



2005 Minerals Yearbook

SOUTH AFRICA

THE MINERAL INDUSTRY OF SOUTH AFRICA

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The Republic of South Africa remained one of the world's leading mining and mineral-processing countries. South Africa was the world's leading producer of andalusite, chromite, ferrochrome, gold, platinum-group metals (PGM), vanadium, and vermiculite. The country was also the world's third-ranked producer of rough diamond by value and the fifth-ranked producer of rough diamond by volume (Damarapurshad, 2006; Masetlana, 2006; George, 2007a, b; Magyar, 2007; Potter, 2007a, b).

In 2005, South Africa's nominal gross domestic product (GDP) based on purchasing power parity amounted to about \$570 billion; the per capita GDP was about \$12,200. The real GDP grew by 4.9% compared with a revised 4.5% in 2004. The mining industry accounted for 7% of the GDP in 2005; crude and processed mineral products accounted for more than 37% of total exports. About 71% of crude mineral products and 75% of processed mineral products by value were exported in 2005 (Mwape and others, 2006, p. 10, 18; International Monetary Fund, 2006¹).

Government Policies and Programs

The Government's Black Economic Empowerment program required that black ownership of the mining industry reach 15% by 2009 and 26% by 2014. Recent actions to increase black ownership included the acquisition of 20% of Gold Fields Ltd. by black-owned Mvelaphanda Resources Ltd. by 2009, the transfer of mines held by AngloGold Ashanti Ltd. to black-owned African Rainbow Minerals Ltd., and the acquisition of 30% of Sallies Ltd. by African Renaissance Investments (Pty.) Ltd. (Mining Journal, 2005).

Commodity Review

Metals

Aluminum.—South Africa produced primary refined aluminum from imported alumina. National aluminum production decreased to 851,000 metric tons (t) in 2005 from 863,000 t in 2004. BHP Billiton plc operated the Bayside and the Hillside primary aluminum smelters at Richards Bay. In 2005, production at the Hillside smelter increased to 690,000 t from 680,000 t in 2004. Production at the Bayside smelter declined to 161,000 t from 183,000 t because of a potline freeze. Exports of aluminum amounted to \$1.03 billion in 2005 (BHP Billiton Group, 2005, p. 2; 2006, p. 2; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Chromium.—In 2005, South Africa accounted for nearly 39% of the world's chromite production. National output of chromite decreased to 7.49 million metric tons (Mt) in 2005

from 7.68 Mt in 2004. In 2005, South Africa's exports of chromite amounted to \$69.5 million. In 2004 and 2005, about 84% of the country's chromite output was sold domestically, most of which was consumed by ferrochromium producers (Masetlana, 2006; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Xstrata plc of Switzerland and its joint-venture partners operated the Boshhoek, the Chrome Eden, the Horizon, the Kroondal, the Thorncliffe, and the Waterval Mines, which had a total capacity of 5.02 million metric tons per year (Mt/yr) of chromite. At the Kroondal Mines, production decreased to 1.86 Mt in 2005 from 2.13 Mt in 2004; at the Boshhoek Mine, to 34,000 t from 253,000 t; and at the Horizon Mine, to 52,000 t from 131,000 t. The Chrome Eden Mine was shut down in 2005. Output at the Waterval Mine amounted to 445,000 t in 2005 (Xstrata plc, 2006, p. 79).

Samancor Chrome Ltd. [a joint venture between BHP Billiton Group (60%) and Anglo American plc (40%)] operated the Eastern Chrome Mines in Mpumalanga Province, which produced about 1.7 Mt/yr of chromite, and the Western Chrome Mines in North West Province, which produced about 1.3 Mt/yr. About 2.3 Mt/yr of the company's output was consumed in its ferrochromium plants. Samancor planned to increase chromite production to 3.61 Mt in 2006 and 9.85 Mt in 2015 because of expected increases in international stainless steel demand. In early 2005, Samancor's chromite and ferrochromium operations were sold to Kermas Group Ltd. (Metal Bulletin, 2005b; Samancor Ltd., undated²).

Assmang Ltd. of South Africa operated the Dwarsrivier Mine in Mpumalanga. In fiscal year² 2004-05, production at Dwarsrivier declined to 568,000 t from 648,000 t in fiscal year 2003-04. Resources at Dwarsrivier amounted to 88.3 Mt at a grade of 39.2% Cr₂O₃, of which 31 Mt was reserves at a grade of 39.6% Cr₂O₃ (Assmang Ltd., 2004; African Rainbow Minerals Ltd., 2005, p. 40; 2006, p. 37, 39).

In December 2005, Assmang completed construction of an underground mine at Dwarsrivier to replace the open pit mine. The new mine had a capacity of 1.2 Mt/yr of run of mine ore; Assmang planned to increase capacity to 1.5 Mt/yr of run of mine ore (1.1 Mt/yr of salable ore) by 2009 (African Rainbow Minerals Ltd., 2006, p. 30, 39).

South Africa was also the world's leading producer of ferrochromium in 2005, accounting for nearly 41% of global output. National production of ferrochromium declined to nearly 2.81 Mt in 2005 from a revised 3.03 Mt in 2004. Exports of ferrochromium amounted to nearly \$1.56 billion in 2005 (Masetlana, 2006; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

¹References that include a section mark (§) are found in the Internet References Cited section.

²Fiscal years run from the end of June in one year through the end of June in the following year unless otherwise specified.

Xstrata and its joint-venture partner Merafe Resources Ltd. of South Africa operated the Boshhoek, the Gemini, the Lydenburg, the Rustenburg, and the Wonderkop ferrochromium plants. These plants had a total combined capacity of 1.62 Mt/yr. Production decreased at Rustenburg to 383,000 t in 2005 from 393,000 t in 2004; at Lydenburg, to 374,000 t from 393,000 t; at Boshhoek, to 196,000 t from 218,000 t; and at Gemini, to 4,000 t from 173,000 t. At Wonderkop, output increased to 333,000 t from 311,000 t. Xstrata's production of ferrochromium declined because of lower world stainless steel production; the company shut down furnaces at several plants in 2005 (Xstrata plc, 2006, p. 37-38, 79).

In December 2004, Xstrata and Merafe started construction on Project Lion, which was a new ferrochromium smelter with a capacity of 360,000 metric tons per year (t/yr). Xstrata planned to start production in the third quarter of 2006. Chromite was expected to be supplied by an expansion of the Thorncliffe Mine. Merafe's share in the project was expected to be 20.5% (Xstrata plc, 2006, p. 9, 38, 40).

Samancor operated the Ferrometals plant in Witbank, the Middleburg Ferrochrome plant in Middleburg, and the Tubatse Ferrochrome Plant in Steelpoort. In 2004, the company's production of ferrochromium amounted to nearly 1.07 Mt; output was reduced by 60,000 t in the third quarter of 2005 because of low ferrochromium prices. Samancor planned to increase output to 1.12 Mt in 2006 and 2.81 Mt in 2015. Initial increases in production were likely to result from expansions of existing facilities; Samancor also planned to build a new ferrochromium plant with a capacity of 1.5 Mt/yr adjacent to the Eastern Chromite Mines (BHP Billiton Group, 2005, p. 4; Magnowski, 2005; Metal Bulletin, 2005a, b).

Hernic Ferrochrome (Pty.) Ltd. (a subsidiary of Mitsubishi Corp.) completed the capacity expansion of its ferrochromium plant to 420,000 t/yr from 260,000 t/yr in October. The company had mined chromite at the Maroelabult open pit mine from 1996 to 2000; a new underground mine at Maroelabult was under construction in 2005. The new mine was expected to be completed in 2006 and to have a capacity of 1 Mt/yr (Mmakau Mining (Pty.) Ltd., 2005; Hernic Ferrochrome (Pty.) Ltd., undated§).

Assmang Ltd. operated the Machadodorp plant in Mpumalanga Province with a capacity of 290,000 t/yr. In fiscal year 2004-05, output increased to 266,000 t from 263,000 t in fiscal year 2003-04 (Assmang Ltd., 2004; African Rainbow Minerals Ltd., 2006, p. 39).

In July, Tata Steel Ltd. of India announced plans to proceed with the construction of a new ferrochromium plant at Richards Bay. The plant was expected to have a capacity of 120,000 t/yr. Tata planned to export most of the plant's output to stainless steel producers in Western Europe, the Republic of Korea, and Taiwan (Swindells, 2005).

In late 2005, International Ferro Metals Ltd. (IFM) started construction of its new chromite mine and ferrochromium plant in North West Province. The plant was expected to be completed in 18 months and to reach its full capacity of 267,400 t/yr in 2007. Jiuquan Iron and Steel Company of China signed an agreement with IFM to purchase nearly one-half of the plant's production. Resources at the mine were estimated to be 45.9 Mt

at a grade of 35.6% Cr₂O₃, of which 13.02 Mt at a grade of 30.3% Cr₂O₃ was reserves. The project was expected to cost about \$170 million (Metal Bulletin, 2005a; Mining Magazine, 2006).

Columbium (Niobium) and Tantalum.—Titan Processors (Pty.) Ltd. (a subsidiary of Pinnacle Resources Inc. of the United States) operated Africa's only tantalum refinery in Johannesburg. In July 2004, Titan announced plans to complete its capacity expansion and to increase production to 30 metric tons per month (t/mo) of high-purity Ta₂O₅ from 2 t/mo by the end of May 2005. The company planned to source ore supplies from independent miners in Mozambique and Zimbabwe. By the end of 2005, Titan had not commenced large-scale production (Pinnacle Resources Inc., 2004; Magyar, 2006, p. 20.5).

Copper.—In 2005, South Africa's mine production of copper increased to 103,856 t from 102,574 t in 2004. Higher production from the Palabora Mine more than offset lower production from the Black Mountain Mine and the shutdown of the Maranda copper-zinc mine in 2004. Copper smelter production increased to an estimated 110,000 t from 89,300 t, and refined copper production, to an estimated 100,000 t from 91,498 t. Copper exports amounted to \$103 million in 2005 (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Rio Tinto plc operated the Palabora copper mine, smelter, and refinery. In 2005, mine production at Palabora was 65,892 t of copper from 9.54 Mt of ore milled compared with 50,915 t of copper from 8.55 Mt of ore milled in 2004. Rio Tinto planned to increase ore mined by 9%. The production of smelted copper at Palabora increased to 84,926 t in 2005 from 67,179 t in 2004, and the production of refined copper, to 80,319 t from 67,545 t. The refinery operated well below its capacity of 130,000 t/yr; most of the output was used by Rio Tinto in the production of copper rods (Palabora Mining Company Ltd., 2006, p. 10-11, 76-77).

Anglo American Platinum Corp. produced 11,300 t of refined copper at Rustenburg Base Metal Refiners in 2005 compared with 12,900 t in 2004. About 10,500 t was attributable to Anglo Platinum's PGM mining operations in 2005 compared with 12,200 t in 2004; the remainder was attributable to purchased concentrates (Anglo American Platinum Corp., 2006, p. 86).

Gold.—South Africa was the world's leading producer of gold in 2005, accounting for about 12% of world production. However, the long-term decline in the country's gold output continued in 2005, with national gold production decreasing to 294,671 kilograms (kg) from 337,223 kg in 2004 and 394,800 kg in 2001. In 2005, gold exports amounted to \$3.8 billion (George, 2007a; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

AngloGold Ashanti Ltd. operated the Great Noligwa, the Kopanang, the Moab Khotsong, and the Tau Lekoa Mines in the West Wits area near Carletonville; and the Mponeng, the Savuka, and the Tau Tona Mines in the Vaal River area near Klerksdorp. AngloGold Ashanti's gold production declined to 83,200 kg in 2005 from 88,900 kg in 2004. The Ergo Mine southeast of Johannesburg, which was not included in these figures, was shut down in 2005. Total cash costs rose to

\$291 per troy ounce of gold from \$284 per troy ounce of gold; this increase was attributable to decreased gold production (AngloGold Ashanti Ltd., 2006, p. 45-46).

At the Mponeng Mine, production increased to 15,900 kg in 2005 from 13,600 kg in 2004 because of higher ore grades. At the Tau Tona Mine, lower ore grades and difficult mining conditions led to a decrease in production to 15,600 kg from 17,700 kg. Output declined to 3,900 kg from 4,900 kg at Savuka as the mine approached the end of its life. Cash costs at Savuka were \$430 per troy ounce of gold in 2005. In 2006, production at the Mponeng Mine was expected to be between 15,400 and 16,000 kg, and at Tau Tona, between 15,300 and 15,900 kg. AngloGold Ashanti planned to shut down the Savuka Mine in March 2006 after producing about 450 kg of gold (AngloGold Ashanti Ltd., 2006, p. 47-49).

