



# 2006 Minerals Yearbook

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## AFRICA

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# THE MINERAL INDUSTRIES OF AFRICA

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The 55 independent nations and other territories of continental Africa and adjacent islands covered in this volume encompass a land area of 30.4 million square kilometers, which is more than three times the size of the United States, and were home to 937 million people in 2006. For many of these countries, mineral exploration and production constitute significant parts of their economies and remain keys to future economic growth. Africa is richly endowed with mineral reserves and ranks first or second in quantity of world reserves of bauxite, cobalt, industrial diamond, phosphate rock, platinum-group metals (PGM), vermiculite, and zirconium.

The mineral industry was an important source of export earnings for many African nations in 2006. To promote exports, groups of African countries have formed numerous trade blocs, which included the Common Market for Eastern and Southern Africa, the Economic and Monetary Community of Central Africa, the Economic Community of Central African States, the Economic Community of West African States, the Mano River Union, the Southern African Development Community, and the West African Economic and Monetary Union. Algeria, Libya, and Nigeria were members of the Organization of the Petroleum Exporting Countries (OPEC). The African Union was formally launched as a successor to the Organization of African Unity in 2002 to accelerate socioeconomic integration and promote peace, security, and stability on the continent.

The U.S. Geological Survey (USGS) acknowledges and expresses its sincere appreciation to the following Government agencies, international institutions, and private research organizations for providing mineral production statistics, basic economic data, and mineral exploration and other mineral-related information:

For mineral production statistics—

- Algeria—Ministry of Energy and Mines,
- Botswana—Department of Mines,
- Burundi—Ministry of Energy and Mines,
- Cameroon—Ministry of Industry, Mines, and Technological Development,
- Central African Republic—Ministry of Energy,
- Egypt—Central Agency for Public Mobilization and Statistics,
- Eritrea—Ministry of Energy and Mines,
- Ethiopia—Ministry of Mines and Energy,
- Ghana—Minerals Commission,
- Guinea—Ministry of Mines,
- Kenya—Ministry of Environment and Natural Resources,
- Liberia—Ministry of Lands, Mines, and Energy,
- Malawi—Department of Mines,
- Mauritania—National Office of Statistics,
- Mauritius—Ministry of Agro Industry and Fisheries,
- Morocco—Office Cherifien des Phosphates,
- Mozambique—National Directorate of Mines,
- Namibia—Ministry of Mines and Energy,

- Niger—National Institute of Statistics,
- Senegal—National Agency of Statistics and Demographics,
- Sierra Leone—Ministry of Mineral Resources,
- South Africa—Department of Minerals and Energy, Mineral Economics Directorate,
- Swaziland—Central Statistical Office,
- Tanzania—Ministry of Energy and Minerals,
- Tunisia—National Institute of Statistics,
- Uganda—Department of Geological Survey and Mines, and
- Zimbabwe—Chamber of Mines.

For basic economic data—the International Monetary Fund in the United States.

For minerals consumption data—

- British Petroleum plc,
- Department of Minerals and Energy of the Republic of South Africa,
- MEPS (International) Ltd., and
- U.S. Department of Energy.

For exploration and other mineral-related information—the Metals Economics Group (MEG) in Canada.

## General Economic Conditions

In 2006, the real gross domestic product (GDP) of Africa increased by 5.5% after increasing by 5.6% in 2005. From 2000 to 2005, Africa's GDP increased at an average annual rate of about 4.7%. In 2006, the GDP increased by an average of 5.9% in African petroleum-exporting countries and by an average of 5.3% in African petroleum-importing countries. GDP growth in African petroleum-exporting countries was projected to be at or about 9.5% in 2007 and at or about 7.3% in 2008. In petroleum-importing countries, GDP growth is expected to be at or about 4.8% in 2007 and at or about 5.2% in 2008 (International Monetary Fund, 2007, p. 75, 196).

## Investment Data and Political Risk

The Department of Minerals and Energy of the Republic of South Africa reported that investment in newly committed precious metals projects in South Africa (that is, those in which funds had already been committed or were being expended) was \$4.04 billion in 2006. PGM accounted for 36% of the investment; gold, 28%; and other minerals, 36%. An additional \$3.04 billion was reported for potential precious metals projects in South Africa (that is, feasibility-level projects for which funds had not yet been committed). PGM accounted for 74% of the investment; gold, 1%; and other minerals, 26%. Investment in newly committed processed minerals projects amounted to \$1.34 billion, and potential processed minerals projects, \$896 million (Mwape and others, 2007, p. 24, 25).

Capital expenditure for the heavy mineral sands project at Mandena in Madagascar was expected to total \$585 million by

2008, and that at Moma in Mozambique, \$348 million. By 2012, capital expenditures for bauxite and alumina at the Dian Dian and the Friguia Mines in Guinea were likely to total \$2.8 billion; nickel in Madagascar, \$2.25 billion; and coal in Mozambique, \$2 billion. Substantial capital expenditures were also likely for cobalt and copper in Congo (Kinshasa) and Zambia, crude petroleum in Nigeria and Sudan, iron ore in Senegal, and natural gas in Nigeria.

Countries directly affected by wars, internal ethnic or political conflicts, and refugee displacements in 2006 included Angola, Burundi, Central Africa Republic, Chad, Congo (Kinshasa), Côte d'Ivoire, Nigeria, Somalia, Sudan, and Uganda. In 2006, the Government of Burundi signed a peace agreement with the Forces for National Liberation.

## Legislation

High metals prices and the resulting large mining company profit margins have triggered a reevaluation of mining royalty rates by several African Governments. In Namibia, new royalty levies were announced; precious, base, and rare metals would be charged at a rate of 3% of gross sales; semiprecious stones and industrial minerals would be charged at a rate of 2%; diamond revenues were left exempt. The South African Government has proposed legislation that would impose royalty rates of 5% for diamond, 3% for refined platinum, and 1.5% for refined gold. Zambia planned to increase the royalty rate on mining sales to 3%, increase income tax rates on mining companies to 30%, and reintroduce a 15% withholding tax on selected sources of revenue, while providing other incentives to stimulate mining (Mukumbira, 2006; Mwila, 2006; Sergeant, 2006; Kruger, 2007).

The Government of Zimbabwe has approved amendments to the nation's Mines and Minerals Act that concern Government participation in all mining activities. As a followup to this legislation, the Government approved an agreement with Zimbabwe Platinum Mines Ltd. (Zimplats) whereby Zimplats would release 36% of its resource base to the Government in return for cash and empowerment credits; all remaining mining claims would be incorporated into a special mining lease that applies to current operations. The Gold Trade Act of 2006 mandated penalties for illegal possession or trading of gold (Engineering and Mining Journal, 2006).

In Equatorial Guinea, law No. 9/2006, which was the new mining law, replaced law No. 9/1981. Law No. 8/2006, which was the new hydrocarbon law, replaced law No. 7/1981 and its amendments. In Chad, law No. 002/PR06 amended the Petroleum Revenue Management Law (law No. 001/PR/99 of 1999), which defined the allocation of petroleum revenues. The Government of Zambia promulgated the Zambia Development Agency Act, which covered investment in most types of mineral operations. Minerals produced for the construction industry, such as clay, sand, and most types of stone, were not included in the new law.

## Exploration

Exploration activity, as defined in the African exploration budgets reported by the MEG, increased by 41% to

US\$1.1 billion in 2006 from \$807 million in 2005. The Africa exploration budget share decreased slightly to 16% of the world exploration budget in 2006 from 16.5% in 2005. In 2006, the principal mineral targets in Africa were copper, diamond, gold, and PGM (Metals Economics Group, 2006).

Gold projects accounted for approximately 50% of reported African exploration projects, diamond projects represented about 16%, copper and PGM projects each made up about 10%, and lead-zinc projects accounted for 5%. Early-stage projects made up about 82% of the 2006 activity, and feasibility-stage projects represented about 8%. Exploration was focused primarily on, in order of the number of sites, South Africa, Ghana, Mali, Congo (Kinshasa), Tanzania, Burkina Faso, Zambia, and Namibia, but activity also took place in a number of other countries.

Australian and Canadian junior companies continued to invest time and money to explore in Africa. South African companies, while spending a sizable amount of their exploration resources overseas, had begun to reinvest in African exploration, with a focus outside of South Africa. De Beers SA planned to spend one-half of its 2006 exploration budget in central Africa, with Congo (Kinshasa) as its top priority (Ruffini, 2006). In 2006, the African mining sector benefited from the currency exchange difference between the South African Rand and the U.S. dollar, as well as increased investment from China and India.

## Commodity Overview

Estimates for the production of major mineral commodities for 2006 and beyond have been based upon supply-side assumptions, such as announced plans for increased production/new capacity construction and bankable feasibility studies. The outlook tables in this summary chapter show historic and projected production trends; therefore, no indication is made about whether the data are estimated or reported and revisions are not identified. Data on individual mineral commodities in tables in the individual country chapters are labeled to indicate estimates and revisions. The outlook segments of the mineral commodity tables are based on projected trends that could affect current (2006) producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward-looking information, which includes estimates of future production, exploration and mine development, cost of capital projects, and timing of the start of operations, are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will occur.

## Metals

**Aluminum and Bauxite and Alumina.—Production.**—In 2006, African production of refined aluminum increased by 8%. South Africa's production increased because of higher output from the Bayside and the Hillside smelters. In Ghana, output increased at the Valco smelter; production, however,

was constrained by limited power availability resulting from low water levels in Lake Volta. Production also increased at the Mozal smelter in Mozambique and the Nag Hammadi smelter in Egypt. South Africa accounted for about 48% of African aluminum output; Mozambique, 30%; and Egypt, 14% (table 6). Kenya was the only African producer of secondary refined aluminum. Africa accounted for 4% of the world's aluminum production in 2006 (table 4).

