



2008 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 2008, South Africa's estimated share of world platinum production amounted to 77%; kyanite and other materials, 55%; chromium, 45%; palladium, 39%; vermiculite, 39%; vanadium, 38%; zirconium, 30%; manganese, 21%; rutile, 20%; ilmenite, 19%; gold, 11%; fluor spar, 6%; aluminum, 2%; antimony, 2%; iron ore, 2%; nickel, 2%; and phosphate rock, 1%. South Africa also accounted for nearly 5% of the world's polished diamond production by value. The country's estimated share of world reserves of platinum-group metals (PGM) amounted to 89%; hafnium, 46%; zirconium, 27%; vanadium, 23%; manganese, 19%; rutile, 18%; fluor spar, 18%; gold, 13%; phosphate rock, 10%; ilmenite, 9%; and nickel, 5% (Bray, 2009; Carlin, 2009; Corathers, 2009; Gambogi, 2009a, b; George, 2009; Jasinski, 2009; Jorgenson, 2009; Kuck, 2009; Loferski, 2009; Magyar, 2009; Miller, 2009; Papp, 2009; Potter, 2009a, b).

Minerals in the National Economy

The output of the mining industry accounted for 9.5% of the gross domestic product in 2008; crude and processed mineral products accounted for 41% of the value of total exports. About 73% of crude mineral products and 80% of processed mineral products, by value, were exported in 2008. Employment in the mining industry amounted to 518,519 in 2008 compared with 495,150 in 2007. PGM mining accounted for 38.6% of the mining industry's employment; gold, 32.1%; coal, 12.6%; diamond, 3.6%; and other minerals, 13.1% (Mwape and others, 2009, p. 10-12, 14-15).

Government Policies and Programs

The Diamonds Act of 2005 was enacted in early 2006; this legislation was intended to promote domestic cutting and polishing of rough diamond. In February 2008, the State Diamond Trader was established with a mandate to purchase 10% of South Africa's rough diamond production for use in domestic cutting and polishing plants (Mining Review Africa, 2008b; Mwape and others, 2009, p. 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. by Exxaro Resources Ltd. Anglo American Platinum Corp. sold its 22.4% share in Northam Platinum Ltd. to Mvelaphanda Resources Ltd., which increased Mvelaphanda's share in Northam to 63%. Anooraq Resources Corp. planned to purchase a 51% share in Anglo Platinum's Lebowa Mine in November 2008; the deal was postponed until the first quarter of 2009 (Mwape and others, 2009, p. 2; Onstad, 2009).

Production

In 2008, feldspar production increased by about 17%; iron ore, 16%; manganese ore, 14%; mined copper, by 12%; and lead, 11%. The output of mineral pigments decreased by 83%; talc, 64%; slate, 59%; pyrophyllite, 35%; direct-reduced iron (DRI), 31%; ferromanganese, 28%; crude petroleum, silicomanganese, and sodium sulfate, 23% each; kaolin, 22%; refined cobalt, 21%; brick clay and shale, 19% each; andalusite and refined copper, 18% each; mined gold and mined nickel, 16% each; diamond, 15%; fire clay, refined zinc, and vanadium, 14% each; flint clay and refined nickel, 12% each; sulfur and phosphate rock, 11% each; mica, 10%; and refined gold, an estimated 10% (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy of the Republic of South Africa, written commun., July 17, 2009).

Structure of the Mineral Industry

Most of the South African mineral industry was privately owned. The production of diamond and gold, 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 93% of national production; iron ore, 69%; manganese ore, 51%; chromite, 43%; and coal, 24%.

Mineral Trade

In 2008, exports of PGM amounted to \$9.43 billion; gold, \$5.32 billion; coal, \$5.13 billion; iron ore, \$2.45 billion; manganese ore, \$1.89 billion; nickel, \$497 million; copper, \$183 million; chromite, \$154 million; and other crude mineral products, which included diamond, ilmenite, rutile, and zircon, \$1.33 billion. Exports of ferrochromium amounted to \$3.43 billion; manganese metal and alloys, \$1.44 billion; vanadium alloys and other vanadium products, \$374 million; silicon metal and alloys, \$209 million; and other processed mineral products, which included aluminum, \$2.86 billion (Martin Kohler, Deputy Director of Statistics, Department of Minerals and Energy of the Republic of South Africa, written commun., July 17, 2009).

In 2008, South Africa's imports of industrial minerals and processed industrial mineral products amounted to \$1.61 billion; diamond and other gemstones, \$176 million; and ferrous metals and products, \$116 million (Mwape and others, 2009, 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 March 2008, BHP Billiton announced plans to reduce production by about 90,000 metric tons (t) because of power supply constraints. The smelters' electricity consumption accounted for 2,150 megawatts (MW) of capacity (BHP Billiton Ltd., 2008, p. 6; 2009, p. 2; Ryan, 2008).

Rio Tinto Group planned to start building a new aluminum smelter at Coega in Eastern Cape Province in 2008 at a cost of \$3.25 billion. The smelter was expected to be completed in 2011 with a capacity of 360,000 metric tons per year (t/yr). By 2013, Rio Tinto planned to double the smelter's capacity. In its first stage, the smelter's electricity consumption was expected to account for 670 MW of capacity, and in the second stage, 1,350 MW of capacity. In May, Rio Tinto put development of the smelter on hold (Mining Journal, 2008b; Ryan, 2008).

Chromium.—Xstrata plc of Switzerland and its joint-venture partner Merafe Resources Ltd. operated the Boshhoek, the Helena, the Horizon, the Kroondal, the Thorncliffe, and the Waterval Mines, which had a total capacity of 5.57 million metric tons per year (Mt/yr) of chromite. The company's production in South Africa increased to 4.15 million metric tons (Mt) in 2008 from 3.47 Mt in 2007. The Boshhoek Mine produced 1.33 Mt in 2008 compared with 602,000 t in 2007. Production at the Helena Mine increased to 434,000 t from 335,000 t (Xstrata plc, 2009, p. 76).

Xstrata and Merafe operated the Boshhoek, the Lion, the Lydenburg, the Rustenburg, and the Wonderkop ferrochromium plants. These plants had a total combined capacity of 1.98 Mt/yr. In 2008, output decreased to 1.13 Mt from 1.22 Mt. Production decreased at Rustenburg to 302,000 t in 2008 from 381,000 t in 2007; and at Lydenburg to 283,000 t from 341,000 t (Xstrata plc, 2009, p. 45, 76).

The proposed doubling of the Lion plant's capacity to 720,000 t/yr by the end of 2010 was put on hold because of power supply constraints. In November, Xstrata and Merafe announced plans to shut down temporarily about 500,000 t/yr of ferrochromium capacity; an additional 406,000 t/yr was shut down at the beginning of December. Furnaces at the Boshhoek, the Lydenburg, the Rustenburg, and the Wonderkop plants were closed (Ryan's Notes, 2007a, 2008a, c; Xstrata plc, 2009, p. 46).

Samancor Chrome Ltd. (a subsidiary of Kermas Group Ltd. of the United Kingdom) produced about 3.5 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 Chrome 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. In early 2008, Samancor's expansion was reportedly on hold because of power supply constraints. The company reduced production in the fourth quarter of 2008 because of the world economic crisis. In early December, Samancor decided to shut down all mining and smelting operations from mid-December to the end of February 2009 (Mathews, 2007; Metal Bulletin, 2008b; Ryan's Notes, 2008a, b).

Assmang Ltd. [African Rainbow Minerals Ltd. (ARM), 50%, and Assore Ltd., 50%] operated the Dwarsrivier Mine in Mpumalanga. In fiscal year¹ 2008, production increased to 849,000 t from 710,000 t in fiscal year 2007. The Dwarsrivier Mine had an estimated remaining life of 30 years (African Rainbow Minerals Ltd., 2008, p. 3, 46).

Assmang produced ferrochromium at the 290,000-t/yr Machadodorp plant in Mpumalanga Province. In fiscal year 2008, output increased to 270,000 t from 242,000 t in fiscal year 2007. In late October, Assmang announced plans to reduce ferrochromium production by 100,000 t/yr. The company also planned to reduce ore production at Dwarsrivier (African Rainbow Minerals Ltd., 2008, p. 46; Ryan's Notes, 2008b).

ARM and its joint-venture partner MMC Norilsk Nickel of Russia operated the Nkomati chromite mine. In fiscal year 2008, production increased to nearly 1.18 Mt from 631,000 t in fiscal year 2007. Production at Nkomati was expected to be more than 1 Mt of chromite in fiscal year 2009; the life of the mine was estimated to be 18 years. In October 2008, ARM planned to reduce sales of chromite and to continue to produce and stockpile ore (African Rainbow Minerals Ltd., 2008, p. 3, 31; Ryan's Notes, 2008b).

ASA Metals (Pty) Ltd. produced about 360,000 t/yr of chromite from its Dilokong Mine at Burgersfort in Mpumalanga Province. The company planned to increase the capacity of its beneficiation plant to 1.2 Mt/yr and to sink two new mine shafts; capacity at the ferrochromium plant in Limpopo was expected to increase to 360,000 t/yr from 120,000 t/yr. In the fourth quarter of 2008, ASA Metals was operating at about 75% of capacity; further cutbacks in production were expected (Mining Journal, 2008b; Ryan's Notes, 2008c).

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; development of 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 cut ferrochromium production in the second half of 2008; the company was producing at a rate of between 96,000 and 108,000 t/yr in early December (Ryan's Notes, 2008e; 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. In fiscal year 2008, IFM produced 205,607 t of ferrochromium. The company planned to expand chromite capacity to 1.8 Mt/yr by November 2009; the ferrochromium plant's capacity was to be increased to 665,000 t/yr from 267,000 t/yr. In November, IFM announced that it was deferring expansion plans and reducing production to 144,000 t/yr; production was shut down temporarily in December (Ryan's Notes, 2008d-f).