In 2005, production at the Great Nologwa Mine declined to 21,600 kg from 24,700 kg in 2004 because of lower ore grades. At the Tau Lekoa Mine, production decreased to 8,200 kg from 9,100 kg because of lower volumes mined. At the Kopanang Mine, output remained nearly unchanged at 15,000 kg. In 2006, production at Great Nologwa was expected to decline to between 20,200 and 21,100 kg; Kopanang, between 14,200 and 14,800 kg; and Tau Lekoa, between 6,400 and 6,700 kg (AngloGold Ashanti Ltd., 2006, p. 50-52).

The Moab Khotsong Mine produced more than 900 kg of gold in 2004. AngloGold Ashanti planned to produce about 1,500 kg at Moab Khotsong in 2006 and to increase output to 15,400 kg by 2012. The mine was expected to produce 112,000 kg of gold from 10 Mt of milled ore during its 15-year life. Capital costs were likely to be \$659 million, of which \$629 million was spent before the end of 2005 (AngloGold Ashanti Ltd., 2006, p. 51).

Harmony Gold Mining Company Ltd. of South Africa mined gold at numerous mines that included the Elandsrand, the Evander, the Kalgold, the Orkney/Welkom, and the Randfontein. The company's production of gold was 72,427 kg in 2005 compared with 89,598 kg in 2004. Harmony closed shafts at some underground mining operations because of the strength of the South African rand. Cash operating costs declined to \$397 per troy ounce of gold in the fourth quarter of 2005 from \$409 per troy ounce of gold in the same period in 2004. Harmony planned to increase its gold production to more than 93,000 kilograms per year (kg/yr) by 2010 (Harmony Gold Mining Company Ltd., 2004, p. 31; 2005a, p. 33; 2005b, p. 32, 39; 2005c, p. 56; 2006, p. 30, 37).

Gold Fields Ltd. of South Africa produced gold at the Beatrix, the Driefontein, and the Kloof Mines. In 2005, the company's production of gold was 83,105 kg from 14.4 Mt of ore milled compared with 87,744 kg from 16.4 Mt of ore milled in 2004. In the second half of 2005, the ore grade was 6.1 g/t gold compared with 5.6 g/t gold in the second half of 2004. Production at the Driefontein Mine declined to 34,490 kg in 2005 from 35,804 kg in 2004; at the Kloof Mine, to 29,636 kg from 32,884 kg, and at the Beatrix Mine, to 18,979 kg from 19,054 kg. Gold Fields planned to maintain production at Driefontein of 31,000 kg/yr; Kloof, 31,000 kg/yr; and Beatrix, nearly 19,000 kg/yr. At these rates of production, the life of the Kloof Mine was estimated to be 9 years; Driefontein, 8 years; and Beatrix, 5 years (Gold Fields Ltd., 2004, p. 13; 2005a, p. 17; 2005b, p. 2, 13; 2006, p. 17).

In 2005, gold production by Durban Roodepoort Deep Ltd. (DRD) of South Africa declined to 14,375 kg from 23,170 kg in 2004. Output at the North West Mines declined to 1,480 kg from 9,993 kg, and at the Blyvooruitzicht Mine, to 5,120 kg from 5,866 kg. The North West Mines were shut down in the first quarter of 2005 because of an earthquake and subsequently were sold to Simmer and Jack Mines Ltd. In the second half of 2005, cash operating costs at Blyvooruitzicht's underground operations were \$419 per troy ounce of gold compared with \$488 per troy ounce of gold in the same period in 2004. Production at the Crown and the East Rand Proprietary Mine joint ventures increased to 7,775 kg in 2005 from 7,311 kg in 2004. In December 2005, DRD purchased the interests of its joint-venture partners in the Crown Mine and the East Rand Proprietary Mine (Durban Roodepoort Deep Ltd., 2005, 2006).

Placer Dome Inc. produced gold at the South Deep Mine. In 2005, output was 14,342 kg from 1.04 Mt of ore milled compared with 13,330 kg from 1.1 Mt of ore milled in 2004. Cash costs decreased to \$387 per troy ounce of gold in 2005 from \$394 per troy ounce of gold in 2004. Reserves amounted to 110 Mt at a grade of 7.3 g/t gold. In December, Placer Dome's board of directors approved a bid by Barrick to purchase the company (Placer Dome Gold Inc., 2006, p. 2, 4, 18).

Thistle Mining Inc. of South Africa operated the President Steyn Mine in Free State. The company produced 5,430 kg of gold from 1 Mt of ore milled in 2005 compared with 5,169 kg from 1.15 Mt of ore milled in 2004. Cash costs decreased to \$521 per troy ounce of gold in 2005 from \$566 per troy ounce of gold in 2004. Thistle planned to produce about 5,000 kg of gold in 2006 and to maintain a long-term production rate of more than 5,400 kg/yr (Thistle Mining Inc., 2006, p. 16-17).

Anglo Platinum's production of refined gold from Rustenburg Base Metal Refiners increased to 3,655 kg in 2005 from 3,418 kg in 2004. Of this amount, 3,359 kg was attributable to Anglo Platinum's PGM mining operations in 2005 compared with 3,241 kg in 2004; the remainder was attributable to purchased concentrates (Anglo American Platinum Corp., 2006, p. 86).

Aflease Gold Ltd. started production at the Bonanza South Mine; the company planned to produce about 900 kg/yr of gold during the 4- to 5-year life of the mine. In 2007, Aflease planned to start production of gold and uranium at the Dominion uranium mine; gold production was expected to be 2,800 kg/yr. The Dominion Mine was expected to reach full production in 2010 (Mining Review Africa, 2005b).

Rand Refinery Ltd. in Germiston (AngloGold Ashanti, 53%; Gold Fields, 33%; DRD, 10%; Avgold Ltd., 2%; and Western Areas Ltd., 2%) produced 390,000 kg of refined gold in 2005, which was nearly 33% of the company's capacity. In 2004, domestic gold mines accounted for about 64% of the refinery's output; imports (mostly sourced from West Africa), 33%; and gold scrap from the domestic jewelry industry, 3%. Harmony also operated a gold refinery (Mining Review Africa, 2004; Seccombe, 2006§).

Iron Ore.—Assmang, Highveld Steel and Vanadium Corp. Ltd. of South Africa, and Kumba Resources Ltd. of South Africa mined iron ore. South Africa accounted for 3% of world iron ore production in 2004. National production of iron ore increased to 39.5 Mt in 2005 from 39.3 Mt in 2004. Iron ore exports

amounted to \$982 million in 2005 (Jorgenson, 2006, p. 40.25; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Kumba operated the Sishen Mine in Northern Cape Province and the Thabazimbi Mine in Limpopo Province. In 2005, output from the Sishen Mine increased to nearly 28.5 Mt from 27.6 Mt in 2004, and the Thabazimbi Mine, to 2.53 Mt from 2.5 Mt (Kumba Resources Ltd., 2006, p. 33-34).

Kumba's exports of iron ore amounted to 22.1 Mt in 2005 compared with 20.9 Mt in 2004. The increase in the company's exports was partially attributable to the increase in Chinese steel production in 2005. China accounted for 39% of Kumba's iron ore export revenues; Japan, 22%; the United Kingdom, 12%; Austria, 11%; and Germany, 10%. Kumba accounted for 4% of the world's seaborne iron ore trade (Kumba Resources Ltd., 2006, p. 34).

Domestic sales declined to 9.17 Mt in 2005 from 9.37 Mt in 2004. Mittal Steel South Africa Ltd. accounted for a majority of Kumba's domestic sales; the company had a contract with Kumba to purchase 6.25 Mt/yr of iron ore and the entire output of the Thabazimbi Mine (Kumba Resources Ltd., 2006, p. 34).

In February, Kumba decided to proceed with the expansion of the Sishen Mine. The expansion was likely to increase salable iron ore production by 10 Mt/yr; the increase would be at least partially attributable to improved beneficiation technology. Kumba planned to start production in mid-2007 and to reach full capacity by the beginning of 2009. The cost of the expansion was expected to be about \$570 million. The company was conducting a feasibility study on the expansion of the Sishen Mine by an additional 10 to 20 Mt/yr. Kumba planned to complete the study in 2007; production could start in 2011 if the study was to yield favorable results. Resources at Sishen were estimated to be 2.46 billion metric tons (Gt) at a grade of 58.6% iron (Kumba Resources Ltd., 2006, p. 44, 48).

Kumba also planned to develop the Sishen South project, which is located 90 km south of the Sishen Mine. In the first phase of the project, Sishen South was expected to produce 3 Mt/yr of iron ore; output could increase to 9 Mt/yr in the second phase. The capital cost of the first phase was expected to be about \$160 million. Resources at Sishen South were estimated to be 290 Mt at a grade of 64.6% iron (Kumba Resources Ltd., 2006, p. 44, 48).

Kumba was also conducting a feasibility study on the Phoenix project at the Thabazimbi Mine, which would produce between 2.5 and 3 Mt/yr of iron ore and extend the life of the mine by 20 years. The decision on the project could be made in 2006; production could start in 2009. Resources at Thabazimbi were estimated to be 61.3 Mt at a grade of 61.3% iron (Kumba Resources Ltd., 2006, p. 44, 48).

Assmang produced iron ore at the Beeshoek Mine in Northern Cape, which had a rated capacity of 6 Mt/yr. In fiscal year 2004-05, production at Beeshoek increased to 6.43 Mt from 6.26 Mt in fiscal year 2003-04. Resources at Beeshoek amounted to 153 Mt at a grade of 63.6% iron, of which 73 Mt was reserves at a grade of 64.8% iron (Assmang Ltd., 2004; African Rainbow Minerals Ltd., 2006, p. 30, 32).

Assmang was considering the development of the iron ore resources at the Bruce, King, and Mokaning properties (BKM).

If the company decided to proceed with the development of BKM, a new mine was expected to be completed in fiscal year 2007-08 at a cost of \$446 million. Exports from the Beeshoek Mine were expected to decline to less than 1 Mt/yr by fiscal year 2008-09. Assmang's total iron ore exports were likely to be about 9 Mt in fiscal years 2007-08 and 2008-09. The company was also considering an expansion of BKM's capacity to 16.8 Mt/yr from 8.4 Mt/yr in fiscal year 2009-10 at a cost of \$223 million. Resources at BKM were estimated to be 672 Mt at a grade of 64.5%, of which 445 Mt was reserves at a grade of 64.7% (African Rainbow Minerals Ltd., 2005, p. 39; 2006, p. 30-31, 33-34).

Highveld mined titaniferous magnetite at its Mapochs open pit mine near Roosenekal in Mpumalanga Province. Mapochs had a capacity of 2.45 Mt/yr; average ore grades from the mine were 54.3% iron (Department of Minerals and Energy, 2004, p. 10).

Iron and Steel.—National production of crude steel was nearly unchanged in 2005 at 9.49 Mt. The production of pig iron increased to 6.13 Mt in 2005 from 6.01 Mt in 2004, and the production of direct-reduced iron (DRI) rose to 1.78 Mt from 1.63 Mt. South Africa's share of African pig iron output amounted to 74%; crude steel, 53%; and DRI, 28% (International Iron and Steel Institute, 2006, p. 3, 5, 11).

Mittal Steel South Africa accounted for most of South Africa's production of crude steel at its Newcastle, Saldanha, Vanderbijlpark, and Vereeniging plants. The production of liquid steel at Vanderbijlpark increased to 3.82 Mt in 2005 from 3.63 Mt in 2004 in spite of a blast furnace shutdown for repairs. At Saldanha, production increased to 1.24 Mt in 2005 from 1.23 Mt in 2004, and at Newcastle and Vereeniging, to 2.19 Mt from 2.18 Mt (Mittal Steel South Africa Ltd., 2006, p. 15).

Mittal planned to increase liquid steel production at Vanderbijlpark by about 1.9 Mt/yr by the end of 2009 and 2.3 Mt/yr by 2012. By the second half of 2006, the company planned to increase production at Vanderbijlpark by 445,000 t/yr by relining blast furnace D, and to gain an additional 660,000 t/yr from increased efficiency. The installation of new DRI kilns was expected to increase output by 325,000 t/yr by the second half of 2007 and by 830,000 t/yr by the second half of 2009. By 2012, Mittal planned to increase production by 355,000 t/yr by relining blast furnace C. The cost of the expansion at Vanderbijlpark was estimated to be about \$700 million from 2006 to 2009. The company also planned to increase capacity at Saldanha and Vereeniging by 105,000 t/yr (Mittal Steel South Africa Ltd., 2005, p. 5, 7).

