

# 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 30.3 million square kilometers, which is more than three times the size of the United States, and were home to 808 million people in 2001. 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, diamond, gold, manganese, phosphate rock, platinum-group metals (PGM), titanium minerals (rutile and ilmenite), vanadium, vermiculite, and zirconium.

The minerals industry was an important source of export earnings for many African nations in 2001. To promote exports, groups of African countries formed numerous trade blocs, which included the Economic and Monetary Community of Central Africa, the Economic Community of the Great Lakes Countries, the Common Market for Eastern and Southern 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).

In 2001, significant events in the minerals industry of Africa included the opening of new gold mines in Mali and Tanzania; high rates of economic growth in Equatorial Guinea and Mozambique attributable to increasing mineral production; the United Nations (U.N.) report on the alleged illegal exploitation of mineral resources in Congo (Kinshasa) by Namibia, Rwanda, Uganda, and Zimbabwe; the Kimberly process agreement on diamond certification; and World Bank approval of funding for energy projects in Tanzania and Uganda.

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## General Economic Conditions

In 2001, the gross domestic product (GDP) of Africa grew by 3% after increasing by 2.8% in 2000. From 1996 to 2001, Africa's GDP grew at an average rate of about 3.2% per year (International Monetary Fund, 2002, p. 49, 174). In 2001, Equatorial Guinea and Mozambique achieved the most rapid economic growth in Africa with GDP increases of 45.5% and 13.9%, respectively. The expansion of the petroleum and natural gas industries was a major factor in the performance of Equatorial Guinea's economy. In Mozambique, increased output from the Mozal SARL aluminum smelter made a substantial contribution to GDP growth. In 2002, Africa's GDP growth was expected to be constrained by low coffee and cotton prices, drought, and falling agricultural output. In 2003, growth was expected to increase because of higher prices for coffee, cotton, and metals and a recovery in the world economy.

The International Monetary Fund (2002, p. 174-175, 232) predicted that Africa's GDP would increase by 3.1% in 2002, 4.2% in 2003, and 4.8% per year from 2004 to 2007. In South Africa, GDP growth was expected to be 2.5% in 2002 and 3.0% in 2003; expected higher gold prices would likely boost

economic growth. The economy of Egypt was expected to grow by 2% in 2002 and 3.7% in 2003. In Morocco, the economy was predicted to grow by 4.4% in 2002 and 4.1% in 2003. Algeria's GDP growth was expected to slow to 2.1% in 2002 before increasing to 2.9% in 2003. Nigeria's GDP was expected to decrease by 2.3% in 2002 and to increase by 3.7% in 2003; cutbacks in oil production owing to OPEC quotas were likely to have a serious effect upon the economic situation in Algeria and Nigeria.

In general, GDP growth in African oil exporting countries was expected to fall to 2.2% in 2002 and to rise to 3.4% in 2003. In oil importing countries, GDP growth was expected to be 3.3% in 2002 and 4.4% in 2003. Improvements in the economic outlook depended upon increasing political stability and the absence of natural disasters (International Monetary Fund, 2002, p. 49, 51, 54, 232).

### **Investment Interest and Political Risk**

A recent review of company investment plans for the period from 2000 to 2007 indicated the potential for the region to attract substantial oil and gas development, primarily in Angola and Nigeria. Investment in mining and mineral processing projects was likely to be concentrated in Mozambique (aluminum and titanium minerals), South Africa (gold, PGM, and titanium), Tanzania (gold), and Zambia (copper).

In 2001, the Government of Madagascar announced that power generation would be opened to the private sector, although transmission and distribution would remain under state control. The International Monetary Fund and the World Bank announced plans to assist Madagascar in reforming its mining sector. Programs would include supervision of the artisanal mining sector, assistance to gemstone cutting and polishing centers, and updated geological data. The National Assembly passed legislation to cut import duties, corporate income taxes, and property taxes in support of attracting large-scale mining projects.

In March, the Uganda Electricity Board was divided into three successor companies; the functions of generation, transmission, and distribution were separated. The Government started to seek bidders for the privatization of generation and distribution in June. The Government also planned to privatize the Karuruma Tin Works.

Countries directly affected by civil wars, internal ethnic or political conflicts, and refugee displacements in 2001 included Algeria, Angola, Burundi, Central African Republic, Chad, Congo (Kinshasa), Ethiopia, Guinea, Guinea-Bissau, Liberia, Rwanda, Sierra Leone, Somalia, Sudan, and Uganda. Angola, Namibia, Rwanda, Uganda, and Zimbabwe were affected by the burden of providing military assistance in the civil war in Congo (Kinshasa).

The United Nations Security Council issued a report that accused Namibian, Rwandan, Ugandan, and Zimbabwean Government officials, military officers, and businessmen of illegally exploiting columbium (niobium), diamond, gold, and tantalum from Congo (Kinshasa) to enrich themselves and to finance their country's military presence in Congo (Kinshasa). The Governments accused denied the accusations. Rebels and

pro-Government militias that operated in Congo (Kinshasa) were also accused of using their military presence to exploit Congolese mineral resources.

### **Exploration**

Exploration activity as defined by reported company exploration budgets for Africa continued to decline during 2001. In its most recent annual review, a consulting group reported a modest drop in exploration spending allocations for Africa of about 6 % from the 2000 level (Metals Economics Group, 2001§). In terms of worldwide allocation, however, the group reported that of Africa actually increased to 13.8% in 2001 compared with the reported 12.5% in 2000.

In 2001, exploration in some parts of Africa increased as the threat of civil strife eased. In other African countries, civil wars, internal ethnic or political conflicts, and refugee displacements continued to destabilize governments and constrained new investment in mineral exploration in many areas. Some international mining companies have expressed reluctance to invest heavily in some areas of Africa because of the perceived long-term instability, increased incidence of HIV/AIDS, and a poor record of recent successful base-metal development (Hinde, 2001).

Recent low mineral commodity prices and industry consolidation and restructuring have increased competition among African, Australian, and North American companies that search for more-advanced projects on the continent. Following a period of corporate restructuring in South Africa, such companies as AngloGold Inc., Ashanti Goldfields Company Ltd. of Ghana, Gold Fields Ltd., and Randgold Resources Ltd. were aggressively competing with foreign companies to expand their exploration and acquisition activities into other parts of Africa. These companies were targeting junior exploration companies that had successfully located drill-identified gold resources during the peak exploration years from 1996 to 1999 during which nearly \$2 billion was spent on African mineral exploration.

Based on site data collected by the USGS, African countries that experienced the highest levels of exploration activity in 2001 were, in descending order by number of sites explored, South Africa, Tanzania, Mali, Ghana, Burkina Faso, and Namibia. Gold accounted for approximately 53% of the reported African exploration projects; diamond, 20%; PGM, about 12%; and base metals, about 11%. Exploration for gold was concentrated in the sub-Saharan African countries of Burkina Faso, Ghana, Mali, and Tanzania. Several diamond and PGM projects in South Africa and gold projects in Tanzania were reported to have reached the advanced development or early production stages.

Most diamond exploration and development was focused in the southern countries of Botswana, Namibia, and South Africa and in the northwestern countries of Guinea and Sierra Leone. Offshore diamond exploration in Namibia continued to stimulate a mining sector that had declined in recent years. Higher prices for PGM early in 2001 stimulated the search for these minerals, and several major new PGM development projects and the proposed expansion of existing PGM operations were announced.

For several years, some of Africa's mineral riches (diamond, gold, and, more recently, tantalum) have reportedly been used to finance civil wars and border conflicts that have destabilized a number of central African countries. This has significantly increased political risks and constrained investment in mineral exploration and development in the region. Revenues from "conflict" diamonds have supported civil strife in Angola and Sierra Leone and were valued at \$255 million in 1999, or about 4% of the world diamond market (Goreux, 2001). In 2001, after more than a year of talks, Government and industry negotiators from dozens of countries agreed on a framework for a system to certify legitimately traded diamonds. The plan has since gone to the U.N. General Assembly for its endorsement.

## Commodity Review

The commodity outlook segments listed below are based upon projected trends that could affect current producing facilities and planned new facility capacities that the operating companies, consortia, or Governments have projected to come online within the indicated timeframes. Projects that have received approval from a company's board of directors would be typical of projects considered to have a chance of proceeding within the indicated timeframes. Forward-looking information, which includes estimates of future production, exploration, and mine development; cost of capital projects; and timing of commencement could differ materially from actual results. As such, projects listed in the following section are presented as an indication of current industry plans and are not a USGS prediction of what will happen. The USGS provides no warranty, expressed or implied, as to the accuracy, reliability, or completeness of furnished data and is under no obligation to correct or update any forward-looking statements, whether as a result of new information, future events, or otherwise.