In early 2008, Tata Steel Ltd. of India opened a new ferrochromium plant at Richards Bay with a capacity of 120,000 t/yr. Tata produced ferrochromium with a chromium content of 47% to 48%; the plant reportedly had difficulty in handling higher-grade material (Ryan's Notes, 2008d).

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

Gold.—The long-term decline in the country's gold output continued in 2008, with national gold mine production decreasing to 212,744 kilograms (kg) from 252,598 kg in 2007 (table 1). Difficulties in mining at greater depths, lower ore grades, power supply constraints, and safety-related stoppages contributed to the decline.

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 65,283 kg in 2008 from 72,429 kg in 2007 (AngloGold Ashanti Ltd., 2009, p. 98).

Most of the decline was attributable to the Great Noligwa Mine, where output decreased to 10,264 kg in 2008 from 15,023 kg in 2007; the Tau Tona Mine, where output decreased to 9,766 kg from 12,721 kg; and the Kopanang Mine, where production decreased to 11,259 kg from 13,001 kg. Production increased slightly at the Mponeng Mine in 2008. Decreases in production were attributable to power supply constraints and seismic activity (AngloGold Ashanti Ltd., 2009, p. 44, 46, 48).

In 2009, AngloGold Ashanti expected to produce a total of between 56,000 and 59,000 kg of gold. The Moab Khotsong Mine produced 5,965 kg of gold in 2008 compared with 2,084 kg in 2007; AngloGold Ashanti planned to increase the output to 10,000 kg in 2009 and 13,600 kg by 2011. At the Kopanang Mine, production was expected to increase to about 12,400 kg in 2009 from 11,244 kg in 2008. Production was expected to decrease at the Great Noligwa, the Mponeng, the Tau Lekoa, and the Tau Tona Mines (AngloGold Ashanti Ltd., 2009, p. 41, 45, 47-49, 52-53).

Harmony Gold Mining Co. Ltd. produced gold at numerous mines; the company's output was 48,227 kg in fiscal year 2008 compared with 54,340 kg in fiscal year 2007. Decreased production was attributable to numerous factors that included decreased ore grades, difficult geologic conditions, flooding, power supply constraints, and seismic events. In fiscal year 2008, production decreased at the Bambanani, the Doornkop, the Elandsrand, the Masimong, the Target, and the Tshepong Mines. Harmony planned to increase its South African gold production to more than 60,000 kilograms per year (kg/yr) by fiscal year 2012. The company planned to increase production at the Doornkop Mine to 10,800 kg/yr by July 2012 from 1,373 kg/yr in fiscal year 2008. The Phakisa Mine started production in September 2008; full output of 7,900 kg/yr was expected by June 2011. At the Elandsrand Mine, production was likely to increase to 11,500 kg/yr by June 2012 from 4,934 kg/yr in fiscal year 2008 (Harmony Gold Mining Company Ltd., 2008, p. 22, 24-29, 33, 35, 37-38).

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 25,807 kg in 2008 from 31,466 kg in 2007; at the Kloof Mine, to 20,263 kg from a revised 28,482 kg, at the Beatrix Mine, to 12,696 kg from 15,022 kg; and at the South Deep Mine, to 5,124 kg from 8,654 kg. In 2008, ore grades were lower at the Beatrix, the Driefontein, and the Kloof Mines than in 2007 (Gold Fields Ltd., 2009b).

Gold Fields planned to increase its total production to about 75,000 kg/yr by the fourth quarter of 2009. The Driefontein and the Kloof Mines were expected to produce more than 25,000 kg/yr each. Gold Fields planned to increase production at South Deep to about 10,000 kg/yr by the first quarter of 2010 and to 25,000 kg/yr by the end of 2014 (Gold Fields Ltd., 2009a, p. 9, 15).

In 2008, gold production by DRDGold Ltd. decreased to 8,476 kg from 10,113 kg in 2007. Output at the Blyvooruitzicht Mine was 4,117 kg in 2008; the Crown Mine, 2,612 kg; and the East Rand Proprietary Mine (ERPM), 1,747 kg. Ore grades decreased at Blyvooruitzicht and ERPM in the second half of 2008 compared with the same period in 2007. In the fourth quarter of 2008, DRDGold and its joint-venture partner Mintails Ltd. of Australia reopened the Ergo tailings treatment plant, which was purchased from AngloGold Ashanti. The companies planned to produce 2,300 kg/yr at Ergo starting in 2009 (Conradie, 2009; DRDGold Ltd., 2009).

Pamodzi Gold Ltd. operated the Orkney and the President Steyn Mines. The company produced at a rate of about 7,000 kg/yr in the second quarter of 2008; production was limited by safety issues and equipment problems. Pamodzi planned to increase production to 13,000 kg/yr by the fourth quarter of 2009 (Mathews, 2008a).

Simmer and Jack Mines Ltd. acquired the Buffelsfontein Mine from DRDGold in 2005. The company planned to produce about 3,400 kg of gold at Buffelsfontein in its 2009 fiscal year (which ran from the beginning of April to the end of March). Production was likely to reach 5,200 kg in fiscal year 2011, 7,100 kg in fiscal year 2013, and 7,500 kg in fiscal year 2015. Starting in fiscal year 2018, gold production at the Buffelsfontein Mine was expected to exceed 9,500 kg/yr and to reach 12,500 kg/yr in fiscal year 2028. Simmer and Jack also planned to produce an average of 1,400 kg/yr of gold at the Transvaal Gold Mining Estate project from fiscal year 2009 to fiscal year 2021 (Simmer and Jack Mines Ltd., 2009).

First Uranium Corp. of Canada (a subsidiary of Simmer and Jack) planned to start mining at the Ezulwini Mine by March 2009; gold production was expected to reach 7,800 kg in fiscal year 2011, 8,400 kg in fiscal year 2013, and 10,300 kg in fiscal year 2015. From fiscal year 2017 to fiscal year 2025, production at Ezulwini was planned to be more than 12,500 kg/yr. First Uranium also planned to recover an average of 3,700 kg/yr of gold at the Buffelsfontein tailings project between fiscal year 2010 and fiscal year 2022 (Simmer and Jack Mines Ltd., 2009).

Great Basin Gold Ltd. (GBG) was engaged in construction of the Burnstone underground gold mine in the Mpumalanga Province in 2008. The company planned to start mining at Burnstone in January 2010; average production was likely to be 7,900 kg/yr during the 14-year life of the mine. Capital costs of the project were estimated to be \$238 million.

Gold One International Ltd. planned to open its new Modder East underground mine starting in 2009. The company planned to produce 620 kg of gold in 2009 and to increase production to 4,400 kg in 2010 and 5,600 kg in 2011. Contained gold resources were estimated to be 114,000 kg, of which 42,000 kg was reserves (Andrews, 2009).

Central Rand Gold Ltd. planned to reopen underground mines in the Central Rand gold field, where production was shut down in the mid-1970s. The company originally planned to start gold production at a rate of 3,100 kg/yr in 2009. By 2012, Central Rand expected to increase production to more than 31,000 kg/yr. Central Rand revised its mining plan to 620 kg in 2009 and about 1,200 kg/yr for the first 7 years of mine life because high costs rendered most of the company's resources subeconomic (Ryan, 2009).

Rand Refinery Ltd. in Germiston (AngloGold Ashanti, 53%; Gold Fields, 33%; DRDGold, 10%; Avgold Ltd., 2%; Western Areas Ltd., 2%) refined most of the gold mined in South Africa; the company also refined gold that was mined in other African countries. The remainder of South Africa's refined gold was produced by 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. In 2008, ArcelorMittal's crude steel production decreased to 5.77 Mt from 6.38 Mt in 2007 because of power supply constraints, repairs at Saldanha, and declining steel demand. Most of the company's production was consumed domestically, especially in the building and construction industry (ArcelorMittal South Africa Ltd., 2009, p. 3, 25, 31-33).

New DRI furnaces with a capacity of 350,000 t/yr were expected to be installed at Vanderbijlpark in the first half of 2009; the furnaces would increase crude steel capacity by 220,000 t/yr. ArcelorMittal's remaining South African expansion plans were on hold because of the worldwide economic crisis (ArcelorMittal South Africa Ltd., 2009, p. 27, 32).

Highveld Steel and Vanadium Corp. Ltd. of South Africa (Evraz Group S.A. of Luxembourg, 79%) operated a steel mill at Witbank; the company's production of crude steel amounted to 796,000 t in 2008. Columbus Stainless (Pty) and Scaw Metals (a subsidiary of Anglo American plc) also produced crude steel (Evraz Group S.A., 2009).

Iron Ore.—Assmang, Highveld, 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 2008, production from the Sishen Mine increased to 34 Mt from 29.7 Mt in 2007; about 4.7 Mt of the increase was attributable to the installation of the new jig plant. Output increased in 2008 in spite of a late start at the jig plant and technical problems during the rampup of production. At the Thabazimbi Mine, production remained nearly unchanged at 2.7 Mt in 2008 (Kumba Iron Ore Ltd., 2009, p. 21-22, 26).

Kumba planned to increase production at the jig plant to its full capacity of 13 Mt/yr of iron ore in the fourth quarter of 2009. The company was also considering a further expansion of the Sishen Mine's capacity by 10 Mt/yr by 2014. Capital expenditures for the expansion were estimated to be nearly \$1.2 billion. The project remained unapproved at the end of 2008 (Kumba Iron Ore Ltd., 2009, p. 28, 48).

