

2007 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. In 2007, South Africa's estimated share of world platinum production amounted to 80%; kyanite, 56%; palladium, 40%; vanadium, 39%; chromite, 38%; vermiculite, 38%; zirconium, 33%; rutile, 25%; manganese, 20%; ilmenite, 19%; gold, 11%; fluorspar, 6%; antimony, 4%; nickel, 3%; aluminum, 2%; phosphate rock; 2%; and iron ore, 2%. The country's estimated share of world reserves of platinum-group metals (PGM) amounted to 89%; hafnium, 46%; zirconium, 37%; vanadium, 23%; manganese, 22%; rutile, 20%; fluorspar, 17%; gold, 14%; ilmenite, 9%; phosphate rock, 8%; and nickel, 6% (Bray, 2008; Carlin, 2008; Corathers, 2008; Gambogi, 2008a, b; George, 2008a, b; Jasinski, 2008; Jorgenson, 2008; Kuck, 2008; Magyar, 2008; Miller, 2008; Papp, 2008; Potter, 2008a, b).

Minerals in the National Economy

The mining industry accounted for 7.7% of the gross domestic product in 2007; crude and processed mineral products accounted for 38% of total exports. About 72% of crude mineral products and 73% of processed mineral products by value were exported in 2007. Employment in the mining industry amounted to 495,474 in 2007 compared with 456,337 in 2006. PGM mining accounted for 37.6% of the mining industry's employment; gold, 34.1%; coal, 12.2%; diamond, 4%; and other minerals, 12.1% (Mwape and others, 2008, p. 9-11, 13, 15).

Government Policies and Programs

The Mineral and Petroleum Resources Development Act of 2002 vested mineral ownership rights in the Government. Companies that owned mineral rights under previous legislation were required to convert their mineral rights to the new system within 5 years of the enactment of the new mining law. The Diamonds Act of 2005 was enacted in early 2006; this legislation was intended to promote domestic cutting and polishing of rough diamond (Mwape and others, 2008, p. 2-3).

The Government's Black Economic Empowerment program required that black ownership of the mining industry reach 15% by 2009 and 26% by 2014. Recent deals to increase black ownership included the acquisition of Namakwa Sands (Pty) Ltd. and the purchase of a 26% interest in Black Mountain Mining (Pty) Ltd. by Exxaro Resources Ltd. In 2007, Lonmin plc's Akanani PGM property was purchased by Incwala Resources Ltd., and Pamodzi Gold Ltd. purchased the President Steyn gold mine from Thistle Mining Ltd. Holcim Ltd. of Switzerland sold 45.9% of Holcim South Africa to AfriSam Consortium (Pty) Ltd. (Thistle Mining Inc., 2007, p. 4; Mwape and others, 2008, p. 1-2).

Production

In 2007, pyrophyllite production increased by about 65%; flint clay, 57%; attapulgite, 39%; bentonite, 39%; chromite, 30%; ferrosilicon, 28%; andalusite, 20%; ferrochromium, 18%; manganese ore, 15%; granite, 13%; gypsum, 13%; refined zinc, 12%; and fluorspar, 11%. The output of mineral pigments decreased by 61%; mica, 47%; crude petroleum, 42%; slate, 31%; antimony, 23%; refined nickel, 18%; lead mine, 13%; salt, 11%; and zinc mine, 10% (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy of the Republic of South Africa, written commun., August 1, 2008).

Structure of the Mineral Industry

Most of the South African mineral industry was privately owned. The production of gold and diamond, which were produced mostly by artisanal miners in many African countries, was dominated by large-scale producers in South Africa. The leading producer's share of total output varied sharply by commodity; the leading producer of diamond accounted for 98% of national production; iron ore, 75%; manganese ore, 48%; chromite, 37%; and coal, 24%.

Mineral Trade

In 2007, exports of PGM amounted to \$9.36 billion; gold, \$5.1 billion; coal, \$3.47 billion; iron ore, \$1.66 billion; nickel, \$879 million; manganese ore, \$374 million; copper, \$259 million; chromite, \$94 million; silver, \$32 million; vermiculite, \$28 million; and other crude mineral products, which included diamond, ilmenite, rutile, and zircon, \$1.72 billion. Exports of ferrochromium amounted to \$2.2 billion; manganese metal and alloys, \$766 million; vanadium alloys and other vanadium products, \$329 million; silicon metal and alloys, \$137 million; and other processed mineral products, which included aluminum, \$2.34 billion (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy of the Republic of South Africa, written commun., August 1, 2008).

In 2007, South Africa's imports of industrial minerals and processed industrial mineral products amounted to \$2 billion; ferrous metals and products, \$178 million; diamond, \$124 million; precious metals, \$130 million; other gemstones, \$56 million; coking coal, \$43 million; and nonferrous metals, \$23 million (Mwape and others, 2008, p. 16).

Commodity Review

Metals

Aluminum.—South Africa produced primary aluminum from imported alumina. BHP Billiton Ltd. operated the Bayside and

the Hillside primary aluminum smelters at Richards Bay. In 2007, output at Hillside and Bayside remained nearly unchanged at 709,000 metric tons (t) and 190,000 t, respectively (BHP Billiton Ltd., 2007; 2008, p. 6).

Chromium.—Xstrata plc of Switzerland and its joint-venture partner Merafe Resources Ltd. operated the Boshoek, the Helena, the Horizon, the Kroondal, and the Thorncliffe Mines, which had a total capacity of 6.48 million metric tons per year (Mt/yr) of chromite. The company's production in South Africa increased to 3.59 million metric tons (Mt) from 3.13 Mt in 2006. The Boshoek Mine, which reopened in 2007, produced 602,000 t. Production at the Helena Mine increased to 335,000 t from 228,000 t. At the Kroondal Mines, production decreased to 1.39 Mt in 2006 from 1.63 Mt in 2006; output at the Thorncliffe Mine remained nearly unchanged at 1.2 Mt (Xstrata plc, 2008, p. 93).

Xstrata and Merafe operated the Boshoek, the Lion, the Lydenburg, the Rustenburg, and the Wonderkop ferrochromium plants. These plants had a total combined capacity of 1.98 Mt/yr. Production increased at Rustenburg to 381,000 t in 2007 from to 316,000 t in 2006; at Wonderkop, to 389,000 t from to 249,000 t; and at Lion, to 230,000 t from 44,000 t. Output decreased at Lydenburg to 341,000 t from 379,000 t. At Boshoek, production remained nearly unchanged at 192,000 t. Output at the Lion plant was constrained by mechanical problems; the plant was expected to reach its full capacity of 360,000 metric tons per year (t/yr) in the second quarter of 2008 (Xstrata plc, 2008, p. 57, 93).

Xstrata and Merafe were considering the expansion of the Lion plant's capacity to 720,000 t/yr. Depending on company approval of the project, construction could start in mid-2008 and reach completion by the end of 2010. The decision on the project was expected to be made in the first half of 2008 (Ryan's Notes, 2007c).

Samancor Chrome Ltd. (a subsidiary of Kermas Group Ltd.) produced an average of about 3.2 Mt/yr from the Eastern Chrome Mines in Mpumalanga Province and the Western Chrome Mines in North West Province. The majority of the company's output was consumed in its ferrochromium plants. Samancor planned to increase chromite production to 10 Mt/yr by 2015 (Brown, 2006).

Samancor operated the Ferrometals plant in Witbank, the Middelburg ferrochrome plant in Middelburg, and the Tubatse ferrochrome plant in Steelpoort. The company planned to increase its capacity to 2.7 Mt/yr from 1.2 Mt/yr between 2011 and 2015. The expansion was expected to take place in three increments of 500,000 t/yr each. The cost of the new mines and smelters was estimated to be \$1.3 billion; expanding existing operations, \$100 million; and a new chromium chemicals plant, \$100 million (Brown, 2006; Mathews, 2007b; Ryan's Notes, 2007c).

Assmang Ltd. [African Rainbow Minerals Ltd. (ARM), 50%, and Assore Ltd., 50%] operated the Dwarsrivier Mine in Mpumalanga. In fiscal year 2007, production increased to 710,000 t from 526,000 t in fiscal year 2006. The Dwarsrivier Mine had a capacity of 1.2 Mt/yr of run of mine ore; Assmang

planned to increase the capacity to 1.5 Mt/yr of run of mine ore (1.1 Mt/yr of salable ore) by 2009 (African Rainbow Minerals Ltd., 2007, p. 31, 36-37).

Assmang produced ferrochromium at the 290,000-t/yr Machadodorp plant in Mpumalanga Province. In fiscal year 2007, output increased to 242,000 t from 230,000 t in fiscal year 2006 (African Rainbow Minerals Ltd., 2007, p. 36-37).

ARM and its joint-venture partner LionOre Mining International Ltd. of Canada opened the Nkomati chromite mine in fiscal year 2007; production amounted to 584,171 t. In June 2007, LionOre was acquired by MMC Norilsk Nickel of Russia. Production at the mine was expected to be 1 Mt/yr of chromite; the life of the mine was estimated to be 4 years (African Rainbow Minerals Ltd., 2007, p. 21).

ASA Metals (Pty) Ltd. produced chromite from its Dilokong Mine at Burgersfort in Mpumalanga Province; the company was also producing ferrochromium at the rate of 120,000 t/yr. ASA planned to add a new smelter that would increase ferrochromium output to 380,000 t/yr by 2008. The company planned a further expansion to 500,000 t/yr of ferrochromium in 2010 or 2011; increased ore supplies were to be obtained by deepening the Dilokong Mine (Markram, 2006).

Hernic Ferrochrome (Pty) Ltd. (a subsidiary of Mitsubishi Corp. of Japan) operated a ferrochromium plant with a capacity of 420,000 t/yr. The company mined chromite at the Maroelabult open pit mine from 1996 to 2000; shaft sinking at a new underground mine at Bokfontein was planned in mid-2008. The new mine was expected to have a capacity of 1.5 Mt/yr (Hernic Ferrochrome (Pty) Ltd., undated).

International Ferro Metals Ltd. (IFM) opened its new Buffelsfontein chromite mine and ferrochromium plant in North West Province in 2007. The Buffelsfontein Mine was producing at a rate of 960,000 t/yr; capacity expansions completed in late 2007 were expected to increase output to 1.32 Mt/yr. Ferrochromium production amounted to 49,000 t in fiscal year 2007 and was expected to increase to 237,000 t in fiscal year 2008. IFM planned to increase the plant's capacity to 665,000 t/yr from 267,000 t/yr by the end of 2010 (Ryan's Notes, 2007c, g).

Tata Steel Ltd. of India planned to complete a new ferrochromium plant at Richards Bay in early 2008. The plant was expected to have an initial capacity of 120,000 t/yr; Tata was likely to increase the capacity to 250,000 t/yr (Metal Bulletin, 2007).

Tharisa Minerals (Pty) Ltd., which was a Black Economic Empowerment company, planned to complete its feasibility study on building a new mine and ferrochromium plant near Rustenburg in February 2008. Depending on the results of the study, the ability to obtain mineral rights, and adequate power supplies, mining could start by the end of 2008. The life of the mine was estimated to be 20 years. The ferrochromium plant was expected to reach its full capacity of 600,000 t/yr by 2012 or 2013 (Ryan's Notes, 2007e).

Copper.—Rio Tinto plc operated the Palabora copper mine, smelter, and refinery. In 2007, mine production at Palabora increased to 79,990 t of copper from 66,202 t in 2006. The production of copper anode increased to 91,204 t in 2007 from 78,980 t in 2006, and the production of refined copper increased

¹Fiscal years run from the end of June in one year through the end of June in the following year unless otherwise specified.

to 91,686 t from 81,163 t (Palabora Mining Company Ltd., 2008, p. 78-79).

Anglo American Platinum Corp. produced 11,000 t of refined copper at Rustenburg Base Metal Refiners in 2007 compared with 11,100 t in 2006. About 9,900 t was attributable to the company's PGM mining operations in 2007 compared with 10,100 t in 2006; the remainder was attributable to purchased concentrates (Anglo American Platinum Corp., 2008, p. 102).

ARM produced 2,788 t of mined copper at the Nkomati nickel mine in fiscal year 2007 compared with 3,398 t in fiscal year 2006. Copper production was expected to reach 9,000 t/yr of copper by fiscal year 2011 as a result of ARM's capacity expansion (African Rainbow Minerals Ltd., 2007, p. 21, 25).

Gold.—The long-term decrease in the country's gold output continued in 2007, with national gold mine production decreasing to 252,598 kilograms (kg) from 272,128 kg in 2006 (table 1). South Africa was estimated to have 40,000 t of gold resources, of which 15,000 t could be mined with existing infrastructure (Mining Review Africa, 2007a).

