



# 2007 Minerals Yearbook

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## AFRICA

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# THE MINERAL INDUSTRIES OF AFRICA

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The 56 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 958 million people in 2007. 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, chromite, cobalt, hafnium, industrial diamond, manganese, phosphate rock, platinum-group metals (PGM), soda ash, vermiculite, and zirconium.

The mineral industry was an important source of export earnings for many African nations in 2007. 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, Angola, 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.

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- For mineral production statistics—
- Algeria—Ministry of Energy and Mines,
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  - Botswana—Department of Mines,
  - Burundi—Ministry of Water, Energy, and Mines,
  - 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; Precious Mineral Marketing Company Ltd.,
  - Guinea—Ministry of Mines, Geology, and Environment; National Directorate of Statistics,
  - Kenya—Ministry of Environment and Natural Resources,
  - Mali—National Directorate of Geology and Mines,
  - Malawi—Department of Mines,
  - Mauritania—National Office of Statistics,
  - Mauritius—Central Statistics Office,

- Morocco—Directorate of Statistics,
  - Mozambique—National Directorate of Mines,
  - Namibia—Ministry of Mines and Energy,
  - Niger—National Institute of Statistics,
  - South Africa—Department of Minerals and Energy, Mineral Economics Directorate,
  - Swaziland—Central Statistical Office,
  - Tanzania—Ministry of Energy and Minerals,
  - Tunisia—Industrial Promotion Agency,
  - Uganda—Department of Geological Survey and Mines, and
  - Zimbabwe—Chamber of Mines.
- For basic economic data—the International Monetary Fund.  
For minerals consumption data—
- BP p.l.c.,
  - Department of Minerals and Energy of the Republic of South Africa, and
  - International Iron and Steel Institute.
- For exploration and other mineral-related information—the Metals Economics Group (MEG) in Canada.

## General Economic Conditions

In 2007, the real gross domestic product (GDP) of Africa increased by 6.3% after increasing by a revised 6.1% in 2006. From 2002 to 2007, Africa's GDP increased at an average annual rate of about 6%. In 2007, the GDP increased by an average of 7.9% 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 7.4% in 2008 and 7.6% in 2009. In petroleum-importing countries, GDP growth was expected to be at or about 5% in 2008 and 2009 (International Monetary Fund, 2008d, p. 76, 263).

## Investment Data and Political Risk

The Department of Minerals and Energy of the Republic of South Africa reported that investment in newly committed mineral projects in South Africa (that is, those for which funds had already been committed or were being expended) was \$8.04 billion in 2007. PGM accounted for 52% of the investment; gold, 2%; and other minerals, 46%. An additional \$13.1 billion was reported for potential mineral projects in South Africa (that is, feasibility-level projects for which funds had not yet been committed). PGM accounted for 11% of the investment; gold, 8%; and other minerals, 81%. Investment in newly committed processed minerals projects amounted to \$255 million (Mwape and others, 2008, p. 16-17).

By 2013, capital expenditure for the Ambatovy nickel mine in Madagascar was expected to total \$3.3 billion; that for the Dian Dian bauxite mine in Guinea, \$2.5 billion; for refined

petroleum projects in Sudan, \$2.5 billion; and for coal projects in Mozambique, between \$1.2 billion and \$2 billion. Substantial capital expenditures were also likely to be made for cobalt and copper projects in the Democratic Republic of the Congo [Congo (Kinshasa)] and Zambia, crude petroleum projects in Nigeria and Sudan, iron ore projects in Guinea and Senegal, and natural gas projects in Nigeria.

The period 2006-07 saw an increase of \$8 billion in extractive industry investment in Africa's least developed countries, such as Ethiopia and Madagascar, following two successive years of decline. Africa's least developed countries accounted for about 23% of the total foreign direct investment (FDI) inflow to the region, and countries of the Asia and Pacific region accounted for more than 50% of such investment in Africa. International corporations from China, India, the Republic of Korea, Malaysia, Singapore, and Taiwan were the top Asian investors to Africa's least developed countries (United Nations Conference on Trade and Development, 2007, p. 40). Interest in African mineral resources also was shown by European and Russian companies. The International Finance Corp. reportedly planned to spend between 75% and 85% of its 2007 investments in the mining sector on projects in Africa (Stablum, 2007).

Countries directly affected by wars, internal ethnic or political conflicts, and refugee displacements in 2007 included Chad, Congo (Kinshasa), Côte d'Ivoire, Ethiopia, Nigeria, Somalia, Sudan, and Uganda.

## Legislation

The Nigerian Minerals and Mining Act of 2007 was signed into law in February. The legislation repeals 1999 legislation and reconfigures mining controls; creates certain mining incentives; sets qualifications for mineral exploration, mining, and quarrying; and outlines environmental considerations and the rights of host communities (Ministry of Mines and Steel Development of Nigeria, 2007). In May, the Nigeria Extractive Industries Transparency Initiative Act 2007 was signed. The Act provides for the verification and public release of information related to the oil, gas, and mining sectors and provides annual audits of these sectors (Anaro and Aregbesola, 2007).

The Government of Zimbabwe suspended the issuance of new Exclusive Prospecting Orders to prospective mineral exploration and mining companies (Karombo, 2007). In addition, previous applications for such exploration licenses made as far back as 2003 were also not being processed, and it was unclear whether such applications would be approved. A draft bill by the Zimbabwean Government to force foreign companies doing business in Zimbabwe to transfer majority shareholdings to local owners was to be debated in early 2008. However, a provision that would have required companies to provide the Government with a free 25% stake was removed from this version of the proposed legislation (Macharia, 2008).

In November 2007, the Government of Tanzania appointed a committee to review all mining contracts. The committee was expected to complete its work and report to the Government by February 2008. The Government of Congo (Kinshasa) announced plans to review mining contracts in early 2007 and started the process in June (Avery, 2008).

## Exploration

Exploration activity, as defined by African exploration budgets reported by the MEG, increased by 40% to \$1.6 billion in 2007 from \$1.1 billion in 2006. In 2007, the principal mineral commodities of interest for exploration in Africa were copper, diamond, gold, PGM, and uranium (Metals Economics Group, 2007).

Exploration was focused primarily in (in order of the number of sites being explored) South Africa, Mali, Ghana, Zambia, Congo (Kinshasa), Tanzania, Namibia, Botswana, Guinea, and Mozambique, but activity also took place in a number of other countries. Gold targets accounted for approximately 48% of reported African exploration projects, copper and diamond each represented about 12%, uranium made up about 8%, and PGM made up about 7%. Based on the number of active exploration sites, early-stage projects accounted for about 74% of the 2007 activity, whereas feasibility-stage projects represented about 16%.

The amount of FDI in Africa doubled between 2004 and 2006 as a result of high commodity prices and buoyant demand from emerging economies (United Nations Conference on Trade and Development, 2007, p. xvii). Available data suggest that the pattern of African mineral exploration investment in 2007 varied significantly from country to country.

Data released by Natural Resources Canada suggest that more than 100 Canadian exploration and mining companies were active in projects in 37 African countries. Canadian spending on exploration accounted for more than \$259 million in Africa in 2007, or an estimated 24% of all African exploration spending. Canadian-capitalized companies were set to invest an additional \$43 billion into mining ventures in Africa during the next 4 to 5 years (Madawo, 2007). Canadian companies had expanded their exploration into such countries as Burkina Faso, Kenya, Madagascar, and Tanzania, where technological advances had aided in the discovery of base and precious metals, cobalt, heavy minerals, and uranium. Australian companies had also focused on Africa. BHP Billiton Ltd. allocated about \$130 million of its \$670 million exploration budget to Africa, focusing on Angola, Congo (Kinshasa), and Guinea (Stablum, 2007).

The AfricaArray project, which was operated by the South African Council for Geoscience, The Pennsylvania State University, and Wits University in South Africa, established a consortium of scientists from the United States and nine African countries to conduct a 4-year seismic study of the African Superplume in East Africa (Faurie, 2007). In addition to collecting geophysical data, this project was designed to provide training on current geophysical techniques to African scientists.

## Commodity Overview

Estimates for the production of major mineral commodities for 2007 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 (2007) 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 2007, African production of refined aluminum decreased by nearly 4% compared with that of 2006. South Africa accounted for about 50% of African aluminum output; Mozambique, 31%; and Egypt, 14% (table 6). Africa accounted for 4% of the world's aluminum production in 2007. In South Africa, production remained nearly unchanged at the Bayside and the Hillside smelters. In Ghana, production shut down at the Valco smelter because of limited power availability resulting from low water levels in Lake Volta. Production increased at the Nag Hammadi smelter in Egypt. Kenya was the only African producer of secondary refined aluminum.

African bauxite production decreased by 1% in 2007. Guinea accounted for about 89% of African bauxite production, and Sierra Leone, 6% (table 5). In 2007, Africa's share of world bauxite production was 9%. In Guinea, production decreased at Compagnie des Bauxites de Guinée and Compagnie des Bauxites de Kindia's mines. Production also decreased in Ghana. Output increased at the SML bauxite mine in Sierra Leone.

*Consumption.*—In 2007, world aluminum consumption amounted to 37.2 million metric tons (Mt) compared with 34 Mt in 2006. Africa accounted for about 1% of world aluminum consumption in 2007; South Africa's consumption decreased to 360,000 metric tons (t) in 2007 from 374,000 t in 2006 (Chili, 2008a).