Kumba approved the Sishen South project in July 2008; the project is located 80 kilometers south of the Sishen Mine. Sishen South was expected to start production in 2012 and to reach full capacity of 9 Mt/yr of iron ore in 2013. The life of the project

was estimated to be 20 years. The estimated capital costs of the project were \$1.1 billion (Kumba Iron Ore Ltd., 2009, p. 30).

In 2007, Kumba extended the life of the Thabazimbi Mine until 2014. The company planned to complete a prefeasibility study of extending the life of the mine until at least 2034 by discovering additional resources and increasing production to 3.4 Mt/yr. The study was expected to be completed in 2010 (Kumba Iron Ore Ltd., 2009, p. 26).

Assmang produced iron ore at the Beeshoek Mine in Northern Cape, which had a rated capacity of 6 Mt/yr. In fiscal year 2008, production decreased to 4.49 Mt from 6.68 Mt in fiscal year 2007. Output was expected to continue to decrease over the remaining 7-year life of the mine (African Rainbow Minerals Ltd., 2008, p. 3, 38, 42).

Assmang opened the new Khumani Mine in fiscal year 2008; production amounted to 1.85 Mt. In fiscal year 2009, Assmang planned to increase the production capacity to 10 Mt/yr from 8.4 Mt/yr and to increase iron ore output to 7.2 Mt. The company also planned to complete a feasibility study of increasing production capacity to between 16 and 20 Mt/yr in the second quarter of 2009. Depending on favorable results of the study, the expansion could be completed in 2013. Most of Khumani's output was expected to be exported. The remaining life of the mine was estimated to be 30 years (African Rainbow Minerals Ltd., 2008, p. 3, 42, 44).

Lead and Zinc.—Anglo American operated the Black Mountain lead-zinc-copper mine near Aggeneys in Northern Cape Province. In 2008, production amounted to 27,900 t of zinc and 47,000 t of lead from 1.2 Mt of ore milled compared with 28,300 t of zinc and 41,900 t of lead from 1.1 Mt of ore milled in 2007 (Anglo American plc, 2009, p. 165).

In October 2008, Minero Zinc (Pty) Ltd. purchased the Pering Mine from BHP Billiton. Minero planned to reopen the Pering Mine, which was shut down in 2003. Production was expected to start at a rate of 16,000 t/yr of zinc and 1,500 t/yr of lead in 2009 and to increase to 50,000 t/yr of zinc and 6,000 t/yr of lead (Africa Mining Intelligence, 2008).

Zinc Corp. of South Africa Ltd. (a subsidiary of Exxaro Resources Ltd.) operated South Africa's only zinc refinery at Springs. In 2008, production decreased to 87,000 t of refined zinc from 101,000 t in 2007 because of power supply constraints and repairs to equipment (Exxaro Resources Ltd., 2009, p. 41-42).

Manganese.—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 2008, production at these mines increased to 3.15 Mt from 2.85 Mt in fiscal year 2007. Assmang planned to increase production at Gloria and Nchwaning in fiscal year 2009. The company also planned to increase capacity at Nchwaning to 5 Mt/yr. The estimated remaining life of the Gloria and the Nchwaning Mines was 30 years (African Rainbow Minerals Ltd., 2008, p. 3, 40, 45).

Assmang operated the Cato Ridge ferromanganese plant in Kwa-Zulu Natal, which had a rated capacity of 300,000 t/yr. In fiscal year 2008, output decreased to 261,000 t from 347,000 t in fiscal year 2007 because of an explosion at one of the plant's furnaces in February (African Rainbow Minerals Ltd., 2008, p. 45).

Samancor Manganese (Pty) Ltd. (BHP Billiton, 60%, and Anglo American, 40%) operated the Mamatwan open pit mine and the Wessels underground mine near Hotazel in Northern Cape Province. In 2008, Samancor's production of manganese ore increased to 3.44 Mt from 2.54 Mt in 2007. The company's ferromanganese and silicomanganese plant at Meyerton was South Africa's leading producer of manganese alloys. In 2008, output of manganese alloys at Meyerton was 494,000 t compared with 469,000 t in 2007. In December, Samancor announced plans to reduce manganese ore and alloy production in 2009; the company planned to rebuild furnaces at Meyerton (BHP Billiton Ltd., 2008, p. 4; 2009, p. 4; Metal Bulletin, 2008a).

Renova was engaged in a joint-venture project with domestic companies Chancellor House and Pitsoe ya Setshaba to develop the Kalahari manganese ore deposit. Construction of a new mine was completed in 2008; the production capacity was planned to be between 1.5 Mt/yr and 2 Mt/yr of manganese ore. Mining operations were limited because of a lack of power and transportation infrastructure (Ryan's Notes, 2007b).

ArcelorMittal was engaged in a joint venture with Kalagadi Manganese (Pty) Ltd. (Kalahari Resources Ltd., 80%) and Government-owned Industrial Development Corp. (IDC) to develop Kalagadi's manganese resources. Arcelor and Kalahari (which was a Black Economic Empowerment company) planned to start production at a new underground mine at Hotazel in 2010. 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 plant was expected to consume nearly 30% of the mine's sintered output. By 2015, capacity at the ferromanganese plant was likely to double (Engineering & Mining Journal, 2008; Mining Journal, 2008b).

Nickel.—Most of South Africa's nickel mine production was a coproduct of PGM mining. Nickel output decreased in 2008 because of reduced domestic demand for stainless steel. Anglo Platinum produced 15,500 t of refined nickel at Rustenburg Base Metal Refiners in 2008 compared with 19,200 t in 2007. About 13,900 t was attributable to the company's PGM mining operations compared with 17,300 t in 2007 (Anglo American Platinum Corp., 2009, p. 106).

ARM produced 5,136 t of nickel at the Nkomati Mine in fiscal year 2008 compared with 4,418 t in fiscal year 2007. The company planned to increase mine production to 20,500 t/yr of nickel by fiscal year 2011-12. The life of the mine was expected to be 18 years (African Rainbow Minerals Ltd., 2008, p. 3, 23, 31).

Platinum-Group Metals.—In 2008, Anglo Platinum produced 140,900 kg of refined platinum-group metals (PGM) compared with 148,700 kg in 2007. About 114,900 kg was attributable to the company's mining operations in 2008 compared with 129,200 kg in 2007. Platinum produced from Anglo Platinum's mining operations amounted to 60,552 kg; palladium, 33,315 kg; rhodium, 7,571 kg; and other PGM, about 13,400 kg (Anglo American Platinum Corp., 2009, p. 106).

Output decreased at the Amandelbult, the Bafokeng-Rasimone (a joint venture with Royal Bafokeng Resources), the Lebowa, the Mototolo (a joint venture with XK Platinum Partnership), the Rustenburg, and the Union Mines in 2008. Production

decreased for numerous reasons, including excessive rainfall, labor disputes, power outages, safety stoppages, and shortages of skilled labor. At Amandelbult, production decreased to 26,068 kg of PGM in 2008 from 33,340 kg in 2007; and at Union, to 17,925 kg from 18,930 kg. At the Kroondal (a joint venture with Aquarius Platinum Ltd.), the Mogalakwana, and the Twickenham Mines, production increased. Anglo Platinum planned to maintain production at about 75,000 kg/yr of refined platinum, which included toll refining (Anglo American Platinum Corp., 2009, p. 56, 62, 107-116, 119).

Anooraq planned to purchase a 51% share in the Lebowa Mine from Anglo Platinum in the first quarter of 2009. The mine produced nearly 4,600 kg of PGM in 2008. Anooraq planned to increase production to more than 13,000 kg/yr by 2013 and to nearly 18,000 kg/yr by 2020. Resources at Lebowa were estimated to be 6,200 t of contained PGM (Onstad, 2009).

Impala Platinum Holdings Ltd. (Implats) operated the Impala Mines near Rustenburg in North West Province and the Marula Mine in Limpopo Province. In fiscal year 2008, production of refined PGM at Impala was nearly unchanged at 57,265 kg, and platinum, at 32,472 kg. Implats planned to maintain production between 31,000 kg/yr and 34,000 kg/yr of platinum through at least 2018. The company completed the capacity expansion of the Precious Metals Refinery to 71,500 kg/yr of refined platinum from about 62,000 kg/yr in 2008. Implats planned to complete a subsequent increase in the refinery's capacity to 87,000 kg/yr of refined platinum by 2011 (Impala Platinum Holdings Ltd., 2008, p. 52-55).

In fiscal year 2008, platinum output at Marula increased to 2,190 kg from 2,028 kg in fiscal year 2007; production was constrained by labor disputes and the closures of shafts for safety reasons. Implats planned to reach Marula's full capacity of 4,000 kg/yr of platinum by fiscal year 2010. Implats planned to start an expansion at Marula in fiscal year 2009. Production from the expansion project was expected to start in fiscal year 2014. By fiscal year 2016, platinum production was likely to reach 7,600 kg/yr (Impala Platinum Holdings Ltd., 2008, p. 56-58).

In April 2008, Implats was awarded the mining rights for the Leeuwkop project near Brits. Depending upon approval of the project and reliable power supplies, Implats could start construction of a new mine in early 2009. Production was expected to start in fiscal year 2013; the mine was likely to reach its full capacity of between 5,000 kg/yr and 5,600 kg/yr of platinum by fiscal year 2015 (Impala Platinum Holdings Ltd., 2008, p. 69).

Implats also operated a refinery northeast of Johannesburg; production at this plant was from purchased concentrates and toll refining. In fiscal year 2008, output decreased to 56,077 kg of PGM from 61,768 kg in fiscal year 2007 (Impala Platinum Holdings Ltd., 2008, p. 68).