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 decreased to 72,429 kg in 2007 from 79,427 kg in 2006 (AngloGold Ashanti Ltd., 2008, p. 57).

Most of the overall decline in the production of gold by AngloGold Ashanti was attributable to the Great Noligwa Mine, where output decreased to 15,036 kg in 2007 from 19,119 kg in 2006, and the Tau Tona Mine, where output decreased to 12,714 kg from 14,736 kg. At the Mponeng Mine, production remained nearly unchanged at 18,300 kg. Output from AngloGold Ashanti's surface mining operations increased in 2007. Ore grades decreased at five mines in 2007; difficult geologic conditions also led to decreased volumes of ore mined (AngloGold Ashanti Ltd., 2008, p. 20).

In 2008, AngloGold Ashanti expected to produce between 56,000 and 59,000 kg of gold. The Moab Khotsong Mine produced about 2,100 kg of gold in 2007; AngloGold Ashanti planned to increase the output to 14,000 kg by 2012. The Tau Tona Below 120 project was expected to start in 2011 and to produce 3,700 kilograms per year (kg/yr) of gold by about 2014. The Mponeng Below 120 VCR project was expected to start in 2015 and would extend the mine's remaining life by 10 years; average production was likely to be 5,600 kg (Mining Review Africa, 2007a; AngloGold Ashanti Ltd., 2008, p. 33).

Harmony Gold Mining Company Ltd. of South Africa produced gold at numerous mines; the company's output was 65,671 kg in fiscal year 2007 compared with 67,042 kg in fiscal year 2006. Increased production from the Elandsrand, the Free Gold, and the Masimong Mines was offset by decreased production from the Evander, the Kalgold, and the Orkney Mines. Harmony planned to increase its South African gold production to nearly 81,000 kg by 2011. The Tshepong Decline project started in April 2007 and was expected to reach full production of 4,200 kg/yr in May 2008. The Doorknop South Reef project was expected to reach full production by December 2009; and the Phakisa Shaft project, in August 2010.

The deepening of the Elandsrand Mine was expected to be completed in 2012 (African Rainbow Minerals Ltd., 2007, p. 53; Mining Review Africa, 2007h; Resource Information Unit, 2008, p. 232-233, 235, 237-238, 240-241).

Gold Fields Ltd. of South Africa produced gold at the Beatrix, the Driefontein, the Kloof, and the South Deep Mines. Production at the Driefontein Mine decreased to 31,466 kg in 2007 from a revised 33,419 kg in 2006; at the Kloof Mine, to 28,482 kg from a revised 28,501 kg; and at the Beatrix Mine, to 15,022 kg from 18,697 kg. Gold Fields purchased Barrick's share in South Deep in 2006; output decreased to 8,654 kg in 2007 from 9,420 kg in 2006 (Gold Fields Ltd., 2008).

Gold Fields planned to spend about \$580 million on a deepening of the Driefontein Mine that would extend its life to 2036. The company expected to start shaft sinking in October 2007; full production from the project was expected by 2019. The project could result in the production of an additional 260,000 kg of gold over the life of the mine. Production at South Deep was expected to be more than 12,400 kg in 2008; Gold Fields planned to increase output to 25,000 kg/yr in 2011. In 2007, Gold Fields put a planned deepening of the Kloof Mine on hold pending the results of a drilling program (Mining Journal, 2007b; Mining Review Africa, 2007e).

In 2007, gold production by DRDGold Ltd. (formerly Durban Roodepoort Deep Ltd.) of South Africa decreased to 10,113 kg from 11,058 kg in 2006. Output at the Blyvooruitzicht Mine was 4,637 kg in 2007; the Crown Mine, 2,829 kg; and the East Rand Proprietary Mine, 2,647 kg. Ore grades decreased at all mines in the second half of 2007 compared with the same period in 2006. DRDGold and its joint-venture partner Mintails Ltd. of Australia planned to reopen the Ergo tailings treatment plant, which was purchased from AngloGold Ashanti. The companies planned to produce 2,300 kg/yr at Ergo (AngloGold Ashanti Ltd. and Gold Fields Ltd., 2008, p. 21; Conradie, 2008a; DRDGold Ltd., 2008).

Thistle Mining Inc. of South Africa operated the President Steyn Mine in Free State. The company produced 2,871 kg of gold in the first 9 months of 2007 compared with 3,552 kg in the same period in 2006; production was reduced by decreased ore grades and mechanical problems. In October 2007, Thistle agreed to sell its interest in the President Steyn Mine to Pamodzi Gold Ltd. (Thistle Mining Inc., 2007, p. 4, 27-28).

Anglo Platinum's production of refined gold from Rustenburg Base Metal Refiners decreased to 3,039 kg in 2007 from 3,533 kg in 2006. Of this amount, 2,712 kg was attributable to Anglo Platinum's PGM mining operations in 2007 compared with 3,182 kg in 2006; the remainder was attributable to purchased concentrates (Anglo American Platinum Corp., 2008, p. 102).

Simmer and Jack Mines Ltd. acquired the Buffelsfontein Mine from DRDGold in 2005. The company planned to produce about 9,900 kg/yr at Buffelsfontein by 2014 or 2015. In 2007, estimated reserves were revised to nearly 160 t from 140 t. The life of the mine was expected to be more than 20 years. Simmer and Jack also planned to complete a feasibility study on the Mpumalanga project by March 2009. Depending on the results of the study, an open pit mine could be opened at Mpumalanga with a peak production of 7,800 kg in 2011; output was expected to be 7,200 kg in 2014 (Mining Review Africa, 2007g).

Central Rand Gold Ltd. planned to reopen underground mines in the Central Rand gold field, where production shut down in the mid-1970s. The company planned to start trial mining in late 2008; the mine was likely to be fully operational in 2009. By 2012, Central Rand expected to increase production to more than 31,000 kg/yr. The life of the mine was estimated to be 50 years; resources could be as much as 3,700 t (Conradie, 2008a).

Great Basin Gold Ltd. (GBG) was engaged in construction of the Burnside underground gold mine. The company completed a revised feasibility study in 2007. GBG planned to start mining at Burnside in January 2010; average production was likely to be 7,900 kg/yr over the 19-year life of the mine. Capital costs of the project were estimated to be \$238 million (Mining Journal, 2007a).

Aflease Gold Ltd. announced the results of a revised feasibility study on its Modder East project in October 2007. The company planned to open a new underground mine at Modder East in the fourth quarter of 2009; production was expected to be about 5,600 kg/yr of gold (Conradie, 2008a).

First Uranium Corp. of Canada (a subsidiary of Simmer and Jack Mines Ltd.) planned to produce an average of 9,000 kg/yr of gold at the Ezulwini Mine between 2008 and 2024; the mine was expected to open in April 2008. Capital costs of the project were estimated to be \$271 million. First Uranium also planned to produce an average of 4,000 kg/yr of gold at the Buffelsfontein Tailings Project between 2008 and 2024 (First Uranium Corp., 2007, p. 5-6, 10).

Other new projects to recover gold as a coproduct of uranium mining included the Dominion and the Mogale Mines. DRDGold and Mintails were considering an increase in production at Mogale to 2,800 kg/yr of gold from 750 kg/yr as the companies started uranium recovery; output could subsequently increase to 5,600 kg/yr. Uranium One Inc. of Canada started production at the Dominion Reefs Mine in 2007; the company planned to produce 1,500 kg/yr of gold (Australia's Paydirt, 2007; Uranium One Inc., 2007, p. 47-49).

South Africa's production of refined gold decreased to an estimated 400,000 kg in 2007 from 427,313 kg in 2006 and 451,533 kg in 2005. The decrease was attributable to the shutdown of the refinery operated by Musuku Beneficiation Systems (Pty) Ltd. in 2006. Musuku produced 29,170 kg of gold in 2006 compared with 62,820 kg in 2005 (AngloGold Ashanti Ltd. and Gold Fields Ltd., 2008, p. 7, 29).

Rand Refinery Ltd. in Germiston (AngloGold Ashanti, 53%; Gold Fields, 33%; DRDGold, 10%; Avgold Ltd., 2%; Western Areas Ltd., 2%) produced 394,053 kg of refined gold in 2006 compared with 384,811 kg in 2005. About 61% of the refinery's gold was sourced from South African mines, and 37%, from mines in other countries. Ghana accounted for 51% of Rand's imports; Mali, 18%; Zimbabwe, 9%; Tanzania, 8%; Guinea, 6%; and other countries, 8%. The remainder of South Africa's refined gold was produced by seven small gold recycling companies (AngloGold Ashanti Ltd. and Gold Fields Ltd., 2008, p. 27-28).

Iron and Steel.—ArcelorMittal South Africa Ltd. accounted for most of South Africa's production of crude steel at its Newcastle, Saldanha, Vanderbijlpark, and Vereeniging plants. The company's crude steel production decreased to 6.38 Mt in 2007 from 7.06 Mt in 2006 because of repairs to one of the

blast furnaces at Vanderbijlpark and an aging blast furnace at Newcastle. Output increased slightly at Saldanha and Vereeniging. ArcelorMittal planned to increase production to 9.5 Mt/yr by 2011. New direct-reduced iron furnaces with a capacity of 350,000 t/yr were expected to be installed at Vanderbijlpark in 2008, and a new blast furnace with a capacity of 3 Mt/yr was expected to replace the current 2-Mt/yr furnace at Newcastle (ArcelorMittal South Africa Ltd., 2008, p. 21, 26-27, 30-31).

In 2007, about 74% of ArcelorMittal's flat steel products was sold in the domestic market and 15% was exported to other African countries. About 81% of the company's long steel products was sold domestically and 10% was exported to other African countries (ArcelorMittal South Africa Ltd., 2008, p. 25, 29).

Highveld operated a steel mill at Witbank. In 2007, the company's production of crude steel was 779,525 t compared with 777,017 t in 2006 and 831,125 t in 2002. Scaw Metals (a subsidiary of Anglo American plc of the United Kingdom) also produced crude steel at its Germiston plant (Highveld Steel and Vanadium Corp. Ltd., 2008, p. 3).

Iron Ore.—Assmang, Highveld Steel and Vanadium Corp. Ltd. of South Africa, and Kumba Iron Ore Ltd. of South Africa mined iron ore. Kumba operated the Sishen Mine in Northern Cape Province and the Thabazimbi Mine in Limpopo Province. In 2007, output from the Sishen Mine increased to 29.7 Mt from nearly 28.7 Mt in 2006. Production at Thabazimbi increased to 2.7 Mt from to 2.4 Mt (Kumba Iron Ore Ltd., 2008, p. 38, 44).

Kumba planned to produce an additional 8 Mt of iron ore from the Sishen expansion project in 2008 and 13 Mt in 2009; the project was expected to reach its full capacity of 13.4 Mt/yr in 2010. Ore from the Sishen Expansion project was expected to have a grade of between 63.5% and 64% iron. In 2008, Kumba also planned to complete a prefeasibility study on the expansion of the Sishen Mine by an additional 5 to 10 Mt/yr, and in 2009, a full feasibility study. Depending on favorable results from the studies, production could start in 2013. The life of the second expansion project was estimated to be between 20 and 30 years (Kumba Iron Ore Ltd., 2008, p. 28, 48).

Kumba completed a feasibility study on the Sishen South project in mid-2007; the project is located 80 km south of the Sishen Mine. The Sishen South project was expected to start production in 2012; full capacity was planned to be 12 Mt/yr of iron ore. The development of Sishen South depended on the expansion of the Sishen-Saldanha export channel and the grant of mining rights (Kumba Iron Ore Ltd., 2008, p. 28, 35).

Assmang produced iron ore at the Beeshoek Mine in Northern Cape Province, which had a rated capacity of 6 Mt/yr. In fiscal year 2007, production increased to 6.68 Mt from 5.54 Mt in fiscal year 2006 (African Rainbow Minerals Ltd., 2007, p. 34-35).

Assmang planned to proceed with the development of the Khumani iron ore resources. Production at the new Khumani Mine was expected to reach 1 Mt in fiscal year 2008 and to increase to 10 Mt by fiscal year 2010. Capital costs of the mine were estimated to be about \$570 million. The life of the mine was expected to be 30 years; reserves were 445 Mt at a grade of 64.7% iron. Assmang was also considering an expansion of Khumani's capacity to 16 Mt/yr; the expansion was dependent

upon logistics. Output from the Beeshoek Mine was expected to decrease sharply as Khumani reached full production. The remaining life of the Beeshoek Mine was estimated to be 7 years (African Rainbow Minerals Ltd., 2007, p. 31-34, 66).

Highveld mined titaniferous magnetite at its Mapochs open pit mine near Roossenekal in Mpumalanga Province. In 2007, the company produced 2.18 Mt of ore compared with 2.1 Mt in 2006 and 2.24 Mt in 2002 (Highveld Steel and Vanadium Corp. Ltd., 2008, p. 3).