## Metals

**Aluminum.**—*Production.*—In 2001, African production of primary refined aluminum was nearly 1.36 million metric tons (Mt); this was an increase of 18.3% from 2000. The increase in production was mostly attributable to higher output at the Mozal smelter in Mozambique, which was in its first full year of operation. Output increased by 14.1% in Ghana and fell by 1.8% in South Africa. Production fell in Cameroon and Egypt by 5.8% and 2.1%, respectively. Africa's share of world primary aluminum production increased to 6% in 2001 from 3% in 1995. South Africa accounted for 49% of African aluminum output; Mozambique, 20%; and Egypt, 14% (tables 1, 30).

African bauxite production rose to 16.4 Mt in 2001 from 16.2 Mt in 2000. In Ghana, investment and equipment upgrades led to higher bauxite production. Guinea accounted for 96% of bauxite production, and Ghana, 4%. From 1995 to 2001, Africa's share of world bauxite production fell to 12% from 15% (tables 2, 30). Guinea was the only African producer of alumina; output remained nearly unchanged in 2001. Guinea accounted for about 1% of world alumina production.

*Consumption.*—Africa's share of the world's primary aluminum consumption in 2001 was nearly 2%. Continental consumption reportedly rose to 361,400 metric tons (t) of

primary aluminum in 2001 from 335,800 t in 2000 and 241,900 t in 1996. South Africa accounted for 55% of African primary aluminum consumption; Egypt, 27%; and Cameroon, 7%. In 1996, South Africa's share of continental primary aluminum consumption was 42% (World Bureau of Metal Statistics, 2000, p. 9; 2002, p. 9).

*Outlook.*—After remaining unchanged in 2002, the outlook for African production of primary refined aluminum is an increase of 5.9% in 2003 and an increase of 36.8% by 2005. In South Africa, expansion of the Hillside Smelter would likely add 150,000 metric tons per year (t/yr) of new production in 2005 and 2007. Aluminum Smelter Co. of Nigeria Ltd. is expected to reopen its smelter at Ikot Abasi by 2005. In Mozambique, the expansion of the Mozal smelter is likely to be completed in late 2003. By 2007, Mozambique, which was not a producer of refined aluminum before 2000, is expected to account for 25% of African primary refined aluminum production. The outlook for African bauxite production is an increase to 17 Mt in 2005 from 16.8 Mt in 2003 and 16.5 Mt in 2002 (tables 1, 2).

For the first 9 months of 2002, African consumption of primary aluminum was about 2% lower than the same period in 2001. The decrease was mostly because of falling demand in Egypt (World Bureau of Metal Statistics, 2002, p. 9).

**Copper.**—*Production.*—In 2001, Africa's mine production amounted to 533,000 t, which was an increase of 20.3% from 2000. Zambia was the largest producer of copper ore in Africa; most of the increase in African output was attributable to the 25.3% rise in Zambian production. Zambian production rose at the Konkola, Mufalira, and Nkana Mines; South African output, by nearly 4%; and production also increased in Namibia. In 2001, Zambia accounted for 58% of African copper mine production; South Africa, 27%; and Namibia, 5%. Continental copper mine production was down sharply from its 1990 level; Africa's share of world copper production fell to 4% in 2001 from 14% in 1990 (tables 3, 30).

Africa's refined copper production increased by 17.2% in 2001. Zambian output increased by 30.4%, and South African output, by 4.8%. In 2001, Zambia accounted for 65% of African refined copper production; South Africa, 29%; and Congo (Kinshasa), 5% (table 4). Africa accounted for 3% of world refined copper output.

*Consumption.*—African consumption of copper rose to 142,100 t in 2001 compared with 131,600 t in 2000 and 112,100 t in 1996. In 2001, Africa's share of the world's copper consumption was 1%. South Africa, which was the dominant consumer of base metals in Africa, accounted for 52% of regional copper consumption; Egypt, 24%; Zambia, 11%; and Zimbabwe, 8%. In 1996, South Africa's and Egypt's shares of regional copper consumption were 68% and 4%, respectively (World Bureau of Metal Statistics, 2000, p. 41; 2002, p. 41).

*Outlook.*—African copper mine production is expected to rise by 6.2% in 2002, 6.9% in 2003, and an average of 7.2% per year from 2004 to 2007. South African production is likely to decrease to 113,000 t. Output is expected to increase to about 500,000 t in Zambia because of the start of the Chambishi Mine and increased production from the Mufalira and Nkana Mines. By 2007, copper mine production in Congo (Kinshasa) is likely

to have reached 130,000 t; this increase would be partially attributable to the startup of the Lonshi Mine in 2003. Ore from the Lonshi Mine is also expected to contribute to higher output of refined copper in Zambia. Africa's production of refined copper is likely to increase by 7.2% in 2002, 5.5% in 2003, and 9.8% per year from 2004 to 2007 (tables 3, 4).

For the first 9 months of 2002, African consumption of refined copper was 15.8% higher than that of the same period in 2001. Most of the increase was attributable to higher demand in South Africa (World Bureau of Metal Statistics, 2002, p. 41).

**Gold.—Production.**—Africa's gold mine production was 594,000 kilograms (kg) in 2001, which was a decrease of nearly 2.3% from 2000 and 7.8% from 1995. From 1995 to 2001, Africa's share of world gold mine production fell to 23% from 29% (tables 5, 30).

In South Africa, lower output from AngloGold Ltd. and Harmony Gold Mining Co. Ltd. caused national gold production to fall by 8.4% in 2001. Output fell in Zimbabwe and Ghana by 18.2% and 4.7%, respectively. These declines in production more than offset sharp increases in production in Mali and Tanzania. Mali's output increased to 42,288 kg from 28,717 kg because of the opening of the Morila Mine. Tanzania's gold production rose to 30,088 kg from 15,060 kg because of the opening of the Bulyanhulu Mine and increased output at the Geita Mine. South Africa accounted for 66% of African gold production; Ghana, 12%; Mali, 7%; and Tanzania, 5%. South Africa's share of continental gold production (66%) fell from 81% in 1995 and 89% in 1990 (table 5).

**Outlook.**—Gold mine production is expected to rise by 1.5% in 2002, 10% in 2003, and 1.8% per year from 2004 to 2007. South African output is likely to rise to 395 t in 2002, 451 t in 2003, 454 t in 2005, and 478 t in 2007. The increase in production would be partially attributable to the opening of the Bambanani, Eland, Moab Khotsoeng, Orkney, Tshepong, and Welkom Mines. Ghana's gold production is expected to fluctuate between 2001 and 2005 before rising to nearly 76 t in 2007. By 2007, gold production in Mali, Tanzania, and Guinea is expected to reach 55 t, 52 t, and 19 t, respectively (table 5). Output in Tanzania is likely to rise with the opening of the North Mara and Tulawaka Mines and the increased capacity at the Bulyanhulu, Geita, and Golden Pride Mines. In Guinea, the opening of the Jean Gobelet Mine is expected to contribute to higher production.

**Iron and Steel.—Production.**—In 2001, the production of iron ore amounted to 49.63 Mt, which was a decrease of less than 1% from that of 2000. The iron content amounted to 32 Mt. In South Africa, production rose by 3.1% because of higher output at the Sishen Mine. Production fell in Algeria, Mauritania, and Zimbabwe. South Africa was the largest iron ore producer in Africa; its share of continental output amounted to 70%. Mauritania and Egypt accounted for 23% and 4% of African production, respectively. Africa produced about 5% of the world's iron ore (tables 6, 30).

In 2001, African production of crude steel increased by 8%. Egypt, which was the second largest African producer, accounted for most of the increase in output; the country's production rose by 34.8%. South Africa's output rose by 4% in

2001. Production rose in Algeria, Libya, and Tunisia and fell in Zimbabwe. South Africa accounted for 59% of regional crude steel production; Egypt, 26%; Libya, 6%; and Algeria, 6%. Africa's share of world crude steel production was about 2% in 2001 (tables 7, 30).