*Outlook.*—The production of refined aluminum is expected to increase by an average of about 6% per year from 2007 to 2015. The majority of the increase is likely to be attributable to the start of the new Coega smelter in South Africa in 2012. In Nigeria, the smelter at Ikot Abasi is expected to reopen in 2008 and to reach full capacity by 2011. In Ghana, the reopening of the Valco smelter would depend upon reliable power supplies (table 6).

African bauxite production is likely to increase by between 3% and 4% per year from 2007 to 2015 (table 5). The Dian-Dian bauxite project could start in Guinea by 2013. In Sierra Leone, the Porto Loko deposit could be developed by 2015. Sierra Leone's share of African bauxite production could increase to 18% in 2015 from 6% in 2007 (table 5).

**Copper.**—*Production.*—Africa's mine production of copper increased by about 6% in 2007. In 2007, Zambia accounted for 61% of African copper mine production; Congo (Kinshasa), 17%; and South Africa, 14% (table 7). Africa's share of world copper mine production was 5% in 2007. The production increase in Congo (Kinshasa) was attributable to the opening of the Frontier, the Kalumines, and the Kinsevere Mines and increased output from the Dikulushi Mine and the Ruashi tailings project. In South Africa, output increased at the Palabora Mine. Production also increased in Zambia.

Africa's refined copper production increased by 16% from 2006 to 2007; most of the increase was attributable to production in Zambia. In 2007, Zambia accounted for 78% of African refined copper production; South Africa, 18%; and Egypt, 2% (table 8). In Congo (Kinshasa), refined copper production resumed in 2007 with the opening of the Luita solvent extraction-electrowinning (SX-EW) plant. Increased output in South Africa was attributable to the Palabora refinery. Egypt was the only producer of secondary refined copper; primary production accounted for most African production.

*Consumption.*—In 2007, world refined copper consumption increased to 18 Mt from 17 Mt in 2006. Africa's share of global copper consumption amounted to about 1% in 2007. South Africa's consumption decreased to 77,000 t in 2007 from 84,000 t in 2006 (Chili, 2008b).

*Outlook.*—African copper mine production is expected to increase by an average of about 11% per year from 2007 to 2015. Congo (Kinshasa) is likely to account for a majority of the increase in output. The Ruashi Mine is likely to open in 2008; the Kinsenda and the Tenke Fungurume Mine, in 2009; and the Kalukundi Mine and the Kolwezi tailings project, in 2010. The Frontier and the Kinsevere Mines are expected to reach full capacity in 2009 and 2010, respectively. By 2015, 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 Lonshi Mine is expected to shut down in 2008, and the Ruashi Tailings project, in 2010. The Congolese share of African copper production is likely to increase to 46% in 2015 from 17% in 2007 (table 7).

Nevsun Resources Ltd. planned to mine from a copper-rich zone at the Bisha Mine in Eritrea from late 2011 to 2015. South Africa's production is expected to increase in 2010 because of the expansion of the Nkomati nickel mine. In Mauritania, the Guelb Moghrein Mine is expected to reach full production by 2009. Tanzania's output is likely to increase with the opening of the Bugwazi gold mine in 2009 (table 7).

The production of refined copper is expected to increase by nearly 9% per year from 2007 to 2015. 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 Kinsevere and Tenke Fungurume in 2009, and at the Kolwezi tailings project by 2010. The expansion of the Luita plant is likely to be completed by 2011. Congo (Kinshasa), which produced less than 1% of Africa's refined copper in 2007, could account for 50% of the continent's refined copper output by 2015 (table 8).

**Gold.**—*Production.*—Africa's gold mine production was about 477,000 kilograms (kg) in 2007, which was a decrease

of about 7% compared with that of 2006. Production decreased significantly since 1995 because of the long-term decline in South African production that more than offset the increased output in Guinea, Ghana, Mali, and Tanzania (table 9). In 2006, Africa's share of world gold mine production was about 20% (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, decreased production from the Bulyanhulu, the Golden Pride, and the North Mara Mines and the shutdown of the Buhemba Mine more than offset the production increases from the Geita and the Tulawaka Mines. Mali's production decreased in 2007; the decreases in output from the Morila, the Sadiola, and the Yatela Mines and the shutdown of the Tabakoto Mine more than offset the increased output from the Loulo Mine. Production also decreased in Burundi, Ethiopia, Guinea, Sudan, and Zimbabwe (table 9).

Ghana's gold production increased in 2007; the increased output from the Ahafo, the Chirano, the Prestea, and the Wassa Mines and from artisanal miners more than offset the decreases in output from the the Damang, the Obuasi, and the Tarkwa Mines. Output also increased in Burkina Faso and Zambia (table 9).

In 2007, South Africa accounted for 53% of African gold production; Ghana, 16%; Mali, 9%; and Tanzania, 8%. South Africa's share of continental gold production decreased 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 decrease by 6% by 2009 and then to increase by an average of about 6% per year from 2009 to 2015. The long-term decline in South Africa's production could be reversed after 2009 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 Buffelsfontein and Ezulwini Mines in 2008 and 2009, respectively, is also likely to contribute to increased gold production. Other new gold projects include the Ergo Mine and the Tshepong Decline project in 2008, the Phakisa Shaft in 2009, and the planned expansion of the Masimong Mine in 2010. The expansion of the Moab Khotsonq Mine is expected to be completed in 2012; the Tau Tona Mine, in 2014; and the Mponeng Mine, in 2015 (table 9).

In Ghana, the outlook is for an increase in output because of increased production from the Bogosu/Prestea, the Damang, the Obuasi, and the Wassa Mines by 2009, and the Chirano and the Tarkwa Mines by 2011. Tanzania's production is likely to increase with the opening of the Buzwagi Mine in 2009 and increased production at the Bulyanhulu and the Geita Mines; these increases could more than offset the planned closures of the Tulawaka and the Golden Pride Mines in 2009 and 2012, respectively. In Mali, the expansion of the Loulo Mine and the reopening of the Syama Mine by 2011 are expected to more than offset the decreased output from the Morila Mine. Mining is expected to cease at Sadiola in 2013; production is expected to continue at a lower rate from processing stockpiles (table 9).

Burkina Faso's production is expected to increase sharply with the opening of the Kalsaka, the Taparko-Boroum, and the Youga Mines. In Mauritania, the Tasiast Mine is likely to reach full production in 2008. The outlook for Côte d'Ivoire is

a substantial increase because of the openings of the Angovia and Bonikro Mines. Production could increase in Zimbabwe depending upon the restoration of economic and political stability (table 9).

Several African countries that had only artisanal gold production in 2007 are likely to open large-scale gold mines in the near future. In Congo (Kinshasa), the Nayoma and the Twangiza Mines could open in 2011. Gold-rich zones in the Bisha Mine in Eritrea are planned to be mined from 2010 to 2012. Production could start at the Passendro gold deposit in the Central African Republic by 2015 (table 9).

**Iron and Steel.—Production.**—African production of crude steel remained nearly unchanged in 2007. Production increased in Algeria, Egypt, and Libya. In South Africa, the decrease in output was owing to the decreased production at the Newcastle and the Vanderbijlpark plants. South Africa accounted for 47% of regional crude steel production; Egypt, 32%; and Algeria and Libya, 7% each (table 11). Africa's share of world crude steel production amounted to 1% in 2007.

In 2007, South Africa's production of hot-rolled steel products was 7.11 Mt compared with 7.51 Mt of in 2006. In Egypt, output increased to 6.69 Mt in 2007 from 6.42 Mt in 2006, and in Morocco, to 1.02 Mt from 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, 2009, p. 4).

**Consumption.**—In 2007, world crude steel consumption increased to 1.32 billion metric tons (Gt) from 1.24 Gt in 2006. African crude steel consumption increased to nearly 26.5 Mt in 2007 from 25.6 Mt in 2006. Egypt accounted for 28% of African crude steel demand; South Africa, 25%; Algeria, 17%; Morocco, 8%; and Libya and Nigeria, 5% each (International Iron and Steel Institute Committee on Economic Studies, 2009, p. 91-92).

**Outlook.**—Crude steel production is expected to decrease by about 11% by 2009, and then to increase by 7% per year from 2009 to 2015. Nigeria, which accounted for less than 3% of African crude steel output in 2007, could increase its share to 9% by 2015 with the opening of the Ajaokuta plant and increased production at the Delta plant. In South Africa, the expansion of the Vanderbijlpark plant is expected to account for most of the increase in production. In Algeria, Arcelor Mittal Annaba plans to increase output by 2011. Ethiopia's production is expected to increase because of the expansions of two steel plants at Debre Zeit. Expansion plans in Libya are likely to be completed by 2009. Production could increase in Zimbabwe from 2011 to 2013 as Zimbabwe Iron and Steel Co. restores its capacity; improvement in this company's situation depends upon the restoration of economic and political stability. Output is also expected to increase in Mauritania and Tunisia (table 11).

**Iron Ore.—Production.**—In 2007, the iron content of ore produced in Africa amounted to 37 Mt compared with about 36 Mt in 2006. South Africa was the leading iron ore producer in Africa and accounted for 72% of continental output; Mauritania, 21%; and Egypt, 4%. Increased production in South Africa was attributable to the Beeshoek, the Sishen, and the Thabazimbi Mines (table 10).