Mittal's production of rolled steel products at Vanderbijlpark was nearly 4 Mt; Newcastle and Vereeniging, about 2 Mt; and Saldanha, about 1.2 Mt/yr. Vanderbijlpark produced a wide range of flat products that included steel coils and plates, and hot-rolled, cold-rolled, galvanized, tinplated, and color-coated sheets. Saldanha produced mainly hot-rolled coil, and Newcastle and Vereeniging, long steel products. Mittal supplied about 80% of South Africa's demand for flat steel products; the company was Africa's leading flat steel producer.

Highveld operated a rolling mill at Witbank. In 2005, the company's production of rolled steel products was 683,969 t compared with 674,013 t in 2004 and 653,723 t in 2001. Scaw Metals (a subsidiary of Anglo American plc) decreased

production of rolled products at its Germiston plant to 386,500 t in 2005 from 458,000 t in 2004 (Anglo American plc, 2006, p. 121; Highveld Steel and Vanadium Corp. Ltd., 2006).

Columbus Stainless (Pty.) Ltd. operated South Africa's only stainless steel plant at Middleburg. Production amounted to 658,000 t in 2005 compared with 718,000 t in 2004 and 643,000 t in 2003. Columbus accounted for nearly 3% of the world's stainless steel output in 2005 (Ferro-alloys Monthly, 2006).

Lead and Zinc.—South Africa's mine production of zinc was nearly unchanged at 32,112 t in 2005. Increased production from the Black Mountain Mine was offset by the shutdown of the Maranda copper-zinc mine in the third quarter of 2004. Lead mine production increased to more than 42,000 t in 2005 from about 37,500 t in 2004.

Anglo American plc operated the Black Mountain lead-zinc-copper mine near Aggeneys in Northern Cape Province. In 2005, production at Black Mountain amounted to 32,100 t of zinc and 42,200 t of lead from 1.35 Mt of ore milled compared with 28,200 t of zinc and nearly 37,500 t of lead from 1.5 Mt of ore milled in 2004. The development of the Deeps Mine at Black Mountain was completed in 2005 (Anglo American plc, 2006, p. 9-10, 120).

Zinc Corp. of South Africa Ltd. (a subsidiary of Kumba Resources Ltd.) operated South Africa's only zinc refinery at Springs. In 2005, production declined to 102,000 t from 104,000 t in 2004 because of lower-quality concentrates from the refinery's main suppliers (Kumba Resources Ltd., 2006, p. 40).

Manganese.—In 2005, South Africa's mine production of manganese ore increased to 4.61 Mt from 4.28 Mt in 2004. Manganese ore exports amounted to \$239 million in 2005 (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Samancor operated the Mamatwan open pit mine and the Wessels underground mine near Hotazel in the Northern Cape Province. In 2005, Samancor's production of manganese ore decreased to 2.33 Mt from 2.52 Mt in 2004 (BHP Billiton Group, 2005, p. 3; 2006, p. 3).

Assmang produced manganese ore at the Gloria and the Nchwaning Mines. Capacity at Nchwaning was 3 Mt/yr, and at Gloria, 600,000 t/yr. In fiscal year 2004-05, production at the mines increased to 1.81 Mt from 1.41 Mt in fiscal year 2003-04. Resources at the mines were 631 Mt at a grade of 39.9% manganese, of which 189 Mt was reserves at a grade of 42.4% manganese. Ore grades at the Nchwaning Mine ranged from 38.9% to 49.1% manganese; and at the Gloria Mine, from 31.9% to 38.3% manganese (Assmang Ltd., 2004; African Rainbow Minerals Ltd., 2005, p. 36-37; 2006, p. 30, 35-36).

Domestic production of manganese metal, alloys, and compounds declined to about 846,000 t in 2005 from 970,000 t in 2004. South Africa's exports of manganese metal and manganese alloys amounted to \$439 million in 2005 (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Samancor produced ferromanganese and silicomanganese at its plant at Meyerton. The company's production of manganese alloys was 419,000 t in 2005 compared with 504,000 t in 2004.

Assmang produced ferromanganese at the Cato Ridge plant in Kwa-Zulu Natal, which had a capacity of 300,000 t/yr. In fiscal year 2004-05, production at Cato Ridge decreased to 197,000 t from 238,000 t in fiscal year 2003-04. Assmang was considering an increase in Cato Ridge's capacity to 380,000 t/yr. Highveld's silicomanganese production was 104,409 t in 2005 compared with 137,606 t in 2004 (Assmang Ltd., 2004; BHP Billiton Group, 2005, p. 3; 2006, p. 3; African Rainbow Minerals Ltd., 2006, p. 35-36; Highveld Steel and Vanadium Corp. Ltd., 2006).

Nickel.—Most of South Africa's nickel mine production was a coproduct of PGM mining. In 2005, national nickel mine production declined to 39,853 t from 40,842 t in 2004. Domestic nickel consumption amounted to about 25,000 t in 2004.

Anglo Platinum produced 20,500 t of refined nickel at Rustenburg Base Metal Refiners in 2005 compared with 22,300 t in 2004 and 19,500 t in 2000. About 19,000 t was attributable to Anglo Platinum's PGM mining operations compared with 21,200 t in 2004 and 19,500 t in 2001 (Anglo American Platinum Corp., 2006, p. 86).

In fiscal year 2004-05, Impala Platinum Holdings Ltd. (Implats) produced 8,100 t of refined nickel from its refinery northeast of Johannesburg compared with 9,500 t in fiscal year 2003-04. Production at this plant was from purchased concentrates and toll refining. Implats also produced nickel from its Impala PGM mines near Rustenburg in North West Province; production of refined nickel from Impala increased to 7,900 t in fiscal year 2004-05 from 6,900 t in fiscal year 2003-04. Implats produced small amounts of nickel from the Marula PGM mine (Impala Platinum Holdings Ltd., 2005, p. 57, 77).

African Rainbow Minerals Ltd. of South Africa operated the Nkomati nickel mine. Output at Nkomati was about 5,000 t/yr of nickel. The company planned to increase production to 21,500 t/yr of nickel by fiscal year 2009-10. Resources at Nkomati were estimated to be 144 Mt at a grade of 0.46% nickel, of which 67 Mt was reserves at a grade of 0.5% nickel. The life of the mine was expected to be 20 years (African Rainbow Minerals Ltd., 2005, p. 42; 2006, p. 18).

Platinum-Group Metals.—South Africa was the world's leading producer of PGM in 2005. The country's share of world platinum production was 78%, and palladium, 39%. South Africa's production of PGM increased to 302,981 kg in 2005 from 276,401 kg in 2004. In 2005, national exports of platinum amounted to \$3.82 billion; rhodium, \$580 million; palladium, \$284 million; and ruthenium, \$53.9 million (George, 2007b; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

In 2005, Anglo Platinum produced 144,700 kg of refined PGM compared with 137,700 kg in 2004. About 131,600 kg was attributable to the company's mining operations in 2005 compared with 130,100 kg in 2004. Platinum produced from Anglo's mining operations amounted to 69,600 kg; palladium, 38,000 kg; and rhodium, 9,300 kg (Anglo American Platinum Corp., 2006, p. 96).

At the Rustenburg Section, platinum production decreased to 25,600 kg in 2005 from 26,900 kg in 2004 in spite of higher output from the UG2 project. (UG2 is a chromite and PGM-rich layer in the Eastern Bushveld.) Anglo Platinum planned to increase platinum output at Rustenburg to between 26,400 and

28,000 kg/yr starting in 2008. Production at the Amandelbult Section declined to 17,100 kg of platinum from 18,800 kg because of difficult geologic conditions. Output was expected to increase in 2006. At the Union Section, platinum production declined to 9,645 kg from 9,941 kg. Production declined slightly at the Lebowa Platinum Mine and increased slightly at the Bafokeng-Raismone and the Potgietersrust Platinums Mines. In 2006, platinum output at the Bafokeng-Raismone Mine was expected to be about 6,200 kg (Anglo American Platinum Corp., 2006, p. 16-17, 46, 48, 52, 99-104).

At the Modikwa Mine (a joint venture with African Rainbow Minerals), production of PGM increased to 10,211 kg in 2005 from 8,603 kg in 2004; platinum production rose to 3,987 kg from 3,546 kg in 2004. Higher production was attributable to an increase in ore milled. By mid-2007, Modikwa was expected to reach its full planned production of 10,800 kg/yr of PGM (African Rainbow Minerals Ltd., 2006, p. 18; Anglo American Platinum Corp., 2006, p. 107).

In 2005, production at the Kroondal Mine (a joint venture with Aquarius Platinum Ltd. of South Africa) increased to 13,009 kg of PGM from 8,014 kg in 2004; platinum production increased to 7,782 kg from 4,823 kg. Higher production was attributable to a new concentrator that was commissioned in March 2005. Anglo Platinum and Aquarius planned to increase Kroondal's production to 15,700 kg/yr of PGM (Aquarius Platinum Ltd., 2005, p. 3-7; 2006, p. 5; Anglo American Platinum Corp., 2006, p. 54).

Anglo Platinum planned to increase its total refined platinum production to between 84,000 and 87,000 kg in 2006. Further production increases were likely in subsequent years because of the Mototolo joint-venture project with Xstrata. Anglo Platinum planned to start production at Mototolo in late 2006; output was expected to be about 4,100 kg/yr of platinum and 2,600 kg/yr of palladium (Anglo American Platinum Corp., 2006, p. 16-18).

Implats Platinum Ltd. (Implats) operated the Impala Mines near Rustenburg in North West Province and the Marula Mine in Limpopo Province. In fiscal year 2004-05, production of refined PGM at Impala was 64,132 kg compared with 61,445 kg in fiscal year 2003-04; platinum production increased to 34,668 kg from 33,912 kg. Higher output was attributable to an increase in ore milled. Implats planned to maintain production at about 34,000 kg/yr of platinum for the 30-year life of the Impala mines. The company also planned to increase the capacity of the Base Metals Refinery (which refined concentrates from the Impala Mines) to more than 62,000 kg/yr of refined platinum in September 2005 and 71,500 kg/yr by the end of June 2006 (Impala Platinum Holdings Ltd., 2005, p. 57, 61-63).

By 2010, higher PGM production in South Africa and Zimbabwe was expected to allow Implats to use its expanded capacity. Sources of additional PGM included the Marula Mine (operated by Implats), the Two Rivers Mine (operated by African Rainbow Minerals and Implats), and the Everest South and Marikana Mines (operated by Aquarius) in South Africa and the Mimosa and Zimplats Mines in Zimbabwe (Mining Review Africa, 2005a).

In fiscal year 2004-05, platinum production at Marula increased to 927 kg from 414 kg in fiscal year 2003-04. Implats planned to increase platinum production at Marula to 2,300 kg

in fiscal year 2006-07 and 4,500 kg in fiscal year 2008-09. The life of the mine was expected to be 17 years (Impala Platinum Holdings Ltd., 2005, p. 64, 67).

Implats also operated a refinery northeast of Johannesburg; production at this plant was from purchased concentrates and toll refining. In fiscal year 2004-05, the refinery's production decreased to 46,245 kg of PGM from 54,409 kg in fiscal year 2003-04 because Lonmin plc completed the refurbishment of its own smelter. Implats planned to increase production in fiscal year 2005-06 (Impala Platinum Holdings Ltd., 2005, p. 76-78).

African Rainbow Minerals and Implats were engaged in a joint venture to develop the Two Rivers Mine in Mpumalanga Province. The companies planned to produce 3,700 kg/yr of platinum, 2,100 kg/yr of palladium, and 600 kg/yr of rhodium; the mine was expected to reach its full capacity in fiscal year 2007-08. The capital cost of the project was likely to be about \$190 million. The reserves at Two Rivers were estimated to be 40.3 Mt at a grade of 4.18 g/t PGM and gold. African Rainbow Minerals also planned to produce 4,000 kg/yr of PGM with the expansion of the Nkomati nickel mine (African Rainbow Minerals Ltd., 2005, p. 44; 2006, p. 18; Impala Platinum Holdings Ltd., 2005, p. 75).