Lonmin plc of the United Kingdom mined PGM at its Marikana operations east of Rustenburg in North West Province and at the Limpopo and the Pandora Mines. From September 2007 to September 2008, these mines produced a total of 22,772 kg of platinum compared with 27,055 kg in the previous 12 months. Total production of PGM decreased to 42,818 kg from 50,931 kg. The Limpopo Mine was placed

on care-and-maintenance status in late 2008; surface mining operations at Marikana were also shut down. Lonmin planned to produce about 22,600 kg of platinum in its fiscal year 2009; plans to increase production to nearly 44,000 kg/yr by 2012 were under review (Lonmin plc, 2008; Mining Review Africa, 2009c).

ARM and Implats operated the Two Rivers Mine in Mpumalanga Province; production increased to 6,423 kg of PGM in fiscal year 2008 from 5,726 kg in fiscal year 2007. The Two Rivers Mine was expected to reach its full capacity of 6,800 kg/yr of PGM in fiscal year 2009. ARM and Anglo Platinum produced 9,167 kg of PGM at Modikwa in fiscal year 2008 that included 4,164 kg of platinum and 4,039 kg of palladium. Output was expected to increase to nearly 10,300 kg/yr starting in fiscal year 2009. The remaining life of the Modikwa and the Two Rivers Mines was estimated to be 30 and 20 years, respectively. ARM also planned to produce 3,400 kg/yr of PGM with the expansion of the Nkomati nickel mine; output amounted to 1,269 kg in fiscal year 2008 (African Rainbow Minerals Ltd., 2008, p. 3, 22, 27-28, 31).

Aquarius operated the Marikana Mine. In 2008, production of PGM at Marikana was nearly unchanged at 4,167 kg. The Everest Platinum Mine produced 3,935 kg of PGM in 2008 compared with 5,493 kg in 2007. Aquarius planned to produce 6,200 kg/yr of PGM at Everest until 2017. The mine, however, was shut down for safety reasons in early December 2008. The closure of the mine was expected to last for at least 6 months. Aquarius also planned to increase production at joint-venture tailings retreatment projects to 1,300 kg/yr of PGM (Aquarius Platinum Ltd., 2009, p. 2, 9; Conradie, 2009; Mining Review Africa, 2009a).

In 2008, Xstrata produced 4,510 kg of PGM at the Elandsfontein Mine compared with 435 kg in 2007. The company planned to increase production to about 9,000 kg/yr by 2012. The life of the Elandsfontein Mine was estimated to be about 50 years (Xstrata plc, 2009, p. 48, 76).

Eastern Platinum Ltd. (Eastplats) of Canada produced PGM at the Crocodile River Mine; planned production for 2008 was 4,000 kg. By 2010, Eastplats planned to increase production at Crocodile River to 6,800 kg/yr of PGM. The company also planned to start production at the new Spitskop Mine in 2009; output was expected to be nearly 1,300 kg of PGM in 2010, 4,400 kg in 2011, and 6,400 kg/yr starting in 2012. Eastplats planned to start production at the new Mareesburg Mine in 2009 and to reach the full capacity of nearly 3,300 kg/yr of PGM in 2012. The planned expansions after 2009 depended on securing additional power supplies. In December, Eastplats put its expansion plans on hold (Eastern Platinum Ltd., 2008).

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 2009 (Conradie, 2009).

Ridge Mining and its joint-venture partners Anglo Platinum and IDC were considering the development of a new mine at the Sheba's Ridge deposit. The mine was expected to produce 23,000 t/yr of nickel, 11,000 t/yr of copper, 7,600 kg/yr of palladium, 2,600 kg/yr of platinum, and 620 kg/yr of gold. The estimated capital cost of the project was \$972 million. ARM,

IDC, Implats, and Ridge were considering a joint venture to conduct a feasibility study of a new smelter; existing PGM smelter capacity was insufficient to handle the planned output from Sheba's Ridge. Development of the mine also depended on negotiations with Eskom concerning power supplies (Mining Journal, 2008a).

In October 2008, Platinum Australia Pty Ltd. (PLA) of Australia started underground operations at its new Smokey Hills Mine. PLA planned to reach the full capacity of about 3,000 kg/yr of PGM by January 2010. PGMs from Smokey Hills were toll smelted and refined at Rustenburg. The capital cost of the project was about \$45 million (Avery, 2009).

In 2009, Platmin Ltd. of Canada planned to produce between 3,900 and 4,700 kg of PGM at its new Pilanesberg Mine on the western limb of the Bushveld Complex. Platmin planned to increase production to the full capacity of 7,800 kg/yr in 2010. Resources were estimated to be 350,000 kg of contained PGM, of which nearly 140,000 kg was reserves. The life of the mine was expected to be 17 years (Mining Review Africa, 2009b).

Platmin was also considering the development of the Mphahlele project, which could produce an additional 7,800 kg/yr of PGM, and the Grootboom project, which could produce about 2,700 kg/yr. The company planned to make a decision on the development of Grootboom in 2009 and Mphahlele in 2010. Depending on Platmin's decision, production could start at Grootboom by the third quarter of 2009. Full production at Grootboom and Mphahlele could be achieved by 2012. The life of the Mphahlele and the Grootboom Mines was estimated to be 30 and 15 years, respectively (Mining Journal, 2008b; Mining Review Africa, 2009b).

In March 2008, Wesizwe Platinum Ltd. completed its prefeasibility study on mining at the Frischgewaagd-Ledig deposit. Wesizwe revised the timeline for the project in late 2008 because of the worldwide economic crisis. The company planned to start preliminary construction activities in late 2009 and to begin production in 2014. The full capacity of 10,900 kg/yr of PGM was expected to be reached by 2018. The life of the mine at full production was estimated to be 35 years (Wesizwe Platinum Ltd., 2009, p. 9, 12).

Silicon.—Grupo Ferroatlantica produced silicon metal at Polokwane; the company's output increased to 51,800 t in 2008 from 50,300 t in 2007 in spite of power supply constraints in the first quarter. Ferrosilicon was produced by Grupo Ferroatlantica and Silicon Technology (Pty) Ltd.; production decreased slightly in 2008 (Lerner, 2008).

Titanium and Zirconium.—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 315,000 t in 2008 from 300,000 t in 2007; rutile, to 27,000 t from 24,000 t; and zircon, to 130,000 t from 115,000 t. Exxaro purchased Namakwa Sands from Anglo American in October 2008 (Exxaro Resources Ltd., 2009, p. 37, 39).

In 2008, Exxaro produced 229,000 t of ilmenite from the KZN Sands Mine in KwaZulu Natal Province compared with 367,000 t in 2007. Rutile production increased to 19,000 t from 17,000 t, and zircon production remained unchanged at 34,000 t. Exxaro delayed the start of construction on the Fairbreeze Mine

until the second half of 2009 as it updated the feasibility study. Depending on the results of the study, production was expected to start at Fairbreeze in the first half of 2011 (Exxaro Resources Ltd., 2009, p. 37, 44).

Mineral Commodities Ltd. (MRC) of Australia was engaged in a joint venture with the Xolobeni Community Empowerment Co. (XolCo) to develop the Xolobeni mineral sands project in Eastern Cape Province. The Government awarded mining rights to MRC and XolCo in August 2008. Output was expected to start in 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, 2007).

Vanadium.—Evraz Group produced vanadium from titaniferous magnetite at the Krokodilkraal and the Mapochs Mines, which were operated by Highveld and Vametco Minerals Corp., respectively. In 2008, production of vanadium in ferrovandium, vanadium pentoxide (V_2O_5), vanadium slag, and vanadium chemicals at Krokodilkraal and Mapochs amounted to nearly 15,800 t. In late August, Evraz sold Highveld's vanadium operations to Vanchem Vanadium Products Pty Ltd., which was a subsidiary of Duferco Investment Partners of Switzerland (Evraz Group S.A., 2009).

Xstrata produced V_2O_5 at the Rhovan Mine in Brits; output decreased to 7,530 t of V_2O_5 in 2008 from 8,558 t in 2007. Ferrovandium production at Rhovan decreased to 3,622 t in 2008 from 4,280 t in 2007. Reduced production was attributable to power supply constraints (Xstrata plc, 2009, p. 47, 76).

Industrial Minerals

Cement.—Domestic sales of cementitious products decreased to 13.3 Mt from 13.7 Mt in 2007. Decreased demand for cement in the residential construction sector more than offset increased demand in road building and the new Kusile power station in Mpumalanga Province. The cement industry accounted for 78% of South Africa's dolomite and limestone demand (Naidoo and Ramane, 2009).

Pretoria Portland Cement Co. (Pty) Ltd. (PPC) was South Africa's leading cement producer. In 2008, PPC increased the capacity of its Dwaalboom plant to 1.25 Mt/yr; the company also planned to increase the capacity of its Riebeeck plant to 1.35 Mt/yr by 2012. Sephaku Cement planned to build a new cement plant in North West Province with a capacity of 2.1 Mt/yr. The plant was expected to be completed by mid-2011 at an estimated cost of \$360 million (Naidoo and Ramane, 2009).

Diamond.—De Beers Group accounted for most of South Africa's rough diamond production. In 2008, the company's output decreased to 12 million carats from 15 million carats in 2007. At Venetia, production decreased to 7.5 million carats from 9.08 million carats; at Kimberley, to 913,000 carats from 1.63 million carats; and at Namaqualand, to 310,000 carats from 767,000 carats. The Cullinan Mine produced 540,000 carats before its sale in 2008. The Oaks Mine was depleted and shut

down. De Beers completed an upgrade of the Finsch Mine treatment plant (De Beers Group, 2009, p. 12, 31).