**Outlook.**—The iron content of ore produced in Africa is expected to increase to about 134 Mt in 2015 (table 10). In

South Africa, the current expansion of the Sishen Mine is likely to be completed in 2010; a further expansion of the mine could be completed by 2013. Production at the Khumani Mine is planned to start in 2008 and to reach full capacity in 2010; a further expansion of the mine could be completed by 2013. The opening of Khumani would more than offset the expected decrease in output from the Beeshoek Mine after 2008. In Guinea, Rio Tinto plc planned to start production at the Pic-de-Fon iron ore deposit by 2013. Senegal's Faleme deposit is expected to be mined starting in 2013; full production is expected by 2015. In Gabon, mining at the Belinga iron ore deposit could start by 2015. In Algeria, increased production would be attributable to the Al-Wenza and the Bou Khadra Mines (table 10).

Guinea, Senegal, and Gabon did not produce iron ore in 2007; their shares of African iron ore production by 2015 are expected to be 34%, 9%, and 9%, respectively. South Africa's share is likely to decline to 39% from 72% in spite of a doubling in domestic production (table 10).

**Lead.—Production.**—From 2006 to 2007, African lead mine production remained unchanged. In 2007, Morocco accounted for 39% of African lead mine production; South Africa, 36%; Nigeria, 15%; and Namibia, 10% (table 12). Africa's share of the world's lead mine production was about 3% in 2007. In South Africa, output decreased at the Black Mountain Mine. Production increased in Morocco and Nigeria.

African production of refined lead decreased by nearly 2% in 2007 compared with that of 2006; increased output in South Africa was more than offset by the shutdown of production in Algeria. South Africa accounted for 56% of African refined lead output, and Morocco, 39% (table 13).

**Outlook.**—The decrease in African lead mine production is likely to continue, with output expected to decrease by 26% by 2015. South Africa's Black Mountain Mine is expected to shut down in 2014. Production is expected to restart in Algeria (table 12). Refined lead production is likely to remain unchanged through 2015 (table 13).

**Nickel.—Production.**—African mine production of nickel decreased by 18% in 2007. Output also decreased in Botswana, South Africa, and Zimbabwe. Most of South Africa's nickel output was a coproduct of PGM mining. In 2007, South Africa accounted for 52% of African nickel mine output; Botswana, 38%; 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 increase by an average of between 12% and 13% per year from 2007 to 2015. The startup of the Ambatovy nickel and cobalt mine in Madagascar in 2010 or 2011 is expected to account for the majority of the increase. Madagascar, which did not mine nickel in 2007, could have a 32% share of African nickel mine production by 2013. Botswana's production is likely to double because of the expansion of the Phoenix Mine and the opening of the Mowana Mine. Increased output is expected in South Africa because of increased capacity at the Nkomati nickel mine and the Northam and the Pilanesberg PGM mines. In Zambia, Albidon Ltd. planned to start production from the Munali project. Output is expected to decrease in Zimbabwe (table 14).

**Platinum-Group Metals.—Production.**—From 2006 to 2007, Africa's production of platinum and palladium decreased

by 4% and 3%, respectively. South African production decreased because of the decrease in output from the Eastern Platinum, the Impala, the Karee, the Kroondal, the Rustenburg, and the Western Platinum Mines. PGM production increased in Zimbabwe. South Africa, which was the continent's dominant producer of PGM, accounted for 97% and 95% of the production of platinum and palladium, respectively (tables 15, 16).

**Outlook.**—African mine production of palladium is expected to decrease by 7% by 2009 and to increase by an average of 6% per year from 2009 to 2015. Platinum mine production is likely to decrease by 15% by 2009 and to increase by an average of 7% per year from 2009 to 2015. In South Africa, the increase is likely to be attributable to the opening of the Blue Ridge and the Smokey River Mines in 2008, the Pilansberg Mines in 2009, the Leeuwkop Mine and the Western Bushveld project in 2010, and the Kalahari Mine in 2011. Expansions are planned to be completed at the Modikwa Mine in 2008 and the Marula, the Nkomati, and the Northam Mines in 2010. The Two Rivers Mine is expected to reach full capacity in 2008. The Marikana Mine is scheduled to be shut down in 2013, and the Everest and the Smokey River Mines, in 2015. Increased output in Zimbabwe is likely to result from the expansion of the Mimosa and the Ngezi Mines and the opening of the Unki Mine (tables 15, 16).

**Tin.—Production.**—In 2007, African tin mine production increased by nearly 34%. Increased output in Congo (Kinshasa) was attributable to increased artisanal and small-scale mining activity in North Kivu Province. Increased Congolese output more than offset the decrease in output in Nigeria. In 2007, Congo (Kinshasa) accounted for 69% of African tin mine production, and Rwanda, 30% (table 17).

Africa did not produce refined tin in 2007 (table 18). Production of tin metal ceased in Nigeria and Rwanda in 2005 and 2006, respectively.

**Outlook.**—African tin mine production is expected to increase by about 46% by 2009. Most of the increase is likely to be attributable to increased artisanal and small-scale mining activity in Congo (Kinshasa) (table 17). African countries are unlikely to open new tin refineries by 2015 because of high energy costs (table 18).

**Zinc.—Production.**—During 2007, Africa's mine production of zinc decreased by about 7%. In Namibia, production decreased at the Rosh Pinah Mine because of equipment failures, floods, and labor disputes. In South Africa, output decreased at the Black Mountain Mine. Output also decreased in Morocco. Algeria's zinc mine production ceased in 2007. Production increased at Slag Treatment Plant Lubumbashi in Congo (Kinshasa). In 2007, Morocco accounted for 38% of African zinc mine production; Namibia, 29%; South Africa, 17%; and Congo (Kinshasa), 11% (table 19). Africa's share of world zinc mine production was about 2% in 2007.

African production of zinc metal remained nearly unchanged in 2007. Production increased at the Skorpion smelter in Namibia and at the Zincor smelter in South Africa; these increases were offset by the shutdown of the smelter at Ghazaouet in Algeria. Namibia, which did not produce zinc metal before 2003, accounted for 60% of continental zinc metal

production in 2007. South Africa's share decreased to 40% in 2007 from 75% in 2000 (table 20).

**Consumption.**—In 2007, world refined zinc consumption increased to 11 Mt from 10.7 Mt in 2006. Africa's share of global zinc consumption amounted to about 2% in 2007 (Pitso, 2008).

**Outlook.**—African zinc mine production is expected to increase by an average of 5% per year from 2007 to 2013, and then to more than double in 2015. In Algeria, the Oued Amizour project is expected to commence operations in 2011. The Perkoa zinc project in Burkina Faso could start production in 2013. Burkina Faso, which did not mine zinc in 2007, could account for 12% of continental zinc mine production in 2015. In Eritrea, mining from a zinc-rich zone of the Bisha deposit is planned to start by 2015. In South Africa, the life of the Black Mountain Mine is estimated to be 7 years. The shutdown of the Black Mountain Mine in 2014 is expected to be more than offset by the opening of the Gamsberg Mine. Zinc mine production at Gamsberg is likely to be nearly double that of all African production in 2007. South Africa's share of African zinc mine production would be 54% by 2015 (table 19).

Continental production of zinc metal is also expected to more than double in 2015 because of the Gamsberg project in South Africa. By 2015, South Africa's share of zinc metal production could increase to 73% (table 20).

### **Industrial Minerals**

**Diamond.**—**Production.**—In 2007, Africa's share of world diamond production, by volume, was 55%. African diamond production decreased by nearly 2% in 2007 compared with that of 2006. Congo (Kinshasa) accounted for a majority of the decrease in production, by volume; Société Minière de Bakwanga (MIBA) experienced a sharp decrease in output. In Botswana, the decrease in production from the Jwaneng Mine more than offset the increase in production from the Damtshaa, the Letlhakane, and the Orapa Mines. The decrease in Namibia's output was attributable to decreased output from small producers. In Zimbabwe, the decrease in production was partially attributable to decreased output from the Murowa Mine.

In Guinea, production increased sharply because of increased output by artisanal and small-scale miners. Increased output in South Africa was attributable to increased production from the Venetia Mine and the opening of the South Africa Sea Areas project. Diamond production also increased in Angola. Botswana accounted for 36% of African diamond output by volume; Congo (Kinshasa), 29%; South Africa, 17%; and Angola, 11% (table 21).

In 2007, the global value of rough diamond production amounted to \$12.5 billion, of which Africa accounted for about 60%. Botswana accounted for 24% of the value of global rough diamond output; Angola, 11%; South Africa, 11%; Congo (Kinshasa), 7%; and Namibia, 5%. The global value of polished diamond production amounted to \$19.9 billion, of which South Africa accounted for nearly 5% (Even-Zohar, 2008).

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 December 2006, the following African countries had met the minimum requirements of the KPCS: Angola, Botswana, Central African Republic, Congo (Brazzaville), Congo (Kinshasa), Ghana, Guinea, Lesotho, Liberia, Mauritius, Namibia, Sierra Leone, South Africa, Tanzania, Togo, and Zimbabwe. Liberia was readmitted to the KPCS in May 2007, and Congo (Brazzaville) was readmitted in November. As a result, the embargoes on exportation of rough diamond from Liberia and Congo (Brazzaville) were lifted (United Nations Department of Public Information, 2007).

