South African supplies, and the companies that control it assumes a special significance. The fact that nations who have signed the treaty have contracts with RTZ adds an ironic piquancy to the situation.

Vanadium

The last of the strategic four, 7 per cent of South Africa's output comes from Tsumeb's operations in Namibia and most of that goes to West Germany. Vanadium rarely occurs as an orebody as such and both the major sources employed in South Africa are effectively foreign-owned. Mapochs mine is owned by *Highveld Steel & Vanadium,* 12,5 per cent owned by Union Carbide with undisclosed stakes from Newmont Mining, and *Brits,* wholly owned by Union Carbide. A third and smaller operation is Transvaal Alloys owned by Otavi Minen and Vereinigte Aluminium-Werke. The first of these two is one of the partners in the largest recovery plant in Europe, at Nurnberg whilst much of the trade in vanadates is run by Phibro, in which Anglo have a 27 per cent stake.

Vermiculite

Vermiculite is used extensively in the building industry as a heat and sound insulation. South Africa's main producer is *Mandoval,* an RTZ subsidiary and that company is also the main marketing agent.

Zinc

This mineral was also extensively mined in Namibia, but the opening of the Gamsberg mine in South Africa sounded the death-knell for these operations as well as the by-products from Prieska. Gamsberg is 45 per cent owned by Anglos and 27.5 per cent by Newmont Mining and O'Okiep Copper, itself a Newmont associate.

All concentrates produced are refined by Zincor, 65 per cent owned by Consgold (Anglos) and 33 per cent by the state-owned steel company Iscor.

RTZ, Imetal and Metallgesellschaft are the major traders involved in marketing.

SUMMARY

This article has inevitably had to omit a lot of detail regarding the specific operations referred to. Nonetheless it shows clearly the extent to which a number of TNCs exert considerable leverage over one of the world's major mining industries. Although Anglo American is frequently mentioned so are TNCs not based in South Africa, Newmont Mining, US Steel, Metallgesellschaft etc. The question is, whose interests are really threatened by attempts to isolate South Africa? Those of the regime in Pretoria certainly, but do not the mining and trading companies also have something to lose by their prolonged association with apartheid?

Table 3
South Africa's major minerals

Mineral etc	South African share[1] of world reserves	South African share[1] of world production per cent	Production data[3] Kt	Production data[3] M ZAR	Export data[3] Kt	Export data[3] M ZAR
Aluminium silicates	33	30	160	–	–	6.2
Antimony[4]	4–7	16–22	16.2	17.7	12.2	15.1
Arsenic[5]	19	–	–	–	–	0.4
Asbestos[6]	6–10	7–8	–	137.8	–	148.5
Chromium ore[7]	68–83	26–34	2100	98.5	597	56.5
Coal	2	2	–	755.4	–	250.5
Cobalt[8]	–	–	–	–	–	9.7
Copper[9]			239 (ore)	209	–	10.9
"	1	3	187 (smelter)	–	87.6	196.3
"			95 (refined)	–	34.6	
Diamonds (industrial)[10]	7	12–15	–	258		859[11]
Ferrochrome		12.5–40	60 blast furnace		–	121.4
"			760 electr. furnace			
Flourspar	26–46	5–7	–	17.7		17.3
Germanium[5]	large	9	20	–	–	–
Gold	50	60	–	2800		2350
Iron ore	1	3	–	205.5		158.6
Lead[5]	1	4	47.3 (ore)	–	2.1	0.2
"			50 (metal)	–	16.7	11.9
Lithium[5]			0.2	–	–	0.6
Manganese ore			5350 metallurgical	–		
"	37–48[2]	23	98 chemical	–	4500	85
Manganese metal			–	–	–	19.3
Ferromanganese			–	–	–	63.5
Nickel	3–10	3	22.4 10	87.3	–	104.5
Phosphates	11	2		23.5		0.25
Phosphoric Acid				43.9		
Platinum group	71	46–47				
Platinum	85+	91	0.08 (2.6 Moz)	300		
Palladium	54+	80	0.02 (0.7 Moz)	36		
Rhodium	83+	88				
other		88				
Silver[9]	1	3	0.15 (4.7 Moz)		3.2	metal
Sulphur	1	–	–	–	–	–
Tin ore	1	4	3.4	24.1	1.5	8.3
" metal						4.9
Titanium	2 (rutile)	5				
	6 (ilmenite)	2			(TiO)	0.1
Tungesten	–	–[2]	–	–	–	3.9
Uranium[9]	17[2]	12	2.78			

Mineral etc	South African share[1] of world reserves	production per cent	Production data[3] Kt	M ZAR	Export data[3] Kt	M ZAR
Vanadium	18–64[2]	35–47	11.2	52.6		
Vermiculite	30	41		5.9		
Zinc[9] ore	2	1	122.6	19.6	97.4	8.3
" metal						4.9
Zirconium	11	5	11.6			1.7

Notes:
The above table embraces about 90 per cent of South Africa's exportable mineral products. By value – and including benefication – some 83 per cent of output (excluding gold, silver and diamonds) is exported. This is as high, if not higher, than the export proportion from many underdeveloped countries whose extraction industry is far more under the control of TNCs than is that of South Africa, for example Zaire, Gabon, Chile.

[1] The variation in the figures stems from estimates from differing sources. There are two important features of South Africa's net worth as a producer; the whole question of 'reserves' is a vexed one and many observers are often imprecise as to whether they are referring to deposits, to proven or to unproven reserves. There is a tendency as regards South Africa to include many deposits that would be totally uneconomic to extract.

[2] At least three cases, manganese, vanadium and uranium, some estimates published by pro-South African sources are pure guesswork (74 per cent, 75 per cent and 22 per cent respectively) and bear no relation to data stemming from the world mining industry. In the final analysis there is, literally, a world of difference between the likely occurence of orebodies in the crust and 'blocked out' reserves.

In some cases in the table export figures may exceed those of production and this is usually due either to benefication processes e g copper, nickel, asbestos, to year-on-year supply positions and contracts or simply to exaggerations in South African export data.

[3] Production and export volumes are 1977/78 averages, values are 1977. Source Chamber of Mines, SACU Stats, Mining Yearbook etc.

[4] antimony ore only
[5] mostly from Namibia
[6] all the world's amosite and crocidolite, includes some from Rhodesia (1977)
[7] may include some of the world's 8 per cent of production and 14 per cent of reserves from Rhodesia (1977)
[8] includes Botswana
[9] includes Namibia
[10] 25 per cent of all *gem* diamonds come fron Namibia – not included in above table
[11] all diamond exports.

Data from 1980/81 do not demonstrate major variations from the table except as follows:

Antimony	1980 production was 22 Kt.
Coal	total coal exports in 1981 were 720 M ZAR
Cobalt	exports in 1981 were down to 6 M ZAR
Copper	ore exports in 1980 and 1981 were over 30 M ZAR
Ferrochrome	export sales in 1981 were valued at 292 M ZAR
Ferromanganese	1981 exports were 124 M ZAR
Fluorspar	1981 exports, 44.3 M ZAR
Iron	ore production in 1980 was 26 Mt
Zinc	ore production in 1980 was 158 Kt.