De Beers reopened the Voorspoed Mine in Free State Province in 2008; output amounted to 128,000 carats. The company planned to mine 8.3 million carats during the estimated 12- to 16-year life of the mine; production was expected to reach 900,000 carats per year in 2010 (De Beers Group, 2009, p. 12, 31; Janse, 2009).

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 2008, Petra produced 610,179 carats of diamond, of which 455,567 carats was attributable to the Cullinan Mine after its purchase from De Beers. About 50,000 carats was mined from alluvial deposits by Bonaparte Diamond Mines NL, Firestone Diamonds, Lonrho plc, Namakwa Diamonds Ltd., Rockwell Diamonds Inc., and other producers. The average value of Rockwell's diamonds was \$1,600 per carat (Janse, 2009).

Between 120,000 and 140,000 carats per year of diamond was estimated to be cut and polished in South Africa. African Romance produced cut diamond at a rate of about 25,000 carats per year compared with its capacity of 40,000 carats per year. The domestic cutting and polishing industry was limited by rough diamond prices that increased in 2007 and the first half of 2008 as polished prices remained nearly unchanged (Mining Review Africa, 2008b).

Fluorspar and Rare-Earth Elements.—National fluorspar production increased in 2008 because of increased output from the Buffalo and the Witkop Mines, which were owned by Sallies Ltd. In fiscal year 2008, production at Witkop increased by 17%. In October 2008, Sallies shut down the Buffalo Mine because of phosphorous contamination of the mine's acid-grade fluorspar. Production was not economic because of the relatively low prices that Sallies received from the few producers that had the equipment to process high-phosphorous fluorspar. Recovering rare-earth elements from the Buffalo Mine's tailings was also subeconomic because of the complex production process (Mathews, 2008b).

Kyanite and Related Materials.—South Africa was the world's leading producer of andalusite, which was mined by Andalusite Resources (Pty) Ltd. and Samrec Pty. Ltd. (a subsidiary of Imerys Group of France). In 2008, production decreased because of lower export demand for andalusite as a refractory in steel production. Samrec reopened the Annesley Mine in 2008. By the beginning of 2010, Samrec planned to complete a debottlenecking program at its Krugersport and Rhino Mines that would increase capacity by 30,000 t/yr. Development of a new andalusite mine at Segorong was on hold in late 2008 because of procedural issues (Industrial Minerals, 2008; Nevondo, 2009).

Mineral Fuels and Related Materials

Coal.—South Africa's coal production amounted to 252.2 Mt in 2008, of which 250 Mt was bituminous. Domestic coal consumption was 197.1 Mt, and exports, 57.9 Mt. In 2008, electric power generation accounted for 64% of South Africa's coal consumption; synthetic fuels made from coal, 22%; and other industries, 14% (Ikaneng, 2009).

Anglo American's coal production remained nearly unchanged at 59.4 Mt in 2008. Production at Kriel decreased to 10.3 Mt from 11.2 Mt, and at Goedehoop, to 7.45 Mt from 8.46 Mt. At Kleinkopje, output increased to 4.55 Mt from 3.49 Mt. The Mafube Mine, which was a joint venture between Anglo American and Exxaro, reached its full capacity of 5.4 Mt/yr in the second quarter of 2008. Production started at the MacWest Mine in 2008; the mine was expected to reach its full capacity of 2.7 Mt/yr in the first quarter of 2009. Anglo American also planned to complete the Zondagsfontein project in the fourth quarter of 2010, which was likely to produce 6.6 Mt/yr of thermal coal. The life of the Zondagsfontein Mine was estimated to be 20 years (Mining Review Africa, 2008a; Anglo American plc, 2009, p. 19, 162).

Other projects under consideration by Anglo American included the Heidelberg opencast mine, which could produce 0.9 Mt/yr starting in 2009; the Elders opencast mine, 6.4 Mt/yr starting in 2011; the Elders underground mine, 3.2 Mt/yr starting in 2012; the Heidelberg underground mine, 4.2 Mt/yr starting in 2014; and the New Largo Mine, 14.7 Mt/yr starting in 2015. The New Largo project had resources of 700 Mt; the life of the mine was estimated to be more than 40 years. The development of New Largo depended on the construction of Eskom's new 4,800-MW Kusile power station. These projects remained unapproved by the Board of Directors at the end of 2008. Depending upon the approval of these projects, Anglo American's coal production could reach 90 Mt in 2015 (Mining Review Africa, 2008a; Anglo American plc, 2009, p. 19).

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 44.8 Mt in 2008 compared with 41.3 Mt in 2007. The Grootegeluk Mine produced at a rate of about 16 Mt/yr, and the Matla Mine, more than 13 Mt/yr. Output at the Arnot Mine increased to 4.87 Mt in 2008 from 3.7 Mt, and at the North Block Complex, to 3.28 Mt from 2.28 Mt. The Inyanda Mine near Witbank started production in 2008 (Exxaro Resources Ltd., 2009, p. 8).

In August 2008, Exxaro completed a feasibility study of the expansion of the Grootegeluk Mine by 14.6 Mt/yr. Construction on the expanded mine was planned to start in 2010 and to be completed by 2015. Production at Grootegeluk was expected to reach 36 Mt in 2015; the expansion was planned to take place in stages to match the capacity expansions of the Medupi power station from the end of 2011 to 2014. Exxaro also planned to produce 1 Mt/yr at the new Eerstelingsfontein Mine near Belfast starting in the second quarter of 2009 (Mining Review Africa, 2008c; Exxaro Resources Ltd., 2009, p. 43).

In fiscal year 2008, Sasol Ltd. of South Africa decreased its coal production to 42.8 Mt from 43.3 Mt in fiscal year 2007. At the Secunda Mining Complex, output decreased to 41.1 Mt from 41.9 Mt. Increased production from the Syferfontein Mine was more than offset by decreased production from the Bosjesspruit, the Middelbult, and the Twistdraai Mines. Sasol consumed 40.1 Mt of coal in the production of synthetic fuels and exported 3.4 Mt of coal, primarily to Europe. Sasol planned to build the new Thubelisha Mine to replace the Twistdraai

Mine; production was expected to start in 2012 (Sasol Ltd., 2008, p. 43, 110; Ikaneng, 2009).

BHP Billiton Energy Coal South Africa Ltd. (formerly Ingwe Coal Corp. Ltd.) produced coal at the Douglas, the Khutala, the Klipspruit, and the Middelburg Mines in Mpumalanga Province. In 2008, Ingwe produced 39.1 Mt of coal compared with 48.4 Mt in 2007. Sales to local utilities amounted to 28.1 Mt in 2008; exports, 12.4 Mt; and sales to other South African customers, 1.2 Mt. BHP Billiton planned to increase run-of-mine production at the Klipspruit Mine to 8 Mt/yr from 4.8 Mt/yr (BHP Billiton Ltd., 2008, 2009, p. 4; Ikaneng, 2009).

Xstrata operated nine coal mines at Breyten, Ermelo, and Witbank. In 2008, production at the company's mines decreased to 20.2 Mt from 21.4 Mt in 2007. Output at the iMpunzi Division decreased to 3.37 Mt from 6.76 Mt. Production at the Tweefontein Division increased to 6.18 Mt in 2008 from 5.11 Mt in 2007, and at the Goedgedonden Mine, to 2.91 Mt from 1.69 Mt (Xstrata plc, 2009, p. 77).

ARM and Xstrata were engaged in a joint venture to increase output at the Goedgedonden 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 at Goedgedonden in 2011. The life of the mine was expected to be 33 years. Capital costs were estimated to be about \$390 million (African Rainbow Minerals Ltd., 2008, p. 54).

Coal of Africa Ltd. started production at the Mooiplaats Mine in October 2008; production was expected to reach between 3.5 Mt/yr and 4 Mt/yr of run-of-mine coal by mid-2010. The company also planned to produce 1 Mt/yr at the new Holfontein Mine in the second half of 2009; output was expected to reach 5 Mt/yr by 2011 (Ikaneng, 2009).

Uranium.—AngloGold Ashanti mined uranium as a coproduct of gold at the Great Nologwa, the Kopanang, and the Tau Lekoa Mines. In 2008, the company's production of uranium oxide (U_3O_8) amounted to 580 t compared with 558 t in 2007. AngloGold Ashanti planned to increase its output to about 900 t/yr in 2013; the increase would be attributable to increased uranium recovery from re-treating uranium-bearing slimes (Mining Journal, 2008b; AngloGold Ashanti Ltd., 2009, p. 281).

Uranium One started production at the Dominion Reefs underground uranium mine in 2007. The company planned to produce about 900 t of U_3O_8 in 2008; production plans subsequently were scaled back to about 270 t. In late 2008, the mine was forced to shut down because of power supply constraints; overestimates of reserves, grades, and recovery rates; and underestimates of costs (Mining Journal, 2008b).

First Uranium planned to start uranium production at the Buffelsfontein tailings project and the Ezulwini Mine in fiscal year 2010. Production at the Buffelsfontein tailings project was expected to be nearly 390 t of U_3O_8 in fiscal year 2010 and to reach a peak of 980 t in fiscal year 2012. From fiscal year 2015 to fiscal year 2023, First Uranium planned to produce more than 550 t/yr of U_3O_8 at the Buffelsfontein tailings project. The company planned to produce about 160 t of U_3O_8 at Ezulwini in fiscal year 2010, 330 t in fiscal year 2012, and 630 t/yr from fiscal year 2017 to fiscal year 2024 (Simmer and Jack Mines Ltd., 2009).