KPCS efforts to control illicit diamond production focused on Côte d'Ivoire in 2007. 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 in Africa is expected to decrease by 26% by 2009, and then to increase by an average of between 7% and 8% per year from 2009 to 2015. Angola's production is likely to double because of the opening of new mines and increased output from existing mines. In South Africa, the De Beers Group planned to increase production from the Finsch Mine and its marine operations and to open the Voorspoed Mine. Lesotho's production is expected to increase because of the opening of three new mines. Production could also increase in Zimbabwe by 2011 (table 21).

**Phosphate Rock.**—**Production.**—In 2007, the diphosphorous pentoxide ( $P_2O_5$ ) content of African phosphate rock production amounted to about 13.8 Mt compared with 14 Mt in 2006. Decreased production in Togo more than offset increased production in Algeria and Senegal. In Togo, output decreased because of the depletion of easily accessible deposits and the lack of funding for new investment. Morocco, which was the leading producer of phosphate rock in Africa, accounted for 63% of continental phosphate rock output in 2007; Tunisia, 17%; and South Africa, 7% (table 22).

**Outlook.**—The  $P_2O_5$  content of African phosphate rock production is expected to increase to about 14.5 Mt by 2015. Algeria is expected to account for the majority of the increase because of the opening of the Bled El Hadba Mine. In Tunisia, planned increases in output are likely to be consumed by a new phosphoric acid plant opening in 2009 (table 22).

**Potash.**—**Production.**—Africa did not mine potash in 2007 (table 23). The most recent African production of potash was in Congo (Brazzaville) in 1977.

**Outlook.**—Potash production is expected to start at the Kouilou project in Congo (Brazzaville) in late 2011 or early 2012. Congo (Brazzaville) is likely to be the only African producer of potash until at least 2015 (table 23).

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

**Coal.**—**Production.**—African coal production increased by 1% in 2007. In South Africa, increased output was attributable

to increased production by small producers; new mines included the Forzando South Mine. Each of the country's four leading producers experienced decreases in production. Output increased in Mozambique, Tanzania, and Zimbabwe, and decreased in Botswana and Swaziland. 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 24). 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 2007.

*Consumption.*—Africa accounted for about 3% of world coal consumption in 2007. Within the region, South Africa accounted for 92% of African coal consumption. From 2002 to 2007, Africa's consumption of coal increased by about 15% (BP p.l.c., 2008, p. 35).

*Outlook.*—African coal production is expected to increase by between 2% and 3% per year from 2007 to 2015. South Africa is likely to be responsible for the majority of the increase; its production could increase to 292 Mt by 2015 (table 24). Increased output would be attributable to the opening of the Eerstelingsfontein and the Inyanda Mines in 2008; the Holfontein, the Mooiplaats, and the Tumelo Mines in 2009; the Zongdagsfontein Mine in 2010; the Elders Opencast Mine in 2011; and the Elders and the Heidelberg underground mines in 2013; and the expansions of the Mafube and the New Clydesdale Mines in 2008, the Forzando South Mine in 2009, and the Goedgevonden Mine in 2011 (table 24).

Mozambique is expected to become the second ranked coal producer in Africa with the development of the Moatize project in 2010. In Zimbabwe, output could increase at Hwange Colliery by 2013 if economic and political stability are restored. Production is also expected to increase in Tanzania with the expansion of the Kiwira Mine (table 24).

**Uranium.**—*Production.*—In 2007, African uranium mine production decreased by 7% compared with that of 2006. In Namibia, decreased output at the Rossing Mine more than offset increased output from the Langer Heinrich Mine, which opened in late December 2006. South Africa's production decreased because of decreased output from gold mines; the decrease was partially offset by the opening of the Dominion Mine in 2007. Output also decreased in Niger. In 2007, Niger accounted for 48% of African uranium production; Namibia, 44%; and South Africa, 8% (table 25). Africa accounted for about 17% of the world's uranium production.

*Consumption.*—South Africa was the only regional consumer of uranium in 2007. Africa accounted for less than 1% of the electricity generated worldwide by nuclear power (BP p.l.c., 2008, p. 36).

*Outlook.*—Continental uranium mine production is expected to increase by about 250% from 2007 to 2013. In Namibia, the Langer Heinrich Mine is expected to reach full production by 2009. The new Trekkopje Mine is expected to open and the expansion of the Rossing Mine is likely to be completed by 2011. In Niger, the new Teguidda Mine is likely to open in 2010, and the Imouraren Mine, in 2012. In South Africa, the Buffelsfontein Tailings project is expected to open in late 2008; the Ezulwini Mine, in 2009; the Cooke project, in 2011; and the Ryst Kuil project, in 2012. AngloGold Ashanti Ltd. planned to

increase uranium output from its South African gold mines by more than 65% by 2010. The Kayelekera Mine in Malawi is expected to start production in 2009 (table 25).

## Trade Review and Outlook

Africa's current account surplus amounted to 0.4% of the GDP in 2007 compared with a revised 2.9% of the GDP in 2006. In 2007, sub-Saharan countries ran an average deficit of 3% of the GDP, and countries in the Arab Maghreb Union ran an average surplus of 12.1% 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 4.9% of the GDP in 2007, and oil-exporting countries had an average current account surplus of 7.9% of the GDP (International Monetary Fund, 2008d, p. 76).

The average current account deficit for oil-importing countries is expected to be 5.7% of the GDP in 2008 and 6.3% of the GDP in 2009. For oil-exporting countries, the surplus is predicted to be 13.5% of the GDP in 2008 and 8.1% of the GDP in 2009. Africa is expected to run a current account surplus of 3% of the GDP in 2008 and 0.2% of the GDP in 2009 (International Monetary Fund, 2008d, p. 76).

In 2006 or 2007, minerals and mineral fuels accounted for more than 90% of the export earnings of Algeria (which were mainly from, in order of value, petroleum and natural gas), Angola (petroleum and diamond), Congo (Brazzaville) (petroleum), Congo (Kinshasa) (diamond, petroleum, cobalt, copper, and gold), Equatorial Guinea (petroleum and natural gas), 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), Guinea (bauxite, gold, alumina, and diamond), Sierra Leone (diamond, rutile, and bauxite), and Zambia (copper and cobalt). Minerals and mineral fuels accounted for more than 50% of the export earnings of Gabon (petroleum and manganese), Mali (gold), Mauritania (iron ore, crude petroleum, copper, and gold), Mozambique (aluminum), and 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. 27; 2008b, p. 38; 2008c, p. 84-85; 2009a, p. 32; 2009b, p. 110; 2009c, p. 15; 2009d, p. 56).

Africa's natural gas exporters included Algeria, which accounted for 55% of the continent's natural gas exports; Nigeria, 20%; Egypt, 15%; and Libya, 9%. Europe received 79% of African total natural gas exports and was the destination for 92% of Africa's natural gas exports by pipeline and 70% of Africa's liquefied natural gas (LNG) exports. The United States received 14% of Africa's LNG exports, and countries of the Asia and the Pacific region, 14% (BP p.l.c., 2008, p. 30).

In 2007, Europe received nearly 32% of Africa's petroleum exports; the United States, nearly 32%; China, 12%; Japan, 2%; and other countries in the Asia and the Pacific region, 11%. West African countries sent 40% of their exports to the United States



and 32% to China, Japan, and other countries in the Asia and the Pacific region. North African countries sent 58% of their exports to Europe and 24% to the United States. Intra-regional exports to African countries amounted to only 2% of total African petroleum exports (BP p.l.c., 2008, p. 20).

Intra-regional minerals trade was, however, significant for gold. South Africa imported about 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 before being exported 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, niobium (columbium), petroleum, tantalum, tin, tungsten, 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 2007<sup>1</sup>

Country	Area <sup>2</sup> (square kilometers)	Estimated population <sup>3</sup> (millions)
Algeria	2,381,740	33.9
Angola	1,246,700	17.0
Benin	112,620	9.0
Botswana	600,370	1.9
Burkina Faso	274,200	14.8
Burundi	27,830	8.5
Cameroon	475,440	18.5
Cape Verde	4,033	0.5
Central African Republic	622,984	4.3
Chad	1,284,200	10.8
Comoros	2,170	0.6
Congo (Brazzaville)	342,000	3.8
Congo (Kinshasha)	2,345,410	62.4
Côte d'Ivoire	322,460	19.3
Djibouti	23,000	0.8
Egypt	1,001,450	75.5
Equatorial Guinea	28,051	0.5
Eritrea	121,320	4.8
Ethiopia	1,127,127	79.1
Gabon	267,667	1.3
Gambia, The	11,300	1.7
Ghana	239,460	23.5
Guinea	245,857	9.4
Guinea-Bissau	36,120	1.7
Kenya	582,650	37.5
Lesotho	30,355	2.0
Liberia	111,370	3.8
Libya	1,759,540	6.2
Madagascar	587,040	19.7
Malawi	118,480	13.9
Mali	1,240,000	12.3
Mauritania	1,030,700	3.1
Mauritius	2,040 <sup>4</sup>	1.3
Mayotte	374	0.2
Morocco	446,550	30.9
Mozambique	801,590	21.4
Namibia	825,418	2.1
Niger	1,267,000	14.2
Nigeria	923,768	148.0
Reunion	2,517	NA
Rwanda	26,338	9.7
Sao Tome e Principe	1,001	0.2
Senegal	196,190	12.4
Seychelles	455	0.1
Sierra Leone	71,740	5.9
Somalia	637,657	8.7
South Africa	1,219,912	47.6
Sudan	2,505,810	38.6
Swaziland	17,363	1.1
Tanzania	945,087	40.4
Togo	56,785	6.6
Tunisia	163,610	10.3
Uganda	236,040	30.9

See footnotes at end of table.

