THE MINERAL INDUSTRY OF

SOUTH AFRICA

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South Africa in 1995 was one of the world's major mining and mineral processing nations. Apart from having by far the largest production of gold, South Africa was the largest or among the dominant producers of many other mineral commodities. World-class output of metallic minerals included ores and/or smelted products of antimony, chromium, iron, manganese, platinum-group metals (PGM), titanium, uranium, vanadium, and zirconium. Important output of industrial minerals included andalusite, asbestos, diamond, dimension stone, fluorspar, phosphate rock, and vermiculite. South Africa was a major producer and the world's third largest exporter of coal. It was also the largest producer of liquid fuels and petrochemicals derived from coal. South Africa's well-developed railing and port infrastructure served the domestic minerals industry and those in neighboring countries.

Mineral commodities continued to be the cornerstone of the South African economy. Total sales of crude or primary minerals in 1995, as reported by the South African Minerals Bureau, amounted to about $15.6 billion.[2] Export sales of mined and quarried commodities accounted for over $12.1 billion of this, including gold worth $6.4 billion and coal worth $3.5 billion.[3] South Africa also had important production of a number of secondary or processed mineral commodities, notably ferroalloys and steel, cement, manufactured fertilizers, and refined petroleum products (from coal and crude petroleum). Data were incomplete on the total value of these products, but it was estimated that they totaled over $10 billion, including exports of about $5 billion. Almost 90% of South Africa's electricity was generated from coal and about 6% from uranium. By comparison, South Africa's gross domestic product in 1995 was $119 billion, and total exports were $27.8 billion.

Government Policies and Programs

The Department of Mineral and Energy Affairs (DMEA), within the Ministry of Mineral and Energy Affairs, was the primary Government entity responsible for oversight of the country's mineral industry. Within DMEA were the Mineral Rights and Management Services Chief Directorate, which was responsible for liaison and information and the registration of mining titles; the Minerals Bureau Directorate, which was responsible for collecting, classifying, and analyzing mineral data; and the Energy Chief Directorate, which promoted the optimum utilization of energy resources. The Government Mining Engineer and the Mining Branch were responsible for mine health and safety issues. Nine Regional Directorates issued prospecting permits, inspected mineral operations and mine rehabilitation sites, and ensured compliance with environmental regulations.

The Council for Mineral Technology (Mintek) and the Council for Scientific and Industrial Research (CSIR) conducted minerals, mineral processing, and environmental research.

The Minerals and Energy Policy Centre (MEPC) continued to act as an advisory think tank to the African National Congress Government administration and helped coordinate a tripartite drafting effort by Government, industry, and labor stakeholders to produce a Green Paper on a Minerals and Mining Policy for South Africa which was released for public comment in November 1995. Following review by DMEA, the final White Paper on minerals policy was expected in 1996, although the subject of public versus private mineral rights remained an issue.[4]

The South African mineral industry operates under a framework of core laws. These include the Mining Titles Registration Act, 1967; Mining Rights Act, 1967; Central Energy Fund Act, 1977; Petroleum Products Act, 1977; Nuclear Energy Act, 1982; Diamonds Act, 1986; Electricity Act, 1987; Mineral Technology Act, 1989; Minerals Act, 1991; and Minerals Amendment Act, 1993; the Liquid Fuels and Oil Repeal Act, 1993; and the Nuclear Energy Act, 1982, as amended in the Nuclear Energy Act of 1993. A number of these laws were expected to be subject to review. Under the Minerals Act of 1991, all mines had to reapply for mining permits by January 1994. In 1994, corporate tax rates were reduced to 35% to encourage investment, but the mining industry was assessed a one-time Transition Levy of 5%, related to the elections.

Mine safety has become a major issue in South Africa, especially in the gold industry where an average of 742 miners a year have been killed from 1900 to 1993. In 1995, gold and coal mining fatalities increased to 435 from the 404 reported by the Chamber of Mines in 1994. The buildup and release of natural earth stresses associated with 1,000 meter (m) to 3,800 m deep mining and the related rockbursts have been a major cause of most fatalities. In May 1995, one of the country's worst mining tragedies occurred at Vaal Reefs

Gold Mine when 104 men lost their lives when a locomotive fell more than 500 m down a shaft, crushing the cage carrying the miners. This accident, along with the Leon Commission Report on mine health and safety conditions and regulations in South Africa spurred a priority effort to revise the country's mine safety laws. Major new legislation was expected to result from this effort. The Leon Commission Report also highlighted the high illiteracy rate among miners as a safety problem that needed to be addressed through additional remedial education and safety training.

Environmental Issues

Reclamation plans and environmental impact statements were required for existing and proposed mineral operations. New mining projects were under increased environmental scrutiny. The bio-oxidation process, developed in South Africa by Gencor Ltd. and Mintek, to reduce arsenic emissions during the processing of gold ores, has been successfully adopted by mines in some other countries, most notably at Ashanti Goldfields Ltd's Obuasi gold mine in Ghana. Feasibility studies were underway to install scrubbers at the country's many large coal-fired powerplants, although the cost of such retrofits was expected to be prohibitive. Environmental considerations to reduce surface impacts were shifting the design of the proposed new Gamsburg zinc deposit from open pit to underground mining. An independent committee recommended against the issuance of a mining permit for the St. Lucia titaniferous sands project in an environmentally sensitive part of the northern Natal coastline, with the Government concurring with this recommendation and denying the permit in early 1996. A proposed new steel plant for Saldanha Bay was opposed on environmental grounds, but subsequently received approval to proceed.

In August 1995, the Department of Environmental Affairs and Tourism initiated a Consultative National Environmental Policy Process, generally referred to as Connepp, to review the state of the environment in South Africa and to recommend a new environmental policy for the country. A draft Green Paper was expected by mid-1996.

Production

South Africa in 1995 was one of the largest and most diverse minerals producers in the world. As shown in table 1, output levels in 1995 were mixed. In the major metals, production of antimony, chromite, and ferrochrome, and of estimated titanium slag output were all up more than 20% from 1994. Aluminum, iron ore, pig iron and steel, manganese ore, rutile and vanadium also experienced increases for the year. Of major importance, gold production, affected by declining ore grades and increasing labor problems decreased by 6% to 10% for the second year in a row and by 48% from peak historical production of about 1,000 metric tons (t) in 1970. It was the lowest production year since 1956. Reflecting weak markets, output of silicon ferroalloys, uranium, and diamond, experienced declines of up to 25% in 1995. Output of lead and nickel also dropped.

Among industrial minerals, cement production, a useful leading economic indicator, increased by over 1 million metric tons (Mt) in 1995 in response to a major growth in domestic housing starts and because of demand from some major industrial development construction projects, such as the Columbus Stainless Steel and Alusaf Aluminium Smelter projects. Fluorite and magnesite production were up from 1994. Continuing strong domestic and very strong export demand for steam coal led to an additional 6% increase in bituminous coal production during the year as South Africa surpassed Australia to become the world's largest producer of coal after China, the United States, and India. Gypsum and vermiculite production dropped by up to 10%. The decline in vermiculite production was attributed by Palabora Mining Co. Ltd. to unusually high rainfall and a delay in commissioning new fluidised bed drying furnaces. Asbestos output continued to decline in step with an the ever-diminishing world market.

Trade

Export data for most crude or primary minerals and for selected processed mineral products are reported by the South African Minerals Bureau. Exports accounted for 78% of total primary minerals sales revenues of $15.6 billion derived from mining and quarrying in 1995. The $12.1 billion in these primary mineral exports accounted for 43.6% of total exports of all goods. The contribution of mining to total export revenues has been declining as the manufacturing sector of the economy has expanded over the past decade. The Minerals Bureau estimated that the inclusion of the various processed mineral products, such as ferroalloys and steel would raise the contribution of the minerals sector to well over 50% of total export revenues.

As usual, primary mineral exports in 1995 were led by gold, valued at $6.43 billion. After gold, the most valuable mineral exports were platinum-group metals (PGM) and coal ($1.79 billion) from the 60 million tons shipped from the expanded Richards Bay Coal Terminal. Exports of iron ore were valued at $351 million, copper at $216 million, nickel at $130 million, and manganese ore at $125 million. Although individual data were officially withheld, exports of diamond, titanium, and zirconium minerals accounted for most of the $983 million reported by the Minerals Bureau for "miscellaneous" mineral exports. Other significant mineral export earners were granite at $66 million and cobalt at $68 million. Major destinations for primary mineral exports, including precious minerals, were Europe at 87.6% by value and the Pacific Rim countries at 9.2%.

The Minerals Bureau also reported an additional $1.94 billion in exports of processed mineral products, of which

ferroalloys accounted for $1.18 billion, vanadium metal for $115 million, and aluminum for $103 million, following the startup of the Alusaf smelter. Major destinations for processed mineral exports, were Europe at 38.4% by value, the Pacific Rim Countries at 37.7%, and North America and Central America at 17.6%. Exports within Africa account for less than 1% of South African mineral export trade. With the end of economic sanctions against South Africa, intraregional trade in Africa is expected to increase; although the African markets for South African mineral exports remain comparatively small.

According to United Nations trade statistics, South Africa imported $4.3 billion in energy and nonfuel mineral products in 1995 with mineral fuels, including coking coal, accounting for 65% of the total. Other significant mineral imports by value were diamonds, precious metals, alumina, certain ferroalloys, nickel, magnesite, magnesia and sulfur. The richly endowed South Africa, which is self-sufficient in a majority of its mineral needs, thus generated a favorable mineral trade balance, estimated based on available data, of nearly $10 billion for the year.

Structure of the Mineral Industry

The South African minerals and energy industries, for the most part, operates on a free enterprise, market-driven basis. Government involvement in these sectors is minimal and is primarily confined to ownership of the national electric utility, Eskom; the national oil and gas exploration company, Soekor; and to subsidies provided to the parastatals Mossgas and Sasol. With the end of economic sanctions and more open access to world petroleum supplies, these state-owned energy companies are now being considered for privatization.