Algeria's production of hot-rolled steel products amounted to nearly 1.05 Mt in 2001, which was an increase from 687,000 t in 2000 and 521,000 t in 1996. South Africa produced about 6.4 Mt of hot-rolled steel products compared with 6.11 Mt in 2000 and 6.56 Mt in 1996. In 2000, South Africa accounted for 48% of continental hot-rolled steel production; Egypt, 31%; and Libya, 9% (International Iron and Steel Institute Committee on Economic Studies, 2002, p. 52).

**Consumption.**—Africa accounted for 2% of global finished steel consumption. Africa consumed 17.97 Mt of finished steel products in 2001, which was an increase from 15 Mt in 2000 and 13.5 Mt in 1996. From 1996 to 2001, South Africa's consumption of steel products rose to 4.21 Mt from 4.01 Mt. Egypt's consumption increased to 4.36 Mt from 3.94 Mt; Algeria's consumption increased to 2.5 Mt from 1.41 Mt; and the demand for steel by other African countries rose to 6.9 Mt from 4.14 Mt (International Iron and Steel Institute Committee on Economic Studies, 2002, p. 91-92).

**Outlook.**—The production of iron ore is likely to increase to 51.5 Mt in 2002, 51.1 Mt in 2003, and 53.3 Mt in 2005 and 2007. Iron content would rise to 33 Mt in 2005 and 2007. Most of the increase would be attributable to South Africa where the expansion of the Sishen Mine is expected to boost output.

Crude steel production is likely to increase by 2.7% in 2002, to remain unchanged in 2003, and to rise by 1.9% per year from 2004 to 2007. The increase is expected to be broadly based with output rising in Algeria, Egypt, Libya, South Africa, and other producing countries. Libya is likely to have the largest increase of the major producers; output is expected to rise by nearly 54% from 2001 to 2007.

Regional consumption of finished steel is expected to increase by 2% in 2002 and between 1% and 2% from 2003 to 2006. During this period, Africa's share of world steel consumption is unlikely to change (MEPS (International) Ltd., 2002§).

**Lead.—Production.**—Africa accounted for about 5% of world lead mine production. In 2001, continental lead mine production fell by 15.4% from 2000 and 17.8% from 1995. Output fell in Morocco and South Africa, which were the two largest producers of lead ore in Africa, and increased in Algeria, Namibia, and Tunisia. In South Africa, national production fell because of lower output at the Black Mountain Mine. Morocco accounted for 52% of African lead mine production; South Africa, 34%; and Namibia, 9% (tables 8, 30).

In 2001, African production of primary refined lead fell by 11.9%; most of the decrease was attributable to Morocco where output fell by 12.9%. Morocco, which was the largest African producer of primary refined lead, accounted for 91% of continental output; Algeria's share was 9% (table 9). Africa accounted for 2% of world primary lead production.

South Africa accounted for 92% of African secondary refined lead output; in 2001, African production of secondary refined lead increased by 5.6% because of higher South African production. Output in Kenya and Morocco remained

unchanged. The share of primary lead in total refined lead production in Africa fell to 55% in 2001 from 66% in 1995 and 72% in 1990 (tables 9, 10).

**Consumption.**—In 2001, continental refined lead consumption fell to 106,600 t from 114,600 t in 2000 and 114,100 t in 1996. Africa's share of the world's lead consumption was nearly 2%. South Africa accounted for 51% of regional lead consumption; Algeria, 20%; and Morocco, 8% (World Bureau of Metal Statistics, 2000, p. 82; 2002, p. 82).

**Outlook.**—Africa's lead mine production is expected to increase by 2.7% in 2002, 17.8% in 2003, and 3.1% per year from 2004 to 2007. By 2005, output in South Africa and Morocco was likely to rise by 65% and 17%, respectively. In South Africa, the expansion of the Black Mountain Mine would account for most of the higher output. The production of primary refined lead is expected to increase slightly to 66,000 t in 2003 and to remain stable through 2007. Secondary refined lead production is expected to rise by 2.1% in 2002 (tables 8-10).

The decline in African consumption of refined lead is likely to reverse because of higher demand in South Africa. In the first 9 months of 2002, South Africa's consumption of refined lead was 27.1% more than that of the same period in 2001. During the same period, regional consumption of refined lead increased by 7.1% (World Bureau of Metal Statistics, 2002, p. 82).

**Nickel.—Production.**—In 2001, Africa produced about 5% of the world's nickel mine output. African mine production of nickel was unchanged compared with that of 2000. The modernization and expansion of the Trojan Mine in Zimbabwe offset falling production in Botswana and South Africa. In 2001, South Africa accounted for 56% of African nickel mine output; Botswana, 29%; and Zimbabwe, 15% (table 11).

**Consumption.**—Demand for refined nickel fell to 34,500 t in 2001 from 38,000 t in 2000 and increased from 24,800 t in 1996. Africa accounted for 3% of the world's nickel consumption. Within the region, South Africa, which was the dominant consumer, accounted for nearly 99% of African nickel demand (World Bureau of Metal Statistics, 2000, p. 105; 2002, p. 105).

**Outlook.**—African mine production of nickel is expected to rise by 4.1% in 2002, 4% in 2003, and by 9.1% per year from 2004 to 2007. Increased capacity at the Nkomati Mine is likely to raise South Africa's share of continental nickel mine production to 61% by 2007. Production is also expected to increase in Botswana and Zimbabwe (table 11). For the first 9 months of 2002, Africa's consumption of refined nickel was up by 7.5% compared with the same period in 2001 (World Bureau of Metal Statistics, 2002, p. 105).

**Platinum-Group Metals.—Production.**—In 2001, Africa's production of platinum, palladium, and rhodium increased by 13.3%, 5.6%, and 11.5%, respectively. South Africa, which was the continent's dominant producer of PGM in Africa, accounted for more than 99% of the production of platinum, palladium, and rhodium. Africa's share of world platinum mine output was 72% and palladium, 36% (tables 12, 13).

**Outlook.**—African production of platinum is expected to increase to rise by 2.9% in 2002, 3.7% in 2003, and 1.1% per year from 2004 to 2007. In 2007, South Africa is likely to produce 140,000 kg of platinum, and Zimbabwe, 5,000 kg.

African production of palladium is expected to rise by 2.1% in 2002, by 6.6% in 2003, and 4.1% from 2004 to 2007. In 2007, South Africa is expected to produce 67,200 kg of palladium, and Zimbabwe, 3,600 kg (tables 12, 13). In South Africa, capacity expansions by Anglo American Platinum Corp. Ltd., Impala Platinum Holdings Ltd., Lonmin plc, and other companies are likely to result in higher production. In Zimbabwe, higher output is likely to result from the expansions of the Makwiro and Mimosa Mines.

**Silver.—Production.**—In 2001, African mine production of silver fell by 8.2% compared with that of 2000. Although output fell by 3.1% in Morocco, which was the largest producer of silver in Africa, the 24% decrease in South African production was a substantially larger factor in the decline in continental production. South Africa's output fell because of lower production at gold, lead, and zinc mines. In Namibia, output rose by 36.5%. In Tanzania, the opening of the Bulyanhulu gold mine accounted for most of the increase in output to 6,861 kg from 1,384 kg. Zambian production also increased. Morocco accounted for 66% of continental output; South Africa, 26%; and Namibia, 3%. Africa's share of world silver mine production was about 2% in 2001 (table 14).

**Outlook.**—Africa's silver mine production is rise by 2.3% in 2002, 1.1% in 2003, and less than 1% per year from 2004 to 2007 (table 14). By 2005, Morocco's production is likely to rise by more than 7% because of higher output at Société Metallurgique d'Imiter's mine near Quarzazate. In Tanzania, production is expected to rise because of the Bulyanhulu Mine. Production is expected to rise in South Africa as gold, lead, and nickel output increases. Output is also likely to rise in Namibia and Zambia and to restart in Congo (Kinshasa).

**Tin.—Production.**—Africa accounted for less than 1% of global tin mine and refined tin production. In 2001, continental tin mine production fell to 343 t from 511 t in 2000 and 4,051 t in 1990. Since 1990, tin mining has ceased in Namibia, South Africa, and Zimbabwe, which were formerly Africa's largest producers of tin ore (table 15).

In Rwanda, which was Africa's largest producer of tin ore in 2001, output fell by 38% compared with that of 2000. Production also fell in Burundi but increased in Uganda. Nigeria was the only producer of refined tin in Africa; its output has fallen sharply since 1995 (tables 15, 16).