Lonmin plc of the United Kingdom mined PGM at the Eastern Platinum Mine, the Karee Mine, and the Western Platinum Mine, east of Rustenburg in North West Province and at the Limpopo Mine. From September 2004 to September 2005, these mines produced 28,145 kg of platinum compared with 28,514 kg in the previous 12 months. Total production of PGM increased to 52,207 kg from 52,147 kg. Ore processed declined to 13.5 Mt from 14.4 Mt. The Limpopo Mine produced 801 kg of PGM that included 358 kg of platinum (Lonmin plc, 2005, p. 26).

Lonmin planned to increase platinum production to 31,000 kg in 2006 and 40,000 kg in 2010. The Eastern Platinum, the Karee, and the Western Platinum Mines were expected to produce 34,000 kg in 2010, and the Limpopo Mine, about 6,000 kg. The expansion of the Limpopo Mine to 6,000 kg from 2,300 kg in 2007 depended upon favorable results from a feasibility study (Lonmin plc, 2005, p. 5, 12).

Aquarius operated the Marikana Mines. In 2005, production of PGM at Marikana was 3,159 kg compared with 2,583 kg in 2004; platinum production rose to 1,999 kg from 1,720 kg. Output at Marikana was expected to increase to 2,800 kg/yr of platinum and 1,300 kg/yr of palladium by the end of 2006. Aquarius completed construction on the Everest Mine in the fourth quarter of 2005; production amounted to 211 kg of PGM. The company planned to reach full production of 7,000 kg/yr of PGM in 2006. Reserves at Everest were estimated to be 26.8 Mt at a grade of 3.36 g/t PGM (Aquarius Platinum Ltd., 2005, p. 3-8; 2006, p. 2, 7, 9; Anglo American Platinum Corp., 2006, p. 17).

Silicon.—In 2005, South Africa's production of silicon metal and ferrosilicon declined to 180,494 t from 191,743 t in 2004. Silicon Smelters (Pty.) Ltd. was the only domestic producer of silicon metal. In 2005, Highveld produced 42,656 t of ferrosilicon compared with 58,155 t in 2004 from its plant at Witbank. Kumba's ferrosilicon production amounted to about 6,000 t/yr. Silicon Technology (Pty.) Ltd. also produced

ferrosilicon. In 2005, exports of silicon metal and ferrosilicon amounted to \$98.3 million (Highveld Steel and Vanadium Corp. Ltd., 2006; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Silver.—National silver mine production was 87,874 kg in 2005 compared with 70,913 kg in 2004 and 109,570 kg in 2001. Silver was mined as a coproduct of copper, gold, lead, PGM, nickel, and zinc. In February, Rand Refinery Ltd. announced that it had installed new equipment that increased its capacity to 200,000 kg/yr of refined silver from 120,000 kg/yr (Rand Refinery Ltd., 2005).

Tin.—In March 2005, Centurion Gold Holdings Inc. of South Africa acquired the assets of Zaaipplaats Tin Mining Ltd., which included the Zaaipplaats Mine in Limpopo Province. In November, Centurion was awarded exploration permits for the Zaaipplaats Mine; the company planned to reopen the mines immediately and produce about 2,500 t/yr of tin (Centurion Gold Holdings Inc., 2005).

Titanium and Zirconium.—BHP Billiton Group and Rio Tinto mined ilmenite, rutile, and zircon, and produced titanium slag at Richards Bay. Titanium slag capacity amounted to 1.06 Mt/yr. In 2004, zircon production declined to less than 240,000 t because of a fire at Richards Bay (Mining Magazine, 2005, 2006).

In 2005, Tigor SA (Kumba, 60%, and Tigor Ltd., 40%) produced 377,000 t of ilmenite from the Hillendale Mine in KwaZulu Natal Province compared with 459,000 t in 2004 because of lower grades. Rutile production increased to 23,000 t from 20,000 t, and zircon production declined to 47,000 t from 49,000 t. Kumba planned to start production at the Fairbreeze Mine in July 2008 because of declining grades at Hillendale. Resources at Fairbreeze were estimated to be 229 Mt at a grade of 3.6% ilmenite, and at Hillendale, 48.7 Mt at a grade of 3.8% ilmenite. Kumba also held a deposit in East Cape Province with resources of 239 Mt at a grade of 4.5% ilmenite. Development of this deposit has been delayed by environmental concerns (Kumba Resources Ltd., 2006, p. 38, 45-46; Mining Magazine, 2006).

Kumba and Tigor SA also operated the Empangeni smelter near the Hillendale Mine. In 2005, production of titanium slag increased to 164,000 t from 136,000 t in 2004. Kumba purchased Tigor Ltd.'s share in Tigor SA in December 2005 (Kumba Resources Ltd., 2006, p. 38).

Anglo American mined ilmenite, rutile, and zircon at its Namakwa Sands project on South Africa's western coast. Ilmenite production at Namakwa Sands declined to 316,100 t in 2005 from 320,600 t in 2004. Rutile production increased to 29,100 t in 2005 from 23,700 t in 2004, and zircon, to 128,600 t from 119,100 t. By 2008, Anglo American planned to complete a \$43 million expansion to increase rutile and zircon output by 26% and 20%, respectively (Mining Magazine, 2006).

Vanadium.—Highveld, Xstrata, and Vametco Minerals Corp. mined vanadium from vanadiferous magnetite. South Africa was the world's leading producer of vanadium in 2005; most of the country's vanadium output was exported. Exports of vanadium products amounted to \$591 million in 2005 (Magyar, 2007; Martin Kohler, Deputy Director of Statistics,

Department of Minerals and Energy, written commun., July 11, 2006).

Highveld produced vanadium from titaniferous magnetite ore at the Mapochs Mine. In 2005, the company produced 8,252 t of vanadium from 66,750 t of vanadium slag compared with 8,448 t of vanadium from 67,587 t of vanadium slag in 2004. Highveld also produced 8,565 t of vanadium in ferrovanadium in 2005 compared with 8,753 t in 2004; production of vanadium pentoxide (V_2O_5) decreased to 9,618 t from 9,869 t. In April 2005, Highveld announced plans to increase its production of V_2O_5 by 30% within 18 months (Ryan's Notes, 2005b; Highveld Steel and Vanadium Corp. Ltd., 2006; Mining Magazine, 2006).

Xstrata produced V_2O_5 at Rhovan in Brits; the plant had a capacity of 10,600 t/yr of V_2O_5 . The company's Vantech facility was placed on care and maintenance in early 2004 after the Kennedy's Vale deposit was depleted in December 2003. Production at Vantech was 548 t of V_2O_5 in 2004. At Rhovan, production increased to 9,146 t of V_2O_5 compared with 9,035 t in 2004. Xstrata also produced ferrovanadium at Rhovan; production declined to 4,592 t in 2005 from 5,910 t in 2004 (Xstrata plc, 2006, p. 79).

Xstrata planned to increase capacity at Rhovan by about 3,900 t/yr of V_2O_5 . The company expected to complete an Environmental Management Program Report for the expansion in the first half of 2006 (Xstrata plc, 2006, p. 41).

In January 2005, Vametco reopened its mine at Brits, which had a capacity of 5,400 t/yr of V_2O_5 . Vametco used vanadium slag from its mine and Highveld's mines to produce vanadium nitride, which was used in steel production (Ryan's Notes, 2005a).

Industrial Minerals

Diamond.—South Africa was the world's fifth-ranked diamond producer by volume, accounting for about 9% of world production in 2004. In 2005, national rough diamond production rose to about 15.8 million carats from 14.3 million carats in 2004. Kimberlites accounted for 14.3 million carats; alluvial deposits, 1.38 million carats; and marine deposits, 55,000 carats (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

DeBeers Group accounted for most of South Africa's rough diamond production. In 2005, the company's production of diamond was nearly 15.2 million carats from 34.7 Mt of ore milled compared with more than 13.7 million carats from 33.8 Mt of ore milled in 2004. Ore grades varied from 6.8 carats per 100 metric tons at the Koffiefontein Mine to 143.5 carats per 100 metric tons at the Venetia Mine (DeBeers Group, 2006, p. 88).

The production increase in 2005 was mostly attributable to the Venetia Mine. At Venetia, production was 8.52 million carats from 5.93 Mt of ore milled in 2005 compared with 7.19 million carats from 5.87 Mt of ore milled in 2004. At Kimberley, production was 1.9 million carats from 9.67 Mt of ore milled in 2005 compared with 2.05 million carats from 9.07 Mt of ore milled in 2004. DeBeers shut down the underground mining operation at Kimberley; the company continued production by reprocessing old tailings. The Koffiefontein Mine was shut

down when DeBeers was unable to find a buyer. In 2005, the Finsch Mine produced 2.22 million carats; the Cullinan Mine, 1.3 million carats; the Namaqualand Mine, 1.01 million carats; the Koffiefontein Mine, 123,505 carats; and The Oaks Mine, 68,943 carats (DeBeers Group, 2006, p. 88; Mining Magazine, 2006).

Trans Hex Group of South Africa operated the Baken, the Bloeddrif, the Reuning, and the Saxendrift alluvial diamond mines. In fiscal year 2004-05, Trans Hex produced 137,100 carats compared with 140,300 carats in fiscal year 2003-04. Resources at the company's South African mines were estimated to be 800,000 carats, of which 700,000 carats was reserves. The Baken Mine accounted for 600,000 carats of reserves. In mid-2005, the Baken Mine was estimated to have a remaining life of at least 8 years, and the Bloeddrif Mine, 4 years (Trans Hex Group, 2005, p. 12-13, 20).

Crown Diamonds NL of Australia produced diamond from the Helam Mine in North West Province, the Sedibeng Mine in Northern Cape Province, and the Star Mine in Free State Province. The company produced 144,000 carats in fiscal year 2004-05. Crown merged with Petra Diamonds Ltd. in May. Petra planned to produce 200,000 carats from Helam, Sedibeng, and Star in fiscal year 2005-06; 265,000 carats in fiscal year 2007-08; and 320,000 carats in fiscal year 2009-10. In April, resources at Helam were estimated to be 3.15 million carats; Star, nearly 590,000 carats, and Sedibeng, about 540,000 carats (Petra Diamonds Ltd., undated).

Fluorspar.—Van den Heever Fluorspar Works, Vergenoeg Mining Corp. (Pty.) Ltd., and Witkop Fluorspar Mine (Pty.) Ltd. (a subsidiary of Sallies Ltd.) produced fluorspar. In 2005, national production of fluorspar declined to an estimated 245,000 t from 265,000 t in 2004. At the Witkop Mine, production from June 2004 to June 2005 was 39% higher than that of the previous 12 months because of an expansion completed in November 2004. In 2005, Sallies announced plans to purchase the Buffalo Fluorspar Mine, which was shut down in 2001.

Vermiculite.—South Africa was the world's leading producer of vermiculite; it accounted for about 40% of world production in 2005. In 2005, production at the Palabora Mine increased to 209,801 t from 196,893 t in 2004 (Palabora Mining Company Ltd., 2006, p. 77; Potter, 2007b).

Mineral Fuels

Coal.—In 2005, South Africa's production of coal increased to 245 Mt from 243.4 Mt in 2004. More than 99% of the country's coal output was bituminous coal. South Africa was Africa's leading producer of coal, accounting for 98% of continental production in 2004. In 2005, exports of coal amounted to \$3.25 billion. South Africa accounted for about 3% of world coal consumption (British Petroleum plc, 2006, p. 35; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy, written commun., July 11, 2006).

Anglo American increased its production of coal to nearly 56.9 Mt in 2005 from 54.5 Mt in 2004. Production at Kriel increased to 12 Mt from 11.1 Mt; at Landau, to 3.68 Mt from 3.47 Mt; at Bank, to 3.2 Mt from 2.73 Mt; at Mafube, to 1.06 Mt

from 321,000 t; and Nooitgedacht, to 794,400 t from 676,600 t. The Isibonelo Mine, which opened in 2005, produced 1.36 Mt. At New Vaal, output declined to 17.1 Mt from 17.3 Mt; at Goedehoop, to 6.3 Mt from 6.46 Mt; at Kleinkopje, to 4.48 Mt from 4.69 Mt; and at New Denmark, to 4.14 Mt from 4.98 Mt. Higher production at these mines was attributable to increased demand from South African utility Eskom (Anglo American plc, 2006, p. 10, 117).