African bauxite production increased by 10% in 2006. Most of the increase was attributable to the reopening of the SML bauxite mine in Sierra Leone. Guinea accounted for about 89% of African bauxite production, and Sierra Leone, 6% (table 5). From 1990 to 2006, Africa's share of world bauxite production decreased to 10% from 16%.

**Consumption.**—In 2006, world aluminum consumption amounted to 34 million metric tons (Mt) compared with 31.7 Mt in 2005. African consumption of aluminum increased to 480,000 metric tons (t) in 2006 from 408,000 t in 2005 (Maphango, 2007a).

**Outlook.**—The production of refined aluminum is expected to increase by an average of about 3% per year from 2006 to 2013. In Cameroon, Alcan Inc. plans to triple production from its smelter by 2011. Aluminum Smelter Co. of Nigeria Ltd. could reopen its smelter at Ikot Abasi by 2008 and reach full capacity by 2011. In Ghana, Alcoa Inc. plans to increase production at the Valco smelter; higher output depended upon reliable power supplies (table 6).

African bauxite production is likely to increase by an average of about 9% per year from 2006 to 2013 (table 5). In Guinea, the Debele, the Friguia, the Kamsar, and the Sangaredi Mines are expected to reach full capacity in 2009. The Dian-Dian Mine is likely to open by 2013. Bauxite mining in the Kambia District could restart by 2013. Sierra Leone, which did not mine bauxite between 1995 to 2005, could have a 14% share of African bauxite production in 2013 (table 5).

**Copper.**—**Production.**—Africa's mine production of copper increased by nearly 14% in 2006. Zambia was the leading producer in Africa; the country's increasing production was partially attributable to higher output from the Kansanshi Mine. The production increase in Congo (Kinshasa) was attributable to the opening of the Kananga, the Ruashi, and the Tilwezembe Mines and higher output from the Dikulushi and the Kulu Mines. The Guelb Moghrein Mine started production in Mauritania in 2006. In 2006, Zambia accounted for 65% of African copper mine production; Congo (Kinshasa), 17%; and South Africa, 13% (table 7). Africa's share of world copper mine production was 5% in 2006 compared with 14% in 1990.

Africa's refined copper production rose by 13% from 2005 to 2006; most of the increase was attributable to Zambia. Output also increased in South Africa. In 2006, Zambia accounted for 79% of African refined copper production; South Africa, 18%; and Egypt, 2% (table 8). Egypt was the only producer of secondary refined copper; primary production accounted for most African production.

**Consumption.**—In 2006, world refined copper consumption increased to 17.1 Mt from 16.8 Mt in 2005. African consumption of copper amounted to about 160,000 t in 2006. South Africa's consumption increased to 83,800 t in 2006 from 82,000 t in 2005 (Maphango, 2007b).

**Outlook.**—African copper mine production is expected nearly to triple from 2006 to 2013. Congo (Kinshasa) is likely to account for a majority of the increase in output. In 2007, the Frontier and the Kinsevere Mines are expected to open, and the Kamoto and the KOV Mines are scheduled to restart production. The Kalukundi, the Kinsenda, and the Ruashi mines are likely to open in 2008; the Tenke Fungurume Mine, in 2009; and the Kolwezi tailings project, in 2010. Additional sources of higher output include the Kakanda and the Taratara Mines, which are expected to reach full production by 2009. The Lonshi Mine is expected to shut down in 2009, and the Ruashi Tailings project, in 2010. By 2011, the Kamoto and the KOV Mines could reach their full capacity, which is planned to be more than twice the current total copper mine output in Congo (Kinshasa). The Congolese share of African copper production is likely to increase to 40% in 2013 from 16% in 2006 (table 7).

Output is likely to double in Zambia by 2013. The openings of the Chingola and the Lumwana Mines are planned to take place in 2007 and 2009, respectively. The Konkola Deeps project is expected to start in 2009 and to reach full production by 2013. Expansions are planned for the Mufulira, the Mufulira South, and the Nkana Mines in 2007 (table 7).

In Botswana, the Dukwe Mine is expected to open in 2009 and to reach full capacity by 2011. Nevsun Resources Ltd. planned to start mining from a copper-rich zone at the Bisha Mine in Eritrea in 2010. South Africa's production could increase because of higher output from the Palabora Mine and the expansion of the Nkomati nickel mine and the Limpopo and the Northam PGM mines. In Mauritania, the Guelb Moghrein Mine is expected to reach full production in 2011. Tanzania's production is likely to increase with the opening of the Bugwazi gold mine in 2009. The opening of the Tschudi Mine in 2009 is expected to result in higher output in Namibia (table 7).

The production of refined copper is expected to rise by an average of 13% per year from 2006 to 2013. Zambia's production is expected to increase because of higher output from the Mufulira refinery and the Bwana Mkubwa, the Kansanshi, and the Konkola solvent extraction/electrowinning (SX/EW) plants by 2009. The new Chambishi and Chingola South SX/EW plants are likely to open in 2009 and to reach planned capacity by 2011. In Congo (Kinshasa), new SX/EW plants could open at the Ruashi Mine and near the Kamoto and the KOV Mines in late 2008. Additional plants are expected to open at Luita in 2009, and at the Kinsevere Mine and the Kolwezi tailings project by 2010. Congo (Kinshasa), which did not produce refined copper in 2006, could account for nearly 38% of Africa's refined copper output by 2011 (table 8).

**Gold.**—**Production.**—Africa's gold mine production was about 525,000 kilograms (kg) in 2006, which was a decrease of about 5% compared with that of 2000. Production was considerably less than that of 1995 because of the long-term decline in South African production (table 9). From 1990 to 2006, Africa's share of world gold mine production decreased to about 21% from 32% (table 4).

In South Africa, the decrease in production was broadly based, with output declining from each of the country's five leading gold producers. In Tanzania, lower production from the Geita and the Golden Pride Mines more than offset higher

production from the Bulyanhulu, the North Mara, and the Tulawaka Mines. In Niger, output declined at the Samira Hill Mine. Production also declined in Ethiopia, Guinea, Sudan, and Zimbabwe (table 9).

Mali's production increased in 2006; higher output from the Kalana, the Loulo, the Sadiola Hill, and the Yatela Mines more than offset lower output from the Morila Mine. Gold production from the Guelb Moghrein copper mine in Mauritania started in December 2006. Output also increased in Botswana, Burkina Faso, Burundi, Cameroon, and Congo (Kinshasa) (table 9).

In 2006, South Africa accounted for 51% of African gold production; Ghana, 12%; Mali, 10%; and Tanzania, 9%. South Africa's share of continental gold production continued to decline from 81% in 1995 because of rising production costs associated with deeper underground operations and increased production in Ghana, Guinea, Mali, and Tanzania (table 9).

**Outlook.**—Gold mine production in Africa is expected to increase by an average of about 3% per year from 2006 to 2013. The long-term decline in South Africa's production could be reversed because of the reopening of mines in the Central Rand gold fields and the opening of the Burnstone and the Modder East Mines in 2009. The opening of uranium mines that include the Dominion Mine in 2007 and the Buffelsfontein and Ezulwini Mines in 2008 is also likely to contribute to higher gold production. Other new gold projects include the Tshepong Decline project in 2008, the Phakisa Shaft in 2009, and the planned expansion of the Masimong Mine in 2010. The Moab Khotsonq Mine, which was producing gold in 2006, is expected to reach full production in 2012; higher production is also planned for the South Deep Mine by 2008. These projects could more than offset lower production from the Great Nologwa Mine and the planned shutdown of the Savuka Mine in 2010 (table 9).

In Ghana, the outlook is for an increase in output because of higher production from the Bibiani Mine by the end of 2008 and the Iduapriem Mine by 2009. Tanzania's production is likely to increase to more than 55 t by 2009 with the opening of the Buckreef Mine in 2008 and the Buzwagi Mine in 2009 and increased production at the North Mara Mine; these increases could more than offset the decreased output at the North Mara Mine and the planned closure of the Tulawaka Mine in 2010. In Mali, the reopening of the Syama Mine is likely in 2008, and the opening of the Tabakoto Mine, in 2009. By March 2008, production is expected to start at the Bonikro gold deposit in Côte d'Ivoire. In Mauritania, Rio Narcea Gold Mines Ltd. plans to start production at the Tasiast Mine by mid-2007. Production could increase in Zimbabwe depending upon the restoration of economic and political stability there (table 9).

Several African countries that had only artisanal gold production in 2006 are likely to open large-scale gold mines in the near future. In Burkina Faso, the Taparko Bourom Mine is expected to open in 2007, and the Kalsaka and the Youga Mines, in 2008. Gold-rich zones in the Bisha Mine in Eritrea are planned to be mined from 2008 to 2010. In Mozambique, production at the Manica gold project could start by 2011. Sudan's only large-scale gold mine is expected to shut down in 2010 (table 9).

**Iron and Steel.**—**Production.**—African production of crude steel increased by 5% in 2006. Most of the increase was

attributable to higher output at the Aladja steel plant in Nigeria. Production increased in Algeria and South Africa and decreased in Libya and Zimbabwe. South Africa accounted for 52% of regional crude steel production; Egypt, 29%; and Algeria and Libya, 6% each (table 11). Africa's share of world crude steel production amounted to 2% in 2006 (table 4).

South Africa produced about 7.51 Mt of hot-rolled steel products in 2006; Egypt, 6.42 Mt; and Morocco, 0.96 Mt. Other African producers of hot-rolled steel products included Algeria, Libya, and Tunisia (International Iron and Steel Institute Committee on Economic Studies, 2007, p. 48).