**Consumption.**—In 2001, continental consumption of refined tin rose to 3,100 t from 2,800 t in 2000 and 2,500 t in 1996. Africa's share of the world's tin consumption was slightly more than 1%. In 2001, South Africa accounted for 65% of the region's tin consumption; Nigeria, 10%; and Egypt, 6% (World Bureau of Metal Statistics, 2000, p. 122; 2002, p. 122).

**Outlook.**—The Metal Processing Association is expected to produce 200 t/yr of refined tin from its smelter in Rwanda starting in August 2002 (table 16). Africa's share of world tin mine and refined tin production, however, is still likely to remain below 1% until at least 2007. Refined tin consumption is likely rise in 2002 because of higher demand in South Africa. For the first 9 months of 2002, African consumption of refined tin was 82.6% higher than that of the same period in 2001 (World Bureau of Metal Statistics, 2002, p. 122).

**Titanium.**—*Production.*—The titanium dioxide (TiO<sub>2</sub>) content of ilmenite produced in Africa fell to 994,000 t in 2001 from 1.02 Mt in 2000. Output fell by 2.7% in South Africa and remained unchanged in Egypt. South Africa accounted for 93% of regional production, and Egypt, 7% (table 17).

*Outlook.*—The TiO<sub>2</sub> content of African ilmenite production is expected to rise to 1.12 Mt in 2003, 1.85 Mt in 2005, and 2.05 Mt in 2007. Most of the increase in output would come from the start of the Richards Bay Project in South Africa, the Kwale Project in Kenya, and the Corridor Sands and Moma Projects in Mozambique. By 2007, Mozambique, which was not producing ilmenite in 2001, would account for 34% of African ilmenite production. The reopening of Sierra Rutile in Sierra Leone is expected to boost continental production of ilmenite starting in 2003 (table 17).

**Tungsten.**—*Production.*—In 2001, African production of tungsten in ore increased to 165 t from 108 t in 2000 and 86 t in 1995. Tungsten production increased in Rwanda and resumed at the Nyamulilo deposit in Uganda (table 18). Africa accounted for less than 1% of global tungsten mine production.

*Outlook.*—Although Africa's output would more than double by 2007, the continent is likely to remain a minor producer of tungsten through at least 2007 (table 18).

**Zinc.**—*Production.*—Africa's mine production of zinc fell by 8.3% in 2001. The decline was broadly based with Namibia's output falling by 18.7%; Morocco, 13.3%; Tunisia, 3%; and South Africa, 2.4%. In South Africa, national production fell because of lower output at the Black Mountain Mine. Morocco accounted for 38% of African zinc mine production; South Africa, 26%; Tunisia, 17%; and Namibia, 14%. Africa's share of world zinc mine production was about 3% (tables 19, 30).

South Africa was the largest producer of refined zinc in Africa. In 2001, African production of refined zinc increased by 4.4% because of rising output from South Africa (table 20).

*Consumption.*—In 2001, Africa's consumption of zinc slab fell to 189,500 t from 201,700 t in 2000 but was still greater than the 147,000 t in 1996. Africa's share of the world's zinc slab consumption was slightly more than 2%. In 2001, South Africa accounted for 63% of regional zinc slab consumption; Egypt, 9%; and Nigeria, 8% (World Bureau of Metal Statistics, 2000, p. 130; 2002, p. 130, 142).

*Outlook.*—African zinc mine production is likely to remain unchanged in 2002 and to increase by 14% in 2003 and 12.7% per year from 2004 to 2007. Most of the increase would be attributable to the Kipushi Mine in Congo (Kinshasa) and the Skorpion Mine and smelter project in Namibia. By 2007, Namibia would account for 42% of African zinc mine production, and Congo (Kinshasa), 12%. In Morocco, which was Africa's largest producer of zinc ore, output is expected to rise by nearly 29% by 2007. In South Africa, which was the continent's second largest producer, output is expected to fall by nearly 43% during the same period to 35,000 t/yr because of the closing of the Perring Mine (table 19).

New smelters in Congo (Kinshasa) and Namibia were likely to increase regional production of refined zinc to 284,000 t in 2003 and 334,000 t in 2007. Namibia, which did not produce refined zinc in 2001, would account for 45% of Africa's refined

zinc output in 2007, and Congo (Kinshasa), 15%.

For the first 9 months of 2002, African zinc slab consumption was 1.1% higher than that of the same period in 2001. Consumption in South Africa was 4.6% higher during the same period, which offset lower demand in Tunisia (World Bureau of Metal Statistics, 2002, p. 130).

### **Industrial Minerals**

**Diamond.**—*Production.*—In 2001, Africa's share of world diamond production by volume was 56%, compared with 47% in 1995. The continent's diamond production increased to 65.5 million carats in 2001 from 62.2 million carats in 2000 and 55 million carats in 1995. The increase in production was broadly based, with output rising in Angola, Botswana, Congo (Kinshasa), and South Africa. In Botswana, increased production from the Jwaneng, Letlhakane, and Orapa Mines boosted national diamond output by 7.2%. In South Africa, the 3.4% increase in production was mostly attributable to higher output from the Finsch and Venetia Mines. Botswana accounted for 40% of African diamond output by volume; Congo (Kinshasa), 28%; South Africa, 17%; and Angola, 8% (tables 21, 30).

In 2001, the global value of rough diamond production amounted to \$7.9 billion, of which Africa accounted for more than 60%. Botswana accounted for nearly 27% of the value of global rough diamond output; South Africa, 15%; Angola, 9%; and Namibia, 6%. In 2001, South Africa, which was Africa's largest producer of polished diamond, produced about \$600 million of polished diamond from \$500 million of rough diamond. South Africa accounted for about 5% of the global value of polished diamond production (Even-Zohar, 2002).

In November, the Kimberly process established a certification system to reduce the trade of conflict diamonds, particularly from Angola, Congo (Kinshasa), and Sierra Leone. The Kimberly process involved Government officials from nearly 40 countries that produced, processed, and imported diamonds; the World Diamond Council; the European Union; and nongovernmental organizations. The certification system was expected to be completed by the end of 2002; Angola and Sierra Leone introduced diamond certification in early 2001 in response to United Nations sanctions.

*Outlook.*—Regional production of rough diamond is expected to rise by 0.9% in 2002, and 1.1% per year from 2003 to 2007. By 2005, production was likely to fall by nearly 1.6% in Botswana and by 7% in Congo (Kinshasa). Production is expected to rise in South Africa and Angola by 25% and 36%, respectively; these increases would more than offset the decreases in Botswanan and Congolese output. In Angola, increasing output would be attributable to the expansion of the Catoca Mine and the reopening of the Camafuca-Camazba Mine. South Africa's production is likely to rise because of several projects, which will include the expansion of the Premier C-Cut Mine and the opening of the Klipspringer mine. By 2007, Namibia's diamond production would rise by nearly 68% because of the opening of the Luderitz Bay marine mine and the expansion of Namdeb's operations (table 21).

**Gemstones.**—*Production.*—Africa's production of ruby increased to 7,990 kg in 2001 from 6,970 kg in 2000; the slight

decrease in Kenyan production was more than offset by rising output in Madagascar and Tanzania. Regional output of sapphire increased to 22,046 kg in 2001 from 13,688 kg in 2000 mostly because of higher production in Madagascar. In recent years, the production of ruby and sapphire in Madagascar has increased because of the discovery of new sapphire deposits at Ilakaka and ruby deposits at Andilamena and Vatondry. Kenya, which was the largest producer of ruby and sapphire in Africa, accounted for 73% of ruby production and 45% of sapphire output (tables 22, 23). Zambia was the largest regional producer of emerald.

Tanzanite production fell to 5,473 kg in 2001 from 5,516 kg in 2000 after increasing from 810 kg in 1997 (table 24). Tanzania was the world's only producer of tanzanite.

*Outlook.*—Political instability in Madagascar could result in lower production of ruby and sapphire in 2002. African Gem Resources Ltd. plans to start commercial production of tanzanite from block C of the Merelani mining area starting in the third quarter of 2002; the company's production would amount to more than 200 kilograms per year.

**Phosphate rock.**—*Production.*—In 2001, the phosphorus pentoxide (P<sub>2</sub>O<sub>5</sub>) content of African phosphate rock production fell to 12.5 Mt from 12.6 Mt in 2000. Morocco's output increased by 2.8%, and Egypt's, 40%. Production fell in Senegal by 8.9%; South Africa, 13.5%; Togo, 24%; and Tunisia, 2.4%. Morocco was the leading producer of phosphate rock in Africa, accounting for 59% of continental phosphate rock output. Tunisia's share of African production was 20%; South Africa, 7%; and Senegal, 5%. In 2001, Africa produced about 30% of the world's phosphate rock (tables 25, 30).