The South African minerals industry was unusual in that the bulk of mineral land holdings and production are controlled by five mining investment houses, Anglo American Corp. (AAC), Gold Fields of South Africa (GFSA), Gencor Ltd. (formerly General Mining and Finance Corp.), Rand Gold and Exploration Co., (formerly Rand Mines Ltd.), and Anglovaal Ltd.. A sixth mining house, Johannesburg Consolidated Investment Ltd. (JCI), is controlled by Anglo American. These houses also had major holdings in most other sectors of the South African economy. The legal and regulatory framework that favored this arrangement was expected to be reevaluated by the new Government. The overall structure and ownership of the minerals industry is summarized in *table 2*.

The major mining houses have begun reorganizing assets and divesting themselves of nonmining subsidiaries—a process of corporate restructuring locally referred to as "unbundling." The mining houses also were expanding activities overseas—a process greatly aided by the rapid removal of economic sanctions against South Africa following the 1994 election and the establishment of majority rule. An example of this was Gencor, which purchased the worldwide mining assets of Billiton Ltd., a subsidiary of Royal Dutch/Shell in 1994 and later merged its Trans-Natal coal company with Randcoal to form the new company, Ingwe Coal Corp. Ltd., which is now the world's largest exporter of steam coal. In May 1995, the AAC unbundled its holdings in JCI into three separate companies: JCI Ltd. with interests in gold, ferrochrome, coal and base metals; Anglo American Platinum Corp. (Amplats), a consolidation of AAC and JCI platinum assets forming the world's largest platinum-group metals producer; and Johnnies Industrial Corp. (Johnnic), containing its nonmining industrial holdings.

The major mining houses are the principal members of the Chamber of Mines of South Africa. Other members include the majority of remaining gold and coal mines and a number of producers of other mineral commodities. The Chamber of Mines was responsible for a variety of advisory and service functions. One of the main activities of the Chamber was the annual wage negotiations between member mines and the National Union of Mineworkers (NUM). The Rand Refinery, the largest gold refinery in the world, was affiliated with the Chamber.

The largest foreign-owned mining group operating in South Africa was RTZ Ltd. of the United Kingdom, which jointly owned, with AAC, the Palabora copper mine in Northern Province, one of the largest copper mines in the world. RTZ was also a 50% shareholder in Richards Bay Minerals Ltd. (RBM), a major world producer of mineral sands, with operations in the coastal areas of Kwa Zulu/Natal Province.

According to the Minerals Bureau, the overall South African mining industry employed an average of 595,000 workers in 1995—about 2.4% fewer than in 1994 and represented about 4% of the country's economically active population. The gold industry was the largest employer within the mining sector with 63.7% of the total employees, followed by the platinum-group metals with 15.4% and the more highly mechanized coal sector with 10.4% of the workforce. Total remuneration paid to the mining workforce in 1995 was $4.2 billion. Employment at Chamber of Mines member gold mines in 1995 dropped to 377,017 down from a peak employment level of 534,255 in 1986.

Commodity Review

Metals

Aluminum.—Primary aluminum production in 1995 came entirely from Aluminium South Africa (Pty.) Ltd.'s. (Alusaf) Bayside smelter at Richards Bay. Output increased by 13% to 195,000 t of aluminum during the year as work progressed on the project to reduce fluoride emissions and upgrade capacity from 170,000 to 210,000 metric tons per year (t/a). Alusaf was on schedule to begin production from it's new $1.5 billion, 466,000 t/a aluminum smelter at

Hillside, adjacent to its Bayside smelter, by mid-1996. The Hillside project is one of the largest green field aluminum smelters ever built. Gencor, the controlling owner, had long-term contracts with Alcoa of Australia Ltd. and Billiton to supply 500,000 t/a and 400,000 t/a alumina, respectively. In turn, Alcoa and Billiton would be major consumers of the smelter's output. Despite the purchase of Billiton by Gencor, no plans were announced to alter the alumina supply arrangements. Financing of the Hillside project by Gencor was aided by agreements with its alumina and energy (Eskom) suppliers to peg raw material charges to the world aluminum price, thus taking part in the upside gains and downside risks of aluminum market cycles.

Antimony.—Consolidated Murchison Ltd. is South Africa's only producer of antimony ore (as stibnite concentrate). Its output the largest in the world after China, Russia, and Bolivia. In 1995, Consolidated Murchison announced an approximately $8 million investment to develop additional ore reserves through its Beta Shaft. The company reported that current mine reserves were expected to be depleted within 6 years at the current production rate of 37,000 t of antimony and gold ore per month. The Beta Shaft project will come on-stream in the year 2000 at a milling rate of 40,000 to 45,000 tons of ore per month. In recent years, most or all of Murchison's concentrates have been sold to the adjacent Antimony Products (Pty.) Ltd. plant for conversion to antimony oxide. Apart from primary production from the Murchison Mine, the Minerals Bureau also reported that, during 1995, an estimated 32,100 tons of antimonial lead, with an antimony content of from 1.5%to 12%, was recovered from recycled lead-acid batteries.

Chromite.—Buoyed by the strong international market for stainless steel, South Africa increased production of chromite ore by more than 40% in 1995. Production comes from over 20 mines within the Bushveld Ultramafic Complex. Domestic ferrochrome smelters consume 78% of chromite ore supply, with the remainder exported. Samancor Ltd. was the largest chromite producer in the country and held 60% of South Africa’s chromite ore reserves. In 1995, Samancor recommissioned several idled mines thereby increasing production to 3.17 Mt of ore—1.65 Mt from the Eastern Chrome Mines Division and 1.52 Mt from the Western Chrome Mines Division.[5] Chrome Resources, a subsidiary of Chrome Corp. Holdings Ltd, produced 1.7 Mt of chromite yielding 800,000 t of marketable product at its Chroombronne Mine and announced plans to double capacity. The remainder of production comes from mines producing from 0.2 Mt/a to 0.6 Mt/a operated by Chrome Chemicals, a subsidiary of Bayer AG (Germany), Dilokong Chrome Mine, Angovaal’s Lavino operations, Marico Chrome Corp, and Consolidated Metallurgical Industries (Pty), Ltd. (CMI).

Copper.—Palabora Mining Co. Ltd. was by far the largest copper producer in the country. In 1995, Palabora treated 29.5 Mt of ore grading 0.59% copper yielding 418,936 t of concentrate averaging 33.83% copper. This was the highest output of copper since the mine opened in 1964. Smelter production, however, dropped by 3% to 114,014 tons, and refined copper cathode, rod and cast shapes remained level at 115,782 tons. During the year, the company announced plans to invest $532 million to convert the mining from open pit to an underground operation by 2003. The conversion will extend the life of the mine by another 20 years, based on a daily mining rate of 30,000 t of ore and an annual refined capacity of 90,000 t of copper. The complex carbonatite mineralogy of the Phalaborwa copper deposit also produces a unique suite of coproducts and byproducts including: the zirconium ore mineral, baddeleyite; nickel sulfate; uranium; a titaniferous magnetite concentrate containing 64% to 67% iron, which is stockpiled; phosphate and vermiculite concentrates; and modest amounts of precious metals contained in refinery tankhouse slimes. Apart from two other copper companies, copper also was produced in small amounts by the country's PGM mines.

Gold.—Although South Africa's gold industry in 1995 remained the largest by far in the world, it had its worst production year since 1956. The decline in 1995 was due mainly to lost productivity resulting from labor unrest; an increase in paid holidays from 4 to 12; and higher costs associated with deeper mining and longer ore haulage routes. The long-term decline in grade of ore milled from an average of 13.68 grams per metric ton (g/t) in 1966 to 4.87 g/t in 1995 was also an ongoing factor.

The major problem, according to the industry, was that the extra holidays were being imposed while the mines were still restricted to a 6-day workweek. The industry argued that Sunday mining, which has been traditionally banned, would give them a large net increase in working days, and hence gold production. Further, it would lead to the mines potentially hiring more workers. Following negotiations, the Chamber of Mines and NUM agreed to incrementally introduce full calendar operations, referred to locally as “Fulco,” and the government ban on Sunday mining was selectively lifted for those mines that requested it.

According to the Chamber of Mines, annual working costs per kilogram of gold produced among 35 mining operations, ranged from a low of 22,066 rands per kilogram ($189 per troy ounce [tr.oz.]) to a high of 49,677 rands per kilogram ($526/tr.oz.). The average cost of production for all mines was reported at 38,040 rands per kilogram ($326/ tr.oz.). The data also showed that working costs per ton of ore milled, in rand terms, has increased by 225% over the past ten years, including a 19% increase in 1995.[6] The increases reflected generally high inflation levels (including higher wages) and, notwithstanding labor-intensive mining

methods, the great technical difficulties of mining at extreme depths. Increasing domestic costs, however, have been offset by the devaluation of the rand against the dollar and the resulting higher rand gold prices realized.

The Witwatersrand gold mines varied greatly in size and grade. The largest, by far, continued to be AAC's Free State Consolidated (Freegold) mine group, which milled 21.9 Mt of ore in 1995 to recover 92,717 kilograms (kg) of gold. In September, Freegold announced plans to downsize its marginal shafts and to close five unprofitable shafts. Apart for some tailings reprocessing operations, the smallest production on the Witwatersrand was from Gencor's Stilfontein Mine, which milled 722,000 t of ore and produced 620 kg of gold, before ceasing operations in September 1995. The highest average grade operation was Gold Fields' Kloof Mine, at 13.65 g/t of gold milled ; the lowest was at Randgold's surface operations at the Harmony Mine at 0.72 g/t.