**Consumption.**—In 2006, world crude steel consumption increased to 1.24 billion metric tons (Gt) from 1.13 Gt in 2005. African crude steel consumption increased to nearly 29.2 Mt in 2006 from 25.6 Mt in 2005. Egypt and South Africa accounted for 23% each of African crude steel demand; Algeria, 14%; Morocco, 6%; Nigeria, 5%; and Libya and Tunisia, 4% each (International Iron and Steel Institute Committee on Economic Studies, 2007, p. 78-79).

**Outlook.**—Crude steel production is expected to rise by an average of about 4% per year from 2006 to 2013. Nigeria, which accounted for less than 1% of African crude steel output in 2005, could increase its share to 10% by 2013 with the opening of the Ajaokuta plant and increased production at the Delta plant. In South Africa, the expansion of the Vanderbijlpark plant is scheduled to take place from 2007 to 2009. In Algeria, increased utilization of existing capacity is expected to raise national steel production to 2.5 Mt by 2011. Libya's output was also likely to increase. Production could increase in Zimbabwe as Zimbabwe Iron and Steel Company restores its capacity; improvement in this company's situation depends upon the restoration of economic and political stability (table 11).

**Iron Ore.**—**Production.**—In 2006, the iron content of ore produced in Africa amounted to 36.3 Mt compared with 34.6 Mt in 2005. Production increased in Algeria, Mauritania, and South Africa in 2006. South Africa was the leading iron ore producer in Africa and accounted for 72% of continental output; Mauritania, 20%; and Egypt, 4% (table 10).

**Outlook.**—The iron content of ore produced in Africa is expected to increase to almost 63 Mt in 2013 (table 10). In South Africa, the expansion of the Sishen Mine is likely to be completed in 2009; a further expansion of the mine could be completed by 2013. Production at the Bruce, the King, and the Mokaning Mines (BKM) could start in 2008 and reach full capacity in 2010. The opening of BKM would more than offset the expected decline in output from the Beeshok Mine after 2008. The Faleme iron ore project in Senegal could start production in 2011. In Nigeria, production at the Ajaybanko and the Itakpe iron ore deposits is expected to reach full capacity by 2013. Output is expected to decrease in Algeria and Egypt and to cease in Tunisia (table 10).

**Lead.**—**Production.**—From 2005 to 2006, African lead mine production decreased by 2%. In South Africa, output increased at the Black Mountain Mine. Production also increased in Morocco. Tunisia's production ceased in 2005 because of the shutdown of the Bougrine Mine. In Namibia, output declined at the Rosh Pinah Mine because of labor disputes. In 2006, South Africa accounted for 46% of African lead mine production;

Morocco, 43%; and Namibia, 11% (table 12). Africa's share of the world's lead mine production was about 3% in 2006 (table 4).

African production of refined lead increased by 12% compared with that of 2005; output increased in Morocco and South Africa. South Africa accounted for 54% of African refined lead output; and Morocco, 37% (table 13).

**Consumption.**—In 2006, world refined lead consumption increased to 7.95 Mt from 7.88 Mt in 2005. South African lead consumption increased to 75,000 t in 2006 from 74,500 t in 2005 (Pitso, 2007).

**Outlook.**—The decline in African lead mine production is likely to continue, with output expected to decline by 9% from 2006 to 2013. Most of the decrease would be attributable to the closure of the Rosh Pinah Mine in Namibia by 2013; production is also expected to decrease in Morocco (table 12). Refined lead production is likely to decline by 12% by 2011 (table 13).

**Nickel.**—**Production.**—African mine production of nickel decreased by 2% in 2006. Output declined in Botswana and South Africa and increased in Zimbabwe. Most of South Africa's nickel output was a coproduct of PGM mining. In 2006, South Africa accounted for 47% of African nickel mine output; Botswana, 43%; and Zimbabwe, 10% (table 14). Minor tonnages of nickel were recovered as a byproduct of cobalt operations in Morocco.

**Outlook.**—Nickel mine production is likely to double from 2006 to 2013. The startup of the Ambatovy nickel and cobalt mine in 2010 in Madagascar is expected to account for the majority of the increase. Madagascar, which did not mine nickel in 2006, could have a 34% share of African nickel mine production in 2013. Higher output is expected in South Africa because of increased capacity at the Nkomati nickel mine and the Limpopo, the Marikana, and the Northam PGM mines. In Zambia, Albidon Ltd. planned to start production from the Munali project in the first half of 2008. The Nkamouna cobalt, manganese, and nickel mine is likely to open in Cameroon in 2010. Output is expected to decline in Zimbabwe. Botswana's production is likely to decline because of the planned closure of the Selebi-Phikwe Mine in 2011 or 2012 (table 14).

**Platinum-Group Metals.**—**Production.**—From 2005 to 2006, Africa's production of palladium and platinum increased by 4% and 3%, respectively. South African production increased because of higher output from the Eastern Platinum, the Everest, the Karee, and the Western Platinum Mines. Production also increased in Zimbabwe. South Africa, which was the continent's dominant producer of platinum-group metals (PGM) in Africa, accounted for 97% and 96% of the production of platinum and palladium, respectively (tables 15, 16).

**Outlook.**—African mine production of palladium is expected to increase by an average of between 6% and 7% per year from 2006 to 2013, and platinum, by between 5% and 6% per year. In South Africa, the increase is likely to be attributable to the opening of the Smokey River Mine in 2007, the Blue Ridge Mine in 2008, the Kalahari Mine and the Pilansberg project in 2009, the Project 1 and the Leeuwkop Mines in 2010, and the Pandora Mine in 2012. Expansions are planned to be completed at the Marula and the PPRust Mines in 2009; the Nkomati and the Western Platinum Mines in 2010; and the Amandelbult,

the Lebowa, the Limpopo, and the Northam Mines in 2012. The Everest and the Marikana Mines are expected to reach full capacity in 2007, and the Mototolo and the Two Rivers Mines, in 2008. Higher output in Zimbabwe is likely to result from the expansion of the Mimosa and the Ngezi Mines and the opening of the Unki Mine in 2009 (tables 15, 16).

**Zinc.**—**Production.**—From 2005 to 2006, Africa's mine production of zinc declined by about 14%. Tunisia's production ceased in 2005 because of the shutdown of the Bougrine Mine. In Namibia, output declined at the Rosh Pinah Mine because of labor disputes. Production also declined in Algeria and Morocco. In South Africa, output increased at the Black Mountain Mine. Production increased sharply at Slag Treatment Plant Lubumbashi in Congo (Kinshasa). In 2006, Morocco accounted for 40% of African zinc mine production; Namibia, 31%; South Africa, 19%; and Congo (Kinshasa), 9% (table 17). Africa's share of world zinc mine production was about 2% in 2006 (table 4).

African production of zinc metal decreased by nearly 6% compared with that of 2005. Production declined at the Skorpion smelter in Namibia because of a fire. In South Africa, output declined because of lower-quality concentrates from the refinery's main suppliers. Namibia, which did not produce zinc metal before 2003, accounted for 52% of continental zinc metal production in 2006. South Africa's share declined to 36% in 2006 from 75% in 2000, and Algeria's share, to 12% from 25% (table 18).

**Consumption.**—In 2005, world refined zinc consumption remained nearly unchanged at about 10.3 Mt. South African zinc consumption increased to 103,000 t in 2005 from 91,000 t in 2004 (Maphango, 2006).

**Outlook.**—African zinc mine production is expected to increase by 41% from 2006 to 2009 before decreasing by 13% from 2009 to 2013. The Perkoa zinc project in Burkina Faso is expected to start production in 2008. Burkina Faso, which did not mine zinc in 2006, could account for 31% of continental zinc production in 2013. The Rosh Pinah Mine is expected to close by 2013. In Congo (Kinshasa), the proposed reopening of the Kipushi Mine could lead to further increases in production, but whether this project will be implemented by the end of 2013 is uncertain (table 17).

Regional production of zinc metal could increase by nearly 20% by 2009. The Zincor smelter is expected to increase production by 33% by the end of 2007 because of debottlenecking operations. Higher production from the Skorpion smelter in Namibia is also likely (table 18).

### **Industrial Minerals**

**Diamond.**—**Production.**—In 2006, Africa's share of world diamond production, by volume, was 53% (table 4). African diamond production decreased by nearly 2% in 2006 compared with that of 2005. Congo (Kinshasa) accounted for most of the decline in production, by volume. Société Minière de Bakwanga (MIBA) experienced a sharp decline in production, which was partially attributable to conflict between MIBA and artisanal miners who reportedly made incursions onto the company's property. Sengamines shut down mining operations

in 2005 because of fuel delivery problems. Artisanal diamond production also declined in 2006. Lower output in South Africa was attributable to the Cullinan and the Venetia Mines. Diamond production also declined in Ghana, Guinea, Sierra Leone, and Togo (table 19).

Most of the increase in Botswana's diamond production was attributable to the Orapa Mine. In Zimbabwe, production quadrupled because of a diamond rush by artisanal miners in the Marange area. Tanzania's production also increased in 2006 because of small-scale and artisanal miners. In Namibia, higher production was attributable to Namdeb Diamond Corporation (Pty) Ltd.'s increased output. Botswana accounted for 37% of African diamond output by volume; Congo (Kinshasa), 30%; South Africa, 16%; and Angola, 10% (table 19).

In 2006, the global value of rough diamond production amounted to \$12.5 billion, of which Africa accounted for about 60%. Botswana accounted for 27% of the value of global rough diamond output; Angola, 12%; South Africa, 10%; Namibia, 6%; and Congo (Kinshasa), 4% (Hinde, 2007).

In November 2002, the Kimberley Process Certification Scheme (KPCS) was established to reduce the trade in conflict diamond, particularly diamond originating from Angola, Congo (Kinshasa), and Sierra Leone. The establishment of the KPCS involved Government officials from more than 50 countries that produced, processed, and imported diamond as well as representatives from the European Union, the World Diamond Council, and nongovernmental organizations. As of 2006, the following African countries had met the minimum requirements of the KPCS: Angola, Botswana, Central African Republic, Congo (Kinshasa), Ghana, Guinea, Lesotho, Mauritius, Namibia, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, and Zimbabwe.