Outlook

Numerous producers planned new mines and plants and capacity expansions of existing operations for andalusite, cement, coal, gold, ilmenite, iron ore, manganese ore, nickel, PGM, rutile, uranium, and zircon. The power supply constraints experienced by many mining and mineral processing operations in early 2008 were inconsequential owing to the decrease in demand for power resulting from the worldwide economic crisis. In the event of economic recovery, power shortages could again constrain mining and mineral processing expansions until 2012 when Exkom planned to complete new coal-fired power stations that would have a combined capacity of 9,600 MW. Expansions and new mines and plants before 2012 were less likely to take place in power-intensive sectors, such as ferrochromium, and depended on worldwide economic recovery. 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.

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TABLE 1
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2004	2005	2006	2007	2008
METALS					
Aluminum metal, primary	866,074	846,213	895,000	899,000	811,000
Antimony concentrate:					
Gross weight	NA ^r	NA ^r	NA ^r	NA ^r	NA
Sb content	4,967	5,979	4,362	3,354	3,370
Chromium, gross weight:					
44% to 48% chromic oxide thousand metric tons	2,888	2,394	1,755	2,122	2,135
Less than 44% chromic oxide do.	4,789	5,100	5,663	7,543	7,547
Total do.	7,677	7,494	7,418	9,665	9,682
Cobalt:					
Mine output, Co content ^e	460	400	400	400	400
Refinery output	309	268	267	307 ^r	244
Copper:					
Mine (company output), Cu content	85,700 ^r	88,600 ^r	89,700 ^r	97,000 ^r	109,000
Metal:					
Smelter	112,025 ^r	92,000 ^r	100,000	105,000 ^r	95,000
Refined, primary	91,295	99,439	104,052	113,166	92,972
Gold:					
Mine kilograms	337,223	294,671	272,128	252,598	212,744
Refined do.	445,300	451,533	427,313	400,000 ^e	360,000 ^e
Iron and steel:					
Ore and concentrate:					
Gross weight thousand metric tons	39,322	39,542	41,326	42,083	48,983
Fe content (62%-65%) do.	24,800	24,900	26,000	26,500	30,800
Metal:					
Pig iron do.	6,011	6,130	6,159	5,358	5,350
Direct-reduced iron do.	1,633	1,781	1,754	1,736 ^r	1,190
Ferroalloys, electric arc furnace:					
Chromium ferroalloys do.	3,032	2,802	3,030	3,552 ^r	3,269
Ferromanganese do.	612	571	656	699	503
Ferrosilicon do.	141	127	149	140 ^r	135
Ferrovanadium ^e do.	20	19	18	19	19
Silicomanganese ^e do.	334	231	247	302	233
Silicon metal do.	51	54	53	50	52
Other do.	NA ^r	NA ^r	NA ^r	NA ^r	NA
Total ^e do.	4,190 ^r	3,800 ^r	4,150 ^r	4,760 ^r	4,210
Steel:					
Crude do.	9,500	9,494	9,718	9,098 ^r	8,550
Stainless	718	658	725	657	613
Lead:					
Concentrate, Pb content	37,485	42,159	48,273	41,857	46,440
Refined, secondary	64,100	66,000	67,000	70,000 ^e	70,000 ^e
Manganese:					
Ore and concentrate, gross weight:					
Metallurgical:					
More than 48% manganese thousand metric tons	1,988	2,467	1,452	1,742	712
45% to 48% manganese do.	372	454	1,812	1,755	2,897
40% to 45% manganese do.	1,041	935	895	961	1,192
30% to 40% manganese do.	864	743	1,042	1,523	1,996
Total do.	4,265	4,599	5,201	5,981	6,797
Chemical, 35% to 65% manganese dioxide do.	17	12	12	14	9
Grand total do.	4,282	4,611	5,213	5,995	6,806
Metal, electrolytic ^e do.	40	44 ²	30	26	26
Nickel:					
Mine output, concentrate, Ni content	39,851	42,392	41,800	37,917	31,675
Metal, electrolytic	39,900	42,400 ^e	41,800	34,400	30,200

See footnotes at end of table.

TABLE 1—Continued
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2004	2005	2006	2007	2008
METALS—Continued					
Platinum-group metals:					
Iridium kilograms	5,769	6,280	6,172	7,211	6,415
Platinum do.	153,239	163,711	168,125	160,940	146,141
Palladium do.	76,403	82,961	86,265	83,643	75,537
Rhodium do.	16,294	20,224	19,633	21,056	19,348
Ruthenium do.	24,696	29,805	27,333	31,182	28,236
Total do.	276,401	302,981	307,528	304,032	275,677
Silver, mine do.	71,600	87,874	86,951	68,919 ^r	75,199
Titanium: ^e					
Ilmenite concentrate thousand metric tons	1,900	1,900	1,900	1,900	1,900
Rutile concentrate do.	110	115	123	123	123
Total do.	2,010	2,020	2,020	2,020	2,020
Titaniferous slag do.	1,020	1,020	1,230	1,230	1,230
Uranium, U ₃ O ₈ content	887	795	639	619	654
Vanadium, vanadium metal content	23,302	22,604	23,780	23,486	20,295
Zinc:					
Concentrate:					
Gross weight	NA ^r	NA ^r	NA ^r	NA ^r	NA
Zn content	32,001	32,112	34,444	30,859	29,002
Metal, smelter, primary	104,000	102,000	90,000	101,000	87,000
Zirconium concentrate (baddeleyite and zircon) ^e	368,000	376,000	398,000	398,000	398,000
INDUSTRIAL MINERALS					
Andalusite	234,625	228,265	221,209	264,645	216,667
Cementitious products:					
Cement, finished product, sales thousand metric tons	10,297	11,464	12,657	13,650	13,323
Granulated slag, fly ash, and others, sales do.	1,439	1,511	1,600	1,666	1,396
Total do.	11,736	12,975	14,257	15,316	14,719
Clays:					
Attapulgitite	20,419	34,340	49,225	68,377	69,876
Bentonite	55,859	139,833	32,878	45,778	44,067
Fire clay	133,258	171,773	157,087	161,493	138,100
Flint clay, raw and calcined	53,367	36,607	34,413	53,974	47,290
Kaolin	81,901	59,356	51,602	50,839	39,506
Brick clay, local sales thousand metric tons	9,523	11,237	11,131	12,017 ^r	9,763
Diamond, natural:					
Gem ^e thousand carats	5,800	6,400	6,100	6,100	5,200
Industrial ^e do.	8,500	9,400	9,050	9,150	7,700
Total do.	14,295	15,776	15,153	15,250	12,901
Feldspar	53,721	57,534	76,722	90,185	105,815
Fluorspar:					
Acid-grade ^e	250,000	250,000	240,000	268,000	282,000
Metallurgical-grade ^e	15,000	16,000	16,000	17,000	17,000
Total	265,000	266,000	256,000	285,000	299,000
Gypsum, crude	524,000	547,581	554,020	627,377	571,343
Industrial or glass sand (silica) thousand metric tons	2,249	2,671	3,234	3,385 ^r	3,544
Lime do.	1,738	1,417	1,583	1,599	1,563
Magnesite, crude	65,900	54,800	73,300	80,700	83,900
Mica, scrap and ground	285	924	828	437	393
Nitrogen, N content of ammonia ^e	459,100 ²	460,000	460,000	460,000	460,000
Perlite ^e	400	400	400	400	400

See footnotes at end of table.

TABLE 1—Continued
SOUTH AFRICA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2004	2005	2006	2007	2008
INDUSTRIAL MINERALS—Continued					
Phosphate rock:					
Gross weight	2,735	2,577	2,629	2,556	2,287
Phosphorus pentoxide content	1,070	1,000	1,020	1,000	890
Pigments, mineral, natural:					
Ochers	360	382	372	20	39
Oxides	152	128	218	212	--
Total	512	510	590	232	39
Salt	332,673	399,087	464,909	411,511	415,996
Sodium sulfate, natural	56,267	55,184	43,303	50,000	38,717
Stone, n.e.s.: ³					
Dimension:					
Granite and norite	548,600	607,500	497,600	564,100	538,100
Slate	47,500	52,312	33,154	22,876	9,281
Crushed and broken:					
Limestone and dolomite	22,031	24,813	27,366	23,941	23,481
Shale:					
For cement	357	501	533	498	418
Other	918 ^r	1,106 ^r	1,010 ^r	1,031 ^r	817
Total	1,275 ^r	1,607 ^r	1,543 ^r	1,529 ^r	1,235
Aggregate and sand, n.e.s.	44,437	49,970	58,519	63,873 ^r	61,369
Sulfur:					
S content of pyrite	165	133	68	71	61
Byproduct:					
Metallurgy	180	220	231	236	187
Petroleum	288	422	343	335	323
Total	633	776	643	642	571
Talc and related materials:					
Talc	8,141	8,469	10,966	14,281	5,145
Pyrophyllite (wonderstone)	28,987	60,267	74,886	123,573	80,704
Vermiculite	196,893	209,801	197,765	198,526 ^r	199,764
MINERAL FUELS AND RELATED MATERIALS					
Coal (salable product):					
Anthracite	1,247	1,640	1,584	2,349	2,207
Bituminous	241,500	243,300	243,198	245,317	250,006
Total	242,747	244,940	244,782	247,666	252,213
Natural gas	1,916	2,060	1,795	1,800 ^e	1,800 ^e
Petroleum: ⁴					
Crude	6,769	7,277	4,441	2,559	1,976
Refinery products:					
Liquefied petroleum gases	3,538	3,445	3,793	3,399 ^r	3,400 ^e
Gasoline	71,166	67,029	67,711	67,182 ^r	67,000 ^e
Jet fuel	14,331	14,751	15,300	13,386 ^r	13,000 ^e
Kerosene	4,893	4,777	4,824	4,715 ^r	4,700 ^e
Distillate fuel oil	53,272	68,639	73,653	46,394 ^r	46,000 ^e
Residual fuel oil	27,919	33,566	32,674	27,426 ^r	27,000 ^e
Other, includes lubricants and greases ^e	17,000	17,000	17,000	17,000	17,000
Total ^{e,5}	192,000	209,000	215,000	180,000 ^r	178,000

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

¹Table includes data available through March 31, 2010.