Lead and Zinc.—Anglo American operated the Black Mountain lead-zinc-copper mine near Aggeneys in Northern Cape Province. In 2007, production amounted to 28,300 t of zinc and 41,900 t of lead from 1.1 Mt of ore milled compared with 34,100 t of zinc and 48,300 t of lead from 1.4 Mt of ore milled in 2006 (Anglo American plc, 2008, p. 161).

Zinc Corp. of South Africa Ltd. (a subsidiary of Exxaro Resources Ltd.) operated South Africa's only zinc refinery at Springs. In 2007, production increased to 101,000 t of refined zinc from 90,000 t in 2006 because of higher quality zinc concentrates and upgrades to equipment; the company planned additional upgrades in 2008 (Exxaro Resources Ltd., 2008, p. 59-60).

Manganese.—Samancor Manganese (Pty) Ltd. (BHP Billiton, 60%; Anglo American, 40%) operated the Mamatwan open pit mine and the Wessels underground mine near Hotazel in Northern Cape Province. In 2007, Samancor's production of manganese ore increased to 2.54 Mt from 2.51 Mt in 2006. The company's ferromanganese and silicomanganese plant at Meyerton was South Africa's leading producer of manganese alloys. In 2007, output of manganese alloys at Meyerton was 533,000 t compared with 469,000 t in 2006 (BHP Billiton Ltd., 2007, 2008).

Manganese Metal Co. (Samancor Manganese, 51%) operated the Nelspruit plant, which produced manganese metal. The company's production decreased to an estimated 26,000 t in 2007 from 30,000 t in 2006 because of the closure of the Krugersdorp plant at the end of February 2006.

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 2007, production at these mines increased to 2.85 Mt from 2.57 Mt in fiscal year 2006 (African Rainbow Minerals Ltd., 2007, p. 31, 38-39).

Assmang operated the Cato Ridge ferromanganese plant in Kwa-Zulu Natal, which had a rated capacity of 300,000 t/yr. In fiscal year 2007, output increased to 347,000 t from 306,000 t in fiscal year 2006 (African Rainbow Minerals Ltd., 2007, p. 38-39).

Highveld produced ferromanganese and silicomanganese at its plant at Witbank; Renova Group of Russia purchased the plant from Highveld in June 2007. During the first 6 months of 2007, Highveld produced 77,327 t of manganese alloys (Highveld Steel and Vanadium Corp. Ltd., 2008, p. 3).

Renova was engaged in a joint-venture project with domestic companies Chancellor House and Pitsoe ya Setshaba to develop the Kalahari manganese ore deposit. In 2007, Renova started development of a new mine at Kalahari. Construction of the mine was expected to be completed by the end of 2008; production capacity was likely to be between 1.5 Mt/yr and 2 Mt/yr of manganese ore. Renova was also considering the

development of a ferromanganese plant at the Coega Industrial Development Zone in Eastern Cape Province. Plans to build the plant may be postponed or abandoned because of a lack of power and transportation infrastructure (Ryan's Notes, 2007a, f).

In November 2007, ArcelorMittal announced plans to form a joint venture with Kalagadi Manganese (Pty) Ltd. (Kalahari Resources Ltd., 80%) to develop Kalagadi's manganese resources. Arcelor and Kalahari (which was a Black Economic Empowerment company) planned to start development of a new mine at Hotazel in March 2008; production was expected to start by 2009. Output was expected to be 3 Mt/yr of manganese ore. The life of the mine was estimated to be more than 20 years. The companies also planned to build a new ferromanganese plant at Coega with a capacity of 320,000 t/yr by 2010; the smelter was expected to consume nearly 30% of the mine's sintered output (Mining Journal, 2007b; Ryan's Notes, 2007a).

North Cape Manganese planned to open a new manganese mine in the second half of 2009. Output at the mine was expected to be 1 Mt/yr of manganese ore at a grade of 40% manganese. The company also planned to start sinter and ferromanganese plants in 2011. Development of the project depended on securing adequate transportation and power supplies (Ryan's Notes, 2007b).

Nickel.—Most of South Africa's nickel mine production was a coproduct of PGM mining. Nickel mine output decreased by 9% in 2007. Anglo Platinum produced 19,200 t of refined nickel at Rustenburg Base Metal Refiners in 2007 compared with 21,300 t in 2006. About 17,300 t was attributable to the company's PGM mining operations compared with 19,200 t in 2005 (Anglo American Platinum Corp., 2008, p. 102).

ARM produced of 4,418 t of nickel at the Nkomati Mine in fiscal year 2007 compared with 5,616 t in fiscal year 2006. The company planned to increase mine production to 5,500 t in fiscal year 2008 and to 20,500 t/yr of nickel by fiscal year 2011. The life of the mine was expected to be 18 years (African Rainbow Minerals Ltd., 2007, p. 21, 25).

Platinum-Group Metals.—In 2007, Anglo Platinum produced 148,900 kg of refined PGM compared with 162,900 kg in 2006. About 129,200 kg was attributable to the company's mining operations in 2007 compared with 144,400 kg in 2006. Platinum produced from Anglo's mining operations amounted to 67,300 kg; palladium, 37,300 kg; and rhodium, 8,900 kg (Anglo American Platinum Corp., 2008, p. 102).

In 2007, output at Rustenburg decreased to about 39,600 kg of PGM from 51,200 kg in 2006; at Amandelbult, to 33,340 kg from 35,452 kg; and at Bafokeng-Rasimone Platinum Mine, to 9,779 kg from 11,863 kg. Production at the Kroondal Mine (a joint venture with Aquarius Platinum Ltd. of South Africa) decreased to 12,705 kg of PGM from 13,866 kg in 2006. At Potgietersrust Platinums (PPRust), PGM production decreased to 11,017 kg from 13,067 kg. Output decreased at Anglo Platinum's mines for numerous reasons, including labor disputes, decreased ore grades, mechanical problems, power outages, and safety stoppages (Anglo American Platinum Corp., 2008, p. 104-105, 107, 110; Aquarius Platinum Ltd., 2007, p. 6; 2008, p. 5).

Anglo Platinum increased PGM production at the Mototolo Mine to about 5,673 kg in 2007 from 426 kg in 2006. The company planned to increase production at PPRust by more

than 160% by 2009. At Rustenburg, production of PGM was expected to increase by between 26% and 33% starting in 2008. Anglo Platinum planned to increase output at Amandelbult by 27% starting in 2012 (Anglo American Platinum Corp., 2008, p. 104-105, 107, 115; Resource Information Unit, 2008, p. 242, 253-254).

Implats operated the Impala Mines near Rustenburg in North West Province and the Marula Mine in Limpopo Province. In fiscal year 2007, production of refined PGM at Impala was 58,238 kg compared with 62,297 kg in fiscal year 2006; platinum production decreased to 32,824 kg from 35,001 kg. The decrease in output was attributable to a decrease in ore grades. Implats planned to maintain production between 31,000 and 34,000 kg/yr of platinum for the 30-year life of the mines. The company planned to complete the capacity expansion of the Precious Metals Refinery to 71,500 kg/yr from about 62,000 kg/yr of refined platinum by 2008. Implats also planned to complete a subsequent increase in the refinery's capacity to 87,000 kg/yr of refined platinum (Impala Platinum Holdings Ltd., 2007, p. 31, 38; 2008).

In fiscal year 2007, platinum production at Marula increased to 2,028 kg from 1,244 kg in fiscal year 2006 because of an increase in ore milled. Implats planned to increase platinum production at Marula to 4,000 kg/yr in fiscal year 2010. The company was also considering a further expansion of Marula's capacity to 7,600 kg/yr of platinum by fiscal year 2015. Development of the project could start in early 2008; capital costs were estimated to be nearly \$430 million. The life of the project was expected to be 20 years (Impala Platinum Holdings Ltd., 2007, p. 40, 42).

African Platinum plc (Aflplats) held the Leeuwkop project near Brits; Impala purchased Afplats in February 2007. Impala planned to start construction of a new mine in early 2008; production was expected to start in fiscal year 2010. By fiscal year 2013, the mine was likely to reach its full capacity of between 4,400 and 5,000 kg/yr of platinum. The life of the mine was estimated to be 22 years (Impala Platinum Holdings Ltd., 2007, p. 43-44).

Implats also operated a refinery northeast of Johannesburg; production at this plant was from purchased concentrates and toll refining. In fiscal year 2007, the refinery's production increased to 61,768 kg of PGM from 46,245 kg in fiscal year 2006 (Impala Platinum Holdings Ltd., 2007, p. 57).

ARM and Implats opened the Two Rivers Mine in Mpumalanga Province in fiscal year 2007; production amounted to 5,726 kg of PGM. The Two Rivers Mine was expected to reach its full capacity of 6,800 kg/yr of PGM in fiscal year 2008. The life of the mine was expected to be 20 years. ARM and Anglo Platinum produced 8,528 kg of PGM at Modikwa in fiscal year 2007; output was expected to increase to nearly 11,000 kg/yr starting in fiscal year 2008. ARM also planned to produce 3,400 kg/yr of PGM with the expansion of the Nkomati nickel mine; output amounted to 1,434 kg in fiscal year 2007 (African Rainbow Minerals Ltd., 2007, p. 21, 23).

Lonmin plc of the United Kingdom mined PGM at the Western Platinum Mine, the Eastern Platinum Mine, and the Karee Mine east of Rustenburg in North West Province, and at the Limpopo Mine. From September 2006 to September 2007,

these mines produced a total of 27,055 kg of platinum compared with 30,014 kg in the previous 12 months. Total production of PGM decreased to 50,931 kg from 56,297 kg. Lonmin planned to increase platinum production to about 37,000 kg/yr in 2012; production of copper and nickel coproducts was also likely to increase (Lonmin plc, 2007, p. 30, 38).

Aquarius operated the Marikana Mine. In 2007, production of PGM at Marikana was 4,211 kg compared with 3,351 kg in 2006; platinum production rose to 2,629 kg from 2,017 kg. Reserves were likely to be depleted in 2013. The Everest Platinum Mine produced 5,493 kg of PGM in 2007 compared with 5,373 kg in 2006. The company planned to increase production at Everest to 6,200 kg/yr of PGM; the remaining life of the mine was estimated to be 8 years (Aquarius Platinum Ltd., 2007, p. 2, 9; 2008, p. 2, 8; Resource Information Unit, 2008, p. 246, 251).

Ridge Mining plc of the United Kingdom and Imbani Platinum (Pty) Ltd. were engaged in a joint venture to produce PGM from the Blue Ridge project. The companies planned to produce 3,900 kg/yr of PGM from the new Blue Ridge Mine starting in the third quarter of 2008. Capital costs of the project were estimated to be \$143 million. The life of the mine was expected to be 18 years (Conradie, 2008b).

In November 2007, Platinum Australia Pty Ltd. (PLA) of Australia started construction on a new mine at the Smokey Hills project. PLA planned to start production in 2008 at a rate of 3,000 kg/yr of PGM. Capital costs of the project were estimated to be \$49 million. The life of the mine was expected to be 7 years (Conradie, 2008b).

In August 2007, Platmin Ltd. announced plans to proceed with the construction of the new Pilanesberg Mine on the western limb of the Bushveld Complex. Platmin planned to start production in the first quarter of 2009 at a rate of 7,800 kg/yr of PGM. Capital costs of the project were estimated to be \$350 million. The life of the mine was expected to be 16 years (Conradie, 2008b).

In March 2007, Wesizwe Platinum Ltd. completed its prefeasibility study on mining at the Frischgewaagd-Ledig deposit. Wesizwe started a feasibility study that the company planned to complete by the end of 2007. Depending on the results of the study, construction of a new mine could start in the first quarter of 2008 and production, in mid-2008. Wesizwe planned to produce at the mine's full capacity of 8,700 kg/yr of PGM, which included 6,200 kg/yr of platinum, by mid-2013. Capital costs of the project were estimated to be about \$680 million. The life of the mine was estimated to be between 20 and 25 years (Mining Review Africa, 2007j).

Silicon.—In 2007, Silicon Smelters (Pty) Ltd.'s production of silicon metal decreased to 50,300 t from 53,300 t in 2006; most of the output was exported. Highveld produced 52,620 t of ferrosilicon in 2007 compared with 51,057 t in 2006 from its Rand Carbide plant at Witbank; Silicon Smelters purchased Rand Carbide. Silicon Technology (Pty) Ltd. also produced ferrosilicon (Highveld Steel and Vanadium Corp. Ltd., 2008, p. 3, 12).