Kimberley Process efforts to control illicit diamond production focused on Côte d'Ivoire and Liberia in 2006. In December 2005, the United Nations Security Council banned the importation of rough diamond from Côte d'Ivoire because of the alleged link between illegal diamond mining and the country's unresolved armed conflict (United Nations Security Council, 2005).

*Outlook.*—The production of rough diamond is expected to increase by an average of 1% per year from 2006 to 2013. The expansion of Namdeb's operations in Namibia is expected to account for most of the increase. In South Africa, DeBeers plans to open its marine operations in 2007, and the Voorspoed Mine, in 2009. The company also expects to increase production at the Finsch Mine in 2007. Petra Diamonds Ltd. plans nearly to triple production at the Helam, the Koffiefontein, the Sedibeng, and the Star Mines by 2010. In Tanzania, DeBeers plans to increase output at the Williamson Mine to 500,000 carats per year by the end of 2008. Lesotho's production is expected to increase because of higher output at the Letseng and the Lighobong Mines. Higher output is also likely in Angola and Guinea (table 19).

Production at MIBA's facilities in Congo (Kinshasa) is expected to decline to less than 1 million carats in 2007. Output is also likely to decline in Zimbabwe as near-surface resources are depleted at the Murowa Mine (table 19).

**Phosphate Rock.**—*Production.*—In 2006, the diphosphorus pentoxide ( $P_2O_5$ ) content of African phosphate rock production

amounted to about 14.4 Mt compared with 14.5 Mt in 2005. Higher production in Algeria and Togo was more than offset by lower production in Morocco, Senegal, and Tunisia. Morocco, which was the leading producer of phosphate rock in Africa, accounted for 63% of continental phosphate rock output in 2006; Tunisia, 17%; and South Africa, 7% (table 20).

*Outlook.*—The  $P_2O_5$  content of African phosphate rock production is expected to increase to nearly 14.7 Mt by 2011. In Morocco, Office Cherifien des Phosphates could complete an expansion by 2009. Production is expected to decline in Algeria and Tunisia (table 20).

### ***Mineral Fuels and Related Materials***

**Coal.**—*Production.*—African coal production remained nearly unchanged in 2006. In South Africa, higher production at the Boschmans, the Goedhoop, the Isibonelo, the New Denmark, and the Waterpan Mines was offset by lower production from the Bank, the Douglas, the Middleburg, the New Vaal, and the Twistdraai Mines. Output increased in Malawi, Mozambique, and Swaziland and decreased in Botswana, Niger, Tanzania, Zambia, and Zimbabwe. South Africa, which was the dominant coal producer in Africa, accounted for 98% of regional coal output; Zimbabwe, 1%; and others, less than 1% (table 21). More than 99% of South Africa's coal production was bituminous. Africa accounted for about 5% of total world anthracite and bituminous coal production in 2006.

*Consumption.*—Africa accounted for about 3% of world coal consumption in 2006. Within the region, South Africa accounted for 92% of African coal consumption. From 2001 to 2006, Africa's consumption of coal increased by about 15% (British Petroleum plc, 2007, p. 35).

*Outlook.*—African coal production is expected to increase by between 3% and 4% per year from 2006 to 2013. South Africa is likely to be responsible for the majority of the increase; its production could increase to 295 Mt by 2013 (table 21). Higher output would be attributable to the opening of the Belfast and the Inyanda Mines in 2008; the Holfontein, the Mooiplaats, the Tumelo, and the Zongdagsfontein Mines in 2009; the Elders Opencast Mine in 2011; and the Elders Underground and the Heidelberg Underground Mines in 2013; and to the expansions of the Mafube Mine in 2008, the Forzando South Mine in 2009, and the Goedgevonden and the Grootegeluk Mines in 2010 (table 21).

Mozambique is expected to become the second ranked coal producer in Africa with the development of the Moatize project in 2010. Botswana is likely to become the third ranked producer because of the expansion of the Morupule Colliery in 2008 and the start of production at the Mmamabula East project in 2011. In Zimbabwe, output could increase at Hwange Colliery by 2011 if economic and political stability are restored. Production is also expected to increase in Tanzania with the expansion of the Kiwira Mine in 2007 (table 21).

**Uranium.**—*Production.*—In 2006, African uranium mine production increased by 2% compared with that of 2005. Higher output in Niger more than offset lower output in Namibia and South Africa. In Namibia, production declined at the Rossing Mine, and the Langer Heinrich Mine opened in late

December 2006. South Africa's production declined because of lower output from gold mines. Namibia accounted for 49% of African uranium production; Niger, 44%; and South Africa, less than 8% (table 22). Africa accounted for about 19% of the world's uranium production in 2005 (table 4).

*Consumption.*—South Africa was the only regional consumer of uranium in 2006. Africa accounted for less than 1% of the electricity generated worldwide by nuclear power (British Petroleum plc, 2007, p. 36).

*Outlook.*—Continental uranium mine production is expected to rise by 10% per year from 2005 to 2011. Namibia is expected to account for the majority of the increase. Declining production from the Rossing Mine by 2013 is likely to be more than offset by increased production from the Langer Heinrich Mine, which is scheduled to reach full capacity by 2009, and the opening of the new Trekkopje and Valencia Mines by 2011. The Goanikontes Mine is also expected to open in 2013. In South Africa, the Dominion Mine is expected to open in 2007, and the Buffelsfontein and the Ezulwini Mines, in 2008. AngloGold Ashanti Ltd. planned to increase uranium output from its South African gold mines by 40% by late 2008. The Kayelekera Mine in Malawi is expected to start production in the third quarter of 2008 (table 22; Mining Review Africa, 2007).

## Trade Review and Outlook

Africa's current account surplus amounted to 2.2% of the GDP in 2006 compared with 1.8% of the GDP in 2005. In 2006, sub-Saharan countries ran an average deficit of 1.3% of the GDP, and countries in the Arab Maghreb Union ran an average surplus of 14.4% of the GDP. Trade surpluses in oil-exporting countries more than offset trade deficits in oil-importing countries. Oil-importing countries had an average current account deficit of 4.2% of the GDP in 2006, and oil-exporting countries had an average current account surplus of 12.6% of the GDP (International Monetary Fund, 2007, p. 75).

Out of 33 African nations for which information was available, 20 countries experienced a decline in their terms of trade from 2002 to 2005 and 13 experienced an improvement. The countries that experienced the worst decline in their terms of trade were oil importers. However, Botswana's terms of trade improved because higher prices for oil imports were more than offset by higher prices for diamond exports. Similar reasoning held for Mozambique because of higher prices for aluminum; in Niger, for uranium; and in Zambia, for copper (International Monetary Fund, 2006, p. 65, 67).

The average current account deficit for oil-importing countries is expected to be 4.4% of the GDP in 2007 and 4.2% of the GDP in 2008. For oil-exporting countries, the surplus is predicted to decline to 7.6% of the GDP in 2007 and 6.8% of the GDP in 2008. Africa is expected to run a current account surplus of 0.1% of the GDP in 2007 and to have balanced trade in 2008 (International Monetary Fund, 2007, p. 75).

In 2005 or 2006, minerals and mineral fuels accounted for more than 90% of the export earnings of Algeria (which were mainly, in order of value, petroleum and natural gas), Congo (Brazzaville) (petroleum), Congo (Kinshasa) (diamond, petroleum, cobalt, copper, and gold), Equatorial Guinea

(petroleum), Libya (petroleum and natural gas), Nigeria (petroleum and natural gas), and Sudan (petroleum and gold). Minerals and mineral fuels accounted for more than 80% of the export earnings of Botswana (diamond, nickel, copper, soda ash, and gold), Chad (petroleum), Gabon (petroleum and manganese), Guinea (bauxite, gold, alumina, and diamond), Sierra Leone (diamond, bauxite, rutile, and ilmenite), and Zambia (copper and cobalt). Minerals and mineral fuels accounted for more than 50% of the export earnings of Mali (gold), Mauritania (iron ore), Mozambique (aluminum), Namibia (diamond, uranium, zinc, gold, and copper). Gold was also a significant source of export earnings in Ghana, South Africa, and Tanzania. Diamond was a significant source of export earnings in the Central African Republic and South Africa, as was uranium in Niger (International Monetary Fund, 2008a, p. 38; 2008b, p. 84-85; 2008c, p. 28).

Africa's natural gas exporters included Algeria, which accounted for 59% of the continent's natural gas exports; Nigeria, 17%; Egypt, 16%; and Libya, 8%. Europe received 87% of African total natural gas exports and was the destination for 93% of Africa's natural gas exports by pipeline and 82% of Africa's liquefied natural gas (LNG) exports. The United States received 11% of Africa's LNG exports, and countries of the Asia and the Pacific region, 7% (British Petroleum plc, 2007, p. 30).

In 2006, Europe received 34% of Africa's petroleum exports; the United States, 33%; China, 11%; Japan, 2%; and other countries in the Asia and the Pacific region, 14%. West African countries sent 41% of their exports to the United States and 38% to China, Japan, and other countries in the Asia and the Pacific region. North African countries sent 60% of their exports to Europe and 23% to the United States. Intra-regional exports to African countries amounted to only 1% of total African petroleum exports (British Petroleum plc, 2007, p. 20).

Intra-regional minerals trade was, however, significant for gold. South Africa imported more than 150,000 kg of gold, mostly from West African countries, to supply its gold refinery. A majority of African gold mine production was refined in South Africa prior to export to other regions. Most of Africa's copper and PGM production was also exported in refined form. The majority of Africa's chromite production was processed into ferrochromium prior to export. For other commodities, which included bauxite, colored gemstones, diamond, iron ore, petroleum, and uranium, most of or all of the continent's production was exported prior to downstream processing.