Among the mining houses, the restructured Randgold focused on the acquisition and operation of lower grade, marginal mines. Randgold also ended its practice, common in the industry, of centralized management contracts with its mines, allowing each mine to staff independently and to operate as a separate profit center. During the year, Randgold acquired the Doornfontein Mine from Gold Fields and merged it with its adjacent Blyvooruitzicht Mine. The rationalization of operations should lead to significant cost savings and optimization of ore recovery for the combined mines. In other corporate moves, Randgold merged Durban Roodepoort Deep Mines with Rand Leases, thus extending the life of Durban Deep Mines well into the next century. Randgold also purchased four marginal mines from Gencor, namely Buffelsfontein, Stilfontein, Unisel, and Grootvlei, with Unisel becoming part of the Harmony mine operations.

Gengold began a major rationalization of operations by selling four marginal mines and reducing its labor force by 6,00 jobs. The company was investing $440 million in shaft expansions at its Beatrix and Kinross Mnes and in redeveloping the closed Oryx Mine. Production at Oryx was scheduled to restart in 1998 at a rate of 120,000 tons per month of ore yielding 875 kg per month of gold.[7]

Anglo American continued development work on the $600 million Moab Mine project to access large high grade reserves adjacent to AAC's Vaal Reefs Mine. The Moab shaft hoisting capacity was increased by 30,000 tons per month to advance by 1 year the startup of ore production. Startup was expected in 1997. A new company, Eastvaal Gold Holdings Ltd., was formed to attract further financing for the project. Production at the Vaal Reefs Mine dropped by 6% in 1995 to 66,172 kgs, primarily due to the major mine accident previously discussed. Work was also underway by AAC to deepen Western Deep Level's No.1 Subshaft system to exploit additional known reserves.

Anglovaal continued on the $110 million phase-1 underground development work from its Loraine Mine to reach large, deep, resources to the north—the so-called Target component of the Sun project. The company reported that two declined shafts were expected to reach the lease area in January 1996, allowing the commencement of underground exploration drilling of the Target ore body.

JCI merged its Western Areas Gold Mine with South Deeps Exploration Co. Ltd.—the company formed to develop the South Deep project adjacent to Western Areas. The combined operations will share underground and surface infrastructure and will exploit a minable reserve of 2,021 tons (65 million troy ounces) of gold.[8] A $600 million shaft sinking project was underway to exploit these reserves.

Gold Fields, which operates two of the richest mines in South Africa (Kloof and Dreifontein Consolidated) continued work on developing the No. 9 shaft at West Dreifontein as part of the company's ongoing reserve replacement program.

Iron and Steel.—Iron Ore.—Continuing strong export demand spurred a 5% increase in iron ore production in 1995. Iscor Ltd. was by far the largest iron ore producer, with its Sishen and Thabazimbi iron ore mines accounting for 81% of the country's total output. The mines produced 23.3 Mt and 2.5 Mt of iron ore respectively in 1995. During the year, Iscor completed installation of a new facility to produce 4 Mt/a of direct reduced iron, which carries a price premium over lumpy ore. Railroad capacity from Sishen to the export terminal at Saldanha Bay was upgraded by 2.5 Mt/a to 23.4 Mt/a in 1994 but it continued to serve as a constraint on Iscor's future export capacity. In situ iron ore reserves at Sishen as of July 1994 were reported by Iscor at 1.74 billion tons grading 64.82% iron, 3.50% silica, 1.58% alumina and 0.067% phosporous. Of this total, 1.43 billion tons were in the proven category.[9]

Steel.—Iscor accounted for 81% of total South African steel production and was the largest steelmaker in Africa. Iscor's domestic sales increased 18.7% to 3.3 Mt tons of steel, while exports sales declined 16.2% to 2.4 Mt of steel. At its Vanderbijlpark plant, Iscor began a 4-year effort to replace outdated coke ovens with a pulverized coal injection plant; to reline and upgrade two blast furnaces and to decommission two others; and to upgrade the continuous casting plants to expand the amount of production continuously cast from 91% to 100%. The Vanderbijlpark plant has the capacity to produce 5 million tons of liquid steel per year. At Iscor's Newcastle plant, the rod mill capacity was being expanded from 420,000 t/a to 620,000 t/a. Iscor was also well on its way to converting the Pretoria works into a stainless steel operation by April 1996, with a capacity to produce 480,000 tons of stainless steel slabs per year for export.

In late 1995, Iscor and the South African Industrial Development Corporation (IDC) established a 50-50 joint venture, Saldanha Steel (Pty.), Ltd., to develop a 1.2 Mt hot rolled steel coil minimill at Saldanha Bay. The $1.87 billion project is planned for startup in 1998.

The Columbus Stainless Steel expansion project was in its final stages at yearend, and full commissioning was expected in early 1996. The project, a joint venture among Samancor, Highveld, and the IDC (33.3% each), would have a capacity of 500,000 t/a. Capacity at the existing plant was about 150,000 t/a and the final, combined plant would have a capacity, after consolidation, of 600,000 t/a. Columbus has lowered its production target for 1996 to 300,000 tons due to bottlenecks encountered during the commissioning process. The expansion project would make Columbus the largest single-site stainless steel producer in the world. Significant production cost savings were to be achieved through the plant's taking hot metal from the adjacent Middelburg ferrochromium smelter.

Ferroalloys.—Ferrochrome.—Substantially improved world stainless steel markets and new feedstock for the commissioning of the new Columbus Stainless Steel Plant contributed to the 21% increase in South African ferrochromium alloy production in 1995. As the world's largest chromium ferroalloy producer, South Africa accounted for 35% of world production and 37% of total world exports during the year. Expansions and new plants by Chrome Resources and Ferrometals added in excess of 100,000 tons of new annual ferrochromium production capacity in 1995. Further annual ferrochromium capacity additions of 0.67 t were planned by Chrome Corp. Holdings, Hernic Ferrochrome, Rhoex, and Samancor Ltd. come into production in or after 1996.

A joint venture between Samancor and Japan's Showa Denko KK and Marubeni Corp. will use Showa Denko technology to expand capacity for low carbon ferrochrome at Samancor's Middleburg plant from 38,000 t/a to 53,000 t/a. Mitsui & Co. Ltd. of Japan acquired a 12% interest in CMI's Lydenburg plant, which will be expanded from 330,000 t/a to 400,000 t/a. Eastern Asia Metal Investment Corp., a subsidiary of China Iron and Steel Industry Trade Group Corp., was to a take a 60% interest in a joint venture with Northern Province Development Corp. to develop a $70 million complex at Dilokong. The complex will include a 400,000 t/a chromite mine and a 100,000 t/a ferrochromium smelter The Swiss-owned Chromecorp Technology Pty. Ltd. reorganized its South African operations by floating a new company, Chromecorp Holdings Ltd., with its subsidiary Chrome Resources responsible for chromite mining and ferrochromium smelting. In other chromite-based industries, Bayer AG of Germany and the South African chemical company, Sentrachem, formed a 50-50 joint venture to develop one of the world's largest chrome chemical plants at Newcastle in KwaZulu/Natal at a cost of $138 million. The plant will utilize chemical grade chromite ore from the Rustenburg area.

Ferromanganese.—South Africa's production of high and medium carbon ferromanganese declined by 14% in 1995 to 507,173 tons as Samancor switched two furnaces at its Palmiet Ferrochrome plant to silicomanganese to take advantage of export markets for this alloy. Several furnaces that were converted from ferrochrome to ferromanganese production in 1994 were converted back to ferrochrome to respond to strong ferrochrome markets in late 1995.

Nickel.—South Africa's nickel output is mostly a byproduct of PGM production, with some byproduct production from the Palabora copper mine. Output was essentially unchanged in 1995. With the anticipated growth in demand from stainless steel producers in South Africa, impetus was given to the development of additional domestic nickel resources. As a result, Anglo American and Anglovaal formed the Nkomati joint venture to proceed with exploration and feasibility studies on a low-grade, high tonnage nickel deposit located in the Uitkomst mafic complex on the Slaaihoek and Uitkomst farms, near Barberton in Mpumalunga Province.

Platinum-Group Metals (PGM).—Based on U.S. Geological Survey production estimates, South Africa continued to be the world's largest primary producer of PGM accounting for 79% of 1996 world supply of platinum, 44% of palladium, and an estimated 84% of other PGM, inclusive of rhodium, osmium, ruthenium, and iridium. Combined PGM production from the 10 mines, operating almost exclusively in the Bushveld Complex, remained level in 1995. The Minerals Bureau reported that reduced output from Impala Platinum Ltd., Eastern Platinum Ltd. and Lebowa Platinum Mines Ltd. was offset by production increases from Rustenburg Platinum Mines Ltd. and Northam Platinum Ltd. About 95% of production was exported, generating sales of $1.81 billion, up 12.3% in dollar terms over 1994.

The corporate restructuring of the platinum industry advanced during the year. The platinum holdings of JCI were transferred to AAC as part of AAC's unbundling of JCI. These holdings, combined with others held by AAC, were combined under the new corporate name, Amplats. By yearend respective company shareholders also approved plans to merge Impala with Lonrho's Eastern and Western Platinum mines. The merger with the Lonrho, a United Kingdom company, was subject to further approval by the European Commission's Merger Task Force.