*Consumption and outlook.*—The Food and Agricultural Organization (2001a) of the United Nations predicted that African consumption of nitrogen fertilizers would increase to nearly 2.79 Mt in 2005-06 from 2.72 Mt in 2002-03 and 2.53 Mt in 2001-02. Africa's consumption of phosphate fertilizers is expected to increase to nearly 1.14 Mt in 2005-06 from 1.07 Mt in 2002-03 and 1.04 Mt in 2001-02. By 2005-06, potash fertilizer consumption was expected to increase to 650,000 t from 580,000 t in 2002-03 and 2001-02. In 2001-02, the Food and Agricultural Organization (2001a) predicted that Africa would account for about 3% of the world's nitrogenous and phosphate fertilizer consumption and 2% of the world's potash demand.

The P<sub>2</sub>O<sub>5</sub> content of African phosphate rock production is expected to increase to 12.9 Mt in 2003, 13.3 Mt in 2005, and 14.3 Mt in 2007. Morocco is expected to account for most of the increase in production; planned expansions by Office Cherifien des Phosphates would increase Morocco's production by nearly 14% by 2007. Togo's production is likely to more than triple by 2007. In South Africa, production is expected to fall by nearly 17%; the country's share of African phosphate rock output would decline to 6% (table 25).

### **Mineral Fuels**

**Coal.**—*Production.*—In 2001, regional anthracite and bituminous coal production remained unchanged. Output fell in Botswana, Morocco, South Africa, and Zambia. Production

increased by 6.7% in Zimbabwe. South Africa, which was the dominant coal producer in Africa, accounted for 97% of regional coal output; Zimbabwe, 2%; and others, 1%. More than 99% of South Africa's coal production was bituminous. Africa accounted for about 6% of world anthracite and bituminous coal production; the continent did not produce lignite coal in 2001 (tables 26, 30).

*Consumption.*—Africa accounted for about 4% of the world's coal consumption in 2001. Within the region, South Africa accounted for 91% of African coal consumption. From 1996 to 2001, Africa's consumption of coal fell by about 1.3% (British Petroleum plc, 2002, p. 33).

*Outlook.*—African production of coal is expected to increase to 241 Mt in 2005 and 258 Mt in 2007. South Africa is likely to account for most of the region's increase in coal output; national production could reach 225 Mt in 2003, 235 Mt in 2005, and 250 Mt in 2007. Rising production would be partially attributable to the opening of the Kriel South Mine. The National Development Corporation of Tanzania received favorable results in its feasibility study to develop the Mchuchuma bituminous coalfield in 2001. Production from Mchuchuma could increase national coal output to 1.6 Mt by 2007 (table 26).

**Natural Gas.**—*Production.*—Regional production of natural gas increased by 10.1% in 2001. The majority of the increase was attributable to Nigeria where output rose by 61.5%. Production also increased in Algeria, South Africa, and Tunisia. In 2001, Algeria accounted for 66% of Africa's natural gas output; Egypt, 13%; and Nigeria, 13%. Nigeria's share of continental natural gas output was 5% in 1995 (table 27). Africa accounted for about 6% of world natural gas production in 2001.

*Consumption.*—The African continent consumed about 2.5% of the world's natural gas. Africa's consumption rose to 60.2 billion cubic meters in 2001 compared with 55.5 billion cubic meters in 2000 and 47 billion cubic meters in 1996. Algeria accounted for nearly 36% of Africa's natural gas consumption; Egypt, 35%; and others, 29%. In 1996, Algeria's and Egypt's shares of regional natural gas consumption were 46% and 24%, respectively (British Petroleum plc, 2002, p. 25).

*Outlook.*—African production of natural gas is expected to decrease by 1.3% in 2002 before increasing by 6.3% in 2003 and 7.5% per year from 2004 to 2007. Algeria's output of natural gas is likely to increase to 122 billion cubic meters by 2007 because of new production from Amenas, Ohanet, and Salah that will start in 2003 and 2004. In spite of its rising production, Algeria's share of African natural gas output is likely to fall to 54% (table 27).

Egypt's production is expected to rise to 31 billion cubic meters in 2003 before falling to 29 billion cubic meters in 2005 and 2007. New sources of production would include the Rosetta and West Delta Deep Marine Fields. In Libya, output is likely to about triple to 17 billion cubic meters by 2005 and to increase to 27 billion cubic meters in 2007. The opening of Sirte Basin and Wafa is expected to contribute to rising production. In Angola, which was a small producer of natural gas in 2001, the development of new petroleum projects is expected to lead to sharply rising natural gas output by 2005. Other projects likely to contribute to higher natural gas production include Songo

Songo in Tanzania and Temane in Mozambique, which were expected to be commissioned in 2004 (table 27).

**Petroleum.—Production.**—In 2001, African crude petroleum production increased by 1.8%. Nigeria's output rose by 5.1%, which more than offset the modest decreases in production in Algeria, Angola, Egypt, and Libya. Nigeria accounted for 29% of regional crude petroleum production; Libya, 18%; Algeria, 17%; Egypt, 10%; and Angola, 10%. In 2001, Africa's share of world crude petroleum production amounted to 11% (tables 28, 30).

**Consumption.**—Regional consumption of petroleum products increased to nearly 909 million barrels (Mbbbl) in 2001 from 899 Mbbbl in 2000 and 820 Mbbbl in 1996; Africa accounted for about 3% of the world's petroleum products consumption. Egypt accounted for 22% of African consumption of petroleum products; South Africa, 20%; Algeria, 8%; and others, 50% (British Petroleum plc, 2002, p. 9).

**Outlook.**—Africa's production of crude petroleum is expected to increase by 0.4% in 2002, 20.1% in 2003, and 5.7% per year from 2004 to 2007. Nigeria's output is likely to increase to 1 billion barrels (Gbbbl) in 2003, 1.35 Gbbbl in 2005, and 1.5 Gbbbl in 2007. Sources of additional production would include the Agbami, Bongo, Bongo Southwest, Erha, Okono, Okpoho, and Yoho/Awawa Fields. In Angola, production is expected to increase to 620 Mbbbl in 2007 from 571 Mbbbl in 2005 and 365 Mbbbl in 2002; this increase is likely to result from development that is based on new deepwater discoveries in blocks 14, 15, 17, and 18. Nigeria's and Angola's shares of African crude petroleum production are expected to rise to 35% and 15%, respectively. Production is also expected to rise substantially in Algeria and Libya (table 28); the majority of the increase in Algerian output would come from the Ourhoud Field.

**Uranium.—Production.**—In 2001, African uranium output amounted to 6,238 t, which was a decrease of 3.6% from 2000 and 11.8% from 1995. Namibia's production decreased by 17.5%; output increased by 6.9% and 4.9% in Niger and South Africa, respectively. Africa's share of global uranium production amounted to 17% in 2001. Niger accounted for 50% of African uranium production; Namibia, 36%; and South Africa, 14% (tables 29, 30).

**Consumption.**—South Africa was the only regional consumer of uranium in 2001; Africa accounted for less than 1% of world uranium demand.

**Outlook.**—Regional production is likely to fall by 1.4% in 2002 and rise by 1.6% per year from 2004 to 2007. Output was expected to fall in South Africa because of the depletion of higher grade ore; production was also likely to decrease in Niger. These decreases are expected to be more than offset by higher production from the Rossing Mine in Namibia (table 29). The U.S. Department of Energy (2001§) predicted that Africa's consumption of uranium would rise by less than 1% per year from 2000 to 2010.

## Trade Review and Outlook

Africa's current account surplus fell to 0.3% of GDP in 2001 from 1.2% of GDP in 2000. South Africa had a current account deficit of 0.1% of GDP and other sub-Saharan countries ran an

average deficit of 3% of GDP in 2001. Africa's modest trade surplus was mostly attributable to petroleum from oil exporting countries (International Monetary Fund, 2002, p. 49).