## Environment

Deforestation for fuel use and land-intensive agricultural production continued to be a significant environmental issue in many African countries. Other causes of deforestation included artisanal production of gemstones, lime, and sand and gravel. The use of mercury by artisanal gold miners has led to serious air and water pollution in such African countries as Ghana, Kenya, Mozambique, South Africa, Sudan, Tanzania, and Zimbabwe. The flaring of natural gas in Nigeria has led to air pollution and emissions of greenhouse gases.



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TABLE 1  
AFRICA: AREAL EXTENT AND ESTIMATED POPULATION IN 2006<sup>1</sup>

Country	Area <sup>2</sup> (square kilometers)	Estimated population <sup>3</sup> (millions)
Algeria	2,381,740	33.4
Angola	1,246,700	16.6
Benin	112,620	8.8
Botswana	600,370	1.9
Burkina Faso	274,200	14.4
Burundi	27,830	8.2
Cameroon	475,440	18.2
Cape Verde	4,033	0.5
Central African Republic	622,984	4.3
Chad	1,284,200	10.5
Comoros	2,170	0.6
Congo (Brazzaville)	342,000	3.7
Congo (Kinshasha)	2,345,410	60.6
Côte d'Ivoire	322,460	18.9
Djibouti	23,000	0.8

See footnotes at end of table.

TABLE 1--Continued  
AFRICA: AREAL EXTENT AND ESTIMATED POPULATION IN 2006<sup>1</sup>

Country	Area <sup>2</sup> (square kilometers)	Estimated population <sup>3</sup> (millions)
Egypt	1,001,450	74.2
Equatorial Guinea	28,051	0.5
Eritrea	121,320	4.7
Ethiopia	1,127,127	77.2
Gabon	267,667	1.3
Gambia, The	11,300	1.7
Ghana	239,460	23.0
Guinea	245,857	9.2
Guinea-Bissau	36,120	1.6
Kenya	582,650	36.6
Lesotho	30,355	2.0
Liberia	111,370	3.6
Libya	1,759,540	6.0
Madagascar	587,040	19.2
Malawi	118,480	13.6
Mali	1,240,000	12.0
Mauritania	1,030,700	3.0
Mauritius	2,040 <sup>4</sup>	1.3
Morocco	712,550	30.7
Mozambique	801,590	21.0
Namibia	825,418	2.0
Niger	1,267,000	13.7
Nigeria	923,768	145
Reunion	2,517	NA
Rwanda	26,338	9.5
Sao Tome e Principe	1,001	0.2
Senegal	196,190	12.1
Seychelles	455	0.1
Sierra Leone	71,740	5.7
Somalia	637,657	8.4
South Africa	1,219,912	47.4
Sudan	2,505,810	37.7
Swaziland	17,363	1.1
Tanzania	945,087	39.5
Togo	56,785	6.4
Tunisia	163,610	10.1
Uganda	236,040	29.9
Zambia	752,614	11.7
Zimbabwe	390,580	13.2
Total	30,359,709	937
United States <sup>5</sup>	9,631,418 <sup>5</sup>	299
World	148,940,000	6,540

NA Not Available.

<sup>1</sup>Includes data available through May 2008. Population estimates are rounded to no more than three significant digits.

<sup>2</sup>Source: U.S. Central Intelligence Agency, World Factbook 2007.

<sup>3</sup>Source: World Bank 2008, World Development Indicators Database.

<sup>4</sup>Includes Agalega Islands, Cargados Carajos Shoals (Saint Brandon), and Rodriguez.

<sup>5</sup>Includes only the 50 States and the District of Columbia.

TABLE 2  
AFRICA: GROSS DOMESTIC PRODUCT IN 2006<sup>1,2,3</sup>

Country	Estimated gross domestic product (billions)	Estimated gross domestic product per capita	Real gross domestic annual percentage change
Algeria	\$209.3	\$6,192	2.0%
Angola	73.4	4,627	18.6%
Benin	11.3	1,485	3.8%
Botswana	23.7	15,073	3.6%
Burkina Faso	16.1	1,199	5.5%
Burundi	2.7	356	5.1%
Cameroon	37.1	2,024	3.2%
Cape Verde	1.5	3,010	10.8%
Central African Republic	2.9	692	4.0%
Chad	15.4	1,662	0.2%
Comoros	0.7	1,130	1.2%
Congo (Brazzaville)	13.1	3,798	6.2%
Congo (Kinshasa)	17.3	291	5.6%
Côte d'Ivoire	30.8	1,669	-0.3%
Djibouti	1.6	2,154	4.8%
Egypt	367.4	5,094	6.8%
Equatorial Guinea	13.5	11,493	-5.6% <sup>4</sup>
Eritrea	3.5	767	-1.0%
Ethiopia	54.4	724	11.6%
Gabon	18.6	13,321	1.2%
Gambia, The	1.9	1,238	6.5%
Ghana	28.7	1,339	6.4%
Guinea	10.3	1,064	2.2%
Guinea-Bissau	0.8	473	1.8%
Kenya	53.6	1,574	6.1%
Lesotho	2.9	1,215	7.2%
Liberia	1.2	333	7.8%
Libya	68.2	11,421	5.2%
Madagascar	16.6	1,005	5.0%
Malawi	9.5	727	7.9%
Mali	12.8	1,002	5.3%
Mauritania	5.7	1,984	11.4%
Mauritius	13.1	10,465	3.6%
Morocco	119.4	3,922	8.0%
Mozambique	15.5	773	8.0%
Namibia	10.0	4,881	4.1%
Niger	8.4	649	5.2%
Nigeria	268.0	1,915	6.2%
Reunion	NA	NA	NA
Rwanda	7.8	843	5.5%
Sao Tome e Principe	0.2	1,470	6.7%
Senegal	19.1	1,600	2.1%
Seychelles	1.3	15,409	5.3%
Sierra Leone	3.6	647	7.4%
Somalia	5.0 <sup>5</sup>	600 <sup>5</sup>	2.6% <sup>5</sup>
South Africa	432.7	9,113	5.4%
Sudan	71.1	1,964	11.3%
Swaziland	5.4	4,671	2.8%
Tanzania	44.4	1,163	6.7%
Togo	5.0	788	4.1%
Tunisia	70.5	6,934	5.5%
Uganda	26.6	889	5.1%
Zambia	14.7	1,241	6.2%

See footnotes at end of table

TABLE 2--Continued  
 AFRICA: GROSS DOMESTIC PRODUCT IN 2006<sup>1, 2, 3</sup>

Country	Estimated gross domestic product (billions)	Estimated gross domestic product per capita	Real gross domestic annual percentage change
Zimbabwe	2.3	195	-5.4%
Total	2,271	170,266	NA
United States <sup>6</sup>	13,195	44,118	2.9%
World	60,295	XX	3.9%

NA Not available. XX Not applicable.

<sup>1</sup>Source: International Monetary Fund, World Economic Outlook Database, April 2008.

<sup>2</sup>Table data compiled May 2008. Gross domestic product may differ from that reported in individual country chapters of the 2006 Minerals Yearbook owing to differences in source or date of reporting.

<sup>3</sup>Gross domestic product based on purchasing power parity.

<sup>4</sup>2003 estimate.

<sup>5</sup>Source: U.S. Central Intelligence Agency, World Factbook 2007.

<sup>6</sup>Includes only the 50 States and the District of Columbia.

TABLE 3  
SELECTED SIGNIFICANT AFRICAN EXPLORATION SITES IN 2006

Country	Type <sup>1</sup>	Site	Commodity <sup>2</sup>	Company	Resource <sup>2,3</sup>	Exploration <sup>4</sup>
Botswana	E	Selkirk	Ni, Cu	LionOre Mining International Ltd.	469,000 t Ni, 401,000 t Cu	Extensive drilling.
Burkina Faso	E	Belahouro/Inata	Au	Goldbelt Resources Ltd.	948,000 oz Au	Do.
Do.	E	Bissa	Au	High River Gold Mines Ltd.	662,000 oz Au	Do.
Do.	E	Essakan	Au	Orezone Resources Inc.	1.9 Moz Au	Extensive work program.
Central African Republic	F	Passendro	Au	Axmin, Inc.	1.56 Moz Au	Extensive drilling.
Congo (Kinshasa)	F	Kinsevere	Cu	Anvil Mining Ltd.	865,000 t Cu	Do.
Do.	E	Moto	Au	Moto Goldmines Ltd.	6.1 Moz Au	Do.
Do.	E	Twangiza	Au	Banro Corp.	3 Moz Au	Do.
Egypt	F	Sukari	Au	Centramin Egypt Ltd.	7.5 Moz Au	Feasibility drilling.
Ghana	P	Chirano/Akwaaba	Au	Red Back Mining Inc.	674,000 oz Au	Extensive drilling.
Do.	F	Southern Ashanti	Au	Adamus Resources Ltd.	1.5 Moz Au	Do.
Guinea	P	Dinguiraye/Lero	Au	Crew Gold Corp.	2.5 Moz Au	Do.
Mali	E	Foulbaba-Tiekoumala (FT)	Au	North Atlantic Resources Ltd.	160,000 oz Au	Do.
Mauritania	F	Guelb el Aouj	Fe	Sphere Investments Ltd.	226 Mt Fe	Do.
Senegal	F	Grande Côte	heavy minerals	Mineral Deposits Ltd.	20 Mt heavy minerals	Do.
Do.	F	Sabodala	Au	do.	2.2 Moz Au	Do.
South Africa	E	Akanani	PGM, Au, Ni, Cu	AfriOre Ltd.	( <sup>5</sup> )	Do.
Tanzania	E	Singida	Au	Shanta Gold Ltd.	Data not released.	Do.
Zambia	E	Cheowa/Chakwenga	Cu, Au	Zambezi Resources Ltd.	do.	Do.
Zimbabwe	E	Pickstone-Peerless	Au	African Consolidated Resources plc.	820,000 oz Au	Do.