Titanium and Zirconium.—South Africa is one of the world's major sources of titanium, producing an estimated 22% of world rutile output and 55% of titaniferous slag in 1995. Richard Bay Minerals' Tisand (Pty.) Ltd., owned jointly by Gencor and RTZ, produced ilmenite, rutile, and zircon from beach sands north of Richards Bay. A sister company, Richards Bay Iron and Titanium Corp. produced an 85% titanium dioxide slag from ilmenite concentrates at the Richards Bay smelter, as well as low-manganese pig iron. RBM overwhelmingly was the largest titanium mineral producer in the country. Phase 1 of Anglo American's new

$550 million, Namakwa Sands project, located on the west coast approximately 300 miles northwest of Cape Town, was completed during the year. Initial mining was at a rate of 4 Mt/a of combined heavy minerals, with smelter production at 33,000 t/a of titaniferous slag. The project was expected to reach capacity level, following the construction of additional concentrator units, of 12 Mt/a by the year 2000. At full production, the mine and smelter was expected to produce about 370,000 mt/a of ilmenite (to be converted to 196,000 t/a titanium slag); 36,000 t/a rutile; 123,000 t/a zircon; and 119,000 t/a pig iron. Titaniferous magnetite also was recovered and stockpiled from the Phalaborwa carbonatite as a byproduct of copper and phosphate rock production, and titaniferous slag was produced from magnetite ores by the Highveld steel plant.

Proposals to mine the large titaniferous sands resources at St. Lucia north of Richards Bay in KwaZulu-Natal by RBM came under increasing pressure from South African and international environmental groups who were counter-proposing the sensitive coastal ecosystem as a World Heritage site. The government ruling to deny the mining permit was made in early 1996.

In July 1994, Iscor acquired 100% of Natal Mineral Sands (Pty.) Ltd., which held substantial titaniferous sand and other mineral resources near Richards Bay. Based on prefeasibility work in 1995, Iscor was proceeding with the final feasibility study which was expected to be completed in 1996. The feasibility study was being conducted on smelting the material, with first production anticipated by 2000. Iscor itself would be the likely customer for the pig iron coproduct.

Zirconium is produced as a zircon byproduct of Richards Bay and Namakwa Sands mineral sands mining. An estimated 260,000 tons per year of zirconium is produced as byproduct baddeleyite from copper mining in the Phalaborwa Carbonatite Complex. Palabora Mining Co. Ltd. produces 70% of the world's baddeleyite, a zirconium sulfate mineral used in specialized applications in the refractory, ceramics and tanning industries, and in kidney dialysis machines.

Uranium.—Uranium production, largely a coproduct of gold mining, fell 17% in 1995 in line with reduced gold output. Seven of the major Witwatersrand gold mines each produce from 12,000 to 36,000 tons of byproduct uranium oxide per year. Production from Chamber of Mines member companies declined from 9.25 Mt of ore grading 0.197 kg/t uranium oxide treated in 1994 to 8.34 Mt of ore grading 0.186 kg of uranium oxide per ton treated in 1995. A small amount (approximately 100 t) of byproduct uranium oxide was produced by the Palabora copper mine.

Vanadium.—South Africa is the world's largest vanadium producer and possesses about 45% of world reserves. Vanadium was produced from extensive seams of vanadium bearing magnetite mined from shallow gabbro and norite zones of the Bushveld Complex, and also as vanadium pentoxide derived from vanadium bearing steel slag. Output of vanadium increased slightly in 1995 as more production came from slag rather than the roast/leaching of magnetite ore. There was also an increased production of value added ferrovanadium during the year as Highveld's Vantra Division quadrupled production and Vantech shifted its entire production to ferrovanadium. As a result, the Minerals Bureau reported that less than half of South African vanadium pentoxide production was now available for export.

Rhombus Vanadium Holdings Ltd. commissioned a 6,000 t/a (contained) vanadium pentoxide plant at the end of 1994 and continued to maintain production of vanadium pentoxide from magnetite ores.

Industrial Minerals

Cement.—Cement was produced by Pretoria Portland Cement Co. Ltd., Alpha Ltd., and Blue Circle Cement (Pty.) Ltd. The three companies had equal interest in Natal Portland Cement Co. (Pty.) Ltd., which served much of the Kwa Zulu/Natal market. These companies comprised a cartel, the South African Cement Producers Association. Following a 2-year investigation of the cartel's pricing and supply practices, the South African Competition Board recommended that the cartel be disbanded in 1994. The cartel was scheduled to be dissolved by September 1996. It was unclear what the effect of disbanding would be, but the producers were planning to increase output capacity in anticipation of major housing projects sponsored by the new Government.

Diamond.—South Africa's rough diamond production decreased 11% in 1995, reflecting planned De Beers strategy to reduce supply, especially from higher cost operations. The Minerals Bureau reported national production of rough diamonds from 54 registered mining operations. Of these, 19 mined kimberlites, 13 alluvial deposits, and 22 marine concession holdings. Mines controlled by De Beers treated 18.8 Mt of ore yielding 9,050,141 carats or 93% of the country's total production. The major production cuts, as reported in De Beers 1995 Annual Report, were taken at the company's two largest mines, with the Venetia Mine reducing output by 12% to 4.35 million carats and the Finsch by 24% to 1.72 million carats from 1994. An increase in the bottom size cutoff from 0.5 to 1.5 millimeters at the underground Finsch Mine resulted in a decline in recovery grade from 71.2 carats per 100 t of ore in 1994 to 49.3 carats per 100 t of ore in 1995. Rough diamond recovery remained level, relative to 1994 output, at the Kimberley Mine and dropped from 2% to 6% at the Premier, Koffiefontein, and Namaqualand Mines.

Apart from De Beers, there were several other companies with diamond operations in South Africa and actively exploring for diamond. Most of these were relatively small

alluvial workings, either onshore or offshore the Atlantic coast north of Saldanha Bay, particularly near the Namibian border around Alexander Bay and along the Orange River. One of the larger of these companies was Trans Hex Group Ltd. A Canadian company, Diamond Field Resources Inc., was producing from the Frank Smith and Loxton Dal kimberlites near Kimberley. Southern Era Resources of Canada was also actively exploring in the Klipspringer area, about 60 kilometers southeast of Potgietersrus in the Northern Province.

Vermiculite.—Production of exfoliated vermiculite remained around 222,000 t in 1995, representing about 46% of world supply. The major producer was the Vermiculite Operations Division of Palabora Mining Co. Ltd., which extracted vermiculite from the paoxenite units of the mineralogically diverse, Phalaborwa Carbonatite Complex. The company reported sufficient remaining proven reserves to sustain current production levels for at least another 25 years. The Natkruit Vermiculite Mining Co. began development of the Natkruit deposit and beneficiation plant in the Northern Province during 1995, with startup expected during the second half of 1996.

Mineral Fuels

Except for a minor amount of gas condensate, South Africa produced no crude oil during the year, and only a limited amount of natural gas. Most of the country's primary energy needs were supplied by coal; most electricity was generated by coal-fired power stations, and coal was also the basic raw material for South Africa's production of synthetic fuels.

The Southern Oil Exploration Co. (Soekor), the state-owned petroleum exploration company, controlled all offshore oil and gas prospects. Fifteen offshore blocks were offered for international bids for subleasing in 1995.

Coal.—South Africa was the fifth largest coal-producing country in the world and the third largest coal exporter. Coal exports of 59.2 Mt, valued at $1.79 billion were shipped, primarily through the Richards Bay Coal Terminal (RBCT), to consumers in the European Union (55.9%), the Far and Middle East (39.6%), South America (3.6%), and other Africa (0.9%). The RBCT was to be expanded to handle 63 Mt/a in the future. Bituminous coal accounted for more than 98% of South African production. Of the 146 Mt of coal consumed domestically, 82.6 Mt went to the electricity sector and 55.9 Mt to the industrial sector, including coal liquifaction.

Three companies, Ingwe Coal Corp., Anglo American Coal Corp. Ltd. (Amcoal), and Sasol Mining (Pty.) Ltd., continued to account for more than 80% of the country's coal production. Ingwe was formed by the merger of Trans-Natal Coal Corp. Ltd. and Randcoal in 1994. Other producers included Iscor Ltd., which mined coal for its own internal use; and numerous independent medium to small coal companies. Although the 76 coal operations within the 19 coalfields of South Africa were spread over an area of 300,000 square kilometers, the main coal-producing area was the Witbank Basin, which accounted for approximately 42% of the country's output. About 65% of the coal was produced from underground mining operations, with the remainder coming from open pit mines. Most open pit mines were less than 70 m deep. Domestic sales of coal amounted to 146Mt in 1995, with Eskom consuming 79.4Mt for power generation. Over 40Mt of coal were consumed in Sasol synfuel plants. A more comprehensive review of the coal sector is available in the June 1996 issue of the Mining Magazine (London).[10]

Synfuels.—The Government entertained bids to privatize the costly, $4.1 billion, Mossgas oil-from-gas project, and Sasol's plants producing oil and petrochemicals from coal; however, all the bids for Mossgas were rejected by the Central Energy Fund in 1995. The Government then granted Mossgas $250 million to extend its life to the year 2001. These companies' fuel production was considered too expensive in light of ready access to imported fuels occasioned by the removal of economic sanctions against South Africa. The Government was also reducing the tariff subsidies available to Sasol. The basis for subsidies for synthetic fuels was reduced to a floor price of $21 per barrel of petroleum in 1995, with the subsidy to be phased out entirely by 1999.

Reserves

South Africa's mineral reserves are large and diverse and reflect the country's complex geology. A detailed account of the geology of many of South Africa's ore deposits is available from the Geological Society of South Africa[11] and a useful background geologic summary is given in an International Strategic Minerals Inventory Working Group study.[12] The bulk of South Africa's mineral resources is from the northern half of the country.

Table 3 gives the reserve base for a number of South Africa's major minerals; diamond reserve base data are unavailable. Although data are incomplete for the world, for many of the minerals shown, South Africa's reserves appear to rank among the top five countries and would rank first in the world for andalusite, chromite, gold, manganese, PGM, and vanadium.