Titanium and Zirconium.—In 2007, Exxaro produced 367,000 t of ilmenite from the Hillendale Mine in KwaZulu Natal Province compared with 319,000 t in 2006. Rutile

production decreased to 17,000 t from 25,000 t, and zircon, to 34,000 t from 50,000 t. Exxaro delayed the start of construction on the Fairbreeze Mine until October 2008. Depending on approval of mining rights for the project, production was expected to start at Fairbreeze in July 2010 (Exxaro Resources Ltd., 2008, p. 56, 64).

Anglo American mined ilmenite, rutile, and zircon at its Namakwa Sands project on South Africa's western coast. Ilmenite production at Namakwa Sands increased to 300,300 t in 2007 from 272,200 t in 2006. Zircon production decreased to 114,800 t from 128,400 t, and rutile, to 24,500 t from 28,200 t. Exxaro announced plans to purchase Namakwa Sands from Anglo American in March 2007 (Anglo American plc, 2008, p. 161).

Mineral Commodities Ltd. (MRC) of Australia was engaged in a joint venture with the Xolobeni Community Empowerment Company (XolCo) to develop the Xolobeni mineral sands project in Eastern Cape Province. The companies planned to make a decision on opening a new mine by March 2008. If the project were to proceed, output was expected to start by 2009 at a rate of 250,000 t/yr of ilmenite, 19,000 t/yr of rutile, and 17,000 t/yr of zircon. XolCo also planned to build a plant that would produce 137,000 t/yr of titanium dioxide and 75,000 t/yr of pig iron from raw materials mined at Xolobeni. Capital costs for the project were estimated to be \$200 million. The life of the mine was expected to be 22 years (Mining Review Africa, 2007f).

Vanadium.—Highveld produced vanadium from titaniferous magnetite ore at the Mapochs Mine. In 2007, the company produced 65,673 t of vanadium slag compared with 64,964 t in 2006; the average vanadium pentoxide ($\rm V_2O_5$) content of the slag amounted to about 22% between 2001 and 2005. Highveld produced 8,679 t of vanadium in ferrovanadium in 2007 compared with 7,572 t in 2006; the company also produced $\rm V_2O_5$ and various vanadium chemicals for sale. Production was constrained by power and water supply interruptions (Highveld Steel and Vanadium Corp. Ltd., 2008, p. 3, 20).

In 2007, Ervaz Group S.A. of Luxembourg purchased a 79% share in Highveld. Ervaz was required to divest Highveld Vanadium and Chemicals Division, part of Highveld's share in the Mapochs Mine, and part of Highveld's ferrovanadium operations (Highveld Steel and Vanadium Corp. Ltd., 2008, p. 12).

Xstrata produced V_2O_5 at the Rhovan Mine in Brits; output decreased to 8,558 t of V_2O_5 in 2007 from 9,819 t in 2006. Decreased production was attributable to a shortage of vanadium-rich spinel. Ferrovanadium production at Rhovan decreased to 4,280 t in 2007 from 4,907 t in 2006 (Xstrata plc, 2008, p. 93).

Vametco Alloys (a subsidiary of Strategic Minerals Corp. of the United States) produced vanadium from a mine in Brits; the company also recovered vanadium from pig iron slag. In June 2007, Vametco increased the capacity of its V_2O_5 plant to 3,800 t/yr from about 3,000 t/yr; the increased capacity was used to produce Stratcor's nitrided-vanadium product (Ryan's Notes, 2007d).

Industrial Minerals

Cement.—Domestic sales of cementitous products increased to 14.1 Mt from 13.3 Mt in 2006. Increased demand for cement

in infrastructure projects and nonresidential buildings offset declining demand in the residential construction sector. The cement industry accounted for 78% of South Africa's dolomite and limestone demand (Naidoo and Modiselle, 2008).

Pretoria Portland Cement Co. (Pty) Ltd. (PPC) was South Africa's leading cement producer. By mid-2009, PPC planned to increase its capacity at its Hercules plant by about 670,000 t/yr by installing a new mill. The company hoped to gain an additional 300,000 t/yr by using existing capacity more efficiently. Lafarge South Africa Ltd. expected to increase its capacity at Lichtenburg to 3.7 Mt/yr from 2.7 Mt/yr and to build a new clinker grinding plant near Randfontein by the end of 2008. The cost of the project was estimated to be \$170 million. Cimentos de Portugal, SGPS, SA (Cimpor) completed an upgrade at the Simumu plant in 2007 that increased capacity by 600,000 t/yr (Building Bulletin, 2007; Naidoo and Modiselle, 2008).

Diamond.—De Beers Group accounted for most of South Africa's rough diamond production. In 2007, the company's output increased to 15 million carats from nearly 14.6 million carats in 2006. At Venetia, production increased to 9.08 million carats from 8.12 million carats because of upgrades to the processing plant. Production at Kimberley decreased to 1.63 million carats from 1.95 million carats; at Cullinan, to 964,000 carats from 1.15 million carats; and at Namaqualand, to 767,000 carats from 978,000 carats. The South Africa Sea Areas project, which mined diamond off the Atlantic coast, produced 121,000 carats in its first year of operation (De Beers Group, 2008, p. 16, 20).

De Beers planned to reopen the Voorspoed Mine in Free State Province in 2008 and to start production in 2009. Production was expected to be 700,000 carats per year. Capital costs of the mine were estimated to be \$170 million. De Beers planned to produce 240,000 carats per year at the South Africa Sea Areas project; the life of the project was expected to be 30 years. The company was also engaged in an upgrade of the Finsch Mine treatment plant that could increase output by 500,000 carats per year. The upgrade was likely to be completed in the first quarter of 2008 at a cost of \$89 million. Production from the Kimberley Mine's surface operations was expected to be 1.5 million carats per year (Mining Review Africa, 2007b; De Beers Group, 2008, p. 16, 20).

Petra Diamonds Ltd. 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. In 2007, Petra purchased the Cullinan Mine and the Kimberley underground mining operations from De Beers. The company planned to produce 100,000 carats per year from the Kimberley underground operations; total production was expected to increase to 400,000 carats in fiscal year 2009 and to 1 million carats in fiscal year 2010 from nearly 200,000 carats in fiscal year 2007 (Mining Review Africa, 2007b; De Beers Group, 2008, p. 16, 20).

Fluorspar.—National fluorspar production increased in 2007 because of increased output from the Vergenoeg Mine (owned by Metorex Ltd.) and the Witkop Mine (owned by Sallies Ltd.). In early 2007, Sallies was producing more than 150,000 t/yr, of which 120,000 t/yr was produced at Witkop and more than 30,000 t/yr was produced by reprocessing tailings

at the Buffalo Mine. Sallies planned to increase production to the company's full capacity of 240,000 t/yr in 2009. The life of the Buffalo Mine was expected to be 4 years as a reprocessing operation; Sallies was considering the reopening of the mine (Mining Review Africa, 2007d; Modiselle, 2008).

Central African Mining and Exploration Company plc (CAMEC) of the United Kingdom planned to complete a prefeasibility study on starting a mine at the Doorhoek fluorspar deposit by the end of 2008 and a feasibility study by the end of 2009. Depending on the results of the studies, CAMEC could produce 350,000 t/yr of acid-grade fluorspar at Doorhoek by 2012 (Modiselle, 2008).

Domestic consumption of fluorspar amounted to 30,000 t in 2007, of which at least 12,000 t was consumed by the Nuclear Energy Corp. From 1998 to 2007, domestic sales amounted to nearly 14% of South Africa's fluorspar output. Alfluorco (a joint venture of Minerales y Productos Derivados S.A. of Spain, Metorex, and Industrial Development Corp.) planned to build a new hydrofluoric acid plant with a capacity of 40,000 t/yr, which would consume 70,000 t/yr of fluorspar from the Vergenoeg Mine. Metorex planned to increase production at Vergenoeg to meet the plant's demand. One-half of the hydrofluoric acid plant's output was expected to be used in the production of aluminum trifluoride (Mining Journal, 2007b; Mining Review Africa, 2007d; Modiselle, 2008).

Vermiculite.—In 2007, production of vermiculite at the Palabora Mine was nearly unchanged at 199,150 t. Reserves at Palabora amounted to 37.2 Mt at a grade of 34% vermiculite. About 87% of South Africa's vermiculite output was exported in 2007 (Palabora Mining Company Ltd., 2008, p. 79, 81; Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy of the Republic of South Africa, written commun., August 1, 2008).

Mineral Fuels and Related Materials

Coal.—Anglo American's coal production remained nearly unchanged at 59.2 Mt in 2007. Production at the New Vaal Mine increased to 17.1 Mt from 16.3 Mt; at the Isibonelo Mine, to 5 Mt from 4.02 Mt; and at the Greenside Mine, to 3.31 Mt from 2.78 Mt. Increased output from these mines was offset by decreased output at the Kleinkopje, the Kriel, and the New Denmark Mines. Production at the Kriel Mine decreased to 11.2 Mt from 12.3 Mt; at New Denmark, to 5.13 Mt from 5.51 Mt; and at Kleinkopje, to 3.49 Mt from 3.9 Mt. Anglo American supplied about 35 Mt/yr of thermal coal to South African utility Eskom Holdings Ltd.; the output of the Isibonelo Mine was sold to Sasol Ltd. of South Africa for use in its coal-to-liquids plants (Anglo American plc, 2008, p. 46, 158).

The Mafube Mine produced 757,200 t of coal in 2007. Anglo American and Exxaro had a joint-venture agreement to increase capacity at Mafube to 5.4 Mt/yr by 2008. The capital cost of the project was estimated to be \$292 million. Anglo American also planned to complete the Zondagsfontein project in 2010, which was expected to produce 6.6 Mt/yr of thermal coal. The MacWest project was expected to be completed in 2009 and to produce 2.7 Mt/yr of thermal coal (Anglo American plc, 2008, p. 22, 158).

Other projects under consideration by Anglo American included the Heidelberg opencast mine, which could produce 1 Mt/yr starting in 2009; the Elders opencast mine, 6.5 Mt/yr starting in 2011; the Heidelberg underground mine, 5 Mt/yr starting in 2013; the Elders underground mine, 4 Mt/yr starting in 2013; and the New Largo Mine, 14.7 Mt/yr starting in 2016. These projects remained unapproved by the Board of Directors at the end of 2007 (Anglo American plc, 2008, p. 158).

Ingwe Coal Corp. Ltd. (a subsidiary of BHP Billiton Group) produced coal at the Douglas, the Khutala, the Klipspruit, the Koornfontein, the Middelburg, and the Rietspruit Mines in Mpumalanga Province. In 2007, Ingwe produced 48.4 Mt of coal compared with 50.6 Mt in 2006. The company had a joint-venture agreement with Xstrata for the operation of the Douglas and the Middleburg Mines, where production increased to 21.9 Mt in 2007 from 21.4 Mt in 2006. Sales to local utilities amounted to 29.7 Mt in 2007; exports, 18.8 Mt; and sales to other South African customers, 1.2 Mt (BHP Billiton Ltd., 2007, 2008; Xstrata plc, 2008, p. 94).

In fiscal year 2007, Sasol Ltd. of South Africa decreased its coal production to 43.3 Mt from 46.2 Mt in fiscal year 2006. At the Secunda Mining Complex, which included the Bosjesspruit, the Brandspruit, the Middelbult, the Syferfontein, and the Twistdraai Mines, output decreased to 41.9 Mt from 44.6 Mt. The decrease in production was broadly based, with output decreasing at all Sasol's mines. Declining output was attributable to decreased demand from Sasol's synthetic fuels plant. Sasol consumed 39.8 Mt of coal in the production of synthetic fuels and exported 3.7 Mt of coal (Sasol Ltd., 2007, p. 44, 47).

Exxaro operated the Grootegeluk and the Tshikondeni Mines in Limpopo Province and the Arnot, the Leeuwpan, the Malta, the New Clydesdale, and the North Block Complex Mines in Mpumalanga Province. Production from the company's mines amounted to about 41.3 Mt in 2007 compared with 41.8 Mt in 2006. Sales to Eskom amounted to 34.2 Mt in 2007 (Exxaro Resources Ltd., 2008, p. 52).

In 2007, Exxaro completed the Inyanda Mine near Witbank, which was expected to produce 1.5 Mt/yr of thermal coal. The company also completed a feasibility study on increasing output at the New Clydesdale Mine by 1.3 Mt/yr of run of mine coal; the expansion was expected to be implemented in the third quarter of 2008. Production could start at the Eerstelingsfontein Mine in 2008 at a rate of 1 Mt/yr of thermal coal if environmental approvals are obtained (Exxaro Resources Ltd., 2008, p. 51, 63).

Xstrata operated nine coal mines at Breyten, Ermelo, and Witbank. In 2007, production at the company's mines increased to 21.4 Mt from 18.9 Mt in 2006. Production at the Southstock Division increased to 5.07 Mt from 4.38 Mt, and at the Mpumalanga Division, to 2.82 Mt from 2.62 Mt. The Goedgevonden Mine produced 1.69 Mt in 2007 compared with 1.05 Mt in 2006 (Xstrata plc, 2008, p. 94).