<sup>1</sup>E--Active exploration; F--Feasibility work ongoing or completed; P--Exploration at producing site.

<sup>2</sup>Abbreviations used in this table for commodities include the following: Au--gold; Cu--copper; Fe--iron; Ni--nickel; and PGM--platinum-group metals.

<sup>3</sup>Based on 2005 data reported from various sources; values vary from measured reserves to identified resources. Data not verified by the U.S. Geological Survey.

<sup>4</sup>Sites where extensive (greater than 10,000 meters) drilling or significant (more than \$5 million) expenditures have been reported.

<sup>5</sup>Resource includes 16 Moz platinum, 14 Moz palladium, 1.6 Moz rhodium, 1.6 Moz gold, 598,000 t nickel, 349,000 t copper.

TABLE 4  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006<sup>1</sup>  
(Thousand metric tons unless otherwise specified)

Country	Metals										
	Aluminum		Chromite, mine output, gross weight	Cobalt, mine output, (metric tons)	Copper, mine output, Cu content	Gold, mine output (kilograms)	Iron and steel		Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content	
	Bauxite	Metal <sup>2</sup>					Iron ore, gross weight	Steel, crude			
Algeria	--	--	--	--	377 <sup>P</sup>	--	2,340 <sup>P</sup>	1,200 <sup>P</sup>	--	--	
Angola	--	--	--	--	--	--	--	--	--	--	
Benin	--	--	--	--	20 <sup>e</sup>	--	--	--	--	--	
Botswana	--	--	--	24	3,020	--	--	--	--	--	
Burkina Faso	--	--	--	--	1,571	--	--	--	--	--	
Burundi	--	--	--	--	4,313	--	--	--	--	--	
Cameroon	--	87 <sup>e</sup>	--	--	20,000 <sup>e</sup>	--	--	--	--	--	
Cape Verde	--	--	--	--	--	--	--	--	--	--	
Central African Republic	--	--	--	--	10 <sup>e</sup>	--	--	--	--	--	
Chad	--	--	--	--	150 <sup>e</sup>	--	--	--	--	--	
Comoros	--	--	--	--	--	--	--	--	--	--	
Congo (Brazzaville)	--	--	--	--	100 <sup>e</sup>	--	--	--	--	--	
Congo (Kinshasa)	--	--	--	28,400	10,000 <sup>e</sup>	--	--	104	--	--	
Côte d'Ivoire	--	--	--	--	1,324	--	--	--	--	--	
Djibouti	--	--	--	--	--	--	--	--	--	--	
Egypt	--	252	--	--	--	--	1,600 <sup>P</sup>	5,500 <sup>P</sup>	--	7	
Equatorial Guinea	--	--	--	--	200 <sup>e</sup>	--	--	--	--	--	
Eritrea	--	--	--	--	25 <sup>e</sup>	--	--	--	--	--	
Ethiopia	--	--	--	--	4,028	--	--	60 <sup>e</sup>	--	--	
Gabon	--	--	--	--	300 <sup>e</sup>	--	--	--	--	1,350	
Gambia, The	--	--	--	--	--	--	--	--	--	--	
Ghana	842	36 <sup>e</sup>	--	--	66,205	--	--	-- <sup>e</sup>	--	560 <sup>e</sup>	
Guinea	16,956	--	--	--	18,147	--	--	--	--	--	
Guinea-Bissau	--	--	--	--	432	--	--	--	--	--	
Kenya	--	2 <sup>e</sup>	--	--	--	--	(3)	--	--	--	
Lesotho	--	--	--	--	--	--	--	--	--	--	
Liberia	--	--	--	--	11 <sup>e</sup>	--	--	--	--	--	
Libya	--	--	--	--	--	--	--	1,158	--	--	
Madagascar	--	--	132	--	5 <sup>e</sup>	--	--	--	--	--	
Malawi	--	--	--	--	--	--	--	--	--	--	
Mali	--	--	--	--	51,957	--	--	--	--	--	
Mauritania	--	--	--	--	5	--	11,155 <sup>e</sup>	--	--	1 <sup>e</sup>	
Mauritius	--	--	--	--	322	--	--	--	--	--	

See footnotes at end of table.

TABLE 4--Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals--Continued											
	Aluminum		Chromite, mine output, gross weight	Cobalt,		Copper, mine output, Cu content	Gold, mine output (kilograms)	Iron and steel		Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content	
	Bauxite	Metal <sup>2</sup>		mine output, (metric tons)	gross weight			Iron ore, gross weight	Steel, crude			
Morocco and Western Sahara	--	--	--	1,100 <sup>e</sup>	3 <sup>e</sup>	1,800 <sup>e</sup>	5 <sup>e</sup>	45,000 <sup>e</sup>	9	--	--	
Mozambique	12	564 <sup>e</sup>	--	--	--	68 <sup>e</sup>	--	--	--	--	--	
Namibia	--	--	--	--	6	2,790	--	11,830	9	--	--	
Niger	--	--	--	--	--	2,615	--	--	--	--	--	
Nigeria	--	--	--	--	--	40 <sup>e</sup>	900 <sup>e</sup>	(3)	--	--	--	
Reunion	--	--	--	--	--	--	--	--	--	--	--	
Rwanda	--	--	--	--	--	--	--	--	--	--	--	
Sao Tome e Principe	--	--	--	--	--	--	--	--	--	--	--	
Senegal	--	--	--	--	--	600 <sup>e</sup>	--	--	--	--	--	
Seychelles	--	--	--	--	--	--	--	--	--	--	--	
Sierra Leone	1,072	--	--	--	--	71	--	--	--	--	--	
Somalia	--	--	--	--	--	--	--	--	--	--	--	
South Africa	--	895 <sup>p</sup>	7,418 <sup>p</sup>	400 <sup>e</sup>	100 <sup>e</sup>	272,128 <sup>p</sup>	9,721 <sup>p</sup>	41,326 <sup>p</sup>	48,273 <sup>p</sup>	2,300 <sup>p</sup>	--	
Sudan	--	--	22 <sup>e</sup>	--	--	3,158	--	--	--	--	--	
Swaziland	--	--	--	--	--	--	--	--	--	--	--	
Tanzania	--	--	--	--	3	47,000	--	--	--	--	--	
Togo	--	--	--	--	--	--	--	--	--	--	--	
Tunisia	--	--	--	--	--	--	214 <sup>p</sup>	--	--	--	--	
Uganda	--	--	--	--	--	50 <sup>e</sup>	68 <sup>p</sup>	--	--	--	--	
Zambia	--	--	--	8,000 <sup>e</sup>	514 <sup>e</sup>	800 <sup>e</sup>	5 <sup>e</sup>	--	--	--	--	
Zimbabwe	--	--	700 <sup>p</sup>	26 <sup>p</sup>	3 <sup>p</sup>	11,354	104 <sup>p</sup>	60	--	--	--	
Total	18,900	1,840	8,270	37,900	788	525,000	18,800	56,700	105,000	4,230	--	
Share of world total	10%	4%	44%	58%	5%	21%	2%	3%	3%	35%	--	
United States	NA	2,280	--	--	1,200	252,000	98,200	52,700	429,000	--	--	
Share of world total	NA	5%	--	--	8%	10%	8%	3%	12%	--	--	
World total	190,000	41,800	18,700	65,700	15,200	2,450,000	1,240,000	1,830,000	3,660,000	12,200	--	

See footnotes at end of table.

TABLE 4--Continued  
 AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006<sup>1</sup>  
 (Thousand metric tons unless otherwise specified)

Country	Industrial minerals					Mineral fuels		
	Zinc, mine output, Zn content (metric tons)	Cement, hydraulic	Diamond, natural (thousand carats) <sup>4</sup>	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42- gallon barrels)	Uranium, U <sub>3</sub> O <sub>8</sub> content (metric tons)
Algeria	572 <sup>p</sup>	15,000	--	--	1,510	--	619,294	--
Angola	--	1,373	9,175 <sup>5,6</sup>	--	--	--	513,560	--
Benin	--	250 <sup>e</sup>	--	--	--	--	--	--
Botswana	--	--	34,293 <sup>7</sup>	--	--	962	--	--
Burkina Faso	--	30 <sup>e</sup>	--	--	2 <sup>e</sup>	--	--	--
Burundi	--	--	--	--	--	--	--	--
Cameroon	--	1,000 <sup>e</sup>	12 <sup>e</sup>	--	--	--	22,000 <sup>e</sup>	--
Cape Verde	--	--	--	--	--	--	--	--
Central African Republic	--	--	420	--	--	--	--	--
Chad	--	--	--	--	--	--	55,900 <sup>e</sup>	--
Comoros	--	--	--	--	--	--	--	--
Congo (Brazzaville)	--	100 <sup>e</sup>	50 <sup>e</sup>	--	--	--	93,261	--
Congo (Kinshasa)	16,500	530	28,540	--	--	1 <sup>e</sup>	9,000	--
Côte d'Ivoire	--	650 <sup>e</sup>	300 <sup>e</sup>	--	--	--	21,900	--
Djibouti	--	--	--	--	--	--	--	--
Egypt	--	29,000	--	--	2,200	75 <sup>e</sup>	220,000 <sup>e</sup>	--
Equatorial Guinea	--	--	--	--	--	--	145,000 <sup>e</sup>	--
Eritrea	--	45 <sup>e</sup>	--	--	--	--	--	--
Ethiopia	--	1,700 <sup>e</sup>	--	--	--	--	--	--
Gabon	--	260 <sup>e</sup>	1	--	--	--	84,738	--
Gambia, The	--	--	--	--	--	--	--	--
Ghana	--	1,900 <sup>e</sup>	973	--	--	--	--	--
Guinea	--	360	474	--	--	--	--	--
Guinea-Bissau	--	--	--	--	--	--	--	--
Kenya	--	2,200 <sup>e</sup>	--	--	--	--	--	--
Lesotho	--	--	37 <sup>e</sup>	--	--	--	--	--
Liberia	--	155 <sup>e</sup>	NA <sup>e</sup>	--	--	--	--	--
Libya	--	3,600 <sup>e</sup>	--	--	--	--	660,000 <sup>e</sup>	--
Madagascar	--	150 <sup>e</sup>	--	15,000 <sup>e</sup>	--	--	--	--
Malawi	--	200 <sup>e</sup>	--	--	--	48	--	--
Mali	--	--	--	--	--	--	--	--
Mauritania	--	374	--	--	--	--	11,170	--

See footnotes at end of table.