Infrastructure

The country had a well-developed and extensive road and railroad infrastructure, serving not only South Africa but also southern Africa. A number of ports handled minerals, notably Durban, Richards Bay, Port Elizabeth, Mossel Bay, East

London, Saldanha Bay, and to a lesser extent, Cape Town. Richards Bay has the largest export capacity of any African port. The RBCT had a coal export capacity of about 60 Mt/a. Coal exports through Durban were only a fraction of those through RBCT. Durban's port facilities were designed mainly for small consignments of high-quality bituminous coal and anthracite that cannot be accommodated at Richards Bay. Durban's coal export capacity is 3.5 Mt/a. An upgrading program, which would increase capacity to 5 Mt/a, was in progress. The dedicated railroad between Sishen and the export harbor at Saldanha Bay handled 27 Mt of cargo in 1995, including 18.6 Mt of iron ore from the Sishen Mine. In addition to fulfilling the requirements of South Africa itself, the country's ports also served as outlets for neighboring countries such as Botswana, Lesotho, Swaziland, Zaire, Zambia, and Zimbabwe. South Africa was also a regional supplier of electricity and petroleum products—two of a number of examples of the dependence of neighboring countries on South Africa's infrastructure and transportation networks.

Eskom, one of the largest utilities in the world with a nominal capacity of 37,840 megawatts, generated 159,547 gigawatt-hours of electricity in 1995—over 95% of the country's total electricity. Coal-fired powerplants accounted for 92% of Eskom's total output. Eskom's Koeberg nuclear powerplant supplied around 6% of the total. The mining industry consumes approximately 20% of Eskom's electricity.

Outlook

The South African minerals industry has entered a major transition period involving changing Government and labor policies and shifts in corporate aims from inward to outward looking. The Government is working to improve labor safety and wage conditions, to enhance business opportunities, and to improve access to mineral rights for black entrepreneurs in the mining sector while maintaining South Africa's export competitiveness in world mineral markets. Public concerns over the impact of mineral development on the environment will increasingly be a factor in assessing the viability of future mining and mineral processing projects.

Since the end of economic sanctions against South Africa, the major mining houses have had greater access to foreign investment capital and are restructuring assets to increase company holdings and activities overseas, and to become more competitive with other multinational mining companies. Thess factors should assist South African companies in becoming an important force in new exploration and mineral development projects worldwide, especially elsewhere in Africa. The South African mining industry, with Government encouragement, will continue expansion of value-added mineral processing capacity, especially for metals. The country will increasingly use its comparative advantage to establish, downstream industries, capitalizing on its mineral resource endowment and relatively inexpensive labor and energy to generate highly competitive, value-added exports. This trend will be most apparent in the aluminum, ferroalloys, and steel sectors with substantial opportunities for job creation in gold and diamond jewelry fabrication. The future of the minerals industry in South Africa is promising. However, future industrial growth and attractiveness to new foreign investment will be dependent on the country's ability to maintain a stable social, political, and economic climate.

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[1]Updated from Hendrik van Oss 1994 review by George J. Coakley, December, 1997.

[2]Where necessary, values have been converted from South African rands (R) to U.S. dollars at the rate of R3.63=US$1.00 for 1995 and R3.55=US$1.00 for 1994.

[3]South Africa Minerals Bureau, 1996: South Africa's Mineral Industry 1995/96, p. 7-8.

[4]The Draft Mineral Policy Green Paper is accessible on the Internet at URL address http://www.bullion.org.za/policy/discuss.htm.

[5]Skillen, A. Welcome to the New South Africa. Industrial Minerals, No. 333, pp. 30, 32, and 53, June 1995.

[6]Chamber of Mines of South Africa. South African Mining Industry: Statistical Tables 1995, p. 30.

[7]Mining Journal. South Africa, in Mining Annual Review, Mining Journal, London, July 1996, p. 137.

[8]Western Areas Gold Mine—Company Profile. Accessed on the Internet at URL address http://www.jci.co.za/mp1204.HTM, September 9, 1997.

[9]Iscor Ltd. Iscor Mining 1995, Company slide presentation, 16 p.

[10]Chadwick, John. Coal RSA, Mining Magazine (London), June 1996, pp. 21-29.

[11]Anhaeusser, C. R., and Maske, S., eds., 1986: Mineral Deposits of Southern Africa, V. 1 and 2: The Geological Society of South Africa, 2,355 p.

[12]Coakley, G. J., Crockett, R. N., and Hammerbeck, E. C. I. International Strategic Minerals Inventory Summary Report: A Regional Assessment of Selected Mineral Commodities in Subequatorial Africa. Published by U.S. Bureau of Mines, Washington, DC, 1991, pp. 6-11.

Major Sources of Information

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Internet site: http://www.mintek.ac.za

National Union of Mineworkers
P.O. Box 2424
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Telephone: (27)-11-833-7012
Fax: (27)-11-836-0201
Internet: http://www.anc.org.za/num

Major Publications

Chamber of Mines of South Africa:
Annual Report.
Statistical Tables 1995.

Dept. of Mineral and Energy Affairs: Annual Report.
Eskom: Statistical Yearbook.

Minerals Bureau:
South Africa's Mineral Industry 1994/95 and 1995/96.
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Mineral Production and Sales Statistics, monthly.

Internet Resources:

Mbendi Information Services—
http://www.mbendi.co.za/cysacy.htm

South African Communication Service—
http: //www.sacs.org.za

TABLE 1
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995
METALS						
Aluminum metal, primary		169,390	172,795	174,700	172,111	195,292
Antimony concentrate 2/:						
Gross weight		7,533	6,465	7,182	7,800 r/ e/	9,550 e/
Sb content		4,485	3,779	4,111	4,534 r/	5,537
Cadmium, Cd content of cadmium cake		103	60	70 e/	-- r/	--
Chromite, gross weight:						
More than 48% chromic oxide	thousand tons	70	18	4	--	16
44% to 48% chromic oxide	do.	2,673	1,904	1,808	1,612 r/	1,792
Less than 44% chromic oxide	do.	2,367	1,441	1,014	2,030	3,296
Total 3/	do.	5,110	3,363	2,827	3,642 r/	5,104
Cobalt:						
Mine output, Co content e/		311 r/	343 r/	265 r/	358 r/	288
Refinery output:						
Metal, powder e/		60	65	48	69 r/	32 4/
Sulfate, contained cobalt e/		150	170	124	177 r/	158 4/
Total 3/		209	234	172	246 r/	190
Columbium and tantalum: Columbite-tantalite concentrate:						
Gross weight	kilograms	14	31	--	--	--
Cb content e/	do.	5	11	--	--	--
Ta content e/	do.	4	9	--	--	--
Copper:						
Mine (company output), Cu content		184,556	176,074	166,348	165,213	165,573
Metal:						
Smelter		164,700	158,700	156,600	154,700 r/	151,200
Refined, primary		127,000	120,100	127,900	129,600 r/	124,300
Gold, primary	kilograms	601,110	614,071	619,201	580,201	523,809
Iron and steel:						
Ore and concentrate:						
Gross weight	thousand tons	29,075	28,226	29,385	30,489 r/	31,946
Fe content	do.	18,900 e/	18,347	19,100 e/	18,903 r/	19,806
Metal:						
Pig iron	do.	6,968	6,498	6,121 r/	6,047	6,224
Direct-reduced iron	do.	863	854	833	980 r/	950
Ferroalloys, electric arc furnace:						
Chromium ferroalloys	do.	1,149	771	834	1,104	1,341
Ferromanganese	do.	260	270	393	591 r/	480
Ferrosilicon	do.	68	64	99	120 r/	90
Ferrovanadium e/	do.	1	1	1	1	1
Silicomanganese	do.	270	267	268	290	280 e/
Silicon metal	do.	40	35	38	36	30
Crude steel	do.	9,358	9,061	8,726	8,320	8,511
Lead:						
Concentrate, Pb content		76,262	75,806	100,171	95,824	88,449
Smelter, secondary		32,200	29,000	31,800	31,900 r/	32,100
Manganese:						
Ore and concentrate, gross weight:						
Metallurgical:						
More than 48% manganese	thousand tons	1,637	1,331	1,239	1,533	1,708
45% to 48% manganese	do.	181	279	237	67	106
40% to 45% manganese	do.	628	273	299	196	191
30% to 40% manganese	do.	653	491	665	1,006	1,145
Total metallurgical 3/	do.	3,100	2,375	2,440	2,801	3,151
Chemical:						
More than 65% manganese dioxide	do.	1	16	--	--	--
35% to 65% manganese dioxide	do.	45	73	67	50	48
Total chemical	do.	46	89	67	50	48
Grand total	do.	3,146	2,464	2,507	2,851	3,199
Metal, electrolytic e/	do.	35	35	35	35	35
Nickel:						
Mine output, concentrate, nickel content e/		27,700 4/	28,400 4/	30,800 r/	31,800 r/	30,700
Metal, electrolytic		26,863	27,621	29,868	30,751 r/	29,803

See footnotes at end of table.