TABLE 1—Continued  
AFRICA: AREAL EXTENT AND ESTIMATED POPULATION IN 2007<sup>1</sup>

Country	Area <sup>2</sup> (square kilometers)	Estimated population <sup>3</sup> (millions)
Western Sahara	266,000	0.2 <sup>2</sup>
Zambia	752,614	11.9
Zimbabwe	390,580	13.4
Total	30,360,083	958.0
United States <sup>5</sup>	9,826,630 <sup>5</sup>	301.6
World	510,072,000	6,612.0

NA Not Available.

<sup>1</sup>Includes data available through April 2, 2009. Population estimates are rounded to no more than three significant digits.

<sup>2</sup>Source: U.S. Central Intelligence Agency, World Factbook 2008.

<sup>3</sup>Source: World Bank 2007, 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 2007<sup>1, 2, 3</sup>

Country	Estimated GDP (billions)	Estimated GDP per capita	Real GDP annual percentage change
Algeria	\$224.9	\$6,539	4.6%
Angola	91.4	5,595	21.1%
Benin	12.2	1,548	4.6%
Botswana	25.8	16,516	5.7%
Burkina Faso	16.6	1,206	3.6%
Burundi	2.9	372	3.6%
Cameroon	39.5	2,094	3.5%
Cape Verde	1.6	3,271	6.9%
Central African Republic	3.1	726	4.2%
Chad	15.8	1,669	0.2%
Comoros	0.7	1,143	0.5%
Congo (Brazzaville)	13.2	3,733	6.3%
Congo (Kinshasa)	19.0	312	-1.6%
Côte d'Ivoire	32.6	1,737	1.6%
Djibouti	1.7	2,274	5.3%
Egypt	404.3	5,495	7.1%
Equatorial Guinea	19.7	16,312	21.4%
Eritrea	3.6	747	1.3%
Ethiopia	62.2	807	11.4%
Gabon	20.2	14,095	5.6%
Gambia, The	2.1	1,318	6.3%
Ghana	31.3	1,426	6.3%
Guinea	9.7	974	1.8%
Guinea-Bissau	0.8	484	2.5%
Kenya	58.0	1,673	7.0%
Lesotho	3.1	1,286	4.9%
Liberia	1.3	358	9.5%
Libya	82.8	13,593	6.8%
Madagascar	19.3	979	6.4%
Malawi	10.6	793	7.9%
Mali	13.6	1,038	3.1%
Mauritania	6.0	2,011	1.0%
Mauritius	14.0	11,126	4.2%
Mayotte	1.0 <sup>4,5</sup>	4,900 <sup>4,5</sup>	NA <sup>4</sup>
Morocco	126.9	4,094	2.7%
Mozambique	17.1	843	7.0%
Namibia	10.6	5,250	3.6%
Niger	8.9	667	3.2%
Nigeria	291.7	2,028	5.9%
Reunion	NA	NA	NA
Rwanda	8.4	899	6.0%
Sao Tome e Principe	0.3	1,644	6.0%
Senegal	20.7	1,692	4.8%
Seychelles	1.4	16,694	5.5%
Sierra Leone	4.0	693	6.8%
Somalia	5.0 <sup>4,6</sup>	600 <sup>4,6</sup>	2.6% <sup>4,6</sup>
South Africa	467.4	9,767	5.1%
Sudan	80.5	2,167	10.2%
Swaziland	5.5	5,401	3.5%
Tanzania	48.9	1,256	7.1%
Togo	5.2	807	2.1%
Tunisia	77.0	7,535	6.3%
Uganda	32.8	1,059	7.9%
Western Sahara	NA <sup>4</sup>	NA <sup>4</sup>	NA <sup>4</sup>

See footnotes at end of table

TABLE 2—Continued  
AFRICA: GROSS DOMESTIC PRODUCT IN 2007<sup>1, 2, 3</sup>

Country	Estimated GDP (billions)	Estimated GDP per capita	Real GDP annual percentage change
Zambia	16.1	1,323	6.3%
Zimbabwe	2.2	188	-6.1%
Total	2,479	192,753	
United States	13,808	45,725	2.0%
World	65,281		3.7%

NA Not available

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

<sup>2</sup>Table data compiled April 2009. Gross domestic product may differ from that reported in individual country chapters of the 2007 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>Source: U.S. Central Intelligence Agency, World Factbook 2007.

<sup>5</sup>2005 estimate.

<sup>6</sup>2006 estimate.

TABLE 3  
SELECTED SIGNIFICANT AFRICAN EXPLORATION SITES IN 2007

Country	Type <sup>1</sup>	Site	Commodity <sup>2</sup>	Company	Resource <sup>2,3</sup>	Exploration <sup>4</sup>
Botswana	E	Dukwe	Au	African Copper plc.	580,000 oz Au	Extensive drilling.
Congo (Kinshasa)	D	Tenke Fungurume	Cu, Co	Freeport McMoRan Copper & Gold Inc.	2,200,000 t Cu, 310,000 t Co	Do.
Do.	F	Twangiza	Au	Banro Corp.	3.1 Moz Au	Do.
Côte d'Ivoire	E	Tengrela	Au	Perseus Mining Ltd.	Data not released	Extensive drilling.
Egypt	F	Sukari	Au	Centramin Egypt Ltd.	7.5 Moz Au	Feasibility drilling.
Ghana	E	Ayanfuri	Au	Perseus Mining Ltd.	640,000 oz Au	Extensive drilling.
Guinea	E	Krouba	Au	Wega Mining ASA	Data not released	Do.
Do.	E	Tongon	Au	Randgold Resources Ltd.	2.3 Moz Au	Do.
Mali	P	Loulo	Au	do.	3.6 Moz Au	Extensive work program.
Senegal	D	Sabodala	Au	Mineral Deposits Ltd.	2.7 Moz Au	Extensive drilling.
Sierra Leone	E	Baomahun	Au	Cluff Gold plc.	110,000 oz Au	Do.
South Africa	E	Kalahari	PGM, Au	Platinum Australia Ltd.	3.4 Moz 3PGM+Au (indicated + inferred)	Do.
Do.	E	Sedibelo	PGM, Au	Barrick Gold Corp.	3.8 Moz Pt, 1.7 Moz Pd	Extensive work program.
Do.	F	Spitzkop	PGM, Au	Eastern Platinum Ltd.	11 Moz 3PGM+Au	Feasibility drilling.
Do.	F	Western Bushveld	PGM, Au	Platinum Group Metals Ltd.	7.3 Moz 3PGM+Au	Do.
Tanzania	F	Buckreef	Au	IAMGOLD Corp.	1 Moz Au	Do.
Do.	E	Kabanga	Ni, Cu, Co	Barrick Gold Corp.	230,000 t Ni, 31,000 t Cu, 18,000 t Co	Extensive drilling.
Zambia	E	Kangaluwi	Cu	Zambezi Resources Ltd.	Data not released	Do.
Do.	E	Mkushi	Cu	African Eagle Resources plc.	117,000 t Cu	Do.

Do.,do. Ditto.

<sup>1</sup>D--Approved for development; E--Active exploration; F--Feasibility work ongoing/completed; P--Exploration related to existing producing operation.

<sup>2</sup>Abbreviations used in this table for commodities include the following: Au--gold; Co--cobalt; Cu--copper; Ni--nickel; Pd--palladium; PGM--platinum-group metals; Pt--platinum; 3PGM+Au--Includes palladium, platinum, rhodium and gold. Abbreviations used in this table for units of measure include the following: Moz--million troy ounces; oz--troy ounces; t--metric tons.

<sup>3</sup>Based on 2007 data reported from various sources. Resources are reported at the indicated level unless otherwise specified. Resource data are 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.