ARM and Xstrata were engaged in a joint venture to increase output at the Goedgevonden Mine to 6.7 Mt/yr. About 3.5 Mt/yr of coal was expected to be consumed domestically and about 3.2 Mt/yr would be exported. ARM and Xstrata planned to reach full capacity in 2011. The life of the mine was expected to be

33 years. Capital costs were estimated to be about \$410 million (African Rainbow Minerals Ltd., 2007, p. 43-44).

Total Coal South Africa started production at the Forzando South Mine at the end of 2006. In early 2007, Total Coal was producing more than 1 Mt/yr of coal at the Forzando North Mine, more than 700,000 t/yr at the Dorstfontein Mine, and 500,000 t/yr at the Forzando South Mine. By 2009, the company planned to open the Tumelo Mine in a joint venture with Mmakau Mining (Pty) Ltd., which was expected to produce 570,000 t/yr, and to expand output at Forzando South to 800,000 t/yr. The life of the Forzando North and the Dorstfontein Mines were estimated to be 12 and 8 years, respectively. About 80% of Total Coal's production was exported (Mining Review Africa, 2007i).

In late 2007, South African Coal Mining Holdings Ltd. (SACMH) was producing 1.2 Mt/yr of coal at the Umlabu Mine; the company's Ilanga Mine was expected to be shut down in January 2008. SACMH planned to increase output at Umlabu to between 5 and 6 Mt/yr by late 2012 (Mining Review Africa, 2007c).

GVM Metals Ltd. was conducting feasibility studies on the development of the Holfontein and the Mooiplaats coal projects. Depending on the results of the studies, GVM planned to produce 4.5 Mt/yr of coal at Mooiplaats and 1.2 Mt/yr at Holfontein starting in 2009 (Mathews, 2007a).

Uranium.—AngloGold Ashanti mined uranium as a coproduct of gold at the Great Noligwa, the Kopanang, and the Moab Khotsong Mines. In 2007, the company's production of uranium oxide (U₃O₈) amounted to about 540 t. AngloGold Ashanti planned to increase its output to about 900 t/yr by 2010; the increase would be attributable to increased uranium recovery from the Kopanang gold mine and upgrading its new uranium processing plant (Mining Review Africa, 2007a: AngloGold Ashanti Ltd., 2008, p. 57).

Uranium One started production at the Dominion underground uranium mine in 2007. The company planned to produce an average of 1,700 t/yr of $\rm U_3O_8$ between 2011 and 2014; production was expected to be nearly 2,000 t of $\rm U_3O_8$ in 2012. Total production in the 11-year first phase of the project was expected to be 12,300 t of $\rm U_3O_8$ and 15,600 kg of gold. Reserves were estimated to be 18.5 Mt that contained 14,200 t of $\rm U_3O_8$ and 18,300 kg of gold. Uranium One was also studying the possible extension of the Dominion Mine's life to 30 years (Uranium One Inc., 2007, p. 47-49, 51-52).

First Uranium planned to produce an average of 490 t/yr of $\rm U_3O_8$ at the Buffelsfontein tailings project between 2010 and 2023; production was expected to start in November 2008. The company also planned to produce an average of 400 t/yr of $\rm U_3O_8$ at the Ezulwini Mine between 2009 and 2024; uranium production was expected to start in June 2008 (First Uranium Corp, 2007, p. 6, 10).

UraMin Inc. and its joint-venture partners planned to complete a feasibility study on mining at the Ryst Kuil Channel project in March 2008. Depending on the results of the study, a new mine could start production at Ryst Kuil Channel at a rate of 1,600 t/yr of $\rm U_3O_8$ by the end of 2009. In August 2007, UraMin was purchased by Arvea NC of France (Resource Information Unit, 2008, p. 259).

In August 2007, DRDGold and Mintails announced plans to produce nearly 1,300 t/yr of $\rm U_3O_8$ from mine tailings at Mogale. Upgrades to Mintails' gold processing plant at Mogale were necessary to reach the targeted level of production. The first upgrade would increase gold production to 2,800 kg/yr from 750 kg/yr and build a uranium circuit at a cost of \$35 million. The second upgrade would double the plant's capacity (Australia's Paydirt, 2007).

Harmony was considering the restart of mining from the Cooke uranium dumps; Gold Fields was considering the treatment of material from its slimes dams to produce uranium. The Nuclear Energy Corp. of South Africa restarted investigations into domestic uranium enrichment that were halted in 1992 (Mining Journal, 2007b; Mining Review Africa, 2007h).

Outlook

Planned and proposed capacity expansions by numerous producers were likely to lead to increased production of cement, coal, ferrochromium, ferromanganese, fluorspar, gold, ilmenite, iron ore, manganese ore, nickel, PGM, rutile, steel, vanadium, uranium, and zircon for the next 5 years. These expansions depended upon the continuation of the broad-based increase in world demand for minerals. Increases in coal exports also depended upon increased capacity on the rail lines between the coal fields in Mpumalanga Province and Richards Bay and at the Richards Bay Coal Terminal. Factors that could inhibit these plans included the strength of the South African rand, the high rates of HIV infection in the mining workforce, and possible power shortages. Demand for electricity has increased more rapidly than expected, and Eskom has not built any new thermal powerplants in the past 20 years (Mining Journal, 2007b).

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$\label{eq:table 1} \textbf{TABLE 1} \\ \textbf{SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES}^1 \\$

(Metric tons unless otherwise specified)

Commodity METALS	2003	2004	2005	2006	2007	
	725 000	066.074	046 212	005 000	000 000	
Antimory comportation		735,000	866,074	846,213	895,000	899,000
Antimony concentrate:		0.000	9.400	10,000	7 200 5	5 600
Gross weight ^e		9,000	8,400	10,000	7,300 ^r	5,600
Sb content		5,291	4,967	5,979	4,362 ^r	3,354
Chromiun, gross weight:		2 (10	• • • • •	2 22 4		2.122
44% to 48% chromic oxide	thousand metric tons	2,640	2,888	2,394	1,755	2,122
Less than 44% chromic oxide	do.	4,766	4,789	5,100	5,663	7,543
Total	do.	7,406	7,677	7,494	7,418	9,665
Cobalt:						
Mine output, Co content ^e		400	460	400	400	400
Refinery output:		271	309	268	267	293
Copper:						
Mine (company output), Cu content		120,920 ^r	102,374 ^r	103,907 ^r	109,505 ^r	117,066
Metal:						
Smelter		112,025	89,300	90,000 ^{r, e}	100,000 r, e	100,000
Refined, primary		111,543 г	91,295 ^r	99,439 ^r	104,052 ^r	113,600
Gold:						
Mine	kilograms	373,300	337,223	294,671	272,128	252,598
Refined	do.	NA	445,300	451,533	427,313	400,000
Iron and steel:						
Ore and concentrate:						
Gross weight	thousand metric tons	38,085	39,322	39,542	41,326	42,083
Fe content (62%-65%)	do.	24,200	24,800	24,900	26,000	26,500
Metal:						
Pig iron	do.	6,234	6,011	6,130	6,159 ^r	5,358
Direct-reduced iron	do.	1,542	1,633	1,781	1,754	1,700
Ferroalloys, electric arc furnace:		· · · · · · · · · · · · · · · · · · ·	<u> </u>		•	
Chromium ferroalloys	do.	2,813	3,032 ^r	2,802 ^r	3,030	3,561
Ferromanganese	do.	607	612	571	656 ^r	699
Ferrosilicon	do.	135	141	127	149 ^r	190
Ferrovanadium ^e	do.	19	20 r	19 ^r	18	19
Silicomanganese ^e	do.	273 г	334 ^r	231 ^r	247 ^r	302
Silicon metal	do.	49	51	54	53 ^r	502
Other ^e	do.	80 ²	80	80	80	80
Total ^e	do.	3,980 ^r	4,270 ^r	3,880 ^r	4,230	4,900
Steel:	uo.	3,960	4,270	3,000	4,230	4,500
Crude	do	9,481	9,500	9,494 ^r	9,718 ^r	9,100
	do.			,		
Stainless Load:	do.	643	718	658	725 ^r	657
Lead:		20.041	27 405	40.150	49.072	41.057
Concentrate, Pb content		39,941	37,485	42,159	48,273	41,857
Refined, secondary		64,900	64,100	66,000 ^r	67,000 ^r	70,000
Manganese:						
Ore and concentrate, gross weight:						
Metallurgical:	<u> </u>	4 240	1.000	2.465	1 450	4 = 4 =
More than 48% manganese	thousand metric tons	1,619	1,988	2,467	1,452	1,742
45% to 48% manganese	do.	178	372	454	1,812	1,755
40% to 45% manganese	do.	783	1,041	935	895	961
30% to 40% manganese	do.	905	864	743	1,042	1,523
Total	do.	3,485	4,265	4,599	5,201	5,981
Chemical, 35% to 65% manganese dioxide	do.	16	17	12	12	14
Grand total	do.	3,501	4,282	4,611	5,213	5,995
Metal, electrolytic ^e	do.	40	40	44 ²	30 ^r	26
Nickel:						
Mine output, concentrate, nickel content		40,842	39,851	42,392	41,800 ^r	37,917
		- / -				

See footnotes at end of table.

$\label{total loss} \mbox{TABLE 1---Continued} \\ \mbox{SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES}^1 \\$

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS—Continued						
Platinum-group metals:						
Iridium	kilograms	6,444	5,769	6,280	6,172	7,211
Platinum	do.	148,348	153,239	163,711	168,125	160,940
Palladium	do.	70,946	76,403	82,961	86,265	83,643
Rhodium	do.	16,816	16,294	20,224	19,633	21,056
Ruthenium	do.	23,537	24,696	29,805	27,333	31,182
Other	do.	59				
Total	do.	266,150	276,401	302,981	307,528	304,032
Silver	do.	79,817	71,600	87,874	86,951	87,000 e
Titanium: ^e		• • • • •	4.000	4.000	4.000	4.000
Ilmenite concentrate	thousand metric tons	2,000	1,900	1,900	1,900	1,900
Rutile concentrate	<u>do.</u>	108	110	115	123	123
Total	do.	2,110	2,010	2,020	2,020	2,020
Titaniferous slag	do.	1,010	1,020	1,020	1,230	1,230
Uranium, U ₃ O ₈ content		894	887	795	639	619
Vanadium, vanadium metal content Zinc:		27,172	23,302	22,604	23,780	23,486
Concentrate:						
		103,100 ²	80,000	80,000	85,000	75,000
Gross weight ^e Zn content		41,400	32,001	32,112	34,444	30,859
Metal, smelter, primary		111,000	104,000	102,000	90,000	101,000
	2	404.000	368,000	376,000	398,000	398,000
Zirconium concentrate (baddeleyite and zircon) INDUSTRIAL MINERAL		404,000	300,000	370,000	398,000	390,000
Andalusite Andalusite	LU	164,921	234,625	228,265 ^r	221,209 ^r	264,645
Asbestos, chrysotile		6,218				204,043
Cementitious products:	-	0,210				
Cement, finished product, sales	thousand metric tons	8,973 ^r	10,297 ^r	11,464 ^r	12,657 ^r	13,650
Granulated slag, fly ash, and others, sales	do.	1,190 ^r	1,439 ^r	1,511 ^r	1,600 r	1,666
Total	do.	10,163 ^r	11,736 ^r	12,975 ^r	14,257 ^r	15,316
Clays:		-,	,	,	,	- ,-
Attapulgite		14,585	20,419	34,340	49,225	68,377
Bentonite		145,060	55,859	139,833	32,878	45,778
Fire clay		90,604	133,258	171,773	157,087	161,493
Flint clay, raw and calcined		53,279	53,367	36,607	34,413	53,974
Kaolin		86,365	81,901	59,356	51,602	50,839
Brick clay, local sales	thousand metric tons	7,593	9,523	11,237	11,131	12,037
Diamond, natural:						
Gem ^e	thousand carats	5,144 ²	5,800	6,400	6,100	6,100
Industrial ^e	do.	7,540 ²	8,500	9,400	9,100	9,100
Total	do.	12,684	14,295	15,776	15,153	15,250
Feldspar		57,738	53,721	57,534	76,722	90,185
Fluorspar:						
Acid-grade ^e		221,000 ²	250,000	250,000	240,000 ^r	268,000
Metallurgical-grade ^e		14,000 2	15,000	16,000	16,000 ^r	17,000
Total		235,000	265,000	266,000	256,000 ^r	285,000
Gypsum, crude		394,069	524,000	547,581	554,020	627,377
Industrial or glass sand (silica)	thousand metric tons	2,311	2,249	2,671	3,234	3,352
Lime	do.	1,571	1,738	1,417	1,583	1,599
Magnesite, crude		86,100	65,900	54,800	73,300 ^r	80,700
Mica, scrap and ground		1,003	285	924	828	437
Nitrogen, N content of ammonia ^e		493,200 ²	459,100 ²	460,000	460,000	460,000
Perlite ^e		400	400	400	400	400
Phosphate rock:						_
Gross weight	thousand metric tons	2,643	2,735	2,577	2,629	2,556
Phosphorus pentoxide content	do.	1,030	1,070	1,000	1,020	1,000
See footnotes at end of table.						