TABLE 1--Continued
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995
METALS--Continued						
Platinum-group metals	kilograms	142,861	152,891	176,167	183,926 r/	184,377
Silver	do.	170,832	182,723	192,418	197,767 r/	174,279
Thorium, monazite concentrate, gross weight e/		400	400	400	131 r/ 4/	--
Tin:						
Cassiterite concentrate:						
Gross weight e/		2,600	1,500	1,200	115	--
Sn content		1,042	582	452	43	--
Metal:						
Primary 5/		1,042	592	452	43	--
Secondary e/		70	60	50	50	--
Titanium: e/						
Rutile concentrate		77,000	85,000	86,000	78,000	90,000
Titaniferous slag 6/	thousand tons	853	929	937	819	990
Uranium oxide		2,039	2,222	2,008	2,069 r/	1,702
Vanadium, vanadium metal content		14,962	14,285 r/	15,051	15,656	16,298
Zinc:						
Concentrate:						
Gross weight e/		127,000	133,892 4/	140,000	140,000	130,000
Zn content		64,425	71,928	77,096	76,361	70,241
Metal, smelter		91,659	83,208	96,154	93,850	98,782
Zirconium concentrate (baddeleyite and zircon) e/		230,000	243,000	243,000	240,000 r/	260,000
INDUSTRIAL MINERALS						
Aluminosilicates:						
Andalusite		209,824	230,333	187,708	206,291 r/	206,378
Sillimanite		422	632	569	525	317
Asbestos:						
Amosite		27,325	5,132	--	--	--
Chrysotile		101,650	103,660	92,380	85,857	81,246
Crocidolite		19,550	24,476	11,614	6,273	7,396
Total		148,525	133,268	103,994	92,130 r/	88,642
Barite		4,790	3,570	2,000	1,945	6,048
Beryl concentrate (11% to 12% BeO)	kilograms	103	--	--	--	--
Calcite		2,556	13,764	14,094	14,660 r/	10,666
Cement, hydraulic	thousand tons	7,427	7,028	7,356	7,905	9,071
Clays:						
Attapulgite		8,109	8,235	7,032	10,230 r/	8,049
Bentonite		64,600	43,977	50,441	71,773	70,927
Fire clay		132,813	86,195	91,839	110,131 r/	74,751
Flint clay, raw and calcined		123,849	123,721	89,352	131,590	118,688
Kaolin		134,485	131,765	147,349	131,863 r/	146,587
Brick clay, local sales	thousand tons	1,260	1,072	1,028	1,386 r/	2,909
Diamond, natural:						
Gem e/	thousand carats	3,800	4,600	4,600	4,900	4,300
Industrial e/	do.	4,630	5,556	5,724	5,954 r/	5,383
Total 3/	do.	8,431	10,156	10,324	10,854 r/	9,683
Diatomite		2,352	576	--	--	--
Feldspar		70,324	49,425	56,761	37,156 r/	47,874
Fluorspar:						
Acid-grade e/		240,000	230,790	194,778	166,761 4/	177,000
Ceramic-grade e/		6,000	6,000	4,000	--	--
Metallurgical-grade e/		24,340	23,000	19,000	7,497	18,794
Total 3/		270,341	259,790	217,778	174,258	195,794
Gemstones, semiprecious:						
Rose quartz	kilograms	41,206	100,834	85,500	--	--
Tiger's eye	do.	467,260	620,827	548,386	531,418	242,552
Gypsum, crude		420,146	333,771	284,389	304,337 r/	288,178
Industrial or glass sand (quartz)	thousand tons	2,068	1,750	1,738	1,920	2,180
Lime 5/	do.	1,765	1,686	1,599	2,891	1,688
Magnesite, crude		92,634	60,085	67,403	71,726 r/	84,639
Mica, scrap and ground		1,883	2,079	1,991	1,973	2,137

See footnotes at end of table.

TABLE 1--Continued
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995
INDUSTRIAL MINERALS--Continued						
Nitrogen: N content of ammonia		457,000	540,500	683,400 r/	754,000 r/	758,500
Perlite		41	97	328	914	1,338
Phosphate rock:						
Gross weight	thousand tons	3,165	3,080	2,466	2,545	2,787
Phosphorus pentoxide content e/	do.	1,234	1,201	962	995	1,087
Pigments, mineral, natural:						
Ochers		999	890	1,175	1,789 r/	2,316
Oxides		123	224	11	295 r/	2,940
Total		1,122	1,114	1,186	2,084 r/	5,256
Salt		664,624	701,991	613,301	414,463 r/	311,388
Sodium sulfate, natural		--	37,169	36,380	44,544	43,971
Stone, n.e.s.:						
Dimension:						
Granite and norite 5/		672,591	574,747	528,310	618,781 r/	812,220
Marble 7/		12,088	17,245	20,615	12,450 r/	5,837
Slate 5/		26,356	26,344	22,019	15,501 r/	11,891
Crushed and broken:						
Limestone and dolomite	thousand tons	21,494	19,782	18,215	19,548 r/	19,738
Nepheline syenite		20,966	174,864	--	98,667 r/	145,459
Quartzite 5/	thousand tons	8,320	8,162	8,224	9,258 r/	9,123
Shale:						
For cement	do.	391	301	331	371	325
Other 5/	do.	3,569	3,254	2,767	2,157	3,248
Total	do.	3,960	3,555	3,098	2,528	3,573
Aggregate and sand, n.e.s.	do.	21,878	19,477	15,824	18,294 r/	20,594
Sulfur:						
S content of pyrite	do.	293	296	323	252	159
Byproduct:						
Metallurgy e/	do.	68	56	82	118 r/	117
Petroleum	do.	160 e/	166	171	209 r/	233
Total 3/	do.	521	518	575	579 r/	509
Talc and related materials:						
Talc		8,235	13,882	8,798	8,202	9,173
Pyrophyllite (wonderstone)		4,448	3,053	4,287	5,507	5,519
Vermiculite		214,656	170,399	211,143	223,478	221,748
MINERAL FUELS AND RELATED MATERIALS						
Coal (salable product):						
Anthracite	thousand tons	2,689	3,345	3,246	2,225 r/	2,137
Bituminous	do.	175,507	171,047	178,980	193,625	204,073
Total	do.	178,196	174,392	182,226	195,850	206,210
Petroleum refinery products:						
Liquefied petroleum gases	thousand 42-gallon barrels	1,543	1,543	2,460	1,825 r/	1,900 e/
Gasoline	do.	54,587	54,545	57,446 r/	59,860 r/	60,000 e/
Jet fuel	do.	5,600	6,480	6,346	7,665 r/	8,000 e/
Kerosene	do.	3,813	3,906	4,678	5,475 r/	5,500 e/
Distillate fuel oil	do.	34,428	33,943	31,136	35,770 r/	36,000 e/
Residual fuel oil	do.	13,626	15,884	16,000 e/	20,075 r/	20,000 e/
Lubricants (including greases)	do.	2,310	2,240	2,503	1,280 r/ e/	1,800 e/
Bitumen	do.	1,673	1,739	1,784	895 r/ e/	1,260 e/
Other e/ 8/	do.	812 4/	686 4/	700	380 r/	540
Total e/ 9/	do.	118,392 r/ 4/	120,966 r/ 4/	123,053 r/	133,225 r/	135,000

e/ Estimated. r/ Revised.

1/ Table includes data available through Sept. 1, 1997.

2/ Data are for the year ending June 30 of that stated.

3/ Data may not add to totals shown because of independent rounding.

4/ Reported figure.

5/ Domestic sales plus exports.

6/ Except for about 45,000 mt/a slag derived from titaniferous magnetite by Highveld Steel, titaniferous slag is all from the smelting of ilmenite, and likely represents most of that mineral's production, for which data are unavailable.

7/ Converted from reported cubic meters using 1 cubic meter = 2.7 tons.

8/ Includes naphthas, paraffin wax, petroleum coke, petrochemical feedstocks, unfinished oils, white spirits, and blending compounds.

9/ Excludes refinery fuel and losses.

TABLE 2
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 1995

(Thousand metric tons unless otherwise specified)

Major commodities	Major operating companies and major equity owners 1/	Location of main facilities	Annual capacity
Aluminum	Aluminium South Africa (Pty.) Ltd. (Gencor, 48%; IDC, 34%; other, 18%)	Bayside smelter at Richards Bay Hillside smelter at Richards Bay	210 hot metal. 466 hot metal.
Andalusite	Rhino Andalusite Mines (Pty.) Ltd. (Anglovaal Ltd., 77%)	Timeball Mine, near Thabazimbi	120.
Do.	Damrec of France (private, 100%)	Annesley Mine at Penge, 50 kilometers north of Steelpoort	75.
Do.	do.	Andafrax Mine at Groot Marico, 60 kilometers west of Rustenburg	12.
Do.	Cullinan Minerals Ltd. (South African Mutual Life Insurance, 44%; Fermain Nom Ltd., 8%; AAC)	Krugerspost Mine, near Lydenburg	50.
Do.	Verref Mining (Pty.) Ltd. (AAC)	Havercroft Mine at Penge, 50 kilometers north of Steelpoort	36.
Do.	Hoogenoeg Andalusite (Pty.) Ltd.	Hoogenoeg Mine, 60 kilometers northeast of Potgietersrus	15.
Antimony	Consolidated Murchison Ltd. (JCI, 24.1%; Middle Witwatersrand, 5.5%; Anglovaal Ltd., 2.4%)	50 kilometers west of Phalaborwa	9.5 Sb concentrate.
Asbestos	Gencor Ltd. (Gencor Beherend Bpk, 54.8%; AAC, 0.9%)	Penge Mine, 50 kilometers north of Steelpoort	48 (amosite).
Do.	do.	Klipfontein Mine, near Sishen	NA (crocidolite).
Do.	Anglo Dutch Exploration & Mining Co. (Pty.) Ltd.	Stella Mine, 25 kilometers east of Barberton	NA (chrysotile).
Cement	Alpha Ltd. (AAC)	Dudfield plant near Lichtenburg	1,830.
Do.	do.	Ulco plant 60 kilometers northwest of Kimberley	1,241
Do.	Blue Circle Cement (Pty.) Ltd. (BCC)	Plant at Lichtenburg	2,000.
Do.	Natal Portland Cement Co. (Pty.) Ltd. (AAL, 33.3%; BCC, 33.3%; Pretoria Portland Cement Co. Ltd., 33.3%)	Simumu plant, 125 kilometers southwest of Durban	580.
Do.	Pretoria Portland Cement Co. Ltd. (Barlow Rand Group, 60.3%)	De Hoek, Herculese, Jupiter, Slurry, Riebeeck West, and Port Elizabeth	4.59 Mt (combined), clinker.
Chromite	Samancor Ltd. (Gencor, 41%; Delauney Ltd., 24.9%; De Beers, 8.7%)	Winterveld and Tweefontein Mines at Steelpoort	960 ore.
Do.	do.	Montrose Mine, near Lydenburg	360 ore.
Do.	do.	Mooinooi Mine, 30 kilometers west of Brits	580 ore.
Do Do	do.	Millsell Mine, 8 kilometers east of Rustenburg	300 ore.
Do.	do.	Elandsdrift Mine, near Brits	420 ore.
Do.	Consolidated Metallurgical Industries (Pty.) Ltd. (JCI, 49.9%; AAC, 26.4%)	Purity Mine, near Rustenburg	360 ore; 252 concentrate.
Do.	Lavino South Africa (Pty.) Ltd. (Anglovaal Ltd., 51%; Middle Witwatersrand, 49%)	Grootboom Mine, near Lydenburg	500 ore.
Do.	Dilokong Chrome Mine (Pty.) Ltd. (Mining Corp. Ltd., 100%)	Dilokong Mine, near Lydenburg	480 ore.
Do.	Chromecorp Technology (Pty.) Ltd. (CI Chromeinvest AG, Germany, 50%; Investinox AG, Germany, 50%)	Chroombronne Mine, near Rustenburg	576 ore; 432 concentrate.
Coal	Anglo American Coal Corp. Ltd. (AAC, 51.4%; ASA Ltd., 2.2%)	13 collieries in the eastern Transvaal and Natal	46,000 anthracite and bituminous.
Do.	Ingwe Coal Corp. (Trans-Natal Corp. Ltd.; 49.1%; Rand Mines Ltd., 45.9%; other, 5%)	12 collieries in the eastern Transvaal and Natal	59,000 anthracite and bituminous.
Do.	Duvha Opencast Services (Pty.) Ltd. (Rand Mines Ltd., 71%)	Duvha Colliery, 18 kilometers southeast of Witbank	11,000 bituminous.
Do.	Sasol Mining (Pty.) Ltd.	Sigma Mine, 75 kilometers south of Johannesburg	7,000 bituminous.
Do.	do.	Secunda Collieries, 75 kilometers south of Witbank	31,000 bituminous.
Do.	Iscor Ltd. (De Beers, 3.4%; AAC, 0.7%)	Grootegeluk Mine, 120 kilometers north of Thabazimbi	6,300 bituminous; 1,700 coking coal.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 1995