Ingwe Coal Corp. Ltd. (a subsidiary of BHP Billiton Group) produced coal at the Douglas, the Khutala, the Klipspruit, the Koornfontein, the Middleburg, and the Rietspruit Mines in Mpumalanga Province. In 2005, Ingwe produced 53.8 Mt of coal compared with 55.3 Mt in 2004. The company had a joint-venture agreement with Xstrata for the Douglas and the Middleburg Mines, where production (combined) declined to 23 Mt in 2005 from 23.9 Mt in 2004. Sales to local utilities amounted to 29.9 Mt in 2005; exports amounted to 21.9 Mt; and sales to other South African customers amounted to 1.1 Mt (BHP Billiton Group, 2005, p. 12; 2006, p. 13; Xstrata plc, 2006, p. 80).

In fiscal year 2004-05, Sasol Ltd. of South Africa decreased its coal production to 47.7 Mt from 52.4 Mt in fiscal year 2003-04. At the Secunda Mining Complex, which included the Bossjesspruit, the Brandspruit, the Middelbult, the Syferfontein, and the Twistdraai Mines, output declined to 45.1 Mt from 46.2 Mt because of difficult geologic conditions at Middelbult. At the Sigma Mine, production decreased to 2.6 Mt from 6.2 Mt because the Sasolburg petrochemical plant switched from using coal to using imported natural gas from Mozambique as raw material. Sasol consumed 42.4 Mt of coal in the production of synthetic fuels and other chemicals and exported 3.6 Mt in fiscal year 2004-05 (Sasol Ltd., 2005a, p. 39-40, 42).

Sasol was engaged in a joint-venture agreement with Anglo American to develop the Kriel South coal reserves and to expand the Syferfontein Mine. Each of these projects was expected to increase coal production by 5 Mt/yr; the Kriel South project was completed in 2005. Anglo American planned to sell the output of Kriel South to Sasol for synthetic fuel production. The project was expected to cost \$169 million. Sasol's coal reserves amounted to 1.46 Gt in 2005, which included 142 Mt at Bossjesspruit, 131 Mt at Syferfontein, and 121 Mt at Middelbult (Sasol Ltd., 2004, p. 32; 2005a, p. 100; 2005b).

Black-empowerment company Eyesizwe Coal (Pty.) Ltd. of South Africa produced 25 Mt/yr of coal from the Arnot, the Glisa, the Mafube, the Matla, and the New Clydesdale Mines. The company exported about 1.2 Mt/yr of coal; Europe accounted for 90% of Eyesizwe's exports, and South America, 10%. In late 2004, Eyesizwe and Anglo American started production at the Mafube Mine in Mpumalanga Province, which produced nearly 1.1 Mt/yr. The companies planned to increase production at Mafube by 5 Mt/yr at a cost of \$264 million. If Eyesizwe and Anglo American were to receive regulatory approval for the expansion, the project could be completed in 2008 (Reuters Ltd., 2005; Anglo American plc, 2006, p. 9-10).

Eyesizwe and Kumba were engaged in a joint venture to build the Inyanda Coal Mine near Witbank with a capacity of 1 Mt/yr. The companies planned to start construction in the fourth quarter of 2006; production was expected to start in July 2008. The cost

of the project was expected to be \$29 million. The timing of the project depended upon the expansion of the Richards Bay coal terminal (Kumba Resources Ltd., 2006, p. 45).

Kumba operated the Grootegeluk and the Tshikandeni Mines in Limpopo Province and the Leeuwpans Mine in Mpumalanga Province. The company's production amounted to more than 19.8 Mt in 2005 compared with 19.4 Mt in 2004. Output increased at Grootegeluk and Leeuwpans; Grootegeluk produced 17.5 Mt in 2005. Sales to Eskom amounted to 14.7 Mt; sales to other domestic consumers, 4.2 Mt; and exports, 1.1 Mt (Kumba Resources Ltd., 2006, p. 33, 36).

Construction of a new plant with a capacity of 530,000 t/yr was started at Grootegeluk in 2005; the plant was expected to be completed in the second half of 2006 at a cost of \$51 million. The capacity expansion of 1 Mt/yr was completed at Leeuwpans in the third quarter of 2005; full production was expected in the first quarter of 2006. Kumba planned to increase its production to 22 Mt in 2006 because of the expansions at Grootegeluk and Leeuwpans and higher demand from Eskom (Kumba Resources Ltd., 2006, p. 36, 45).

In March 2005, Kumba completed a prefeasibility study on the Waterburg development, which could increase production at the Grootegeluk Mine by an additional 6 Mt/yr. The company planned to complete a feasibility study by mid-2006. If the study yielded favorable results, Kumba planned to start construction in 2008 and to start production in early 2010. (Kumba Resources Ltd., 2006, p. 45).

Xstrata operated 11 coal mines at Breyten, Carolina, Ermelo, and Witbank. In 2005, the company's coal production decreased to 16.6 Mt from 17.4 Mt in 2004. Production at the Tavistock Mine rose to 2.04 Mt from 1.88 Mt because of upgrades to the beneficiation plant and mining equipment in 2003 and 2004. At the South Witbank Mine, output rose to 1.86 Mt from 1.77 Mt. At the Phoenix Mine, production declined to 1.01 Mt from 1.66 Mt. Output declined to 733,000 t from 920,000 t at the Spitzkop Mine and to 504,000 t from 814,000 t at the Waterpan Mine. Production at Waterpan declined because of the closure of the underground mining operations, and at Phoenix, because of changes in the coal grades required by Eskom (Xstrata plc, 2006, p. 52-53, 80).

In 2005, Xstrata completed a feasibility study on increasing production at the Goedgevonden Mine to between 6 and 7 Mt/yr. About 3 Mt/yr of coal was expected to be exported and between 3 and 4 Mt/yr was expected to be consumed by Eskom. Xstrata planned to commence the expansion in 2006. The company also completed a prefeasibility study on expanding the life of the Douglas and Middleburg Mines to 2033 (Xstrata plc, 2006, p. 54).

Petroleum.—South Africa produced modest amounts of crude petroleum; most of the country's output of refined petroleum products was derived from imports. In 2005, South Africa's consumption of petroleum products amounted to 529 million barrels (Mbbbl) compared with 523 Mbbbl in 2004 and 475 Mbbbl in 2000. South Africa accounted for 19% of African petroleum products consumption and nearly 1% of world petroleum products consumption (British Petroleum plc, 2006, p. 11).

Uranium.—Anglogold Ashanti mined uranium as a coproduct of gold at its Vaal Reefs operations. In 2005, national

production of uranium oxide (U_3O_8) declined to 795 t from 887 t in 2004 and 1,065 t in 2001. All South Africa's uranium output was exported; enriched uranium was imported for use in the Koeberg nuclear reactor. South Africa accounted for less than 1% of world nuclear energy consumption (British Petroleum plc, 2006, p. 36).

Aflease Gold Ltd. produced small amounts of uranium from the Bonanza South Gold Mine. The company planned to start development of the Dominion uranium mine in November. Aflease expected to produce 900 t of U_3O_8 in 2007, nearly 1,300 t in 2008, 1,600 t in 2009, and 1,800 t in 2010. Rare earth elements could also be produced at the mine. The capital cost was expected to be \$112 million; the life of the Dominion Mine was likely to be more than 30 years (Mining Review Africa, 2005b).

Outlook

Capacity expansions by numerous producers are likely to lead to higher production of coal, ferrochromium, fluorspar, iron ore, manganese, nickel, PGM, steel, vanadium, and uranium for the next 5 years. These expansions depend upon the continuation of the broad-based increase in world demand for minerals. Factors that could inhibit these plans include the strength of the South African rand and the high rates of HIV infection in the mining workforce.

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TABLE 1
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2001	2002	2003	2004	2005 ^p	
METALS						
Aluminum metal, primary	662,497	706,916	738,000	863,000	851,000	
Antimony concentrate:						
Gross weight	8,320	9,910	9,000	8,400 ^e	8,600 ^e	
Sb content (58% Sb)	4,827	5,746	5,291	4,967	5,000 ^e	
Chromium, gross weight:						
44% to 48% chromic oxide	thousand metric tons	2,180	2,459	2,640	2,888	2,394
Less than 44% chromic oxide	do.	3,322	3,977	4,766	4,789	5,100
Total	do.	5,502	6,436	7,406	7,677	7,494
Cobalt:						
Mine output, Co content ^f	560 ^r	520 ^r	400 ^r	460 ^r	400	
Refinery output:	371	366	271	309	268	
Copper:						
Mine (company output), Cu content	141,865	129,589	120,800	102,574 ^r	103,856	
Metal:						
Smelter	142,500	119,667	112,025	89,300	110,000 ^e	
Refined, primary	132,078	101,000	111,000	91,498	100,000 ^e	
Gold, primary	kilograms	394,800	398,523	373,300	337,223 ^r	294,671
Iron and steel:						
Ore and concentrate:						
Gross weight	thousand metric tons	34,757	36,484	38,086	39,322	39,542
Fe content (62%-65%)	do.	22,240	23,200	24,200	24,800	24,900
Metal:						
Pig iron	do.	5,820	5,823	6,234	6,011	6,130
Direct-reduced iron	do.	1,556	1,702	1,542	1,633	1,781
Ferroalloys, electric arc furnace:						
Chromium ferroalloys	do.	2,141	2,351	2,813	3,032 ^r	2,812
Ferromanganese	do.	524	619	607	612	530 ^e
Ferrosilicon	do.	108	142	135	141	130 ^e
Ferrovandium ^e	do.	18	25	27	25	25
Silicomanganese ^e	do.	220	273	301	310	270
Silicon metal	do.	39	43	49	51	50 ^e
Other	do.	64	85	80	80 ^e	80 ^e
Total ^e	do.	3,110	3,540	4,010	4,250	3,900
Steel:						
Crude	do.	8,821	9,100	9,481	9,500 ^r	9,493
Stainless		440	550	643	718	658
Lead:						
Concentrate, Pb content	50,771	49,444	39,941	37,485	42,159	
Refined, secondary	53,000	60,900	64,900	64,100	64,000 ^e	
Manganese:						
Ore and concentrate, gross weight:						
Metallurgical:						
More than 48% manganese	thousand metric tons	2,082	1,600	1,619	1,988	2,467
45% to 48% manganese	do.	--	728	178	372	454
40% to 45% manganese	do.	326	19	783	1,041	935
30% to 40% manganese	do.	832	955	905	864 ^r	743
Total	do.	3,240	3,302	3,485	4,265 ^r	4,599
Chemical, 35% to 65% manganese dioxide	do.	26	20	16	17	12
Grand total	do.	3,266	3,322	3,501	4,282 ^r	4,611
Metal, electrolytic ^e	do.	40	40	40	40	44 ²
Nickel:						
Mine output, concentrate, nickel content ^f	36,443	38,546	40,842	39,851 ^r	42,392	
Metal, electrolytic	30,500 ^e	31,646	40,800	39,900	42,400 ^e	

See footnotes at end of table.