TABLE 4  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals												
	Aluminum		Chromite, mine output, gross weight	Cobalt,		Copper,		Gold,		Iron and steel		Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content
	Bauxite	Metal <sup>2</sup>		mine output, Co content (metric tons)	mine output, Cu content	mine output (kilograms)	Iron ore, gross weight	Steel, crude	mine output, Pb content (metric tons)				
Algeria	--	--	--	--	--	--	236	--	1,982	1,278	--	--	
Angola	--	--	--	--	--	--	--	--	--	--	--	--	
Benin	--	--	--	--	--	--	19	--	--	--	--	--	
Botswana	--	--	--	--	--	22 <sup>e</sup>	2,722	--	--	--	--	--	
Burkina Faso	--	--	--	--	--	--	2,250	--	--	--	--	--	
Burundi	--	--	--	--	--	--	2,423	--	--	--	--	--	
Cameroon	--	90	--	--	--	--	2,000 <sup>e</sup>	--	--	--	--	--	
Cape Verde	--	--	--	--	--	--	--	--	--	--	--	--	
Central African Republic	--	--	--	--	--	--	10	--	--	--	--	--	
Chad	--	--	--	--	--	--	150 <sup>e</sup>	--	--	--	--	--	
Comoros	--	--	--	--	--	--	--	--	--	--	--	--	
Congo (Brazzaville)	--	--	--	--	--	--	100 <sup>e</sup>	--	--	--	--	--	
Congo (Kinshasa)	--	--	--	25,300 <sup>e</sup>	--	148 <sup>e</sup>	10,200 <sup>e</sup>	100 <sup>e</sup>	--	--	--	--	
Côte d'Ivoire	--	--	--	--	--	--	1,243	--	--	--	--	35	
Djibouti	--	--	--	--	--	--	--	--	--	--	--	--	
Egypt	--	258 <sup>e</sup>	--	--	--	--	--	--	1,600 <sup>e</sup>	6,224	--	7 <sup>e</sup>	
Equatorial Guinea	--	--	--	--	--	--	200 <sup>e</sup>	--	--	--	--	--	
Eritrea	--	--	--	--	--	--	87	--	--	--	--	--	
Ethiopia	--	--	--	--	--	--	3,400 <sup>e</sup>	--	--	110 <sup>e</sup>	--	--	
Gabon	--	--	--	--	--	--	300 <sup>e</sup>	--	--	--	--	1,485	
Gambia, The	--	--	--	--	--	--	--	--	--	--	--	--	
Ghana	748	--	--	--	--	--	77,349	--	--	--	--	410 <sup>e</sup>	
Guinea	16,100 <sup>P</sup>	--	--	--	--	--	15,465 <sup>P</sup>	--	--	--	--	--	
Guinea-Bissau	--	--	--	--	--	--	--	--	--	--	--	--	
Kenya	--	2 <sup>e</sup>	--	--	--	--	460 <sup>e</sup>	--	(3) <sup>e</sup>	--	--	--	
Lesotho	--	--	--	--	--	--	--	--	--	--	--	--	
Liberia	--	--	--	--	--	--	311 <sup>e</sup>	--	--	--	--	--	
Libya	--	--	--	--	--	--	--	--	--	1,250	--	--	
Madagascar	--	--	125 <sup>e</sup>	--	--	--	210 <sup>e</sup>	--	--	--	--	--	
Malawi	--	--	--	--	--	--	--	--	--	--	--	--	
Mali	--	--	--	--	--	--	43,850	--	--	--	--	--	
Mauritania	--	--	--	--	--	29	1,694	--	11,910	1	--	--	
Mauritius	--	--	--	--	--	--	--	--	--	--	--	--	

See footnotes at end of table.

TABLE 4—Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals—Continued										
	Aluminum		Chromite, mine output, gross weight	Cobalt, mine output, Co content (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>		gross weight	gross weight			Steel, crude	Iron ore, gross weight		
Morocco and Western Sahara	--	--	--	1,100 <sup>e</sup>	5 <sup>e</sup>	1,600 <sup>e</sup>	8 <sup>e</sup>	325 <sup>e</sup>	44,800	33	
Mozambique	12 <sup>e</sup>	564	--	--	--	450 <sup>e</sup>	--	--	--	--	
Namibia	--	--	--	--	9 <sup>e</sup>	2,600 <sup>e</sup>	--	--	11,900 <sup>e</sup>	21 <sup>e</sup>	
Niger	--	--	--	--	--	2,625 <sup>p</sup>	--	--	--	--	
Nigeria	--	--	--	--	--	120 <sup>e</sup>	58	500 <sup>e</sup>	17,500	--	
Reunion	--	--	--	--	--	--	--	--	--	--	
Rwanda	--	--	--	--	--	-- <sup>e</sup>	--	--	--	--	
Sao Tome e Principe	--	--	--	--	--	--	--	--	--	--	
Senegal	--	--	--	--	--	600 <sup>e</sup>	--	--	--	--	
Seychelles	--	--	--	--	--	--	--	--	--	--	
Sierra Leone	1,169	--	--	--	--	212	--	--	--	--	
Somalia	--	--	--	--	--	--	--	--	--	--	
South Africa <sup>p</sup>	--	899	9,665	400 <sup>e</sup>	117	252,598	42,083	9,100	41,857	2,600	
Sudan	--	--	15	--	--	2,787	--	--	--	--	
Swaziland	--	--	--	--	--	--	--	--	--	--	
Tanzania	5	--	--	--	3	40,193	--	--	--	--	
Togo	--	--	--	--	--	--	--	--	--	--	
Tunisia	--	--	--	--	--	--	180	160	--	--	
Uganda	--	--	--	--	--	20 <sup>e</sup>	(3) <sup>e</sup>	30 <sup>e</sup>	--	--	
Zambia <sup>e</sup>	--	--	--	7,600	520	1,270	--	--	--	--	
Zimbabwe	--	--	650 <sup>e</sup>	50 <sup>e</sup>	3 <sup>e</sup>	6,750	110 <sup>e</sup>	100 <sup>e</sup>	--	--	
Total	18,000	1,810	10,500	34,500	855	477,000	57,900	19,200	116,000	4,590	
Share of world total	9%	4%	50%	49%	5%	20%	3%	1%	3%	33%	
United States	NA	2,550	--	--	1,170	238,000	52,500	98,100	434,000	--	
Share of world total	NA	6%	--	--	7%	10%	3%	7%	12%	--	
World total	200,000	46,200	21,000	70,700	15,700	2,360,000	2,040,000	1,350,000	3,740,000	13,800	

See footnotes at end of table.



TABLE 4—Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals— Continued		Industrial minerals					Mineral fuels	
	Zinc, mine output, Zn content (metric tons)	Cement, hydraulic (metric tons)	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	--	15,886	--	--	1,800	--	615,324	--	
Angola	--	1,400	9,702 <sup>5,6</sup>	--	--	--	628,900	--	
Benin	--	1,550 <sup>P</sup>	--	--	--	--	--	--	
Botswana	--	--	33,639 <sup>7</sup>	--	--	828	--	--	
Burkina Faso	--	30 <sup>e</sup>	--	--	2 <sup>e</sup>	--	--	--	
Burundi	--	--	--	--	--	--	--	--	
Cameroon	--	1,150	12 <sup>e</sup>	--	--	--	30,364	--	
Cape Verde	--	160 <sup>e</sup>	--	--	--	--	--	--	
Central African Republic	--	--	468	--	--	--	--	--	
Chad	--	--	--	--	--	--	52,400 <sup>e</sup>	--	
Comoros	--	--	--	--	--	--	--	--	
Congo (Brazzaville)	--	100 <sup>e</sup>	--	--	--	--	81,700	--	
Congo (Kinshasa)	18,500	520 <sup>e</sup>	27,000 <sup>e</sup>	--	--	1 <sup>e</sup>	9,000 <sup>e</sup>	--	
Côte d'Ivoire	--	650 <sup>e</sup>	300 <sup>e</sup>	--	--	--	17,727	--	
Djibouti	--	--	--	--	--	--	--	--	
Egypt	--	29,000 <sup>e</sup>	--	--	2,200 <sup>e</sup>	75 <sup>e</sup>	232,505	--	
Equatorial Guinea	--	--	--	--	--	--	127,000 <sup>e</sup>	--	
Eritrea	--	45 <sup>e</sup>	--	--	--	--	--	--	
Ethiopia	--	1,700 <sup>e</sup>	--	--	--	--	--	--	
Gabon	--	229	1 <sup>e</sup>	--	--	--	84,008	--	
Gambia, The	--	--	--	--	--	--	--	--	
Ghana	--	1,900 <sup>e</sup>	895	--	--	--	--	--	
Guinea	--	360 <sup>e</sup>	1,019	--	--	--	--	--	
Guinea-Bissau	--	--	--	--	--	--	--	--	
Kenya	--	2,314	--	--	--	--	--	--	
Lesotho	--	--	114 <sup>e</sup>	--	--	--	--	--	
Liberia	--	157 <sup>P</sup>	22	--	--	--	--	--	
Libya	--	6,000 <sup>e</sup>	--	15,000 <sup>e</sup>	--	--	654,000 <sup>e</sup>	--	
Madagascar	--	270	--	--	--	--	--	--	
Malawi	--	185	--	--	--	59	--	--	
Mali	--	--	--	--	--	--	--	--	
Mauritania	--	410	--	--	--	--	5,487	--	
Mauritius	--	--	--	--	--	--	--	--	

See footnotes at end of table.