(Thousand metric tons unless otherwise specified)

Major commodities	Major operating companies and major equity owners 1/	Location of main facilities	Annual capacity
Coal--Continued	Iscor Ltd. (De Beers, 3.4%; AAC, 0.7%)	Durnacol Mine at Dannhauser, 40 kilometers south of Newcastle	1,200 coking coal.
Do.	do.	Hlobane Mine, 100 kilometers east of Newcastle	700 coking coal.
Do.	do.	Tshikondeni Mine in Venda, about 100 kilometers southeast of Messina	200 coking coal.
Copper	Palabora Mining Co. Ltd. (Rio Tinto Zinc Corp. plc, 38.9%; AAC, 19.1%; De Beers, 9.5%)	Palabora Mine and plant at Phalaborwa	130 metal.
Do.	O'Okiep Copper Co. Ltd. (GFSA, 82%; Mellon Securities Trust Co., 18%)	O'Okiep copper mine, 20 kilometers north of Okiep	40.
Do.	Black Mountain Mineral Development Co. (Pty.) Ltd. (GFSA, 55.4%; Phelps Dodge Corp., 44.6%)	Black Mountain Mine, 100 kilometers northwest of Okiep	2.5 Cu in concentrate.
Diamond, million carats	De Beers (Anglo American Investment Trust Ltd., 25.8%; AAC, 6.9%)	Finsch Mine, 100 kilometers west of Kimberley	3.5. e/
Do. do.	do.	Kimberley Mines, Kimberley	0.8. e/
Do. do.	do.	Koffiefontein Mine, 70 kilometers south of Kimberley	0.25. e/
Do. do.	do.	Namaqualand Mines, 50 kilometers north of Port Nolloth	1.0. e/
Do. do.	do.	Premier Mine, 70 kilometers east of Pretoria	1.7. e/
Do. do.	do.	Venetia Mine, 150 kilometers north of Potgietersrus	5. e/
Fluorspar	Vergenoeg Mining Corp. (Pty.) Ltd. (Bayer AG, Germany, 100%)	Vergenoeg Mine, 90 kilometers east of Pretoria	200 acid- and metallurgical-grade fluorspar. e/
Do.	Phelps Dodge Mining (Pty.) Ltd. (Phelps Dodge Corp., U.S., 100%)	Witkop Mine, 130 kilometers west of Johannesburg	75 acid-grade fluorspar. e/
Do.	Van Den Heever Vloeispaat Werke	Van Den Heever Mine, 120 kilometers west of Johannesburg	50.e/
Gold: tons	AAC (De Beers, 38.7%; ASA Ltd., 0.1%)	Freegold near Welkom, Vaal Reefs near Klerksdorp, Western Deep Levels, 70 kilometers southwest of Johannesburg	260 Au.
Do. do.	GFSA (GFSA Holdings Ltd., 43%; Anglo American Gold Investment Co., 10.8%; AAC, 8.9%; De Beers, 1.3%)	East Driefontein and West Driefontein, 65 kilometers southwest of Johannesburg; Kloof, 55 kilometers southwest of Johannesburg; and others	125 Au.
Do. do.	Gencor (Gencor Beherend Bpk, 54.8%; AAC, 0.9%)	Buffelsfontein near Klerksdorp; Beatrix, 35 kilometers southeast of Welkom; Winkelhaak, 120 kilometers southeast of Johannesburg; others	90 Au.
Do. do.	Rand Mines Ltd.	Harmony Mine, 20 kilometers southeast of Welkom and others	55 Au.
Do. do.	Anglovaal Ltd. (Anglovaal Holdings Ltd., 49.7%;, South African Mutual Life Insurance, 10.7%)	Hartebeestfontein Mine near Klerksdorp and others	45 Au.
Do. do.	JCI (AAC, 39.8%; South African Mutual Life Insurance, 8.9%; De Beers, 8.4%)	Randfontein Mine, 20 kilometers west of Johannesburg; Western Areas Mine, 30 kilometers southwest of Johannesburg; and others	41 Au.
Iron and steel:			
Iron ore	Iscor Ltd. (De Beers, 3.4%; AAC, 0.7%)	Sishen Mine at Sishen	21,500 ore.
Do.	do.	Thabazimbi Mine at Thabazimbi	2,500 ore.
Do.	Highveld Steel and Vanadium Corp. Ltd. (Anglo American Industrial Corp. Ltd., 51.8%)	Mapochs Mine at Roossenekal, 60 kilometers west of Lydenburg	3,000 titaniferous and vanadiferous magnetite ore.
Ferroalloys 2/	Ferrometals Ltd. (Samancor Ltd., 100%)	Witbank	320 ferrochromium.
Do.	Tubatse Ferrochrome (Pty.) Ltd. (Samancor Ltd., 100%)	Steelpoort	300 ferrochromium.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 1995

(Thousand metric tons unless otherwise specified)

Major commodities		Major operating companies and major equity owners 1/	Location of main facilities	Annual capacity
Iron and steel--Continued				
Ferroalloys--Continued		Batlhako Ferrochrome (Pty.) Ltd. (Samancor Ltd., 100%)	Ruighoek Mine site, 80 kilometers southwest of Thabazimbi	20 ferrochromium.
Do.		Samancor Ltd. (100%)	Middelburg	234 ferrochromium.
Do.		do.	Krugersdorp, 30 kilometers west of Johannesburg	120 ferrochromium.
Do.		Consolidated Metallurgical Industries (Pty.) Ltd. (JCI, 49.9%; AAC, 26.4%)	Lydenburg	210 ferrochromium.
Do.		do.	Purity, at Rustenburg	120 ferrochromium.
Do.		Chromecorp Technology (Pty.) Ltd. (CI Chromeinvest AG, Germany, 50%; Investinox AG, Germany, 50%)	Rustenburg	200 ferrochromium.
Do.		Feralloys Ltd. (Associated Manganese Mines of South Africa Ltd., 100%)	Machadadorp, 80 kilometers east of Middelburg	110 ferrochromium.
Do.		do.	Cato Ridge, 75 kilometers west of Durban	130 high-carbon ferromanganese.
Do.		Metalloys Ltd. (Samancor Ltd., 100%)	Meyerton plant, 50 kilometers south of Johannesburg	532 high-carbon ferromanganese; 200 silicomanganese.
Do.		Manganese Metal Co. (Pty) Ltd. (Samancor Ltd., 45.9%)	Plants at Krugersdorp and Nelspruit	38 electrolytic manganese (total).
Do.		Transvaal Alloys Pty. Ltd., (Highveld Steel and Vanadium Corp., 100%)	Witbank	20 low-carbon ferromanganese; 175 silicomanganese.
Steel		Iscor Ltd. (De Beers, 3.4%; AAC, 0.7%)	Plant at Vanderbijlpark	4,300.
Do.		do.	Newcastle plant	2,000.
Do.		do.	Pretoria plant	800.
Do.		do.	Cisco plant near Cape Town	150.
Do.		do.	Corex plant in Pretoria	300.
Do.		do.	Ex-Usko plant in Vereeniging	450. e/
Do.		Highveld Steel and Vanadium Corp. Ltd. (Anglo American Industrial Corp. Ltd., 51.8%; De Beers, 3.8%)	Witbank	1,000.
Do.		Columbus Stainless, Ltd. (AAC and De Beers, 33.3%; Gencor, 33.3%; IDC, 33.3%)	Stainless steel plant at Middelburg	660
Manganese		Associated Manganese Mines of South Africa Ltd. (Associated Ore and Metal Corp. Ltd., 45%; Anglovaal Ltd., 44%)	Blackrock, Gloria, N'Chwaning Mines near Hotazel, 70 kilometers north of Sishen	1,500 ore.
Do.		Samancor Ltd. (100%)	Mamatwan and Wessels Mines near Hotazel	3,000 ore.
Petroleum products	million 42-gallon barrels	Shell and British Petroleum South Africa Petroleum Refineries Pty. Ltd. (Shell South Africa, 50%; British Petroleum Co., 50%)	Sanref refinery in Durban	73 crude.
Do.		Caltex Oil SA Pty. Ltd. (private, 100%)	Refinery in Cape Town	33 crude.
Do.		National Petroleum Refiners of South Africa Pty. Ltd. (SASOL, 100%)	Refinery in Secunda, 100 kilometers southeast of Johannesburg	28 crude.
Do.		Genref (Engen Ltd., 62%)	Refinery in Durban	24 crude.
Phosphate		Phosphate Development Corp. Ltd. (Foskor Ltd.) (IDC, 100%)	Foskor mine and plant at Phalaborwa	3,800. e/ 3/
Platinum-group metals	tons	Rustenburg Platinum Mines Ltd. (JCI, 32.6%; AAC, 23.9%; Lydenburg Platinum Ltd., 8.3%; ASA Ltd., 0.8%)	Rustenburg Mine near Rustenburg, Union and Amandelbult Mines about 50 kilometers south of Thabazimbi	70 PGM. e/
Do.	do.	Lebowa Platinum Mines Ltd. (Rustenburg Platinum Holdings, 21.5%; JCI, 20.1%; Lydenburg Platinum Ltd., 20.1%; AAC, 14.4%)	Atok Mine, 70 kilometers east of Potgietersrus	10 PGM. e/
Do.	do.	Potgietersrust Platinums Ltd. (JCI, 30.23%; AAC, 22.65%)	Open pit mine near Potgietersrust	10 PGM (in concentrates.)