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.

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

TABLE 2
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and 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.	Andalusite Resources (Pty) Ltd. [African Mineral Trading and Exploration (Pty) Ltd.]	Maroeloesfontein, near Thabazimbi, Northern Province	30.
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. (Barloworld Trust Co. Ltd., 68%)	De Hoek, Dwaalboom, Hercules, Jupiter, Port Elizabeth, Riebeeck, and Slurry plants	6,800.
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. (Cimentos de Portugal SGPS, S.A., 98%)	Simumu plant	1,340.
Chromite	Xstrata plc, 79.5%, and Merafe Resources Ltd., 20.5%	Boshhoek Mine at Boshhoek	1,344.
Do.	do.	Kroondal Mine at Rustenburg	1,320.
Do.	do.	Thorncliffe Mine at Steelpoort	1,320.
Do.	do.	Helena Mine at Steelpoort	960.
Do.	do.	Waterval Mine	480.
Do.	do.	Horizon Mine at Pilansberg	144.
Do.	Samancor Chrome Ltd. (Kermas Group Ltd., 100%)	Eastern Chrome Mines in Steelpoort Valley, Mpumalanga Province ²	2,000.
Do.	do.	Western Chrome Mines in Northern Province ²	1,800.
Do.	International Ferro Metals Ltd.	Buffelsfontein Mine ²	1,320.
Do.	Nkomati Joint Venture (African Rainbow Minerals Ltd., 50%, and MMC Norilsk Nickel, 50%)	Nkomati Chrome Mine in Mpumalanga Province	1,000.
Do.	Assmang Ltd. (African Rainbow Minerals Ltd., 50%, and Assore Ltd., 50%)	Dwarsrivier Mine in Mpumalanga Province	880. ^c
Do.	Bayer (Pty) Ltd.	Rustenburg Chrome Mine	450.
Do.	Dilokong Chrome Mine (Pty) Ltd. [ASA Metals (Pty) Ltd., 100%]	Dilokong Mine, near Burgersfort in Mpumalanga Province	360. ^c
Do.	National Manganese Mines (Pty) Ltd.	Buffelsfontein Mine at Mooiooi	180.
Coal	Anglo Coal Ltd. (Anglo American plc, 100%)	Goedehoop, Greenside, Isibonelo, Kleinkopje, Kriel, Landau, Mafube, New Denmark, New Vaal and Nooitgedacht Mines	60,000. ^c
Do.	Exxaro Resources Ltd. (BEE Holdco, 52.3%)	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.	Sasol Ltd.	Twistdraai Mine	9,600.
Do.	do.	Syferfontein Mine	8,600.
Do.	do.	Middelbult Mine	8,600.
Do.	do.	Brandspruit Mine	8,300.
Do.	do.	Bosjesspruit Mine	8,100.
Do.	do.	Mooikraal Mine	1,800.

See footnotes at end of table.

TABLE 2—Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Coal—Continued	BHP Billiton Energy Coal South Africa Ltd., 84%, and Xstrata plc, 16%		Middelburg Mine	17,000 bituminous.
Do.	BHP Billiton Energy Coal South Africa Ltd.		Khutala Underground Mine	15,100 bituminous.
Do.	BHP Billiton Energy Coal South Africa Ltd., 84%, and Xstrata plc, 16%		Douglas Mine	8,500 bituminous.
Do.	BHP Billiton Energy Coal South Africa Ltd.		Klipspruit Mine	3,600 bituminous.
Do.	Xstrata plc, 74%		Goedgevonden Mine at Witbank	6,700.
Do.	Xstrata plc, 79.8%		Twefontein Division (Boschmans, South Witbank, Waterpan, and Witcons Mines) at Witbank	5,100.
Do.	do.		iMpunzi Division (Phoenix and Tavistock Mines) at Witbank	5,100.
Do.	do.		Southstock Division at Witbank	4,800.
Do.	do.		Mpumalanga Division (Spitzkop and Tselentis Mines) at Breyten and Ermelo	3,300.
Do.	Optimum Coal Holdings (Pty) Ltd		Optimum Open Pit Mine	13,500 bituminous.
Do.	do.		Koornfontein Mines	5,200 bituminous.
Do.	Shanduka Coal (Pty) Ltd. [Glencore International AG, 70%, and Shanduka Resources (Pty) Ltd., 30%]		Bankfontein, Graspan, Lakeside, Leeuwfontein, and Townlands Mines	13,000.
Do.	Coal of Africa Ltd.		Mooiplaats Mine	6,000.
Do.	Kangra Group Pty. Ltd. [Shanduka Resources (Pty) Ltd., 40%]		Savmore Mine	3,000. ^c
Do.	Stuart Coal Group		Stuart Colliery	3,000. ^c
Do.	Total Coal SA (Pty) Ltd.		Forzando North and Forzando South Mines	1,800. ^c
Do.	do.		Dorsfontein Mine	700. ^c
Copper	Palabora Mining Co. Ltd. (Rio Tinto Ltd., 57%, and Anglo American plc, 29%)		Palabora Mines at Phalaborwa	80 copper in concentrate.
Do.	do.		Smelter at Phalaborwa	130 anodes.
Do.	do.		Refinery at Phalaborwa	130 cathodes.
Do.	Anglo American Platinum Corp. Ltd. (Anglo American plc, 74.1%)		Amandebult, Rustenburg, and Union sections; and Bafokeng Rasimone, Lebowa, Modikwa, Potgietersrust, and Western Limb Mines	13 ^c mine.
Do.	do.		Rustenburg Base Metal Refiners	12 refined. ^c
Do.	Black Mountain Mineral Development Co. (Pty) Ltd. (Anglo American plc, 74%)		Black Mountain Mine near Aggeneys in Northern Cape Province	6 copper in concentrate.
Do.	Impala Platinum Ltd. (Impala Platinum Holdings Ltd., 100%)		do.	NA.
Diamond	thousand carats	De Beers Consolidated Mines Ltd. (Anglo American plc, 29%)	Venetia Mine in Northern Province	7,500.
Do.	do.	do.	Finsch Mine, 100 kilometers west of Kimberley	2,800.
Do.	do.	do.	Kimberley Surface Mines, Kimberley	1,500.
Do.	do.	do.	Namaqualand Mine near Kleinsee	1,200.
Do.	do.	do.	Voorspoed Mine	900.
Do.	do.	do.	South Africa Sea Areas	240.
Do.	do.	Petra Diamonds Ltd.	Cullinan Mine	1,800.
Do.	do.	do.	Helam, Sedibeng, and Star Mines	175.
Do.	do.	do.	Koffiefontein Mine in Free State Province	120.
Do.	do.	do.	Kimberley Underground Mines, Kimberley	100.
Do.	do.	Trans Hex Group Ltd.	Baken, Bloeddrif, Reuning, and Saxendrift Mines	140. ^c
Fluorspar		Witkop Fluorspar Mine (Pty) Ltd. (subsidiary of Sallies Ltd.)	Witkop Mine, 250 kilometers west of Johannesburg	180.
Do.		do.	Buffalo Mine at Mookgopong	60.
Do.		Vergenoeg Mining Corp. (Pty) Ltd. [Metorex Pty. Ltd., 70%]	Vergenoeg Mine, 75 kilometers north of Pretoria	120.

See footnotes at end of table.

TABLE 2—Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Gold:				
Mine		AngloGold Ashanti Ltd. (Anglo American plc, 41.8%)	Vaal River operations: 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 Gold Fields Ltd., 50%)	South Deep Mine	2,600 ore.
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 Mining Co. Ltd., 50%, and African Rainbow Minerals Ltd., 50%)	Freegold operations	5,040 ore.
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.	5,400 gold.
Do.		do.	Kalgold Mine	1,620 ore.
Do.	kilograms	do.	do.	1,800 gold.
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.
Do.		Pamodzi Gold Ltd.	President Steyn Gold Mines in Free State Province	1,200 ore.
Do.	kilograms	do.	do.	6,000 gold.
Do.		do.	Orkney Mine	NA.
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.

See footnotes at end of table.