TABLE 4--Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006<sup>1</sup>  
(Thousand metric tons unless otherwise specified)

Country	Industrial minerals					Mineral fuels			
	Zinc, mine output, Zn content (metric tons)	Cement, hydraulic	Diamond, natural (thousand carats) <sup>4</sup>	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42- gallon barrels)	Uranium, U <sub>3</sub> O <sub>8</sub> content (metric tons)	
Mauritius	--	--	--	--	--	--	--	--	
Morocco and Western Sahara	72,600	11,000 <sup>e</sup>	--	--	28,000	( <sup>3</sup> )	240	--	
Mozambique	--	720	--	--	--	10	--	--	
Namibia	55,455 <sup>e</sup>	--	2,356	--	--	--	--	3,617	
Niger	--	54 <sup>e</sup>	--	--	--	176	--	4,049	
Nigeria	--	3,000 <sup>e</sup>	--	--	--	10 <sup>e</sup>	813,950	--	
Reunion	--	400 <sup>e</sup>	--	--	--	--	--	--	
Rwanda	--	100 <sup>e</sup>	--	--	--	--	--	--	
Sao Tome e Principe	--	--	--	--	--	--	--	--	
Senegal	--	2,884	--	--	584	--	388	--	
Seychelles	--	--	--	--	--	--	--	--	
Sierra Leone	--	234	582	--	--	--	--	--	
Somalia	--	--	--	--	--	--	--	--	
South Africa	34,444 <sup>p</sup>	13,000 <sup>e</sup>	15,153	--	2,629 <sup>p</sup>	244,782 <sup>p</sup>	4,441 <sup>p</sup>	639 <sup>p</sup>	
Sudan	--	202	--	--	--	--	158,000 <sup>e</sup>	--	
Swaziland	--	--	--	--	--	311	--	--	
Tanzania	--	1,422	272	--	3	18	--	--	
Togo	--	800 <sup>e</sup>	28	--	1,650 <sup>e</sup>	--	--	--	
Tunisia	--	6,932	--	--	7,801	--	25,000 <sup>p</sup>	--	
Uganda	--	600 <sup>e</sup>	--	--	--	--	--	--	
Zambia	--	650 <sup>e</sup>	--	--	--	100 <sup>e</sup>	--	--	
Zimbabwe	--	700 <sup>e</sup>	1,046	--	66	2,107	--	--	
Total	180,000	102,000	93,700	21,600	44,400	249,000	3,460,000	8,310	
Share of world total	2%	4%	53%	2%	29%	5%	13%	19%	
United States	727,000	99,700	--	--	30,100	977,000	3,610,000	1,970	
Share of world total	7%	4%	--	--	20%	19%	14%	4%	
World total	10,100,000	2,520,000	175,000	1,000,000	151,000	5,040,000	2,640,000	44,400	

<sup>e</sup>Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. <sup>p</sup>Preliminary. NA Not available. -- Zero or zero percent.

<sup>1</sup>Totals may not add owing to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of June 10, 2008.

<sup>2</sup>Primary and secondary production.

<sup>3</sup>Less than 1/2 unit.

<sup>4</sup>Gemstones and industrial diamond.

<sup>5</sup>Does not include smuggled production.

<sup>6</sup>Production was approximately 90% gem and 10% industrial grade.

<sup>7</sup>Assumed to contain about 70% gem and near gem.

TABLE 5  
AFRICA: HISTORIC AND PROJECTED BAUXITE PRODUCTION, 1995-2013<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2006	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>
Ghana	513	504	607	842	850	850	850
Guinea	15,800	15,700	14,600	14,800	20,000	20,000	25,600
Mozambique	11	8	10	12	12	12	12
Sierra Leone	--	--	--	1,072	1,200	1,200	4,200
Total	16,300	16,200	15,200	16,700	22,100	22,100	30,700

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 6  
AFRICA: HISTORIC AND PROJECTED ALUMINUM PRODUCTION, 1995-2013<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2006	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>
Cameroon	79	86	87	87	90	260	250
Egypt	180	189	244	252	250	250	250
Ghana	135	137	13	36	100	100	100
Kenya <sup>2</sup>	2	2	2	2	2	2	2
Mozambique	--	54	555	564	560	560	560
Nigeria	--	--	--	--	100	193	193
South Africa	229	673	846	895	900	900	900
Total	630	1,100	1,700	1,800	2,000	2,300	2,300

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Kenya produced secondary refined aluminum; primary production in all other African countries.

TABLE 7  
AFRICA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in thousand metric tons)

Country	1995	2000	2005	2006	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>
Botswana	25	35	31	24	60	90	90
Congo (Kinshasa)	29	31	97	130	610	950	940
Eritrea	--	--	--	--	--	70	70
Mauritania	--	--	--	5	39	46	46
Morocco	14	7	3	3	3	3	3
Namibia	23	6	10	6	25	27	30
South Africa	166	137	97	100	126	135	138
Tanzania <sup>2</sup>	--	--	3	3	6	8	8
Zambia	316	249	447	514	800	900	1,000
Zimbabwe	9	2	3	3	2	2	2
Total	600	500	700	800	1,700	2,200	2,300

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Copper contained in concentrates and doré.

TABLE 8  
AFRICA: HISTORIC AND PROJECTED REFINED COPPER PRODUCTION, 1995-2013<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2006	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>
Botswana	--	--	(2)	--	5	20	20
Congo (Kinshasa)	35	--	--	--	190	510	510
Egypt <sup>3</sup>	4	4	14	14	14	14	14
South Africa	124	126	99	104	116	116	118
Zambia	328	227	399	460	600	700	700
Zimbabwe	7	10	2	2	2	2	2
Total	500	370	510	580	930	1,360	1,360

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Pilot plant production only.

<sup>3</sup>Egypt produced secondary refined copper; primary production in all other African countries.

TABLE 9  
AFRICA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in kilograms)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	--	--	697	377	1,500	1,500	1,000
Benin <sup>2</sup>	300	--	20	20	20	20	20
Botswana	86	4	2,709	3,020	3,200	3,200	3,200
Burkina Faso	1,319	625	1,397	1,571	9,800	9,800	9,800
Burundi	2,000	--	3,905	4,313	4,300	4,300	4,300
Cameroon <sup>2</sup>	800	1,000	18,895	20,000	15,000	15,000	15,000
Central African Republic	97	15	10	10	10	10	10
Chad	--	120	150	150	50	50	50
Congo (Brazzaville)	10	10	120	100	100	100	100
Congo (Kinshasa)	1,180	69	9,000	10,000	10,000	10,000	10,000
Côte d'Ivoire	1,983	3,444	1,335	1,324	5,000	6,600	6,600
Equatorial Guinea	50	500	200	200	200	200	200
Eritrea	59	264	25	25	13,200	840	1000
Ethiopia	4,500	3,206	4,376	4,028	4,000	4,000	4,000
Gabon	70	70	300	300	300	300	300
Ghana	53,087	72,080	66,852	66,205	70,000	70,000	70,000
Guinea	7,863	15,788	25,097	18,147	19,000	19,000	19,000
Kenya	170	1,243	616	432	650	650	650
Liberia	800	25	27	11	10	10	10
Madagascar	38	5	5	5	5	5	5
Mali	3,996	28,717	44,230 <sup>3</sup>	51,957	58,200	58,200	58,200
Mauritania	1,196	--	--	322	5,300	5,300	5,300
Morocco	580	505	1,786	1,800	2,700	2,700	2,600
Mozambique	6,800	23	63	68	70	2,700	2,700
Namibia	2,394	2,417	2,703	2,790	2,800	2,500	2,500
Niger	1000	25	4,962	2,615	3,000	3,000	3,000
Nigeria	5	52	30	40	30	30	30
Rwanda	26	10	--	--	--	--	--
Senegal	--	550	600	600	600	600	600
Sierra Leone	4	--	53	71	70	70	70
South Africa	523,809	430,800	294,671	272,128	330,000	360,000	360,000
Sudan	3,700	5,774	3,625	3,158	2,700	--	--
Tanzania	320	15,060	52,236	47,000	50,000	56,000	56,000
Uganda	1,506	56	46	50	50	50	50
Zambia	91	600	440	800	1,000	1,100	1,200
Zimbabwe	23,959	22,069	14,024	11,354	8,000	15,000	20,000
Total	644,000	605,000	555,000	525,000	621,000	653,000	657,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>From artisanal mining.

<sup>3</sup>Excludes artisanal mining, which was estimated to be 2,000 kilograms in 2005.