TABLE 4—Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals--		Industrial minerals					Mineral fuels		
	Continued		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)	
	Zinc, mine output, (metric tons)	Zn content (metric tons)								
Morocco and Western Sahara	68,000 <sup>e</sup>	12,000 <sup>e</sup>	--	--	--	27,000 <sup>e</sup>	--	245 <sup>e</sup>	--	
Mozambique	--	850 <sup>e</sup>	--	--	--	--	72 <sup>e</sup>	--	--	
Namibia	52,000 <sup>e</sup>	--	2,266	--	--	--	--	--	3,395	
Niger	--	54 <sup>e</sup>	--	--	--	--	171	--	3,718	
Nigeria	8,700	4,700 <sup>e</sup>	--	--	--	--	530 <sup>e</sup>	803,000	--	
Reunion	--	400 <sup>e</sup>	--	--	--	--	--	--	--	
Rwanda	--	103	--	--	--	--	--	--	--	
Sao Tome e Principe	--	--	--	--	--	--	--	--	--	
Senegal	--	3,152	--	--	691	--	--	317	--	
Seychelles	--	--	--	--	--	--	--	--	--	
Sierra Leone	--	236	605	--	--	--	--	--	--	
Somalia	--	--	--	--	--	--	--	--	--	
South Africa <sup>p</sup>	30,859	15,316	15,250	--	--	2,556	247,666	2,559	619	
Sudan	--	200 <sup>e</sup>	--	--	--	--	--	176,574	--	
Swaziland	--	--	--	--	--	--	241	--	--	
Tanzania	--	1,513	283	--	8	--	27	--	--	
Togo	--	800 <sup>e</sup>	17	--	750 <sup>e</sup>	--	--	--	--	
Tunisia	--	7,052	--	--	8,005	--	--	35,100	--	
Uganda	--	650 <sup>e</sup>	--	--	--	--	--	--	--	
Zambia <sup>e</sup>	--	650	--	--	--	--	220	--	--	
Zimbabwe	--	700 <sup>e</sup>	695	--	5,000 <sup>e</sup>	30 <sup>e</sup>	2,400 <sup>e</sup>	--	--	
Total	178,000	112,000	92,300	20,000	43,000	252,000	3,560,000	7,730		
Share of world total	2%	4%	55%	2%	27%	5%	12%	17%		
United States	803,000	96,900	--	--	29,700	968,000	6,570,000	1,950		
Share of world total	7%	3%	--	--	18%	18%	22%	4%		
World total	10,800,000	2,790,000	168,000	1,080,000	162,000	5,330,000	29,800,000	45,700		

<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 4, 2009.

<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, 1995-2015<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Ghana	513	504	727	748	850	850	850	850
Guinea	15,800	15,700	14,600	16,100	16,000	16,000	18,800	18,800
Mozambique	11	8	10	12	12	12	12	12
Sierra Leone	--	--	--	1,169	1,200	1,200	1,200	4,200
Tanzania	--	--	2	5	5	5	5	5
Total	16,300	16,200	15,300	18,000	18,100	18,100	20,900	23,900

<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 6  
AFRICA: HISTORIC AND PROJECTED ALUMINUM PRODUCTION, 1995-2015<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Cameroon	79	86	87	89	90	90	90	90
Egypt	180	189	244	258	250	250	250	250
Ghana	135	137	13	--	--	100	100	140
Kenya <sup>2</sup>	2	2	2	2	2	2	2	2
Mozambique	--	54	555	564	530	560	560	560
Nigeria	--	--	--	--	50	197	197	197
South Africa	229	673	846	899	760	900	1,620	1,620
Total	625	1,140	1,750	1,810	1,700	2,100	2,800	2,900

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

TABLE 7  
AFRICA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1995-2015<sup>1</sup>

(Metal content in thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Botswana	25	35	31	22	30	30	30	30
Congo (Kinshasa)	29	31	97	148	315	678	775	902
Eritrea	--	--	--	--	--	1	78	57
Mauritania	--	--	--	29	30	30	30	30
Morocco	14	7	4	5	5	5	5	5
Namibia	23	6	10	9	--	--	--	--
South Africa	166	137	104	117	116	124	124	124
Tanzania <sup>2</sup>	--	--	3	3	6	7	7	7
Zambia	316	249	447	520	600	800	800	800
Zimbabwe	9	2	3	3	2	2	2	2
Total	582	467	699	856	1,100	1,700	1,900	2,000

<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, 1995-2015<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Botswana	--	--	(2)	--	--	--	--	--
Congo (Kinshasa)	35	--	--	6	132	373	470	630
Egypt <sup>3</sup>	4	4	14	12	12	12	12	12
South Africa	124	126	99	114	112	114	114	114
Zambia	328	227	399	500	500	500	500	500
Zimbabwe	7	10	7	7	7	7	7	7
Total	498	367	519	639	760	1,000	1,100	1,300

<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>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, 1995-2015<sup>1</sup>

(Metal content in kilograms)

Country	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Algeria	--	--	697	236	1,100	1,100	1,100	1,100
Benin <sup>2</sup>	300	--	20	19	20	20	20	20
Botswana	86	4	2,709	2,722	2,800	2,800	2,800	2,800
Burkina Faso	1,319	625	1,397	2,250	9,100	10,300	10,300	10,300
Burundi	2,000	--	3,905	2,423	2,400	2,400	2,400	2,400
Cameroon <sup>2</sup>	800	1,000	2,000	2,000	2,000	2,000	2,000	2,000
Central African Republic	97	15	15	10	10	10	10	3,100
Chad	--	120	150	150	50	50	50	50
Congo (Brazzaville)	10	10	120	100	100	100	100	100
Congo (Kinshasa)	1,180	69	9,000	10,200	10,000	25,900	25,900	25,900
Côte d'Ivoire	1,983	3,444	1,335	1,243	6,200	6,200	6,200	6,200
Equatorial Guinea	50	500	200	200	200	200	200	200
Eritrea	59	264	25	87	100	14,000	1,100	800
Ethiopia	4,500	3,206	4,376	3,400	3,400	3,400	3,400	3,400
Gabon	70	70	300	300	300	300	300	300
Ghana	53,087	72,080	66,852	77,349	81,900 <sup>3</sup>	85,900 <sup>3</sup>	85,900 <sup>3</sup>	85,900
Guinea	7,863	15,788	25,097	15,465	15,500	15,500	15,500	15,500
Kenya	170	1,243	616	460	460	460	460	460
Liberia	800	25	27	311	300	300	300	300
Madagascar	38	5	5	210	210	210	210	210
Mali	3,996	28,717	44,230 <sup>4</sup>	43,850 <sup>4</sup>	42,500 <sup>4</sup>	50,800 <sup>4</sup>	50,800 <sup>4</sup>	47,700
Mauritania	1,196	--	--	1,694	4,000	4,000	4,000	4,000
Morocco	580	505	1,786	1,600	1,800	1,800	1,800	1,800
Mozambique	6,800	23	63	450	810	810	810	810
Namibia	2,394	2,417	2,703	2,600	2,200	2,200	2,200	2,200
Niger	1000	25	4,962	2,625	2,600	2,600	2,600	2,600
Nigeria	5	52	30	120	120	120	120	120
Rwanda	26	10	--	--	20	20	20	20
Senegal	--	550	600	600	600	600	600	600
Sierra Leone	4	--	53	212	200	200	200	200
South Africa	523,809	430,800	294,671	252,598	206,000	264,000	340,000	344,000
Sudan	3,700	5,774	3,625	2,787	2,300	2,300	2,300	2,300
Tanzania	320	15,060	52,236	40,193	41,200	52,800	48,500	48,500
Uganda	1,506	56	46	20	25	25	25	25
Zambia	91	600	440	1,270	1,000	1,000	1,200	1,200
Zimbabwe	23,959	22,069	14,024	6,750	8,000	15,000	20,000	20,000
Total	644,000	605,000	538,000	477,000	450,000	569,000	633,000	637,000

<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 production from artisanal mining.

<sup>4</sup>Excludes production from artisanal mining, which is estimated to be about 4,000 kilograms per year.

TABLE 10  
AFRICA: HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 1995-2015<sup>1</sup>

(Fe content in thousand metric tons)

Country	Average grade <sup>2</sup>	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Algeria	50%	1,100	820	800	990	900	1,500	1,500	1,500
Egypt	55%	1,120	1,900	1,599	1,600	1,600	1,600	1,600	1,600
Gabon	64%	--	--	--	--	--	--	--	11,500
Guinea	66% to 68%	--	--	--	--	--	--	46,200	46,200
Mauritania	59% to 72%	7,000	7,500	7,000	7,680	7,700	8,000	8,500	8,500
Morocco	54%	32	4	4	5	5	5	5	5
Nigeria	36%	62	9	20	20	0	10	20	50
Senegal	42% to 59%	--	--	--	--	--	--	7,500	12,500
South Africa	62% to 65%	19,800	21,570	24,900	26,500	36,800	38,800	53,000	52,000
Tanzania	32%	14	--	--	--	--	--	--	--
Tunisia	54%	122	98	108	100	100	100	100	100
Uganda	61% to 67%	--	3	--	--	--	--	--	--
Zimbabwe <sup>3</sup>		160	225	184	55	50	100	200	200
Total		29,400	32,100	34,600	37,000	47,200	50,100	119,000	134,000

<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>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, 1995-2015<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Algeria	827	842	1,007	1,278	1,000	1,500	1,500	1,500
Congo (Kinshasa)	NA	159	110	100	100	100	100	100
Egypt	2,642	2,838	5,600	6,224	6,000	6,000	6,000	6,000
Ethiopia	NA	NA	60	110	350	350	350	350
Kenya	20	--	--	--	--	--	--	--
Libya	909	1,055	1,255	1,250	2,000	2,000	2,000	2,000
Mauritania	NA	5	1	1	10	100	100	100
Morocco	7	5	205	325	320	320	320	320
Nigeria	36	--	100	500	300	1,200	1,200	2,400
South Africa	8,741	8,481	9,494	9,100	6,600	9,400	12,200	12,200
Tunisia	201	237	115	160	200	220	240	250
Uganda	12	7	30	30	30	30	30	30
Zimbabwe	210	258	107	100	100	200	400	400
Total	13,600	13,900	18,100	19,200	17,000	21,500	24,500	26,000