TABLE 2—Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Iron and steel:			
Iron ore	Kumba Iron Ore Ltd.	Sishen Mine at Sishen in Northern Cape Province	42,000.
Do.	do.	Thabazimbi Mine at Thabazimbi	2,700.
Do.	Assmang Ltd.	Khumani Mine	8,400.
Do.	do.	Beeshoek Mine near Postmasburg	6,000.
Do.	Highveld Steel and Vanadium Corp. Ltd. (Ervaz Group S.A., 79%)	Mapochs Mine at Roosenekal, 60 kilometers west of Lydenburg	2,450.
Do.	Xstrata plc	Rhovani Mine at Brits	400.
Do.	Vametco Minerals Corp. (Ervaz Group S.A., 81%)	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%	Lion plant at Steelpoort	360 ferrochromium.
Do.	do.	Boshhoek	240 ferrochromium.
Do.	Samancor Chrome Division (Kermas Group Ltd., 100%)	Plants at Middelburg, Steelpoort, and Witbank ²	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 ²	267 ferrochromium.
Do.	ASA Metals (Pty) Ltd. (Sinosteel, 60%, and Limpopo Economic Development Enterprise, 40%)	Plant near Pietersburg, Northern Province	120 ferrochromium.
Do.	Tata Steel Ltd.	Richards Bay	120 ferrochromium.
Do.	Samancor Manganese (Pty) Ltd. (BHP Billiton Ltd., 60%, and Anglo American plc, 40%)	Plant at Meyerton	370 ferromanganese; 120 silicomanganese.
Do.	Assmang Ltd.	Cato Ridge plant in KwaZulu Natal Province	300 ferromanganese.
Do.	Advalloy (Pty) Ltd. [Samancor Manganese (Pty) Ltd., 100%]	Furnace at Samancor's Meyerton plant	82 ferromanganese.
Do.	Renova Group	Plant at Witbank	48 ferromanganese
Do.	do.	do.	170 silicomanganese.
Do.	Silicon Technology Pty Ltd.	NA	55 ferrosilicon.
Do.	Grupo Ferroatlantica	Rand Carbide plant	55 ferrosilicon.
Do.	metric tons Vanchem Vanadium Products (Pty) Ltd.	Plant at Witbank	12,500 ferrovanadium.
Do.	do. Xstrata plc	Rhovani plant at Brits	6,000 ferrovanadium.
Do.	do. Vametco Minerals Corp.	Smelter near Brits	4,800 ferrovanadium.
Steel	ArcelorMittal South Africa Ltd.	Vanderbijlpark plant	4,400 crude steel.
Do.	do.	Newcastle plant	1,800 crude steel.
Do.	do.	Saldanha plant	1,200 crude steel.
Do.	do.	Vereeniging plant	400 crude steel.
Do.	Highveld Steel and Vanadium Corp. Ltd.	Witbank	1,000 iron; 1,000 crude steel.
Do.	Columbus Stainless (Pty) Ltd. (Acerinox SA, 76%)	Stainless steel plant at Middelburg	750 crude steel.
Do.	Scaw Metals Division (Anglo Operations Ltd.)	Germiston plant, Johannesburg	600 crude steel.
Do.	Davsteel Division (Cape Gate Pty. Ltd.)	Vanderbijlpark plant, Gauteng	480 crude steel; 480 billet.
Do.	Cape Town Iron & Steel Works (Pty) Ltd.	Kuilsrivier plant, Cape Town	250 crude steel; 250 billet.
Do.	Duferco Steel Processing Ltd.	Cold-rolled slab steel plant at Saldanha Bay	240 rolled steel.

See footnotes at end of table.

TABLE 2—Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Lead	Black Mountain Mineral Development Co. (Pty) Ltd.		Black Mountain Mine near Aggeneys in Northern Cape Province	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 in Northern Cape Province	3,400 ore.
Do.	Renova Group		Kalahari Mine	NA.
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	27 manganese metal.
Nickel	Anglo American Platinum Corp. Ltd.		Amandebult, Rustenburg, and Union sections; and Bafokeng Rasimone, Lebowa, Modikwa, Potgietersrust, and Western Limb Mines	24 mine. ^c
Do.	do.		Rustenburg Base Metal Refiners	22 refined. ^c
Do.	Impala Platinum Ltd.		Impala Mines	8 mine. ^c
Do.	do.		Impala Refining Services	10 refined. ^c
Do.	do.		Base Metals Refinery	14 refined. ^c
Do.	Lonmin plc		Marikana Mines (Eastern Platinum, Karee, and Western Platinum) near Rustenburg and Limpopo Mine	5 mine. ^c
Do.	do.		Base Metals Refinery	5 refined. ^c
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 Co., 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	61,900.
Do.	do.	Engen Ltd. (62%)	Engen refinery in Durban	43,463.
Do.	do.	National Petroleum Refiners of South Africa Pty. Ltd. (Sasol Ltd., 63.6%)	Natref refinery in Sasolburg	32,042.
Do.	do.	Caltex Oil SA Pty. Ltd. (private, 100%)	Calref refinery in Cape Town	40,300.
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.
Platinum-group metals	Anglo American Platinum Corp. Ltd.		Rustenburg section near Rustenburg	12,000 ore.
Do.	kilograms	do.	do.	24,000 platinum; 13,000 palladium; 3,300 rhodium.
Do.	do.		Amandelbult section	7,000 ore.
Do.	kilograms	do.	do.	18,000 platinum; 8,700 palladium; 2,300 rhodium.

See footnotes at end of table.

TABLE 2—Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Platinum-group metals—Continued		Anglo American Platinum Corp. Ltd., 85%	Union section	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., 50%)	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, Polokwane, and Waterval smelters	81,000 platinum; 44,000 palladium; 11,000 rhodium.
Do.	do.	do.	Precious Metals Refinery	81,000 platinum metal; 44,000 palladium metal; 11,000 rhodium metal.
Do.		Impala Platinum Ltd. (Impala Platinum Holdings Ltd., 100%)	Impala Mines, near Rustenburg in North West Province	17,000 ore.
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, near Rustenburg	71,500 platinum; 33,400 palladium; 8,300 rhodium.

See footnotes at end of table.

TABLE 2—Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Platinum-group metals—Continued	kilograms	Impala Platinum Ltd.	Precious metals refinery, near Springs in Guateng Province	71,500 platinum metal; 33,400 palladium metal; 8,300 rhodium metal.
Do.		Lonmin plc	Marikana Mines (Eastern Platinum, Karee, and Western Platinum, near Rustenburg)	14,400 ^e ore.
Do.	kilograms	do.	do.	34,000 ^e platinum; 15,000 ^e palladium; 4,300 ^e rhodium.
Do.		do.	Limpopo Mine ²	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	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.	kilograms	Xstrata plc, 74%	Elandsfontein Mine	7,500.
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.
Pyrophyllite		Idwala Industrial Minerals (Benoni)	Ottsdal Mine in North West Province	15.
Do.		Wonderstone Ltd. (The Associated Ore & Metals Corp. Ltd.)	Pyrophyllite (wonderstone) mine, North West Province	NA.
Do.		G&W Base and Industrial Minerals Pty. Ltd.	Piet Retief Mine	NA.
Silicon, metal		Grupo Ferroatlantica	Polokwane plant, near Pietersburg	52. ^e
Silver, refined	metric tons	Rand Refinery Ltd.	Germiston, Gauteng Province	200
Sulfur		Sasol Ltd.	Plants at Sasolburg and Secunda	205.
Synthetic fuels	thousand 42-gallon barrels	do.	Coal to oil plant at Secunda	54,800.
Do.	do.	Petroleum Oil and Gas Corporation of South Africa	Natural gas to petroleum products plant at Mossel Bay	18,300.

See footnotes at end of table.

TABLE 2—Continued
SOUTH AFRICA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008¹

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Titanium:				
Titanium concentrates	Richards Bay Minerals (Rio Tinto Plc., 50%, and BHP Billiton Ltd., 50%)		Open cast operations, near Richards Bay	1,280 ilmenite; ^c 125 rutile. ^c
Do.	Namakwa Sands Ltd. (Anglo Operations Ltd., a subsidiary of Exxaro Resources, 100%)		Mine near Brand-se-Baai and mineral separation plant at Koekenaap	540 ilmenite; 25 rutile.
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. ^c
Do.	Exxaro Resources Ltd.		Empangeni smelter near Richards Bay	250 titanium slag.
Uranium oxide	metric tons	AngloGold Ashanti Ltd.	Vaal Rivers operation, near Klerksdorp	3,000.
Do.	do.	Uranium One Inc.	Dominion Reefs Mine ²	700.
Vanadium pentoxide	do.	Vanchem Vanadium Products Pty Ltd.	Mapochs Mine near Lydenburg	17,500.
Do.	do.	do.	Plant at Witbank	10,800.
Do.	do.	Xstrata plc	Rhovan Mine at Brits	10,000.
Do.	do.	Vametco Minerals Corp.	Krokodilkraal Mine and plant near Brits	3,800.
Do.	do.	Vanchem Vanadium Products Pty Ltd.	Wapadskloof Mine and plant, 60 kilometers northeast of Middelburg	2,250. ^c
Vermiculite	Palabora Mining Co. Ltd.		Palabora Mine and plant at Phalaborwa	223.
Zinc	Zinc Corp. of South Africa Ltd. (Exxaro Resources Ltd., 100%)		Struisbult Springszinc refinery at Springs, southeast of Johannesburg	110 refined zinc; 170 sulfuric acid.
Do.	Black Mountain Mineral Development Co. (Pty) Ltd.		Black Mountain Mine near Aggeneys in Northern Cape Province	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. ^c
Do.	do.		Zirconium sulfate plant at Phalaborwa	8 zirconium sulfate.
Do.	Phosphate Development Corp. Ltd. (Foskor Ltd.) (IDC, 100%)		Plant at Phalaborwa	8 baddeleyite. ^c
Do.	do.		Fused zirconia plant	6 synthetic zirconia.

^cEstimated. NA Not available.

¹Table includes data available through February 1, 2010.

²Not operating in 2008.

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

TABLE 3
SOUTH AFRICA: RESERVE BASE OF MAJOR MINERALS IN 2008¹

(Million metric tons unless otherwise specified)

Commodity	Reserve base
Andalusite ²	51
Antimony	thousand metric tons 200
Chromium, ore	5,500
Coal, recoverable	30,408
Copper	13
Fluorspar	80
Gold	thousand metric tons 31
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.

²Includes the aluminosilicate and sillimanite.

Source: Mwape, P., Malebo, L., Mokwena, E., Tjatjie, T., Mnguni, M., Mashaba, P., Musi, L., Perold, W., Andreas, A., and Mudau, S., 2009, General review, *in* South Africa's Mineral Industry 2008/2009: Johannesburg, South Africa, Department of Minerals and Energy of the Republic of South Africa, p. 1-19.