Oil-importing countries had an average deficit of 2.2% of GDP in 2001, which was a decrease from 3% of GDP in 2000. Oil-exporting countries ran an average surplus of 7.1% of GDP in 2001, which was a decrease from 13% of GDP in 2000. The average current account deficit for oil-importing countries is expected to increase to 3.2% of GDP in 2002 and 3.4% of GDP in 2003. For oil-exporting countries, the surplus is predicted to fall to 2.3% of GDP in 2002 before rising to 3.4% of GDP in 2003. Africa's current account is expected to return to a deficit of 1.7% of GDP in 2002 and 1.8% of GDP in 2003. An increase in gold and other metals prices would be more than offset by declining terms of trade for oil exporters (International Monetary Fund, 2002, p. 49).

Mineral fuels accounted for at least 90% of the export earnings of Algeria, Congo (Brazzaville), Equatorial Guinea, Libya, and Nigeria. Other significant sources of mineral export earnings included aluminum in Ghana and Mozambique; bauxite in Guinea; copper in Zambia; diamond in Angola, Botswana, Congo (Kinshasa), Namibia, and South Africa; and gold in Mali, South Africa, and Tanzania. Mineral exports accounted for more than one-third of the value of total exports in at least 23 African countries and more than two-thirds in at least 13 countries (table 32).

## Environment

Deforestation resulting from fuel use and land-intensive agricultural production continues to be a significant environmental issue in Africa. From 1990 to 2000, forest cover decreased at a rate of 0.8% per year compared with the global rate of 0.2% per year. The most rapid deforestation occurred in Burundi, which lost forest cover at a rate of 9% per year; Comoros, 4.3%; Rwanda, 3.9%; and Niger, 3.7% (Food and Agricultural Organization of the United Nations, 2001b, p. 31, 34). The economic losses from deforestation, such as soil erosion and desertification, have led to plans to increase hydroelectric power capacity in Ethiopia and Uganda and discussions of increasing peat production in Burundi.

The West African Pipeline Project could also help mitigate the effects of deforestation in Africa and reduce the emissions of greenhouse gases. Some of the natural gas that is currently being flared by Nigeria will be exported to Togo, Benin, and Ghana, which have deforestation rates of 3.4%, 2.3%, and 1.7%, respectively (Food and Agricultural Organization of the United Nations, 2001b, p. 31). The Government of Nigeria has committed to ending the flaring of natural gas by 2010, which will also lead to decreased pollution.

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 United Nations Industrial Development Organization (UNIDO) is formulating a plan that would assist Sudan, Tanzania, and Zimbabwe in introducing cleaner artisanal mining technologies. UNIDO was already involved in reducing mercury pollution from artisanal gold mining in Ghana (United Nations Industrial Development Organization, 2001§).



Artisanal mining of gemstones also caused considerable environmental damage in Kenya, Madagascar, and Tanzania. In February, the Government of Madagascar closed the Vatomandry ruby deposit to mining to prevent the environmental, health, and smuggling problems that resulted from unregulated mining at Ilakaka in 1999 and 2000.

In April, a new mining law that replaced regulations that dated back to 1964 was passed in Cameroon. A new provision of the law requires companies to present an environmental impact assessment and sign a mining convention with the Government setting out and guaranteeing investment terms.

In Kenya, new environmental laws that affect most types of mining operations came into effect in January. The High Court of Kenya issued an injunction to prevent Tiomin Resources Inc. from engaging in exploration or development of the Kwale titanium project. The court cited the new environmental legislation to support its decision to halt the Kwale Project until more information was available on its environmental effects.

In April, the Government of Mauritius announced plans to ban sand extraction from the Port Louis lagoon to protect the marine environment and tourist industry; the ban would become effective in October 2002.

In 2001, several projects that had been controversial for environmental reasons moved substantially closer to development. In Madagascar, the Government granted QIT-Madagascar Minerals SA an environmental permit for the development of the titanium deposits near Tolagnaro. The World Bank approved funding for the Bujagali hydropower project in Uganda and the Songo Songo natural gas project in Tanzania.

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TABLE 1  
AFRICA: HISTORIC AND PROJECTED ALUMINUM PRODUCTION, 1990-2007

(Thousand metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Cameroon	93	79	86	81	90	90	90	90
Egypt	179	180	193	189	190	200	200	200
Ghana	174	135	142	162	140	140	160	140
Kenya	--	2	2	2	2	2	2	2
Mozambique	--	--	54	266	270	330	500	510
Nigeria	--	--	--	--	--	--	190	190
South Africa	159	229	674	662	670	675	825	825
Total	605	625	1,150	1,360	1,360	1,440	1,970	1,950

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 2  
AFRICA: HISTORIC AND PROJECTED BAUXITE PRODUCTION, 1990-2007

(Thousand metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Ghana	381	513	504	715	750	800	1,000	1,000
Guinea	15,800	15,800	15,700	15,700	15,700	16,000	16,000	16,000
Mozambique	7	11	8	9	(1/)	(1/)	(1/)	(1/)
Sierra Leone	1,430	--	--	--	(1/)	(1/)	(1/)	(1/)
Undistributed	--	--	--	--	10	10	10	10
Total	17,600	16,300	16,200	16,400	16,500	16,800	17,000	17,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

1/ Included in "Undistributed."

TABLE 3  
AFRICA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1990-2007

(Metal content in thousand metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Botswana	25	25	22	20	20	20	18	18
Congo (Kinshasa)	509	29	21	21	57	70	70	130
Morocco	16	14	7	6	6	6	6	6
Namibia	28	23	5	27	25	25	25	25
South Africa	179	166	137	142	132	118	123	113
Tanzania	--	--	--	3	4	4	4	4
Zambia	519	316	249	312	320	360	420	500
Zimbabwe	14	9	2	2	2	2	--	--
Total	1,290	582	443	533	566	605	666	800

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 4  
AFRICA: HISTORIC AND PROJECTED REFINED COPPER PRODUCTION, 1990-2007

(Thousand metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Congo (Kinshasa)	339	35	21	21	57	70	70	130
Egypt	4	4	5	5	5	5	5	5
South Africa	133	124	126	132	122	109	114	104
Zambia	438	328	227	296	290	320	420	500
Zimbabwe	14	7	10	2	15	12	10	10
Total	928	498	389	456	489	516	619	749

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

TABLE 5  
AFRICA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1990-2007

(Metal content in kilograms)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	--	--	--	300	(1/)	(1/)	(1/)	(1/)
Benin	--	300	500	500	(1/)	(1/)	(1/)	(1/)
Botswana	46	86	4	2	(1/)	(1/)	(1/)	(1/)
Burkina Faso	7,800	1,319	1,000	1,000	(1/)	(1/)	(1/)	(1/)
Burundi	9	2,000	--	415	(1/)	(1/)	(1/)	(1/)
Cameroon	10	800	1,000	1,000	(1/)	(1/)	(1/)	(1/)
Central African Republic	241	97	12	20	(1/)	(1/)	(1/)	(1/)
Chad	--	--	120	150	(1/)	(1/)	(1/)	(1/)
Congo (Brazzaville)	7	10	10	10	(1/)	(1/)	(1/)	(1/)
Congo (Kinshasa)	9,300	1,180	52	50	50	50	50	5,000
Cote d'Ivoire	20	1,983	3,154	3,100	3,000	3,000	3,000	3,000
Equatorial Guinea	50	50	500	500	(1/)	(1/)	(1/)	(1/)
Eritrea	--	59	264	270	(1/)	(1/)	(1/)	(1/)
Ethiopia	848	4,500	5,177	5,200	5,300	5,300	5,300	5,300
Gabon	80	70	70	70	(1/)	(1/)	(1/)	(1/)
Ghana	16,800	53,087	72,080	68,699	72,400	69,800	66,700	75,700
Guinea	6,340	7,863	13,104	13,000	13,500	14,000	15,000	19,000
Kenya	25	170	1,243	1,200	(1/)	(1/)	(1/)	(1/)
Liberia	600	800	1,000	1,000	(1/)	(1/)	(1/)	(1/)
Madagascar	216	38	5	--	(1/)	(1/)	(1/)	(1/)
Mali	5,200	3,996	28,717	42,288	44,000	45,000	50,000	55,000
Mauritania	--	1,196	1,000	1,000	(1/)	(1/)	(1/)	(1/)
Morocco	500	580	505	1,190	2,000	3,000	3,000	3,000
Mozambique	63	6,800	23	25	(1/)	(1/)	(1/)	(1/)
Namibia	1,610	2,394	2,417	2,851	(1/)	(1/)	(1/)	(1/)
Niger	--	1,000	1,000	1,000	(1/)	(1/)	(1/)	(1/)
Nigeria	--	5	10	10	(1/)	(1/)	(1/)	(1/)
Rwanda	2,160	26	10	10	(1/)	(1/)	(1/)	(1/)
Senegal	--	--	550	550	(1/)	(1/)	(1/)	(1/)
Sierra Leone	32	4	30	30	(1/)	(1/)	(1/)	(1/)
South Africa	605,000	523,809	430,816	394,535	395,000	451,000	454,000	478,000
Sudan	100	3,700	5,770	5,800	5,000	5,000	4,000	--
Tanzania	3,500	320	15,060	30,088	37,000	44,000	52,000	52,000
Uganda	--	1,506	56	--	(1/)	(1/)	(1/)	(1/)
Zambia	129	91	600	130	(1/)	(1/)	(1/)	(1/)
Zimbabwe	16,900	23,959	22,069	18,050	14,000	11,500	10,000	10,000
Undistributed	--	--	--	--	12,000	13,000	13,000	10,000
Total	678,000	644,000	608,000	594,000	603,000	665,000	676,000	716,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

1/ Included in "Undistributed."