$\label{total commodities} TABLE\ 1\\ \hbox{--Continued}$ SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES 1

(Metric tons unless otherwise specified)

Soline sulfrate, natural Solone, ne.s.; Solone, ne.s.; Solone, ne.s.; Solone, ne.s.; Solone, ne.s.; Solone, ne.s.; Solone Solone, ne.s.; Solone Solone, ne.s.; Solone Solone Solone, ne.s.; Solone S	Commodity		2003	2004	2005	2006	2007
Oxides	INDUSTRIAL MINERALS—Continue	ed					
Dixides	Pigments, mineral, natural:						
Total	Ochers		608	360	382	372	20
Salium sulfate, natural 52,813 50,267 55,184 43,303 50	Oxides		156	152	128	218	212
Sodium sulfate, natural	Total		764	512	510	590	232
Sodium sulfate, natural	Salt		441,306	332,673	399,087	464,909	411,511
Since No. No. No. Since No.	Sodium sulfate, natural		52,813	56,267	55,184		50,000
Dimension:							
Slate							
Crushed and broken: Limestone and dolomite thousand metric tons Shale:	Granite and norite		463,200	548,600	607,500	497,600 ^r	564,100
Limestone and dolomite thousand metric tons Shale:	Slate		40,700	47,500	52,312	33,154	22,876
For cement	Crushed and broken:						
For cement	Limestone and dolomite tho	usand metric tons	21,267	22,031	24,813	27,366 ^r	23,941
Other	Shale:		·	•	·	·	<u> </u>
Total	For cement	do.	345	357	501	533	498
Total	Other ^e	do.	49 ²	50	50	50	50
Souther Sout		do.	394 ²	407	551	583	548
Scottent of pyrite (53.45%) do. 176 165 133 68	Aggregate and sand, n.e.s.	do.	32,587	44,437	49,970	58,519	63,821
Byproduct: Metallurgy							
Metallurgy do. 174 180 220 231 r Petroleum do. 264 288 422 343 r Total do. 614 633 776 643 Talc and related materials: Tale 6,719 8,141 8,469 10,966 14 Pyrophyllite (wonderstone) 14,350 28,987 60,267 74,886 123 Vermiculite 182,802 196,893 209,801 197,765 199 MINERAL FUELS AND RELATED MATERIALS 182,802 196,893 209,801 197,765 199 Mineral forming for products: 1,206 1,247 1,640 1,584 2 Bituminous do. 238,105 241,500 243,300 243,198 245 Total do. 239,311 242,747 244,940 244,782 247 Natural gas million cubic meters 1,247 1,916 2,060 1,795 1 Petroleum.* Crude <t< td=""><td>S content of pyrite (53.45%)</td><td>do.</td><td>176</td><td>165</td><td>133</td><td>68</td><td>71</td></t<>	S content of pyrite (53.45%)	do.	176	165	133	68	71
Petroleum do. 264 288 422 343 Total do. 614 633 776 643 Talc and related materials: Talc	Byproduct:						
Petroleum	Metallurgy	do.	174	180	220	231 ^r	236
Talc and related materials: Talc			264			343 ^r	335
Talc	Total	do.	614	633	776	643	642
Pyrophyllite (wonderstone)	Talc and related materials:						
Pyrophyllite (wonderstone)	Talc		6,719	8,141	8,469	10,966	14,281
MINERAL FUELS AND RELATED MATERIALS Coal (salable product):	Pyrophyllite (wonderstone)		14,350	28,987	60,267	74,886	123,573
MINERAL FUELS AND RELATED MATERIALS Coal (salable product):	, 1, ,						199,150
Anthracite thousand metric tons 1,206 1,247 1,640 1,584 2 Bituminous do. 238,105 241,500 243,300 243,198 245 Total do. 239,311 242,747 244,940 244,782 247 Natural gas million cubic meters 1,247 1,916 2,060 1,795 1 Petroleum: ⁴ Crude thousand 42-gallon barrels 4,068 6,769 7,277 4,441 2 Refinery products: Liquefied petroleum gases do. 3,561 3,538 3,445 ° 3,793 ° 3 Gasoline do. 77,452 71,166 67,029 ° 67,711 ° 68 Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil <td>MINERAL FUELS AND RELATED MATE</td> <td>ERIALS</td> <td></td> <td></td> <td></td> <td></td> <td></td>	MINERAL FUELS AND RELATED MATE	ERIALS					
Bituminous do. 238,105 241,500 243,300 243,198 245 Total do. 239,311 242,747 244,940 244,782 247 Natural gas million cubic meters 1,247 1,916 2,060 1,795 1 Petroleum: ⁴ Crude thousand 42-gallon barrels 4,068 6,769 7,277 4,441 2 Refinery products: Liquefied petroleum gases do. 3,561 3,538 3,445 ° 3,793 ° 3 Gasoline do. 77,452 71,166 67,029 ° 67,711 ° 68 Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil do. 47,959 27,919 33,566 ° 32,674 ° 33 Other, inc	Coal (salable product):						
Total do. 239,311 242,747 244,940 244,782 247 Natural gas million cubic meters 1,247 1,916 2,060 1,795 1 Petroleum: 4	Anthracite tho	usand metric tons	1,206	1,247	1,640	1,584	2,349
Natural gas million cubic meters 1,247 1,916 2,060 1,795 1 Petroleum: ⁴ Crude thousand 42-gallon barrels 4,068 6,769 7,277 4,441 2 Refinery products: Liquefied petroleum gases do. 3,561 3,538 3,445 ° 3,793 ° 3 Gasoline do. 77,452 71,166 67,029 ° 67,711 ° 68 Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil do. 47,959 27,919 33,566 ° 32,674 ° 33 Other, includes lubricants and greases ^c do. 21,000 17,000 17,000 17,000	Bituminous	do.	238,105	241,500	243,300	243,198	245,317
Petroleum: ⁴ Crude thousand 42-gallon barrels 4,068 6,769 7,277 4,441 2 Refinery products: Liquefied petroleum gases do. 3,561 3,538 3,445 ° 3,793 ° 3 Gasoline do. 77,452 71,166 67,029 ° 67,711 ° 68 Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil do. 47,959 27,919 33,566 ° 32,674 ° 33 Other, includes lubricants and greases ° do. 21,000 17,000 17,000 17,000	Total	do.	239,311	242,747	244,940	244,782	247,666
Crude thousand 42-gallon barrels 4,068 6,769 7,277 4,441 2 Refinery products: Liquefied petroleum gases do. 3,561 3,538 3,445 ° 3,793 ° 3 Gasoline do. 77,452 71,166 67,029 ° 67,711 ° 68 Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil do. 47,959 27,919 33,566 ° 32,674 ° 33 Other, includes lubricants and greases° do. 21,000 17,000 17,000 17,000	Natural gas mil	lion cubic meters	1,247	1,916	2,060	1,795	1,800 e
Refinery products: Liquefied petroleum gases do. 3,561 3,538 3,445 ° 3,793 ° 3 Gasoline do. 77,452 71,166 67,029 ° 67,711 ° 68 Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil do. 47,959 27,919 33,566 ° 32,674 ° 33 Other, includes lubricants and greases ° do. 21,000 17,000 17,000 17,000	Petroleum: ⁴						
Liquefied petroleum gases do. 3,561 3,538 3,445 ° 3,793 ° 3 Gasoline do. 77,452 71,166 67,029 ° 67,711 ° 68 Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil do. 47,959 27,919 33,566 ° 32,674 ° 33 Other, includes lubricants and greases ° do. 21,000 17,000 17,000 17,000	Crude thousand	42-gallon barrels	4,068	6,769	7,277	4,441	2,559
Gasoline do. 77,452 71,166 67,029 ° (67,711 ° (68) Jet fuel do. 17,350 14,331 14,751 ° (15,300 ° (15) 15 Kerosene do. 4,831 4,893 4,777 ° (4,824 ° (48) 4 Distillate fuel oil do. 63,268 53,272 68,639 ° (73,653 ° (74) 74 Residual fuel oil do. 47,959 27,919 33,566 ° (32,674 ° (33) 32,674 ° (33) Other, includes lubricants and greases ° do. 21,000 17,000 17,000 17,000	Refinery products:						
Jet fuel do. 17,350 14,331 14,751 ° 15,300 ° 15 Kerosene do. 4,831 4,893 4,777 ° 4,824 ° 4 Distillate fuel oil do. 63,268 53,272 68,639 ° 73,653 ° 74 Residual fuel oil do. 47,959 27,919 33,566 ° 32,674 ° 33 Other, includes lubricants and greases° do. 21,000 17,000 17,000 17,000	Liquefied petroleum gases	do.	3,561	3,538	3,445 ^r	3,793 ^r	3,800 e
Kerosene do. 4,831 4,893 4,777 r 4,824 r 4 Distillate fuel oil do. 63,268 53,272 68,639 r 73,653 r 74 Residual fuel oil do. 47,959 27,919 33,566 r 32,674 r 33 Other, includes lubricants and greases ^c do. 21,000 17,000 17,000 17,000	Gasoline	do.	77,452	71,166	67,029 ^r	67,711 ^r	68,000 e
Kerosene do. 4,831 4,893 4,777 r 4,824 r 4 Distillate fuel oil do. 63,268 53,272 68,639 r 73,653 r 74 Residual fuel oil do. 47,959 27,919 33,566 r 32,674 r 33 Other, includes lubricants and greases ^c do. 21,000 17,000 17,000 17,000	Jet fuel	do.	17,350	14,331	14,751 ^r	15,300 ^r	15,000 e
Residual fuel oil do. 47,959 27,919 33,566 r 32,674 r 33 Other, includes lubricants and greases ^e do. 21,000 17,000 17,000 17,000 17,000 17	Kerosene	do.	4,831	4,893	4,777 ^r	4,824 ^r	4,800 e
Other, includes lubricants and greases ^e do. 21,000 17,000 17,000 17,000 17	Distillate fuel oil	do.	63,268	53,272	68,639 ^r	73,653 ^r	74,000 e
Other, includes lubricants and greases ^e do. 21,000 17,000 17,000 17,000 17	Residual fuel oil	do.					33,000 e
,	Other, includes lubricants and greases ^e						17,000
Total ^{e, 5} do. 235,000 192,000 209,000 ^r 215,000 ^r 216	Total ^{e, 5}					· · · · · · · · · · · · · · · · · · ·	216,000

estimated; estimated data are rounded to no more than three significant figures; may not add up to totals shown. Revised. do. Ditto. NA Not available. -- Zero.

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

¹Table includes data available through August 9, 2009.

²Reported figure.

³Not elsewhere specified.

⁴In addition, Sasol Ltd. produced about 67 million barrels per year of synthetic liquid petroleum fuels from coal.

⁵Excludes refinery fuel and losses.