TABLE 1--Continued
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity		2001	2002	2003	2004	2005 ^p
METALS--Continued						
Platinum-group metals:						
Iridium	kilograms	NA	3,682	6,444	5,769 ^r	6,280
Platinum	do.	130,307	132,897	148,348	153,239 ^r	163,711
Palladium	do.	62,601	63,758	70,946	76,403 ^r	82,961
Rhodium	do.	13,507	15,175	16,816	16,294 ^r	20,224
Ruthenium	do.	19,329	21,022	23,537	24,696 ^r	29,805
Other ³	do.	4,169	107	59	-- ^r	--
Total	do.	229,913	236,641	266,150	276,401 ^r	302,981
Silver	do.	109,570	113,142	79,817	70,913 ^r	87,874
Titanium: ^e						
Ilmenite concentrate	thousand metric tons	1,750	1,800	2,000	1,900	1,900
Rutile concentrate	do.	120	120	150	150	150
Total	do.	1,870	1,920	2,150	2,050	2,050
Titaniferous slag ⁴	do.	1,090	1,150	1,350	1,300	1,300
Uranium oxide		1,065	998	894	887 ^r	795
Vanadium, vanadium metal content		18,184	25,227	27,172	23,302	22,604
Zinc:						
Concentrate:						
Gross weight		113,400	118,900	103,100	80,000 ^e	80,000 ^e
Zn content		61,560	64,580	41,400	32,001 ^r	32,112
Metal, smelter, primary		109,000	111,000	113,000	104,000	102,000
Zirconium concentrate (baddeleyite and zircon) ^e		245,000	274,000	300,000	400,000	410,000
INDUSTRIAL MINERALS						
Andalusite		193,225	165,087	164,921	234,625	235,000 ^e
Asbestos, chrysotile		13,393	--	6,218	--	--
Cementitious products:						
Cement, finished product, sales	thousand metric tons	8,036	8,525	8,883	12,348 ^r	13,000 ^e
Granulated slag, fly ash, and others, sales	do.	1,129	1,099	1,280	1,436 ^r	1,500 ^e
Total	do.	9,165	9,624	10,163	13,784 ^r	14,500 ^e
Clays:						
Attapulgite		9,299	13,288	14,585	20,419	34,340
Bentonite		108,300	101,100	145,060	55,859	139,833
Fire clay		141,303	101,150	90,604	133,258	171,773
Flint clay, raw and calcined		50,848	41,963	53,279	53,367	36,607
Kaolin		83,500	86,700	86,365	81,901	59,356
Brick clay, local sales	thousand metric tons	5,823	6,203	7,593	9,392 ^r	11,097
Diamond, natural:						
Gem	thousand carats	4,465	4,350	5,144	5,800 ^e	6,400 ^e
Industrial	do.	6,698	6,526	7,540	8,500 ^e	9,400 ^e
Total	do.	11,163	10,876	12,684	14,295 ^r	15,776
Feldspar		66,736	57,197	57,738	53,721 ^r	57,534
Fluorspar:						
Acid-grade		272,068	216,000 ^e	221,000	250,000 ^e	230,000 ^e
Metallurgical-grade		14,319	11,000 ^e	14,000	15,000 ^e	15,000 ^e
Total		286,387	227,000	235,000	265,000	245,000 ^e
Gemstones, semiprecious, Tiger's eye ^e	kilograms	80,000	-- ²	-- ²	-- ^e	-- ^e
Gypsum, crude		382,830	421,861	394,069	452,271	547,581
Industrial or glass sand (silica)	thousand metric tons	2,132	2,262	2,312	2,174	2,200 ^e
Lime	do.	1,615	1,585	1,518	1,738	1,417
Magnesite, crude		36,500	87,200	86,100	65,900 ^r	66,000 ^e
Mica, scrap and ground		937	880	1,003	901	924
Nitrogen, N content of ammonia		505,900	491,900	493,200	459,100	460,000 ^e
Perlite ^e		400	400	400	400	400

See footnotes at end of table.

TABLE 1--Continued
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2001	2002	2003	2004	2005 ^p	
INDUSTRIAL MINERALS--Continued						
Phosphate rock:						
Gross weight	thousand metric tons	2,550	2,803	2,643	2,735	2,577
Phosphorus pentoxide content	do.	995	1,086	1,030	1,070	1,000 ^e
Pigments, mineral, natural:						
Ochers		801	143	608	360	382
Oxides		51	109	156	152	128
Total		852	252	764	512	510
Salt		353,998	429,429	441,306	332,673 ^r	399,087
Silica	thousand metric tons	2,127	2,251 ^r	2,311 ^r	2,400 ^r	2,671
Sodium sulfate, natural		57,759	53,793	52,813	56,267	55,184
Stone, n.e.s.:						
Dimension:						
Granite and norite ⁵		846,700	705,800	461,300	527,100	302,483
Slate		40,984	24,386	40,700	47,500	52,312
Crushed and broken:						
Limestone and dolomite	thousand metric tons	18,946	20,738	21,267	21,961	22,000 ^e
Quartzite	do.	7,412	318	--	--	--
Shale:						
For cement	do.	243	275	345	357	501
Other ⁵	do.	67	67	49	50 ^e	50 ^e
Total	do.	310	342	394	407 ^e	551 ^e
Aggregate and sand, n.e.s.	do.	27,632	28,916	32,587	44,437	49,970
Sulfur:						
S content of pyrite (53.45%)	do.	150	183	176	165	133
Byproduct:						
Metallurgy	do.	265 ^e	179	174	180	250 ^e
Petroleum	do.	123	170	264	288	390 ^e
Total	do.	538	532	614	633	776
Talc and related materials:						
Talc		3,030	2,511	6,719	8,141 ^r	8,469
Pyrophyllite (wonderstone)		14,047	15,587	14,350	28,987 ^r	60,267
Vermiculite		156,632	210,000	182,802	196,893	209,801
MINERAL FUELS AND RELATED MATERIALS						
Coal (salable product):						
Anthracite	thousand metric tons	1,607	1,305	1,206	1,487 ^r	1,639
Bituminous	do.	221,882	218,895	238,105	241,885 ^r	243,368
Total	do.	223,489	220,200	239,311	243,372 ^r	245,007
Natural gas	million cubic meters	1,800 ^e	2,000 ^e	2,230 ^r	2,011 ^r	2,000 ^e
Petroleum:⁶						
Crude	thousand 42-gallon barrels	13,870	10,950	4,068	6,769	7,277
Refinery products:						
Liquefied petroleum gases	do.	3,758	3,677	3,561 ^r	3,538 ^r	3,500 ^e
Gasoline	do.	67,796	73,077	77,452 ^r	71,166 ^r	71,000 ^e
Jet fuel	do.	13,829	16,726	17,350 ^r	14,331 ^r	14,000 ^e
Kerosene	do.	11,108	4,754	4,831 ^r	4,893 ^r	4,900 ^e
Distillate fuel oil	do.	53,339	59,620	63,268 ^r	53,272 ^r	53,000 ^e
Residual fuel oil	do.	32,221	34,452	47,959 ^r	27,919 ^r	28,000 ^e
Other, includes lubricants and greases ^c	do.	19,500	21,000 ^r	21,000 ^r	17,000 ^r	17,000 ^e
Total ^{c,7}	do.	202,000	213,000	235,000 ^r	192,000 ^r	191,000

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^pPreliminary. ^rRevised. NA Not available. -- Zero.

¹Table includes data available through November 30, 2006.

²Reported figure.

³Difference between total production reported by the South African Department of Minerals and Energy, Mineral Development Branch, Mineral Economics Directorate and palladium, platinum, and rhodium supplies (shipments) reported in Johnson and Matthey Annual Platinum Review. Includes iridium and ruthenium production plus excess palladium, platinum, and rhodium inventory.

⁴Except for about 45,000 metric tons per year, slag derived from titaniferous magnetite by Highveld Steel and Vanadium Corp. Ltd., titaniferous slag is all from the smelting of ilmenite and likely represents most of that mineral's production, for which data are unavailable.

TABLE 1--Continued
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES¹

⁵Converted from reported cubic meters by using 1 cubic meter=2.7 metric tons.

⁶In addition, Sasol Ltd. produced about 67 million barrels per year of synthetic liquid petroleum fuels from coal.

⁷Excludes refinery fuel and losses.

Source: Mineral Economics Directorate, South Africa Department of Minerals and Energy.