<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 12  
AFRICA: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1995-2015<sup>1</sup>

(Metal content in thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Algeria	1	1	--	--	--	10	10	10
Morocco	68	81	42	45	39	45	45	45
Namibia	16	11	14	12	12	12	12	12
Nigeria	NA	--	--	18	18	18	18	18
South Africa	88	75	42	42	39	42	42	--
Tunisia	7	7	9	--	--	1	1	1
Total	180	175	107	116	108	130	130	90

<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, 1995-2015<sup>1</sup>

(Thousand metric tons)

Country <sup>2</sup>	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Algeria	8	6	5	--	--	--	--	--
Kenya	2	1	1	1	1	1	1	1
Morocco	60	67	43	48	45	45	45	45
Namibia	27	--	--	--	--	--	--	--
Nigeria	4	5	5	5	5	5	5	5
South Africa	32	46	66	70	70	70	70	70
Total	133	125	120	124	120	120	120	120

<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, 1995-2015<sup>1</sup>

(Metal content in metric tons)

Country	1995	2000	2005	2007	2009 <sup>c</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Botswana	18,088	38,420	39,305	27,600	54,000	54,000	54,000	54,000
Madagascar	--	--	--	--	--	30,000	60,000	60,000
Morocco	NA	84	99	80	80	80	80	80
South Africa	30,700	36,616	42,392	37,917	25,000	42,000	58,300	58,600
Zambia	--	--	--	--	540	6,000	6,000	9,000
Zimbabwe	11,721	8,160	8,556	7,100	2,000	8,000	8,000	5,000
Total	60,500	83,300	90,400	72,700	81,600	140,000	190,000	190,000

<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, 1995-2015<sup>1</sup>

(Metal content in kilograms)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Ethiopia	--	--	--	5	12	12	12	12
South Africa	102,300	114,459	163,711	160,940	133,000	161,000	193,000	200,000
Zimbabwe	7	505	4,834	5,300	8,000	11,000	11,000	11,000
Total	102,000	115,000	169,000	166,000	141,000	172,000	204,000	211,000

<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 16  
AFRICA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 1995-2015<sup>1</sup>

(Metal content in kilograms)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
South Africa	51,000	55,818	82,961	83,643	75,000	88,000	104,000	108,000
Zimbabwe	17	366	3,879	4,300	6,500	9,000	9,000	9,000
Total	51,000	56,200	86,800	87,900	82,000	97,000	113,000	117,000

<sup>e</sup>Estimated.

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

TABLE 17  
AFRICA: HISTORIC AND PROJECTED TIN MINE PRODUCTION, 1995-2015<sup>1</sup>

(Metal content in metric tons)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Burundi	15	6	4	2	2	2	2	2
Congo (Kinshasa)	--	50	4,400	7,200	12,000	12,000	12,000	12,000
Niger	20	22	14	11	11	11	11	11
Nigeria	250	2,760	1,300	180	200	200	200	200
Rwanda	242	276	3,100	3,100	3,100	3,100	3,100	3,100
Tanzania	3	--	--	--	--	--	--	--
Zimbabwe	10	--	--	--	--	--	--	--
Total	540	3,110	8,820	10,500	15,500	15,500	15,500	15,500

<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 18  
AFRICA: HISTORIC AND PROJECTED TIN METAL PRODUCTION, 1995-2015<sup>1</sup>

(Metric tons)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Nigeria	259	25	25	--	--	--	--	--
Rwanda	--	--	200	--	--	--	--	--
Total	259	25	225	--	--	--	--	--

<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 19  
AFRICA: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1995-2015<sup>1</sup>

(Metal content in thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Algeria	7	10	4	--	--	10	10	10
Burkina Faso	--	--	--	--	--	--	68	68
Congo (Kinshasha)	5	--	8	19	19	19	19	19
Eritrea	--	--	--	--	--	--	--	47
Morocco	80	103	79	68	57	55	55	50
Namibia <sup>2</sup>	30	39	69	52	52	52	52	52
Nigeria	--	--	--	9	9	9	9	9
South Africa	70	64	32	31	29	31	31	300
Tunisia	44	41	16	--	--	--	--	--
Total	236	257	208	178	166	176	244	550

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

TABLE 20  
AFRICA: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 1995-2015<sup>1</sup>

(Metal content in thousand metric tons)

Country <sup>2</sup>	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Algeria	30	34	30	--	--	--	--	--
Namibia	--	--	133	150	150	150	150	150
South Africa	99	103	102	101	90	100	100	400
Total	129	137	265	251	240	250	250	550

<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>Nigeria also refined a small quantity of zinc.

TABLE 21  
AFRICA: HISTORIC AND PROJECTED DIAMOND MINE PRODUCTION, 1995-2015<sup>1</sup>

(Thousand carats)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Angola <sup>2,3</sup>	2,900	4,313	7,079	9,702	10,000	10,000	10,000	19,000
Botswana	16,802	24,635	31,890	33,369	20,000	30,000	35,000	35,000
Cameroon	NA	NA	12	12	12	12	12	12
Central African Republic	530	464	383	468	500	500	500	500
Congo (Brazzaville)	NA	50	--	--	20	50	50	50
Congo (Kinshasa)	22,024	16,006	35,207	27,000	27,000	27,000	27,000	27,000
Côte d'Ivoire	75	320	300	300	300	300	300	300
Gabon	1	1	(4)	(4)	(4)	(4)	(4)	(4)
Ghana	632	878	1,013	895	900	900	900	900
Guinea	365	327	549	1,019	1,000	1,000	1,000	1,000
Lesotho	NA	2	52	114	500	500	550	600
Liberia	150	170	NA	22	20	20	20	20
Namibia	1,382	1,552	1,902	2,266	2,300	2,300	2,300	2,300
Sierra Leone	214	77	669	605	600	600	600	600
South Africa	9,683	10,790	15,776	15,250	3,800	10,300	16,700	16,700
Tanzania	50	354	220	283	280	280	280	280
Togo	NA	NA	41	17	20	20	20	20
Zimbabwe	204	23	251	695	400	1,000	1,000	1,000
Total	55,000	60,000	95,300	92,000	68,000	85,000	96,000	105,000

<sup>e</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.

<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 22  
AFRICA: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1995-2015<sup>1</sup>

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

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>e</sup>	2013 <sup>e</sup>	2015 <sup>e</sup>
Algeria	500	265	260	540	600	650	750	1,000
Burkina Faso	NA	NA	1	1	1	1	1	1
Egypt	207	317	622	625	625	625	625	625
Mali	1	--	--	--	--	--	--	--
Morocco	6,399	7,200	9,195	8,700	8,700	8,700	8,700	8,700
Senegal	556	626	504	234	200	200	200	200
South Africa	1,101	1,083	1,000	1,000	1,000	1,000	1,000	1,000
Tanzania	2	2	2	3	3	3	3	3
Togo	930	490	481	270	300	300	300	300
Tunisia	2,181	2,500	2,500	2,400	2,500	2,700	2,700	2,700
Zimbabwe	45	25	14	4	--	10	20	20
Total	11,900	12,500	14,600	13,800	13,900	14,200	14,300	14,500

<sup>e</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 23  
AFRICA: HISTORIC AND PROJECTED POTASH PRODUCTION, 1995-2015<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Congo (Brazzaville)	--	--	--	--	--	--	(2)	(2)
Total	--	--	--	--	--	--	--	--

<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>Less than 1 unit.

TABLE 24  
AFRICA: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 1995-2015<sup>1</sup>

(Thousand metric tons)

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Botswana	898	947	985	828	830	850	850	900
Congo (Kinshasa)	10	--	1	1	1	1	1	1
Egypt	10	39	75	75	60	60	60	60
Malawi	15	34	52	59	60	60	60	60
Morocco	650	31	(2)	--	--	--	--	--
Mozambique	40	16	3	72	72	12,000	12,000	12,000
Niger	135	158	182	171	175	175	175	175
Nigeria	29	12	8	530	500	500	500	500
South Africa	206,210	224,118	244,940	247,666	230,000	277,000	288,000	292,000
Swaziland	172	178	222	241	250	250	250	250
Tanzania	43	79	75	27	50	150	150	150
Zambia	141	168	240	220	100	200	300	300
Zimbabwe	5,538	3,809	2,891	2,400	2,000	2,000	4,000	4,000
Total	214,000	230,000	250,000	252,000	234,000	293,000	306,000	310,000

<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>Less than 1 unit.

TABLE 25  
AFRICA: HISTORIC AND PROJECTED URANIUM PRODUCTION, 1995-2015<sup>1</sup>

[Metal (U) content in metric tons]

Country	1995	2000	2005	2007	2009 <sup>e</sup>	2011 <sup>c</sup>	2013 <sup>c</sup>	2015 <sup>c</sup>
Gabon	653	--	--	--	--	--	--	--
Malawi	--	--	--	--	1,300	1,300	1,300	1,300
Namibia	2,006	2,714	3,147	2,878	4,000	8,600	8,600	8,600
Niger	2,970	2,895	3,093	3,153	3,000	3,700	8,700	8,700
South Africa	1,443	861	674	525	670	1,600	4,500	4,500
Total	7,100	6,500	6,900	6,600	9,000	15,200	23,100	23,100

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

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