TABLE 10  
AFRICA: HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 1995-2013<sup>1</sup>

(Fe content in thousand metric tons)

Country	Average grade <sup>2</sup>	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	50%	1,100	820	800	1,200	500	1,000	1,000
Egypt	55%	1,120	1,900	1,599	1,600	1,600	1,200	1,200
Liberia	57% to 64%	--	--	--	--	--	--	--
Mauritania	59% to 72%	7,000	7,500	7,000	7,250	7,300	7,300	7,300
Morocco	54%	32	4	4	4	4	4	4
Nigeria	36%	62	9	20	50	50	100	1,000
Senegal	42% to 59%	--	--	--	--	--	6,300	6,300
South Africa	62% to 65%	19,800	21,570	24,900	26,000	34,200	39,700	45,800
Tanzania	32%	14	--	--	--	--	--	--
Tunisia	54%	122	98	108	112	70	50	--
Uganda	61% to 67%	--	3	--	--	--	--	--
Zimbabwe <sup>3</sup>		160	225	185	52	100	100	200
Total		29,400	32,100	34,600	36,300	43,800	55,800	62,800

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Direct-shipping ore and concentrate.

<sup>3</sup>Average iron content for Zimbabwe prior to 1996 was 61%. Since 1996, the average grade has been 51%.

TABLE 11  
AFRICA: HISTORIC AND PROJECTED STEEL PRODUCTION, 1995-2013<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	827	842	1,007	1,200	1,700	2,500	2,500
Congo (Kinshasa)	NA	159	110	104	100	100	100
Egypt	2,642	2,838	5,600	5,500	5,500	5,500	5,500
Kenya	20	--	--	--	--	--	--
Libya	909	1,055	1,260	1,158	1,300	1,700	1,700
Mauritania	NA	5	1	1	1	1	1
Morocco	7	5	5	5	5	5	5
Nigeria	36	--	100	900	1,000	1,000	2,400
South Africa	8,741	8,481	9,493	9,721	11,600	12,000	12,000
Tunisia	201	237	66	68	200	200	200
Uganda	12	7	7	5	7	7	7
Zimbabwe	210	258	107	60	150	300	400
Total	13,600	13,900	17,600	17,700	20,400	22,100	22,200

<sup>c</sup>Estimated. NA Not available. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 12  
AFRICA: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in metric tons)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	1,383	818	--	--	--	--	--
Morocco	67,708	81,208	42,200	45,000	45,000	42,000	40,000
Namibia	16,084	11,114	14,320	11,830	15,300	15,300	7,000
Nigeria	NA	165	--	100	100	100	100
South Africa	88,449	75,262	42,159	48,273	48,000	48,000	48,000
Tunisia	6,601	6,602	8,708	--	--	--	--
Total	180,000	175,000	107,000	105,000	108,000	105,000	95,000

<sup>c</sup>Estimated. NA Not available. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 13  
AFRICA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED LEAD PRODUCTION, 1995-2013<sup>1</sup>

(Metric tons)

Country <sup>2</sup>	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	8,300	6,100	5,000	5,000	--	--	--
Kenya	2,000	1,000	1,000	1,000	1,000	1,000	1,000
Morocco	59,673	66,812	39,000	47,700	50,000	40,000	40,000
Namibia	26,752	--	--	--	--	--	--
Nigeria	4,000	5,000	5,000	5,000	5,000	5,000	5,000
South Africa	32,100	46,200	65,300	70,000	67,000	67,000	67,000
Total	133,000	125,000	115,000	129,000	123,000	113,000	113,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Nigeria also refines a small quantity of primary lead.

TABLE 14  
AFRICA: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in metric tons)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Botswana	18,088	38,420	39,305	38,000	38,000	25,000	25,000
Cameroon	--	--	--	--	--	3,200	3,200
Madagascar	--	--	--	--	--	60,000	60,000
Morocco	NA	84	99	80	100	100	100
South Africa	30,700	36,616	42,392	41,599	45,000	62,000	74,000
Zambia	--	--	--	--	10,000	10,500	10,500
Zimbabwe	11,721	8,160	8,556	8,825	9,000	8,000	7,500
Total	60,500	83,300	90,000	89,000	102,000	169,000	180,000

<sup>c</sup>Estimated. NA Not available. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 15  
AFRICA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in kilograms)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Ethiopia	--	--	--	5	12	12	12
South Africa	102,300	114,459	163,711	168,125	198,000	217,000	241,000
Zimbabwe	7	505	4,834	4,998	8,000	11,000	11,000
Total	102,000	115,000	169,000	173,000	206,000	228,000	252,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 16  
AFRICA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in kilograms)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
South Africa	51,000	55,818	82,961	86,265	111,000	120,000	132,000
Zimbabwe	17	366	3,879	4,022	6,500	9,000	9,000
Total	51,000	56,000	87,000	90,000	118,000	129,000	141,000

<sup>c</sup>Estimated.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 17  
AFRICA: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in metric tons)

Country <sup>2</sup>	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	7,174	10,452	4,463	572	--	1,000	3,000
Burkina Faso	--	--	--	--	68,000	68,000	68,000
Congo (Kinshasha)	4,500	--	7,500	16,500	16,000	16,000	16,000
Morocco	79,947	103,064	78,660	72,600	70,000	70,000	70,000
Namibia <sup>3</sup>	30,209	39,126	69,368	55,455	65,000	65,000	30,000
South Africa	70,241	63,590	32,112	34,444	34,000	34,000	34,000
Tunisia	44,244	41,247	15,889	--	--	--	--
Total	236,000	257,000	208,000	180,000	253,000	254,000	221,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Nigeria also mined a small quantity of zinc.

<sup>3</sup>Does not include zinc content of ore processed at Skorpion solvent extraction-electrowinning facility.

TABLE 18  
AFRICA: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 1995-2013<sup>1</sup>

(Metal content in metric tons)

Country <sup>2</sup>	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	30,000	34,000	30,000	30,000	30,000	30,000	30,000
Namibia	--	--	132,818	129,897	150,000	150,000	150,000
South Africa	98,782	103,000	102,000	90,000	120,000	120,000	120,000
Total	129,000	137,000	265,000	250,000	300,000	300,000	300,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Nigeria also refined a small quantity of zinc.

TABLE 19  
AFRICA: HISTORIC AND PROJECTED DIAMOND MINE PRODUCTION, 1995-2013<sup>1</sup>

(Thousand carats)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Angola <sup>2,3</sup>	2,900	4,313	7,079	9,175	10,000	10,000	10,000
Botswana	16,802	24,635	31,890	34,293	35,000	35,000	35,000
Cameroon	NA	NA	12	12	12	12	12
Central African Republic	530	464	383	420	400	400	400
Congo (Brazzaville)	NA	50	50	50	50	50	50
Congo (Kinshasa)	22,024	16,006	35,207	28,540	27,200	27,200	27,200
Côte d'Ivoire	75	320	300	300	300	300	300
Gabon	1	1	<sup>(4)</sup>	<sup>(4)</sup>	<sup>(4)</sup>	<sup>(4)</sup>	<sup>(4)</sup>
Ghana	632	878	1,013	973	1,000	1,000	1,000
Guinea	365	327	549	474	1,000	1,000	1,000
Lesotho	NA	2	37	37	390	390	390
Liberia	150	170	NA	NA	20	20	20
Namibia	1,382	1,552	1,902	2,356	4,000	9,000	8,000
Sierra Leone	214	77	669	582	600	600	600
South Africa	9,683	10,790	15,776	15,153	16,100	16,700	16,700
Tanzania	50	354	220	272	580	580	580
Togo	NA	NA	41	28	30	30	30
Zimbabwe	204	23	251	1,046	1,000	700	700
Total	55,000	60,000	95,400	93,700	97,700	103,000	102,000

<sup>c</sup>Estimated. NA Not available.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Does not include smuggled production.

<sup>3</sup>Production was about 90% gem and 10% industrial grade.

<sup>4</sup>Less than 1 unit.



TABLE 20  
AFRICA: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1995-2013<sup>1</sup>

(P<sub>2</sub>O<sub>5</sub> content in thousand metric tons)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Algeria	500	265	260	460	350	300	250
Burkina Faso	NA	NA	1	1	1	1	1
Egypt	207	317	622	625	800	800	800
Mali	1	--	--	--	--	--	--
Morocco	6,399	7,200	9,195	9,100	9,500	9,500	9,500
Senegal	556	626	464	187	200	200	200
South Africa	1,101	1,083	1,000	1,000	1,000	1,000	1,000
Tanzania	2	2	2	1	1	1	1
Togo	930	490	481	590	600	600	600
Tunisia	2,181	2,500	2,500	2,400	2,400	2,300	2,300
Zimbabwe	45	25	14	20	15	25	25
Total	11,900	12,500	14,500	14,400	14,900	14,700	14,700

<sup>c</sup>Estimated. NA Not available. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 21  
AFRICA: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 1995-2013<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Botswana	898	947	985	962	1,200	5,200	5,000
Congo (Kinshasa)	10	--	1	1	1	1	1
Egypt	10	39	75	75	75	75	75
Malawi	15	34	45	48	48	48	48
Morocco	650	31	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
Mozambique	40	16	3	10	260	12,800	12,800
Niger	135	158	182	176	180	180	180
Nigeria	29	12	--	10	50	50	50
South Africa	206,210	224,118	244,940	244,782	264,000	286,000	295,000
Swaziland	172	178	222	311	300	300	300
Tanzania	43	79	75	18	150	150	150
Zambia	141	168	240	100	100	120	150
Zimbabwe	5,538	3,809	2,891	2,107	2,500	4,000	4,000
Total	214,000	230,000	250,000	249,000	269,000	309,000	318,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Less than 1 unit.

TABLE 22  
AFRICA: HISTORIC AND PROJECTED URANIUM PRODUCTION, 1995-2013<sup>1</sup>

(U content in metric tons)

Country	1995	2000	2005	2006	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>
Gabon	770	--	--	--	--	--	--
Malawi	--	--	--	--	1,300	1,300	1,300
Namibia	2,006	2,714	3,147	3,067	5,000	7,000	8,000
Niger	2,970	2,895	3,093	3,434	3,400	3,400	3,400
South Africa	1,443	861	674	542	1,800	2,800	2,900
Total	7,200	6,500	6,900	7,000	11,500	14,500	15,600

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.