${\rm TABLE~2}$ SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN $2007^{\rm l}$

(Thousand metric tons unless otherwise specified)

	Major operating companies and		
Commodity	major equity owners	Location of main facilities	Annual capacity
Aluminum	BHP Billiton Ltd.	Hillside smelter at Richards Bay	700.
Do.	do.	Bayside smelter at Richards Bay	180.
andalusite	Samrec Pty. Ltd. (Imerys, 100%)	Rhino Mine near Thabazimbi	120.
Do.	do.	Annesley Mine at Penge ²	75.
Do.	do.	Havercroft Mine at Penge	60.
Do.	do.	Krugerspost Mine, near Lydenburg	50.
Do.	do.	Andalusite Refractories Mine at Groot	15.
		Marico ²	
Do.	Andalusite Resources (Pty) Ltd. (African	Maroeloesfontein, near Thabazimbi,	30.
	Mineral Trading and Exploration (Pty) Ltd.)	Northern Province	
antimony	metric tons Consolidated Murchison Ltd. (Metorex Pty. Ltd., 100%)	Consolidated Murchison Mine near Gravelotte	7,000 antimony in concentrate.
Cement	Pretoria Portland Cement Co. (Pty) Ltd.	De Hoek, Dwaalboom, Hercules, Jupiter,	6,800.
	(Barloworld Trust Co. Ltd., 68%)	Port Elizabeth, Riebeeck, and Slurry plants	
Do.	Alpha Ltd. [AfriSam Consortium (Pty) Ltd., 48.5%]	Dudfield and Ulco plants	3,700.
Do.	Lafarge South Africa Ltd. (Lafarge S.A.)	Lichtenburg plant in North West Province	2,700.
Do.	Natal Portland Cement Co. (Pty) Ltd.	Simumu plant	1,655.
	(Cimentos de Portugal SGPS, S.A., 98%)		
hromite	Xstrata plc, 79.5%, and Merafe Resources Ltd., 20.5%	Kroondal Mines at Rustenburg	2,460.
Do.	do.	Boshoek Mine at Boshoek	1,800.
Do.	do.	Thorncliffe Mine at Steelpoort	1,440.
Do.	do.	Helena Mine at Steelpoort	600.
Do.	do.	Horizon Mine at Pilansberg	180.
Do.	Samancor Chrome Ltd. (Kermas Group Ltd.,	Eastern Chrome Mines in Steelpoort Valley,	2,000.
	100%)	Mpumalanga Province	,
Do.	do.	Western Chrome Mines in Northern Province	1,800.
Do.	International Ferro Metals Ltd.	Buffelsfontein Mine	1,320.
Do.	Nkomati Joint Venture (African Rainbow	Nkomati Chrome Mine in Mpumalanga	1,000.
	Minerals Ltd., 50%, and MMC Norilsk Nickel, 50%)	Province	
Do.	Assmang Ltd. (African Rainbow Minerals Ltd.,	Dwarsrivier Mine	880. ^e
	50%, and Assore Ltd., 50%)		
Do.	Bayer (Pty) Ltd.	Rustenburg Chrome Mine	450.
Do.	Dilokong Chrome Mine (Pty) Ltd. [ASA	Dilokong Mine, near Lydenburg	320. ^e
	Metals (Pty) Ltd., 100%]		
Do.	National Manganese Mines (Pty) Ltd.	Buffelsfontein Mine at Mooinooi	180.
oal	Anglo Coal Ltd. (Anglo American plc, 100%)	Bank, Goedehoop, Isibonelo, Kleinkopje,	60,000. ^e
		Kriel, Landau, Mafube, New Denmark,	
		New Vaal, and Nooitgedacht Mines	
Do.	Ingwe Coal Corp. Ltd. (BHP Billiton Ltd., 100%)	Witbank Coalfield, Mpumalanga Province:	
Do.	Ingwe Coal Corp. Ltd., 84%, and Xstrata plc, 16%	Middelburg Mine	17,000 bituminous.
Do.	Ingwe Coal Corp. Ltd.	Khutala Underground Mine	15,100 bituminous.
Do.	do.	Optimum Open Pit Mine	13,500 bituminous.
Do.	Ingwe Coal Corp. Ltd., 84%, and Xstrata plc, 16%	Douglas Mine	8,500 bituminous.
Do.	Ingwe Coal Corp. Ltd.	Koornfontein Mines	5,200 bituminous.
Do.	do.	Klipspruit Mine	3,600 bituminous.
Do.	Sasol Ltd.	Secunda Mines:	
Do.	do.	Twistdraai Mine	10,600.
Do.	do.	Syferfontein Mine	8,700.
Do.	do.	Brandspruit Mine	8,400.
Do.	do.	Middelbult Mine	8,200.
			·
Do.	do.	Bosjesspruit Mine	8,100.

(Thousand metric tons unless otherwise specified)

C **:		Major operating companies and	T 0 0	
Commodity	1	major equity owners	Location of main facilities	Annual capacity
Coal—Continue	ea	Exxaro Resources Ltd. (Anglo American plc, 67%)	Grootegeluk Mine in Limpopo Province	18,600.
Do.		do.	Matla Mine in Mpumalanga Province	14,000.
Do.		do.	Arnot Mine in Mpumalanga Province	5,000.
Do.		do.	North Block Mine in Mpumalanga Province	3,000.
Do.		do.	Leeuwpan Mine in Mpumalanga Province	2,500.
Do.		do.	Inyanda Mine	1,500.
Do.		do.	New Clydesdale Mine in Mpumalanga Province	1,400.
Do.		do.	Tshikondeni Mine in Limpopo Province	414.
Do.		Xstrata plc, 74%	Goedgevonden Mine at Witbank	6,700.
Do.		Xstrata plc, 79.8%	Tweefontein Division (Boschmans, South	5,100.
			Withank, Waterpan, and Witcons Mines) at	
			Witbank	7.100
Do.		do.	iMpunzi Division (Phoenix and Tavistock	5,100.
			Mines) at Witbank	
Do.		do.	Southstock Division at Witbank	4,800.
Do.		do.	Mpumalanga Division (Spitzkop and Tselentis	3,300.
			Mines) at Breyton and Ermelo	
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. ^e
Do.		Wakefield Investments (Pty) Ltd. (subsidiary	Bankfontein, Lakeside, Leeuwfontein, and	2,300. ^e
		of Shanduka Group)	Middleburg Townlands Mines	
Do.		Total Coal SA (Pty) Ltd.	Forzando North and Forzando South Mines	1,200. ^e
Do.		do.	Dorsfontein Mine	1,000. ^e
Do.		Graspan Colliery Pty Ltd.	Graspan Mine	1,800.
Do.		South African Coal Mining Holdings Ltd.	Umlabu Mine	1,200. ^e
Copper		Palabora Mining Co. Ltd. (Rio Tinto Ltd.,	Palabora Mines at Phalaborwa	80 copper in
		57%, and Anglo American plc, 29%)		concentrate.
Do.		do.	Smelter at Phalaborwa	130 anodes.
Do.		do.	Refinery at Phalaborwa	130 cathodes.
		Anglo American Platinum Corp. Ltd. (Anglo	Amandebult, Rustenburg, and Union sections;	13 mine.e
		American plc, 74.1%)	and Bafokeng Rasimone, Lebowa, Modikwa,	
		•	Potgietersrust, and Western Limb Mines	
Do.		do.	Rustenburg Base Metal Refiners	12 refined.e
Do.		Black Mountain Mineral Development Co.	Black Mountain Mine near Aggeneys	6 copper in
		(Pty) Ltd. (Anglo American plc, 74%)		concentrate.
Do.		Lonmin Platinum (Lonmin plc., 73%, and	Marikana Mines (Eastern Platinum, Karee,	3 mine.e
		Impala Platinum Holdings Ltd., 27%)	and Western Platinum) near Rustenburg	<i>-</i>
		impata i tatatan iiotanigo zita, 2770)	and Limpopo Mine	
Do.		do.	Base Metals Refinery	3 refined. ^e
Do.		Impala Platinum Ltd. (Impala Platinum	do.	NA.
20.		Holdings Ltd., 100%)	uo.	
Diamond	thousand	De Beers Consolidated Mines Ltd. (Anglo	Venetia Mine in Northern Province	8,700.
Diamona	carats	American plc, 29%)	Venetia Wille III Profesiona i Tovince	0,700.
Do.	do.	do.	Finsch Mine, 100 kilometers west of Kimberley	2,300.
Do.	do.	do.	Kimberley Surface Mines, Kimberley	2,500. 1,500.
			Namaqualand Mine near Kleinzee	•
Do.	do.	do.	1	980.
Do.	do.	do.	South Africa Sea Areas	240.
Do.	do.	do.	The Oaks	110.
Do.	do.	Petra Diamonds Ltd.	Cullinan Mine	1,700.
Do.	do.	do.	Helam, Sedibeng, and Star Mines	175.
Do.	do.	do.	Koffiefontein Mine in Free State Province	140.
Do.	do.	do.	Kimberley Underground Mines, Kimberley	100.
Do.	do.	Trans Hex Group Ltd.	Baken, Bloeddrif, Reuning, and Saxendrift Mines	140. ^e

See footnotes at end of table.

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Fluorspar		Witkop Fluorspar Mine (Pty) Ltd.	Witkop Mine, 250 kilometers west of	180.
		(subsidiary of Sallies Ltd.)	Johannesburg	
Do.		do.	Buffalo Mine at Mookgopong	60.
Do.		Vergenoeg Mining Corp. (Pty) Ltd.	Vergenoeg Mine, 75 kilometers north of	120.
		[Metorex Pty. Ltd., 70%]	Pretoria	
Gold:		_		
Mine		AngloGold Ashanti Ltd. (Anglo American plc,	Vaal River operations:	
		41.8%)	Kopanang Mine	5,000 ore.
Do.	kilograms	do.	do.	36,000 gold.
Do.		do.	Great Noligwa Mine	2,700 ore.
Do.	kilograms	do.	do.	20,000 gold.
Do.		do.	Tau Lekoa Mine	5,000 ore.
Do.	kilograms	do.	do.	18,100 gold.
Do.		do.	Moab Khotsong Mine	1,200 ore.
Do.	kilograms	do.	do.	9,500 gold.
Do.		do.	West Wits operations:	
			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.	18,000 gold.
Do.		Gold Fields Ltd.	Kloof Mine	3,960 ore.
Do.	kilograms	do.	do.	30,000 gold.
Do.		do.	Driefontein Mine	6,660 ore.
Do.	kilograms	do.	do.	32,000 gold.
Do.		do.	Beatrix Mine	4,920 ore.
Do.	kilograms	do.	do.	23,000 gold.
Do.		Western Areas Ltd. (JCI Gold, 50%, and	South Deep Mine	2,600 ore.
		Gold Fields Ltd., 50%)		
Do.	kilograms	do.	do.	12,000 gold.
Do.		Harmony Gold Mining Co. Ltd.	Randfontein Mine	6,000 ore.
Do.	kilograms	do.	do.	31,000 gold.
Do.		do.	Free State operations	5,020 ore.
Do.	kilograms	do.	do.	26,400 gold.
Do.		Freegold Joint Venture (Harmony Gold	Freegold operations	5,040 ore.
		Mining Co. Ltd., 50%, and African Rainbow		
		Minerals Ltd., 50%)		
Do.	kilograms	do.	do.	15,000 gold.
Do.		Harmony Gold Mining Co. Ltd.	Elandsrand Mines	2,220 ore.
Do.	kilograms	do.	do.	13,300 gold.
Do.		do.	Evander operations	2,400 ore.
Do.	kilograms	do.	do.	11,600 gold.
Do.		do.	Target Mine	1,260 ore.
Do.	kilograms	do.	do.	6,800 gold.
Do.		do.	Kalgold Mine	1,620 ore.
Do.	kilograms	do.	do.	1,800 gold.
Do.		do.	Orkney and Welkom Mines	NA.
Do.		DRDGold Ltd.	Blyvooruitzicht and Doornfontein section	4,800 ore.
Do.	kilograms	do.	do.	4,800 gold.
Do.		do.	Crown Mine	11,760 ore.
Do.	kilograms	do.	do.	4,400 gold.
Do.		do.	East Rand Proprietary Mine	2,200 ore.
Do.	kilograms	do.	do.	2,700 gold.

$\label{thm:continued} \textbf{TABLE 2--Continued}$ SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007^1

(Thousand metric tons unless otherwise specified)

		Major operating companies and		
Commodity	•	major equity owners	Location of main facilities	Annual capacity
old—Continue		5 1101111	5 6 6 5	4.200
Mine—Contir	nued	Pamodzi Gold Ltd.	President Steyn Gold Mines in Free State Province	1,200 ore.
Do.	kilograms	do.	do.	6,000 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. ^e
Refined	metric tons	Rand Refinery Ltd. (AngloGold Ashanti Ltd., 53%, and Gold Fields Ltd., 33%)	Germiston, Gauteng Province	1,200.
Do.	do.	Harmony Gold Mining Co. Ltd.	Virginia in Free State Province ²	100.
ron and steel:			——————————————————————————————————————	
Iron ore		Kumba Iron Ore Ltd.	Sishen Mine at Sishen	29,000.
Do.		do.	Thabazimbi Mine at Thabazimbi	2,700.
Do.		Assmang Ltd.	Beeshoek Mine near Postmasburg	6,000.
Do.		Highveld Steel and Vanadium Corp. Ltd. (Ervaz Group S.A., 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%	Wonderkop	553 ferrochromium.
Do.		do.	Rustenburg	430 ferrochromium.
Do.		Xstrata plc, 69.6%, and Merafe Resources Ltd., 30.4%	Lydenburg	396 ferrochromium.
Do.		Xstrata plc, 79.5%, and Merafe Resources Ltd., 20.5%		360 ferrochromium.
Do.		do.	Boshoek	240 ferrochromium.
Do.		Samancor Chrome Division (Kermas Group Ltd., 100%)	Plants at Middelburg, Steelpoort, and Witbank	1,200 ferrochromium.
Do.		Hernic Ferrochrome (Pty) Ltd. (Mitsubishi Corp., 51%)	Plant at Brits	420 ferrochromium.
Do.		Assmang Ltd.	Machadodorp plant in Mpumalanga Province	290 ferrochromium.
Do.		International Ferro Metals Ltd.	Plant in North West Province	267 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 (Pty) Ltd. (BHP Billiton Ltd., 60%, and Anglo American plc, 40%)	Plant at Meyerton	560 ferromanganese; 200 silicomanganes
Do.		Assmang Ltd.	Cato Ridge plant in KwaZulu Natal Province	300 ferromanganese.
Do.		Renova Group	Plant at Witbank	48 ferromanganese.
Do.		do.	do.	170 silicomanganese.
Do.		Silicon Technology Pty Ltd.	NA NA	55 ferrosilicon.
Do.		Silicon Smelters (Pty) Ltd.	Rand Carbide plant	55 ferrosilicon.
Do.	metric tons	do.	Plant at Witbank	12,500 ferrovanadium
Do.	do.	Xstrata plc	Rhovan plant at Brits	6,000 ferrovanadium.
Do.	do.	Vametco Minerals Corp. (Strategic Minerals Corp., 100%)	Smelter near Brits	4,800 ferrovanadium.
Steel		ArcelorMittal 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,	Stainless steel plant at Middelburg	750 crude steel.
Do.		76%) Scaw Metals Division (Anglo Operations Ltd.)	Germiston plant, Johannesburg	600 crude steel.