TABLE 6  
AFRICA: HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 1990-2007

(Thousand metric tons of Fe content)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	1,470	1,100	820	750	750	750	750	750
Egypt	1,330	1,120	1,380	1,380	1,380	1,380	1,380	1,380
Kenya	--	--	--	--	(1/)	(1/)	(1/)	(1/)
Mauritania	6,800	7,000	7,500	7,300	6,820	6,820	6,820	6,820
Morocco	90	32	4	4	(1/)	(1/)	(1/)	(1/)
Nigeria	138	62	--	--	(1/)	(1/)	(1/)	(1/)
South Africa	19,800	19,800	21,570	22,244	22,600	22,300	23,600	23,600
Tanzania	--	14	--	--	(1/)	(1/)	(1/)	(1/)
Tunisia	154	122	98	109	(1/)	(1/)	(1/)	(1/)
Uganda	--	--	3	1	(1/)	(1/)	(1/)	(1/)
Zimbabwe	730	160	225	180	(1/)	(1/)	(1/)	(1/)
Undistributed	--	--	--	--	250	350	450	450
Total	30,500	29,400	31,600	32,000	31,800	31,600	33,000	33,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

1/ Included in "Undistributed."

TABLE 7  
AFRICA: HISTORIC AND PROJECTED STEEL PRODUCTION, 1990-2007

(Thousand metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	836	827	842	850	800	800	900	900
Benin	8	--	--	--	(1/)	(1/)	(1/)	(1/)
Congo (Kinshasa)	NA	NA	80	80	(1/)	(1/)	(1/)	(1/)
Egypt	2,240	2,642	2,820	3,800	4,360	4,000	4,000	4,000
Kenya	20	20	--	--	(1/)	(1/)	(1/)	(1/)
Libya	492	909	1,055	900	886	1,000	1,300	1,300
Morocco	7	7	5	5	(1/)	(1/)	(1/)	(1/)
Nigeria	220	36	--	--	(1/)	(1/)	(1/)	(1/)
South Africa	8,620	8,741	8,481	8,821	8,800	9,000	9,000	9,000
Tunisia	177	201	237	239	(1/)	(1/)	(1/)	(1/)
Uganda	--	12	7	7	(1/)	(1/)	(1/)	(1/)
Zimbabwe	580	210	258	156	(1/)	(1/)	(1/)	(1/)
Undistributed	--	--	--	--	450	450	800	1,300
Total	13,200	13,600	13,800	14,900	15,300	15,300	16,000	16,500

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

1/ Included in "Undistributed."

TABLE 8  
AFRICA: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1990-2007

(Metal content in metric tons)

Country 1/	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	1,100	1,383	818	900	900	900	900	900
Morocco	68,800	67,708	81,208	76,747	80,000	85,000	90,000	90,000
Namibia	18,000	16,084	11,114	13,025	14,800	15,800	15,800	20,000
South Africa	69,400	88,449	75,280	50,771	49,000	70,000	84,000	84,000
Tunisia	2,970	6,601	6,602	6,820	6,900	6,900	6,900	6,900
Total	160,000	180,000	175,000	148,000	152,000	179,000	198,000	202,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

1/ Nigeria also mined small amounts of lead.

TABLE 9  
AFRICA: HISTORIC AND PROJECTED PRIMARY REFINED LEAD PRODUCTION, 1990-2007

(Metric tons)

Country 1/	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	1,000	800	6,100	6,000	6,000	6,000	6,000	6,000
Morocco	64,000	59,673	66,812	58,178	58,000	60,000	60,000	60,000
Namibia	35,100	26,752	--	--	--	--	--	--
Total	100,000	87,200	72,900	64,200	64,000	66,000	66,000	66,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

1/ Nigeria also refined a small quantity of primary lead.

TABLE 10  
AFRICA: HISTORIC AND PROJECTED SECONDARY REFINED LEAD PRODUCTION, 1990-2007

(Metric tons)

Country 1/	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	3,500	7,500	--	--	--	--	--	--
Kenya	2,400	2,000	1,000	1,000	1,000	1,000	1,000	1,000
Morocco	2,000	2,600	3,000	3,000	3,000	3,000	3,000	3,000
Nigeria	--	4	5	5	--	--	--	--
South Africa	31,200	32,100	46,124	48,909	50,000	50,000	50,000	50,000
Total	39,100	44,200	50,100	52,900	54,000	54,000	54,000	54,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

1/ Uganda also refined a small quantity of secondary lead.

TABLE 11  
AFRICA: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 1990-2007

(Metal content in metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Botswana	23,200	18,088	20,286	18,585	20,000	25,000	25,000	28,000
South Africa	29,000	30,700	36,616	36,443	38,300	36,000	40,000	60,000
Zimbabwe	13,500	11,721	8,160	10,120	9,500	9,500	10,900	11,900
Total	65,700	60,500	65,100	65,100	67,800	70,500	75,900	99,900

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 12  
AFRICA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 1990-2007

(Metal content in kilograms)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
South Africa	87,800	102,300	114,459	129,746	132,000	135,000	138,000	140,000
Zimbabwe	21	7	505	519	1,500	4,400	4,800	5,000
Total	87,800	102,000	115,000	130,000	134,000	139,000	143,000	145,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 13  
AFRICA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 1990-2007

(Metal content in kilograms)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
South Africa	38,300	51,000	58,818	62,142	62,700	64,800	66,200	67,200
Zimbabwe	31	17	366	371	1,080	3,170	3,460	3,600
Total	38,300	51,000	59,200	62,500	63,800	68,000	69,700	70,800

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 14  
AFRICA: HISTORIC AND PROJECTED SILVER MINE PRODUCTION, 1990-2007

(Metal content in kilograms)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	2,500	2,000	1,400	1,700	1,700	1,700	1,700	1,700
Congo (Kinshasa)	84,000	900	--	--	--	--	--	5,000
Ghana	840	2,660	6,100	1,945	3,600	3,500	3,400	3,800
Mali	270	250	--	--	--	--	--	--
Morocco	241,000	204,000	289,000	280,000	285,000	290,000	300,000	300,000
Namibia	92,100	69,000	9,287	12,679	12,700	13,000	14,000	15,000
South Africa	161,000	174,279	144,143	109,570	110,000	110,000	123,000	132,000
Tanzania	--	--	1,384	6,861	9,200	10,300	10,900	10,900
Tunisia	930	4,000	3,700	3,650	3,700	3,700	3,700	3,700
Zambia	17,000	8,676	4,710	6,290	6,300	6,300	9,100	10,800
Zimbabwe	21,200	15,640	3,799	3,449	3,400	2,800	2,300	2,300
Total	621,000	481,000	464,000	426,000	436,000	441,000	468,000	485,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

TABLE 15  
AFRICA: HISTORIC AND PROJECTED TIN MINE PRODUCTION, 1990-2007

(Metal content in kilograms)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Burundi	54	15	7	4	5	5	5	5
Cameroon	3	2	--	--	--	--	--	--
Congo (Kinshasa)	100	--	--	--	--	--	--	20
Namibia	900	--	--	--	--	--	--	--
Niger	38	20	22	20	20	20	20	20
Nigeria	145	250	200	130	150	150	200	200
Tanzania	15	3	--	--	--	--	--	--
Rwanda	510	242	276	171	170	220	220	220
South Africa	1,140	--	--	--	--	--	--	--
Uganda	25	43	6	18	20	20	20	20
Zambia	1	--	--	--	--	--	--	--
Zimbabwe	1,120	10	--	--	--	--	--	--
Total	4,050	585	511	343	365	415	465	485