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 1995

(Thousand metric tons unless otherwise specified)

Major commodities		Major operating companies and major equity owners 1/	Location of main facilities	Annual capacity
Platinum-group metals--Continued	tons	Impala Platinum Ltd. (Gencor, 40.7%; Genbel Investments Corp. Ltd., 10.8%)	Bafokeng North, Bafokeng South, Wildebeestfontein North, and Wildebeestfontein South Mines, 20 kilometers north of Rustenburg	35 PGM. e/
Do.	do.	Eastern Platinum Ltd. (Lonrho Plc., 73%; Impala Platinum Holdings Ltd., 27%)	40 kilometers northeast of Rustenburg	3 PGM. e/
Do.	do.	Western Platinum Ltd. (Lonrho Plc., 73%; Impala Platinum Holdings Ltd., 27%)	20 kilometers east of Rustenburg	10 PGM. e/
Do.	do.	do.	Karee Mine, 25 kilometers northeast of Rustenburg	5 PGM. e/
Do.	do.	Barplats Investments Ltd. (Impala Platinum Holdings Ltd., 38%; Rand Mines Ltd., 30.6%; Vansa Vanadium, 3.2%)	Crocodile River Mine near Brits	10 PGM.
Do.	do.	Northam Platinum Ltd. (GFSA, 63%; New Wits Ltd., 3.1%)	Northeast of Northam, 20 kilometers south of Thabazimbi	10 PGM. e/
Pyrophyllite		Wonderstone 1937 Ltd. (Associated Ore and Metal Co. Ltd., 100%)	Gestoptefontein Quarry near Ottosdal, 70 kilometers west of Klerksdorp	2. e/
Titanium:				
Mineral concentrates		Tisand (Pty.) Ltd./Richards Bay Minerals (Rio Tinto Zinc Corp. Plc., 50%; Gencor, 50%)	Opencast operations near Richards Bay	125 rutile concentrate; e/ 1,280 ilmenite concentrate. e/
Do.		Namakwa Sands project (AAC, 80%; De Beers, 20%)	Opencast mine near Koekenaap, 300 kilometers north of Cape Town	16 rutile concentrate; 220 ilmenite concentrate. 4/
Titanium slag		Richards Bay Iron and Titanium Corp./ Richards Bay Minerals (Rio Tinto Zinc Corp. plc, 50%; Gencor, 50%)	Smelter at Richards Bay	1,000 slag.
Do		Namakwa Sands project (AAC, 80%; De Beers, 20%)	Smelter near Koekenaap, 300 kilometers north of Cape Town	195 slag; 4/ 120 pig iron
Do.		Highveld Steel and Vanadium Corp. Ltd.	Steel plant at Witbank	48 slag. e/
Uranium	tons	Vaal Reefs Exploration and Mining Co. Ltd. (Anglo American Gold Investment Co., 16.8%; AAC, 10.8%; ASA Ltd., 3.1%)	Mine and plant near Klerksdorp	2,000 uranium oxide. e/
Do.	do.	Hartebeestfontein Gold Mining Co. Ltd. (Zandpan Gold Mining Co. Ltd., 19.6%; Anglo American Gold Investment Co., 15.5%; AAC, 7.5%; Anglovaal Ltd., 4.6%)	Mine and plant, 5 kilometers southeast of Klerksdorp	400 uranium oxide. e/
Do.	do.	Western Areas Gold Mining Co. Ltd. (Elsburg Gold Mining Co. Ltd., 48.7%; JCI, 6.5%)	Western Areas Mine, 30 kilometers southwest of Johannesburg	500 uranium oxide. e/
Do.	do.	Palabora Mining Co. Ltd.	Palabora Mine and plant at Phalaborwa	200 uranium oxide. e/
Vanadium	do.	Highveld Steel and Vanadium Corp. Ltd.	Mapochs Mine near Lydenburg	25,000 vanadium pentoxide. e/
Do.	do.	do.	Highveld steel plant in Witbank	17,000 vanadium pentoxide.
Do.	do.	do.	Highveld Vantra plant in Witbank	8,000 vanadium pentoxide.
Do.	do.	Vametco Minerals Corp. (Strategic Metals Corp., USA, 100%)	Krokodilkraal Mine and plant near Brits	5,000 vanadium pentoxide. e/
Do.	do.	Transvaal Alloys Pty. Ltd., (Highveld Steel and Vanadium Corp., 100%)	Wapadskloof Mine and plant, 60 kilometers northeast of Middelburg	2,250 vanadium pentoxide. e/
Do.	do.	Vanadium Technology Ltd. (Chromecorp Technology (Pty.) Ltd., 100%)	Kennedy's Vale (ex-Vansa Vanadium) Mine and plant, near Lydenburg	3,600 vanadium pentoxide.
Do.	do.	Rhombus Vanadium Holdings Ltd. (Rhombus Exploration Ltd., 50%; Usko Ltd., 50%)	Ba-Mogopa Mine and Usko plant near Brits	13,500 vanadium pentoxide. e/
Vermiculite		Palabora Mining Co. Ltd.	Palabora Mine and plant at Phalaborwa	230. e/
Zinc		Zinc Corp. of South Africa Ltd. (GFSA, 56%; Iscor Ltd., 35%)	Struisbult Springs Works in Springs, southeast of Johannesburg	90 Zn.
Do.		Black Mountain Mineral Development Co. (Pty.) Ltd.	Black Mountain Mine near Aggeneys, 100 kilometers northeast of Okiep	26 Zn (in concentrate).

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 1995

(Thousand metric tons unless otherwise specified)

Major commodities	Major operating companies and major equity owners 1/	Location of main facilities	Annual capacity
Zirconium	Tisand (Pty.) Ltd./Richards Bay Minerals	Opencast mines near Richards Bay	300 zircon concentrate.
Do.	Namakwa Sands project (AAC, 80%; De Beers, 20%)	Opencast mine along coast about 300 kilometers north of Cape Town	140 zircon concentrate.
Do.	Palabora Mining Co. Ltd.	Palabora Mine and plant at Phalaborwa	13.2 baddeleyite. e/
Do.	Phosphate Development Corp. Ltd.	Plant at Phalaborwa	12.5 baddeleyite. e/

e/ Estimated.

1/ Abbreviations of company names used are as follows: Anglo American Corp. of South Africa Ltd. (AAC); De Beers Consolidated Mines Ltd. (De Beers); General Mining, Metals and Minerals Ltd. (Gencor); Gold Fields of South Africa Ltd. (GFSA); Investment Development Corp. of South Africa (IDC); and Johannesburg Consolidated Investment Co. Ltd. (JCI).

2/ Depending on markets, furnace capacity can switch between FeCr and FeMn.

3/ Most of Foskor's phosphate output is from phosphate concentrates supplied by the neighboring Palabora copper mine.

4/ Full capacity shown will be reached in 2000.

TABLE 3
SOUTH AFRICA: RESERVE BASE OF MAJOR MINERALS 1/ FOR 1995

(Million metric tons unless otherwise specified)

Commodity		Reserve base
Andalusite 2/		51
Antimony	thousand tons	250
Asbestos, fiber		8.2
Chromium, ore		3,200
Coal, recoverable		55,300
Cobalt	thousand tons	15
Copper		13
Fluorspar		36
Gold	thousand tons	40
Iron ore		5,900
Lead		3
Manganese		4,000
Nickel		12
Phosphate rock, concentrates		2,310
Platinum-group metals	thousand tons	63
Silver	do.	10
Titanium		72
Uranium 3/	thousand tons	179
Vanadium		12.5
Vermiculite		80
Zinc		15
Zirconium		14.3

1/ Metallic minerals are contained metal.

2/ Includes the alumino-silicate, sillimanite.

3/ Recoverable at a cost of less than $80 per kilogram.

Sources: Chamber of Mines Statistical Tables 1995, p .4. (Minerals Bureau August 31, 1995 estimates.)