TABLE 2
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	BHP Billiton Aluminium South Africa (Pty.) Ltd. (BHP Billiton Plc, 100%)	Hillside smelter at Richards Bay	700.
Do.	do.	Bayside smelter at Richards Bay	180.
Andalusite	Rhino Minerals (Pty.) Ltd. (Imerys, 100%)	Rhino Mine near Thabazimbi	120.
Do.	do.	Havercroft Mine at Penge	60.
Do.	Samrec Pty. Ltd. of France (Imerys, 100%)	Annesley Mine at Penge	75.
Do.	do.	Krugerspost Mine, near Lydenburg	50.
Do.	do.	Andalusite Refractories Mine at Groot Marico	15.
Do.	Hoogenoeg Andalusite (Pty.) Ltd.	Hoogenoeg Mine and plant	36.
Do.	Andalusite Resources (Pty.) Ltd. (African Mineral Trading and Exploration (Pty.) Ltd.)	Maroeloesfontein, near Thabazimbi, Northern Province	30.
Antimony	Consolidated Murchison Ltd. (Metorex Pty. Ltd., 100%)	Consolidated Murchison Mine near Gravelotte	7,000 antimony concentrate.
Cement	Pretoria Portland Cement Co. (Pty.) Ltd. (Bartworld Trust Co. Ltd., 68%)	De Hoek, Dwaalboom, Hercules, Port Elizabeth, Riebeeck, and Slurry plants	6,000.
Do.	Alpha Ltd. [Holcim Ltd. (Switzerland)]	Dudfield and Ulco plants	3,725.
Do.	Lafarge South Africa Ltd. [Lafarge (France)]	Lichtenburg plant in North West Province	2,345.
Do.	Natal Portland Cement Co. (Pty.) Ltd. (Cimentos de Portugal SGPS, S.A., 98%)	Simumu plant	970.
Chromite	Xstrata plc, 79.5%, and Merafe Resources Ltd., 20.5%	Kroondal Mines at Rustenburg	2,460.
Do.	do.	Thornecliffe Mine at Steelpoort	1,440.
Do.	do.	Waterval Mine at Rustenburg	480.
Do.	do.	Boshoek Mine at Boshoek	360.
Do.	do.	Horizon Mine at Pilansberg	180.
Do.	do.	Chrome Eden Mine at Pilansberg	96.
Do.	Samancor Chrome Ltd. (Kermas Group Ltd., 100%)	Eastern Chrome Mines in Steelpoort Valley, Mpumalanga Province	2,000.
Do.	do.	Western Chrome Mines in Northern Province	1,800.
Do.	Assmang Ltd. (African Rainbow Minerals Ltd., 50%, and Assore Ltd., 50%)	Dwarsrivier Mine in Mpumalanga	880. ^c
Do.	Bayer (Pty.) Ltd.	Rustenburg Chrome Mine	450.
Do.	Dilokong Chrome Mine (Pty.) Ltd. (ASA Metals (Pty.) Ltd., 100%)	Dilokong Mine, near Lydenburg	320. ^c
Do.	Merafe Resources Ltd.	Horizon Mine	250.
Do.	National Manganese Mines (Pty.) Ltd.	Buffelsfontein Mine at Mooinooi	180.
Coal	Anglo Coal Ltd. (Anglo American plc, 100%)	Bank, Goedehoop, Isibonelo, Kleinkopje, Kriel, Landau, Mafube, New Denmark, New Vaal, and Nooitgedacht Mines	57,000. ^c
Do.	Ingwe Collieries Ltd. (BHP Billiton Plc, 100%)	Witbank Coalfield, Mpumalanga Province:	
Do.	do.	Middelburg Mine (Xstrata plc, 16% interest)	17,000 bituminous.
Do.	do.	Khutala Underground Mine	15,100 bituminous.
Do.	do.	Optimum Open Pit Mine	13,500 bituminous.
Do.	do.	Douglas Mine (Xstrata plc, 16% interest)	8,500 bituminous.
Do.	do.	Koorfontein Mines	5,200 bituminous.
Do.	do.	Klipspruit Mine	3,600 bituminous.
Do.	Zululand Anthracite Colliery (BHP Billiton Plc, 100%)	Zululand Mine, KwaZulu Natal Province	600 anthracite. ^c
Do.	Sasol Ltd.	Secunda Mines:	
Do.	do.	Twistdraai Mine	14,200.
Do.	do.	Brandspruit Mine	8,500.
Do.	do.	Middlebult Mine	8,500.
Do.	do.	Syferfontein Mine	8,200.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005 ¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Coal--Continued	Eyesizwe Coal (Pty.) Ltd.		Arnot, Glisa, Mafube, Matla, and New Clydesdale collieries	25,000. ^c
Do.	Kumba Resources Ltd. (Anglo American plc, 66%)		Grootegeeluk Mine, 120 kilometers north of Thabazimbi	17,000. ^c
Do.	do.		Leeuwpan Colliery in Mpumalanga Province	2,700.
Do.	do.		Tshikondeni Mine in Venda	600.
Do.	Xstrata plc		Twefontein Division (Boschmans, Goedgevonden South Witbank, Waterpan, and Witcons Mines) at Witbank	6,500.
Do.	Xstrata plc, 50%		ATC and ATCOM Mines at Witbank	4,100.
Do.	do.		Mpumalanga Division (Spitzkop and Tselentis Mines) at Breyton and Ermelo	2,900.
Do.	do.		iMpunzi Division (Phoenix and Tavistock Mines) at Witbank	2,800.
Do.	Anker Holdings B.V.		Elandsfontein Mine	2,040.
Do.	do.		Golfview Mine	1,740.
Do.	Kangra Group Pty. Ltd.		Savmore and Welgedacht collieries	3,000. ^c
Do.	Wakefield Investments (Pty.) Ltd. (Metorex Pty Ltd., 74%)		Bankfontein, Lakeside, Leeuwfontein, and Middleburg Townlands Mines	2,300. ^c
Do.	Total Coal SA (Pty.) Ltd.		Dorsfontein and Forzando Mines	2,000. ^c
Do.	Graspan Colliery Pty Ltd.		Graspan Mine	1,800.
Do.	Kuyasa Mining (Pty.) Ltd.		Delmas Mine	1,200. ^c
Copper	Palabora Mining Co. Ltd. (Rio Tinto Ltd., 49%, and Anglo American plc, 29%)		Palabora Mines at Phalaborwa	80 copper in concentrate.
Do.	do.		Smelter at Phalaborwa	135 anodes.
Do.	do.		Refinery at Phalaborwa	130 cathodes.
Do.	Anglo American Platinum Corp. Ltd. (Anglo American plc, 74.1%)		Amandebult, Rustenburg, and Union sections; and Bafokeng Rasimone, Lebowa, Modikwa, Potgietersrust, and Western Limb Mines	13 mine. ^c
Do.	do.		Rustenburg Base Metal Refiners	12 refined. ^c
Do.	Black Mountain Mineral Development Co. (Pty.) Ltd. (Anglo American plc, 100%)		Black Mountain Mine near Aggeneys	6 copper in concentrate.
Do.	Lonmin Platinum (Lonmin plc., 73%, and Impala Platinum Holdings Ltd., 27%)		Marikana Mines (Eastern Platinum, Karee, and Western Platinum) near Rustenburg and Limpopo Mine	3 mine. ^c
Do.	do.		Base Metals Refinery	4 refined. ^c
Do.	Impala Platinum Ltd. (Impala Platinum Holdings Ltd., 100%)		do.	NA.
Diamond	thousand carats	De Beers Consolidated Mines Ltd. (Anglo American plc, 29%)	Venetia Mine in Northern Province	8,600.
Do.	do.	do.	Finsch Mine, 100 kilometers west of Kimberley	2,200.
Do.	do.	do.	Kimberley Mines, Kimberley	2,000.
Do.	do.	do.	Cullinan Mine	1,100.
Do.	do.	do.	Namaqualand Mines, 50 kilometers north of Port Nolloth	940.
Do.	do.	do.	Koffiefontein Mine, 70 kilometers south of Kimberley	140 (closed in 2005).
Do.	do.	do.	The Oaks	100.
Do.	do.	Petra Diamonds Ltd.	Helam, Sedibang, and Star Mines	175.
Do.	do.	Trans Hex Group Ltd.	Baken, Bloeddrif, Reuning, and Saxendrift Mines	140. ^c
Fluorspar	Witkop Fluorspar Mine (Pty.) Ltd. (Sallies Ltd.)		Witkop Mine, 250 kilometers west of Johannesburg	180.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Fluorspar--Continued	Vergenoeg Mining Corp. (Pty.) Ltd. [Metorex Pty. Ltd., 70%, and Minerales y Productos Derivados SA (Spain), 30%]		Vergenoeg Mine, 75 kilometers north of Pretoria	120.
Do.	Van den Heever Fluorspar Works		Van Den Heever Mine, 120 kilometers west of Johannesburg	50 metallurgical- grade fluorspar. ^e
Gold:				
Mine	AngloGold Ashanti Ltd. (Anglo American plc, 41.8%)		Vaal River operations:	
Do.		do.	Kopanang Mine	5,000 ore.
Do.	kilograms	do.	do.	37,000 gold.
Do.		do.	Great Noligwa Mine	2,700 ore.
Do.	kilograms	do.	do.	25,000 gold.
Do.		do.	Tau Lekoa Mine	5,000 ore.
Do.	kilograms	do.	do.	20,000 gold.
Do.		do.	Vaal River Surface operations	5,800 ore.
Do.	kilograms	do.	do.	3,000 gold.
Do.	do.	do.	Moab Khotsong Mine	900 gold
Do.		do.	West Wits operations:	
Do.		do.	Tau Tona Mine	3,100 ore.
Do.	kilograms	do.	do.	30,000 gold.
Do.		do.	Savuka Mine	3,000 ore.
Do.	kilograms	do.	do.	20,000 gold.
Do.		do.	Mponeng Mine	1,900 ore.
Do.	kilograms	do.	do.	17,000 gold.
Do.		Gold Fields Ltd.	Kloof Mine	5,280 ore.
Do.	kilograms	do.	do.	36,000 gold.
Do.		do.	Driefontein Mine	6,660 ore.
Do.	kilograms	do.	do.	36,000 gold.
Do.		do.	Beatrix Mine	4,800 ore.
Do.	kilograms	do.	do.	22,000 gold.
Do.		Freegold Joint Venture (Harmony Gold Mining Co. Ltd., 50%, and African Rainbow Minerals Ltd., 50%)	Freegold operations	7,238 ore.
Do.	kilograms	do.	do.	46,000 gold.
Do.		Harmony Gold Mining Co. Ltd.	Randfontein Mine	6,000 ore.
Do.	kilograms	do.	do.	28,000 gold.
Do.		do.	Elandskraal Mines	2,280 ore.
Do.	kilograms	do.	do.	21,000 gold.
Do.		do.	Free State operations	4,980 ore.
Do.	kilograms	do.	do.	14,000 gold.
Do.		do.	Evander operations	1,776 ore.
Do.	kilograms	do.	do.	13,000 gold.
Do.		do.	Target Mine	1,380 ore.
Do.	kilograms	do.	do.	8,300 gold.
Do.		do.	Kalgold Mine	1,800 ore.
Do.	kilograms	do.	do.	3,800 gold.
Do.		do.	Orkney and Welkom Mines	NA.
Do.		Western Areas Ltd. (JCI Gold, 50%, and Placer Dome Inc., 50%)	South Deep Mine	2,700 ore
Do.	kilograms	do.	do.	19,000 gold.
Do.		Durban Roodeport Deep Ltd.	Blyvooruitzicht and Doornfontein section	4,800 ore.
Do.	kilograms	do.	do.	6,900 gold.
Do.		do.	Crown section--tailings retreatment	11,760 ore.
Do.	kilograms	do.	do.	4,700 gold.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Gold--Continued:				
Mine--Continued		Durban Roodeport Deep Ltd.	East Rand Proprietary Mine	1,800 ore.
Do.	kilograms	do.	do.	2,500 gold.
Do.		Thistle Mining, Inc.	President Steyn Gold Mines in Free State	1,200 ore.
Do.	kilograms	do.	do.	6,500 gold.
Do.	do.	Barberton Mines Ltd. [Metorex Ltd., 54%, and Shanduka Resources (Pty.) Ltd., 26%]	Eastern Transvaal Consolidated Division (Fairview, New Consort, and Sheba Mines)	3,200. ^c
Do.		Simmer and Jack Mines Ltd.	North West Operations	NA.
Refined	metric tons	Rand Refinery Ltd.	Germiston, Gauteng Province	1,200.
Do.	do.	Harmony Gold Mining Co. Ltd.	Musuku Beneficiation Services	110.
Iron and steel:				
Iron ore		Kumba Resources Ltd.	Sishen Mine at Sishen	28,000.
Do.		do.	Thabazimbi Mine in Limpopo Province	2,400.
Do.		Assmang Ltd.	Beeshoek Mine near Postmasburg	6,000.
Do.		Highveld Steel and Vanadium Corp. Ltd. (Anglo American plc, 79%)	Mapochs Mine at Roossenekal, 60 kilometers west of Lydenburg	2,450.
Do.		Xstrata plc	Rhovan Mine at Brits	400.
Do.		Vametco Minerals Corp. (Strategic Minerals Corp., USA, 100%)	Krokodilkraal Mine and plant near Brits	180.
Ferroalloys		Xstrata plc, 79.5%, and Merafe Resources Ltd., 20.5%	Rustenburg	430 ferrochromium.
Do.		Xstrata plc, 69.6%	Lydenburg	396 ferrochromium.
Do.		Xstrata plc, 79.5%, and Merafe Resources Ltd., 20.5%	Wonderkop	362 ferrochromium.
Do.		do.	Boshoek	240 ferrochromium.
Do.		Xstrata plc, 50%	Gemini plant at Marikana	191 ferrochromium.
Do.		Samancor Chrome Division (Kermas Group Ltd., 100%)	Ferrometals plant at Witbank	415 ferrochromium.
Do.		do.	Tubatse Ferrochrome plant at Steelport	340 ferrochromium.
Do.		do.	Middelburg Ferrochrome plant 35 kilometers east of Witbank	235 ferrochromium.
Do.		Hernic Ferrochrome (Pty.) Ltd. (Mitsubishi Corp., 51%)	Plant at Brits	420 ferrochromium.
Do.		Assmang Ltd.	Machadorp plant in Mpumalanga Province	290 ferrochromium.
Do.		Merafre Resources Ltd. (Royal Bafokeng Nation, 33.2%, and Industrial Development Corporation of South Africa Ltd., 25.2%)	Smelter at Boshoek, North West Province	235 ferrochromium.
Do.		ASA Metals (Pty.) Ltd. (Eastern Asia Metal Investment Co. Ltd., 60%, and Northern Province Development Corp., 40%)	Plant near Pietersburg, Northern Province	120 ferrochromium.
Do.		Samancor Manganese Division (BHP Billiton Plc, 54.6%; Anglo American plc, 28.9%; other private, 16.5%)	Metalloys Ltd. plant at Meyerton; can switch between ferromanganese and silicomanganese	560 high-carbon ferromanganese; 200 silicomanganese.
Do.		Assmang Ltd.	Cato Ridge plant in KwaZulu Natal Province	300 ferromanganese.
Do.		Advalloy (Pty.) Ltd. (BHP Billiton/Samancor, 50%; Japan Metals & Chemicals Co., 35%; Mitsui & Co. Ltd., 15%)	Furnace at Samancor's Meyerton Plant	75 ferromanganese.
Do.		Transalloys Division (Highveld Steel and Vanadium Corp. Ltd., 100%)	Plant at Witbank	45 medium-carbon ferromanganese.
Do.		do.	do.	170 silicomanganese.
Do.		Silicon Technology Pty Ltd.	NA	55 ferrosilicon.
Do.		Highveld Steel and Vanadium Corp.	Rand Carbide plant	55 ferrosilicon.
Do.	metric tons	do.	Vanchem plant at Witbank	12,500 ferrovandium.
Do.	do.	Xstrata plc	Rhovan plant at Brits	7,800 ferrovandium.
Do.	do.	Vametco Minerals Corp. (Strategic Minerals Corp., 100%)	Smelter near Brits	5,250 ferrovandium.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005 ¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity	
Iron and steel--Continued:				
Steel	Mittal Steel South Africa Ltd.	Newcastle, Saldanha, Vanderbijlpark, and Vereeniging plants	7,100 crude steel.	
Do.	Highveld Steel and Vanadium Corp. Ltd. (Anglo American plc, 79%)	Witbank	1,000 iron; 1,000 crude steel.	
Do.	Columbus Stainless (Pty.) Ltd. (Acerinox SA, 76%)	Stainless steel plant at Middelburg	750 crude steel.	
Do.	Scaw Metals Division (Anglo Operations Ltd.)	Germiston plant, Johannesburg	600 crude steel.	
Do.	Davsteel Division (Cape Gate Pty. Ltd.)	Vanderbijlpark plant, Gauteng	480 crude steel; 480 billet.	
Do.	Cape Town Iron & Steel Works (Pty.) Ltd.	Kuilsrivier plant, Cape Town	250 crude steel; 250 billet.	
Do.	Duferco Steel Processing Ltd.	Cold-rolled slab steel at Saldanha Bay	240 rolled steel.	
Lead	Black Mountain Mineral Development Co. (Pty.) Ltd.	Black Mountain Mine near Aggeneys	54 lead in concentrate.	
Lime	PPC Lime Ltd. (subsidiary of Pretoria Portland Cement Company Ltd.)	Plant at Lime Acres	1,200.	
Do.	Idwala Lime (Idwala Industrial Holdings)	Plant at Danielskuil	1,000.	
Do.	Inca Lime (Pty.) Ltd. (subsidiary of Inca Mining (Pty.) Ltd.)	Plant at Immerpan, Limpopo Province	100.	
Manganese	Assmang Ltd.	Nchwaning Mine near Black Rock	3,000 ore.	
Do.	do.	Gloria Mine near Black Rock	600 ore.	
Do.	Samancor Ltd. (BHP Billiton Plc, 60%, and Anglo American plc, 40%)	Mamatwan and Wessels Mines near Hotazel	3,400 ore.	
Do.	Metmin (Metorex Pty. Ltd., 100%)	Open pit mine in North West Province	24 manganese dioxide.	
Do.	Manganese Metal Co. Pty. Ltd. (BHP Billiton Plc, 51%)	Electrolytic plant at Nelspruit	30 manganese metal.	
Do.	do.	Electrolytic plant at Krugersdorp	20 manganese metal.	
Nickel	Anglo American Platinum Corp. Ltd.	Amandebult, Rustenburg, and Union sections; and Bafokeng Rasimone, Lebowa, Modikwa, Potgietersrust, and Western Limb Mines	24 mine. ^c	
Do.	do.	Rustenburg Base Metal Refiners	22 refined. ^c	
Do.	Impala Platinum Ltd.	Impala Mines	8 mine. ^c	
Do.	do.	Impala Refining Services	10 refined. ^c	
Do.	do.	Base Metals Refinery	14 refined. ^c	
Do.	Lonmin Platinum	Marikana Mines (Eastern Platinum, Karee, and Western Platinum) near Rustenburg and Limpopo Mine	5 mine. ^c	
Do.	do.	Base Metals Refinery	7 refined. ^c	
Do.	Nkomati Joint Venture (African Rainbow Minerals Ltd., 50%, and LionOre Mining International Ltd, 50%)	Nkomati Mine in Mpumalanga Province	5.	
Petroleum:				
Crude	thousand 42-gallon barrels	Petroleum Oil and Gas Corporation of South Africa, 55%, and Pioneer Natural Resources Company, 45%	Pioneer offshore field	21,900.
Do.	do.	Petroleum Oil and Gas Corporation of South Africa	Oribi field 140 kilometers southwest offshore from Mossel Bay	9,100.
Do.	do.	do.	Oryx field	4,400.
Refined	do.	Shell and BP Refineries Pty. Ltd. (Shell SA Energy, 50%, and BP Southern Africa, 50%)	Sapref refinery in Durban	63,900.
Do.	do.	Engen Ltd. (62%)	Engen refinery in Durban	54,800.
Do.	do.	Caltex Oil SA Pty. Ltd. (private, 100%)	Calref refinery in Cape Town	40,200.
Do.	do.	National Petroleum Refiners of South Africa Pty. Ltd. (Sasol Ltd., 63.6%)	Natref refinery in Sasolburg	32,000.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005 ¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Phosphate rock	Phosphate Development Corp. Ltd. (Foskor Ltd.) (Industrial Development Corp., 100%)		Foskor Mine and plant at Phalaborwa	3,850 phosphate rock. ²
Do.	Fer-Min-Ore Ltd.		Plant at Germiston	30.
Do.	do.		Plant at Isithebe	12.
Platinum-group metals	Anglo American Platinum Corp. Ltd.		Rustenburg section near Rustenburg	12,420 ore.
Do.	kilograms	do.	do.	27,000 platinum; 13,000 palladium; 3,700 rhodium.
Do.	do.		Amandelbult section, 50 kilometers south of Thabazimbi mines	4,080 Merensky ore; 2,640 UG2 ore.
Do.	kilograms	do.	do.	20,000 platinum; 9,400 palladium; 2,700 rhodium.
Do.	do.		Union section, 50 kilometers south of Thabazimbi	6,000 ore.
Do.	kilograms	do.	do.	9,200 platinum; 4,200 palladium; 1,700 rhodium.
Do.	Bafokeng Rasimone Platinum Mine (Anglo American Platinum Corp. Ltd., 50%, and Royal Bafokeng Nation, 50%)		Bafokeng Rasimone Mine in Northern Province	2,400 ore.
Do.	kilograms	do.	do.	11,000 platinum; 4,500 palladium; 880 rhodium.
Do.	do.	Kroondal Platinum Mines (Anglo American Platinum Corp. Ltd., 50%, and Aquarius Platinum Ltd, 25.5%)	Kroondal Mine	9,300 platinum; 4,600 palladium; 1,700 rhodium.
Do.	Modikwa Platinum Mine (Anglo American Platinum Corp. Ltd., 50%; and African Rainbow Minerals, 50%)		Modikwa Mine	2,400 ore.
Do.	kilograms	do.	do.	7,300 platinum; 7,300 palladium; 440 rhodium.
Do.	Anglo American Platinum Corp. Ltd.		Potgietersrust Platinum Mine	4,620 ore.
Do.	kilograms	do.	do.	6,400 platinum; 6,800 palladium; 440 rhodium.
Do.	do.		Lebowa Platinum (Atok) Mine, 70 kilometers east of Potgietersrus	960 Merensky ore; 600 UG2 ore.
Do.	kilograms	do.	do.	3,300 platinum; 2,300 palladium; 350 rhodium.
Do.	do.		Western Limb Mine	5,400 ore.
Do.	kilograms	do.	do.	1,700 platinum; 560 palladium; 120 rhodium.
Do.	do.		Polokwane smelter	650 concentrate.
Do.	do.		Mortimer smelter	600 concentrate.
Do.	do.		Waterval smelter	200 concentrate.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005 ¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Platinum-group metals-- Continued	kilograms	Anglo American Platinum Corp. Ltd.	Mortimer, Polokwane, and Waterval smelters	110,000 platinum; 60,000 palladium; 15,000 rhodium.
Do.	do.	do.	Precious Metals Refinery	110,000 platinum metal; 60,000 palladium metal; 15,000 rhodium metal.
Do.		Impala Platinum Ltd. (Impala Platinum Holdings Ltd., 100%)	Impala Mines, near Rustenburg in Northwest Province	17,000 ore.
Do.	kilograms	do.	do.	34,000 platinum; 16,000 palladium; 4,000 rhodium.
Do.		Impala Platinum Ltd.	Marula Mine	2,200 ore.
Do.	kilograms	do.	do.	2,700 platinum; 2,600 palladium; 540 rhodium.
Do.	do.	do.	Smelter	62,000 platinum; 29,000 palladium; 7,200 rhodium.
Do.	do.	do.	Precious metals refinery, near Springs in Guateng Province	62,000 platinum metal; 29,000 palladium metal; 7,200 rhodium metal.
Do.		Lonmin plc	Marikana Mines (Eastern Platinum, Karee, and Western Platinum) near Rustenburg	14,400 ore. ^c
Do.	kilograms	do.	do.	29,000 platinum; ^c 13,000 palladium; ^c 4,000 rhodium. ^c
Do.		do.	Limpopo Mine	1,000 ore. ^c
Do.	kilograms	do.	do.	1,500 platinum; ^c 1,100 palladium; ^c 170 rhodium. ^c
Do.	do.	do.	Precious Metals Refinery at Western Platinum	31,000 platinum metal; 14,000 palladium metal; 4,000 rhodium metal.
Do.		Marikana Platinum Mine (Anglo American Platinum Corp. Ltd., 50%, and Aquarius Platinum Ltd, 50%)	Marikana Mine	3,000 ore.
Do.	kilograms	do.	do.	4,000 platinum; 1,600 palladium; 500 rhodium.
Do.		Everest South Platinum Mine (Aquarius Platinum Ltd., 50.5%, and Impala Platinum Holdings Ltd, 20%)	Everest South Mine	3,000 ore.
Do.	kilograms	do.	do.	3,000 platinum; 1,700 palladium; 400 rhodium.
Do.	do.	Northam Platinum Ltd. (Anglo American Platinum Corp. Ltd., 22.5%, and Mvelaphanda Resources Ltd., 21.9%)	Northam Mine, 20 kilometers south of Thabazimbi	1,800 Merensky ore; 900 UG2 ore.
Do.	do.	do.	do.	7,900 platinum; 3,800 palladium; 700 rhodium.
Pyrophyllite		Idwala Industrial Minerals (Benoni)	Ottedal Mine in North West Province	15.
Do.		Wonderstone Ltd. (The Associated Ore & Metals Corp. Ltd.)	Pyrophyllite (wonderstone) mine, North West Province	NA.
Do.		G&W Base and Industrial Minerals Pty. Ltd.	Piet Retief Mine	NA.