See footnotes at end of table.

$\label{thm:continued} \textbf{TABLE 2--Continued}$ SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007^1

(Thousand metric tons unless otherwise specified)

C 1''		Major operating companies and	Tarakina (C. 11. C. 11.)	A 1
Commodity Iron and steel—Cor	stimus di	major equity owners	Location of main facilities	Annual capacity
Steel—Continued		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 Daniëlskuil	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 Manganese (Pty) Ltd.	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. (Samancor Manganese (Pty) Ltd., 51%)	Electrolytic plant at Nelspruit	30 manganese metal.
Do.		do.	Electrolytic plant at Krugersdorp ²	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. ^e
Do.		do.	Rustenburg Base Metal Refiners	22 refined. ^e
Do.		Impala Platinum Ltd.	Impala Mines	8 mine. ^e
Do.		do.	Impala Refining Services	10 refined. ^e
Do.		do.	Base Metals Refinery	14 refined. ^e
Do.		Lonmin plc	Marikana Mines (Eastern Platinum, Karee, and Western Platinum) near Rustenburg and Limpopo Mine	5 mine. ^e
Do.		do.	Base Metals Refinery	5 refined.e
Do.		Nkomati Joint Venture	Nkomati Mine in Mpumalanga Province	5 mine.
Nitrogen, ammonia		Sasol Ltd.	Plants at Sasolburg and Secunda	660.
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	65,700.
Do.	do.	Engen Ltd. (62%)	Engen refinery in Durban	45,600.
Do.		National Petroleum Refiners of South Africa Pty. Ltd. (Sasol Ltd., 63.6%)	Natref refinery in Sasolburg	39,400.
Do.	do.	Caltex Oil SA Pty. Ltd. (private, 100%)	Calref refinery in Cape Town	36,500.
Phosphate rock		Phosphate Development Corp. Ltd. (Foskor Ltd.) (Industrial Development Corp., 100%)	Foskor Mine and plant at Phalaborwa	3,850 phosphate rock. ³
Do.		Fer-Min-Ore Ltd.	Plant at Germiston	30.
Do.	·	do.	Plant at Isithebe	12.
Phosphoric acid		Sasol Ltd.	Plant at Phalaborwa	325.

(Thousand metric tons unless otherwise specified)

Commodite		Major operating companies and	Location of main facilities	Annual associate
Commodity		major equity owners Anglo American Platinum Corp. Ltd.	Rustenburg section near Rustenburg	Annual capacity 12,000 ore.
latinum-group metals		Angio American Fiaunum Corp. Ltd.	Rustenburg section hear Rustenburg	12,000 ore.
Do.	kilograms	do.	do.	24,000 platinum;
				13,000 palladium; 3,300 rhodium.
Do.		do.	Amandelbult section, 50 kilometers south of Thabazimbi Mines	7,000 ore.
Do.	kilograms	do.	do.	18,000 platinum; 8,700 palladium; 2,300 rhodium.
Do.		Anglo American Platinum Corp. Ltd., 85%	Union section, 50 kilometers south of Thabazimbi	6,000 ore.
Do.	kilograms	do.	do.	10,000 platinum; 4,800 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; 4,700 palladium; 770 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.	7,600 platinum; 7,600 palladium; 1,500 rhodium.
Do.		Anglo American Platinum Corp. Ltd.	Potgietersrust Platinum Mine	5,000 ore.
Do.	kilograms	do.	do.	6,000 platinum; 6,200 palladium; 430 rhodium.
Do.		do.	Lebowa Platinum (Atok) Mine, 70 kilometers east of Potgietersrus	1,860 ore.
Do.	kilograms	do.	do.	4,100 platinum; 2,700 palladium; 470 rhodium.
Do.		do.	Western Limb Mine	5,400 ore.
Do.	kilograms	do.	do.	1,400 platinum; 550 palladium; 120 rhodium.
Do.		do.	Polokwane smelter	650 concentrate.
Do.		do.	Mortimer smelter	600 concentrate.
Do.		do.	Waterval smelter	200 concentrate.
Do.	kilograms	do.	Mortimer, Polokwante, 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 meta 15,000 rhodium meta

See footnotes at end of table.

(Thousand metric tons unless otherwise specified)

Commodity	7	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Platinum-grou	ıp	Impala Platinum Ltd. (Impala Platinum	Impala Mines, near Rustenburg in	17,000 ore.
metals—Co		Holdings Ltd., 100%)	North West Province	
Do.	kilograms	do.	do.	34,000 platinum; 15,000 palladium; 3,300 rhodium.
Do.		Impala Platinum Ltd.	Marula Mine	2,200 ore.
Do.	kilograms	do.	do.	3,100 platinum; 3,200 palladium; 650 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. ^e
Do.	kilograms	do.	do.	34,000 platinum; ^e 15,000 palladium; ^e 4,300 rhodium. ^e
Do.		do.	Limpopo Mine	1,000 ore. ^e
Do.	kilograms	do.	do.	1,400 platinum; ^e 970 palladium; ^e 150 rhodium. ^e
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	2,640 ore.
Do.	kilograms	do.	do.	3,100 platinum; 1,400 palladium; 370 rhodium.
Do.		Everest Platinum Mine (Aquarius Platinum Ltd., 50.5%, and Impala Platinum Holdings Ltd., 20%)	Everest Platinum Mine	2,760 ore.
Do.	kilograms	do.	do.	3,800 platinum; 1,900 palladium; 650 rhodium.
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.	kilograms	do.	do.	7,800 platinum; 7,600 palladium; 1,500 rhodium.
Do.		Two Rivers Platinum Mine (Pty) Ltd. (African Rainbow Minerals Ltd., 55%, and Impala Platinum Holdings Ltd., 45%)	Two Rivers Platinum Mine near Steelpoort	2,200 ore.
Do.	kilograms	do.	do.	2,800 platinum; 1,700 palladium; 540 rhodium.

$\label{thm:continued} \textbf{TABLE 2--Continued}$ SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007^1

(Thousand metric tons unless otherwise specified)

-		Major operating companies and		
Commodity		major equity owners	Location of main facilities	Annual capacity
Pyrophyllite		Idwala Industrial Minerals (Benoni)	Ottsdal Mine in North West Province	15.
Do.		Wonderstone Ltd. (The Associated Ore & Metals Corp. Ltd.)	Pyrophylite (wonderstone) mine, North West Province	NA.
Do.		G&W Base and Industrial Minerals Pty. Ltd.	Piet Retief Mine	NA.
Silicon		Silicon Smelters (Pty) Ltd. (Anglo American plc, BHP Billiton Plc, and Pechiney Metallurgie)	Polokwane plant, near Pietersburg, Limpopo Province	45 silicon metal.
Silver	metric tons	Rand Refinery Ltd.	Germiston, Gauteng Province	200 refined silver.
Sulfur		Sasol Ltd.	Plants at Sasolburg and Secunda	205.
Synthetic fuels	thousand	do.	Coal to oil plant at Secunda	54,800.
	allon barrels	D. 1 01 10 0 d f0 d	N. 1 1 1 1	10 200
Do.	do.	Petroleum Oil and Gas Corporation of South Africa	Natural gas to petroleum products plant at Mossel Bay	18,300.
Γitanium:		_		
Titanium concentrates		Richards Bay Minerals (Rio Tinto Plc., 50%, and BHP Billiton Ltd., 50%)	Open cast operations, near Richards Bay	1,280 ilmenite; ^e 125 rutile. ^e
Do.		Namakwa Sands Ltd. (Anglo Operations Ltd., a	Mine near Brand-se-Baai and mineral	540 ilmenite; 25 rutile.
		subsidiary of Exxaro Resources Ltd., 100%)	separation plant at Koekenaap	77011 1 20 11
Do.		Exxaro Resources Ltd.	Hillendale Mine near Richards Bay	550 ilmenite; 20 rutile; 5 leucoxene.
Titanium slag		Richards Bay Iron and Titanium (Pty) Ltd./ Richards Bay Minerals (Rio Tinto Plc.)	Smelter at Richards Bay	1,000 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. ^e
Do.		Exxaro Resources Ltd.	Empangeni smelter near Richards Bay	250 titanium slag.
Jranium oxide	metric tons	AngloGold Ashanti Ltd.	Vaal Rivers operation, near Klerksdorp	3,000.
Do.	do.	Uranium One Inc.	Dominion Reefs Mine	700.
Vanadium	do.	Highveld Vanadium and Chemicals Division	Mapochs Mine near Lydenburg	17,500.
pentoxide		(Anglo American plc through Highveld Steel and Vanadium Corp. Ltd.)		
Do.	do.	do.	Plant at Witbank	10,800.
Do.	do.	Xstrata plc	Rhovan Mine at Brits	10,000.
Do.	do.	Vametco Minerals Corp. (Strategic Minerals Corp., 100%)	Krokodilkraal Mine and plant near Brits	3,800.
Do.	do.	Transvaal Alloys Pty. Ltd. (Highveld Steel and Vanadium Corp. Ltd., 100%)	Wapadskloof Mine and plant, 60 kilometers northeast of Middelburg	2,250. ^e
Vermiculite		Palabora Mining Co. Ltd.	Palabora Mine and plant at Phalaborwa	223.
Zinc		Zinc Corp. of South Africa Ltd. (Exxaro	Struisbult Springszinc refinery at Springs,	110 refined zinc;
		Resources Ltd., 100%)	southeast of Johannesburg	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.		Exxaro Resources Ltd.	Hillendale Mine near Richards Bay, KwaZulu Natal Province	45 zircon in concentrate.
Do.		Palabora Mining Co. Ltd.	Palabora Mine and plant at Phalaborwa	14 baddeleyite. ^e
Do.		do.	Zirconium sulfate plant at Phalaborwa	8 zirconium sulfate.
Do.		Phosphate Development Corp. Ltd. (Foskor Ltd.) (IDC, 100%)	Plant at Phalaborwa	8 baddeleyite. ^e
Do.		do.	Fused zirconia plant	6 synthetic zirconia.
Estimated Do d	I Div M		i useu zneoma piam	o synthetic zirconia.

^eEstimated. Do., do. Ditto. NA Not available.

¹Based on information available as of March 2009.

²Not operating in 2007.

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

${\bf TABLE~3}$ SOUTH AFRICA: RESERVE BASE OF MAJOR MINERALS IN $2007^{\rm l}$

(Million metric tons unless otherwise specified)

Commodi	ty	Reserve base
Andalusite ²		51
Antimony	thousand metric tons	200
Chromium, ore		5,500
Coal, recoverable		27,981
Cobalt	thousand metric tons	15
Copper		13
Fluorspar		80
Gold	thousand metric tons	36
Iron ore		1,500
Lead		3
Manganese, ore		4,000
Nickel		12
Phosphate rock, concentrates		2,500
Platinum-group metals	thousand metric tons	70
Titanium minerals		244
Uranium	thousand metric tons	341
Vanadium		12
Vermiculite		80
Zinc		15
Zirconium		14

¹Metallic minerals are contained metal.

Source: Mwape, P., Roberts, M.J., Mokwena, E., Musi, L., Tjatjie, T., Mnguni, M., Masahba, P., and Kwata, P.G., 2008, General review, *in* South Africa's Mineral Industry 2007/2008:

Johannesburg, South Africa, Department of Minerals and Energy of the Republic of South Africa, p. 1-18.

²Includes the aluminosilicate and sillimanite.