See footnotes at end of table.

TABLE 2--Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005 ¹

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Silicon		Silicon Smelters (Pty.) Ltd. (Anglo American plc, BHP Billiton Plc, and Pechiney Metallurgie)	Polokwane plant, near Pietersburg, Limpopo Province	45 silicon; 15 silica fume.
Silver	metric tons	Rand Refinery Ltd.	Germiston, Gauteng Province	200 refined silver.
Synthetic fuels	thousand 42-gallon barrels	Sasol Ltd.	Coal to oil plant at Secunda and a coal to petrochemical plant at Sasolburg	54,800.
Do.	do.	Petroleum Oil and Gas Corporation of South Africa	Natural gas to petroleum products plant at Mossel Bay	18,300.
Tantalum	metric tons	Titan Processors (Pty.) Ltd. (subsidiary of Pinnacle Resources Inc.)	Plant at Johannesburg	360 tantalum oxide.
Titanium:				
Titanium concentrates		Richards Bay Minerals (Rio Tinto Plc., 50%, and BHP Billiton Plc, 50%)	Open cast operations, near Richards Bay	1,280 ilmenite; ^c 125 rutile. ^c
Do.		Namakwa Sands Ltd. (Anglo Operations Ltd., a subsidiary of Anglo American plc, 100%)	Mine near Brand-se-Baai and mineral separation plant at Koekenaap	540 ilmenite; 25 rutile.
Do.		Ticor SA (Kumba Resources Ltd., 100%)	Hillendale Mine near Richards Bay, KwaZulu Natal Province	550 ilmenite; 20 rutile; 5 leucocene.
Titanium slag		Richards Bay Iron and Titanium (Pty.) Ltd./Richards Bay Minerals (Rio Tinto Plc.)	Smelter at Richards Bay	1,060 titanium slag; 110 rutile.
Do.		Namakwa Sands Ltd.	Smelter at Vredenberg, Saldanha Bay area	200 titanium slag.
Do.		Highveld Steel and Vanadium Corp. Ltd.	Steel plant at Witbank	48 titanium slag. ^c
Do.		Ticor SA (Kumba Resources Ltd., 100%)	Empangeni smelter near Richards Bay, KwaZulu Natal Province	250 titanium slag.
Uranium oxide	metric tons	AngloGold Ashanti Ltd.	Vaal Rivers operation, near Klerksdorp	3,000.
Vanadium pentoxide	do.	Highveld Vanadium and Chemicals Division (Anglo American plc through Highveld Steel and Vanadium Corp. Ltd.)	Mapochs Mine near Lydenburg	25,000. ^c
Do.	do.	do.	Highveld steel plant in Witbank	17,000.
Do.	do.	do.	Highveld Vantra plant in Witbank	8,000.
Do.	do.	Xstrata plc	Rhovan Mine at Brits	10,600.
Do.	do.	Vametco Minerals Corp. (Strategic Minerals Corp., USA, 100%)	Krokodilkraal Mine and plant near Brits	5,400.
Do.	do.	Transvaal Alloys Pty. Ltd. (Highveld Steel and Vanadium Corp., 100%)	Wapadskloof Mine and plant, 60 kilometers northeast of Middelburg	2,250. ^c
Vermiculite		Palabora Mining Co. Ltd.	Palabora mine and plant at Phalaborwa	223.
Zinc		Zinc Corp. of South Africa Ltd. (Kumba Resources Ltd., 100%)	Struisbult Springszinc refinery at Springs, southeast of Johannesburg	110 refined zinc; 170 sulfuric acid.
Do.		Black Mountain Mineral Development Co. (Pty.) Ltd.	Black Mountain Mine near Aggeneys	41 zinc in concentrate.
Zirconium		Tisand (Pty.) Ltd./Richards Bay Minerals	Open cast mines near Richards Bay	300 zircon in concentrate.
Do.		Namakwa Sands Ltd.	Mine near Brand-se-Baai and mineral separation plant at Koekenaap	125 zircon in concentrate.
Do.		Ticor SA	Hillendale Mine near Richards Bay, KwaZulu Natal Province	45 zircon in concentrate.
Do.		do.	Zirconium basic sulfate plant at Phalaborwa	8 zirconium basic sulfate.
Do.		do.	Fused zirconia plant	6 synthetic zirconia.

^cEstimated. NA Not available.

¹Based on information available as of February 2007.

²Most of Foskor's phosphate output is from phosphate concentrates supplied by the neighboring Palabora copper mine.