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

TABLE 16  
AFRICA: HISTORIC AND PROJECTED TIN METAL PRODUCTION, 1990-2007

(Metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Congo (Kinshasa)	90	--	--	--	--	--	--	--
Nigeria	130	259	25	25	25	25	30	30
Rwanda	--	--	--	--	80	200	200	200
South Africa	1,210	--	--	--	--	--	--	--
Total	1,430	259	25	25	105	225	230	230

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 17  
AFRICA: HISTORIC AND PROJECTED ILMENITE MINE PRODUCTION, 1990-2007

(Thousand metric tons of TiO<sub>2</sub>)

Country	1990 e/	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Egypt	--	30	66	66	69	69	69	69
Kenya	--	--	--	--	--	--	150	150
Mozambique	--	--	--	--	--	--	490	690
Sierra Leone	33	--	--	--	--	50	50	50
South Africa	567	890	954	928	930	1,000	1,090	1,090
Total	600	920	1,020	994	1,000	1,120	1,850	2,050

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

TABLE 18  
AFRICA: HISTORIC AND PROJECTED TUNGSTEN MINE PRODUCTION, 1990-2007

(Metal content in metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Burundi	--	22	--	--	--	--	--	--
Rwanda	84	47	108	148	150	150	150	150
Uganda	4	17	--	17	115	115	270	270
Total	88	86	108	165	265	265	420	420

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

TABLE 19  
AFRICA: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1990-2007

(Metal content in metric tons)

Country 1/	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	4,160	7,174	10,452	12,000	12,000	12,000	12,000	12,000
Congo (Kinshasa)	61,800	4,500	215	1,014	1,000	1,000	--	50,000
Morocco	18,800	79,947	103,064	89,339	90,000	100,000	110,000	115,000
Namibia	37,700	30,209	39,126	31,803	32,000	80,000	180,000	180,000
South Africa	75,000	70,241	62,703	61,221	60,000	35,000	35,000	35,000
Tunisia	3,960	44,244	41,247	40,000	40,000	40,000	40,000	40,000
Total	201,000	236,000	257,000	235,000	235,000	268,000	377,000	432,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

-- Negligible or no production.

1/ Nigeria also mined a small quantity of zinc.

TABLE 20  
AFRICA: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 1990-2007

(Metal content in metric tons)

Country 1/	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	23,600	30,000	34,000	34,000	34,000	34,000	34,000	34,000
Congo (Kinshasa)	38,200	--	--	--	--	--	--	50,000
Namibia	--	--	--	--	--	150,000	150,000	150,000
South Africa	92,000	98,782	103,000	109,000	100,000	100,000	100,000	100,000
Total	154,000	129,000	137,000	143,000	134,000	284,000	284,000	334,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

1/ Nigeria also refined a small quantity of zinc.

TABLE 21  
AFRICA: HISTORIC AND PROJECTED DIAMOND MINE PRODUCTION, 1990-2007

(Thousand carats)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Angola	1,130	2,900	4,313	5,159	5,500	6,000	7,000	7,000
Botswana	17,400	16,802	24,635	26,416	27,000	27,000	26,000	26,000
Central African Republic	381	530	461	480	(1/)	(1/)	(1/)	(1/)
Congo (Kinshasa)	19,400	22,024	17,700	18,200	18,000	18,000	17,000	17,000
Cote d'Ivoire	12	75	320	320	(1/)	(1/)	(1/)	(1/)
Gabon	1	1	1	1	1	1	1	1
Ghana	650	632	920	870	(1/)	(1/)	(1/)	(1/)
Guinea	127	365	369	370	(1/)	(1/)	(1/)	(1/)
Lesotho	NA	NA	2	1	1	1	1	1
Liberia	100	150	170	170	(1/)	(1/)	(1/)	(1/)
Namibia	763	1,382	1,542	1,490	1,500	1,500	2,000	2,500
Sierra Leone	78	214	600	600	(1/)	(1/)	(1/)	(1/)
South Africa	8,710	9,683	10,805	11,167	11,000	11,000	14,000	14,000
Tanzania	85	50	354	254	(1/)	(1/)	(1/)	(1/)
Zimbabwe	--	204	17	15	(1/)	(1/)	(1/)	(1/)
Undistributed	--	--	--	--	3,100	3,300	3,200	3,200
Total	48,800	55,000	62,200	65,500	66,100	66,800	69,200	69,700

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. NA Not available. -- Negligible or no production.

1/ Included in "Undistributed."

TABLE 22  
AFRICA: RUBY PRODUCTION, 1995-2001 1/

(Kilograms)

Country	1995	1996	1997	1998	1999	2000	2001
Kenya	1,200	1,200	5,175	4,001	4,488	5,896	5,862
Madagascar	73	92	21	31	6	3	941
Malawi	5	6	20	20	15	--	15
Tanzania	800	800	900	1,000	1,000	1,070	1,174
Total	2,100	2,100	6,100	5,050	5,510	6,970	7,990

-- Negligible or no production.

1/ Totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 23  
AFRICA: SAPPHIRE PRODUCTION, 1995-2001 1/

(Kilograms)

Country	1995	1996	1997	1998	1999	2000	2001
Kenya	2,300	2,300	615	3,313	7,232	10,686	10,000
Madagascar	99	110	3,957	2,874	3,810	471	8,470
Tanzania	2,000	2,200	2,400	2,450	2,500	2,531	3,576
Total	4,400	4,610	6,970	8,640	13,500	13,700	22,000

1/ Totals are rounded to no more than three significant digits; may not add to totals shown

TABLE 24  
AFRICA: TANZANITE PRODUCTION, 1997-2001

(Kilograms)

Country	1997	1998	1999	2000	2001
Tanzania	810	1,226	5,216	5,516	5,473



TABLE 25  
AFRICA: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1990-2007

(Thousand metric tons of P<sub>2</sub>O<sub>5</sub> content)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	333	500	265	280	280	310	310	310
Egypt	286	207	300	420	420	420	420	420
Morocco	6,910	6,399	7,200	7,400	7,240	7,400	7,740	8,420
Senegal	823	556	720	656	660	660	660	660
South Africa	1,200	1,101	1,083	937	940	900	900	780
Tanzania	8	2	5	4	5	5	5	5
Togo	840	930	500	380	460	760	760	1,200
Tunisia	1,860	2,181	2,500	2,440	2,460	2,460	2,460	2,460
Zimbabwe	52	45	25	28	26	22	22	38
Total	12,300	11,900	12,600	12,500	12,500	12,900	13,300	14,300

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 26  
AFRICA: HISTORIC AND PROJECTED COAL PRODUCTION, 1990-2007

(Thousand metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Botswana	793	898	947	930	950	950	950	950
Congo (Kinshasa)	100	10	--	1	2	2	10	20
Egypt	--	10	400	400	400	400	400	400
Malawi	41	15	34	34	35	35	35	35
Morocco	526	650	31	2	2	2	2	2
Mozambique	40	40	16	18	20	20	20	20
Niger	154	135	158	160	160	160	160	160
Nigeria	78	29	35	35	35	40	80	100
South Africa	175,000	206,210	224,118	223,500	225,000	225,000	235,000	250,000
Swaziland	151	172	378	380	--	--	300	400
Tanzania	52	43	79	78	80	85	90	1,600
Zambia	382	141	168	150	100	150	150	200
Zimbabwe	5,500	5,538	3,809	4,064	3,200	2,800	3,500	4,000
Total	183,000	214,000	230,000	230,000	230,000	230,000	241,000	258,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 27  
AFRICA: HISTORIC AND PROJECTED DRY NATURAL GAS PRODUCTION, 1990-2007

(Million cubic meters)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	48,500	58,100	100,092	105,000	103,000	101,000	111,000	122,000
Angola	538	560	560	574	580	560	3,000	5,500
Congo (Kinshasa)	--	--	--	--	--	30	60	60
Cote d'Ivoire	--	36	1,323	1,230	1,300	1,500	1,200	1,200
Egypt	7,900	12,536	21,000	21,000	21,000	31,000	29,000	29,000
Equatorial Guinea	--	--	98	790	800	1,350	1,350	1,400
Ethiopia	--	--	--	--	--	--	100	100
Gabon	150	150	99	99	100	103	100	100
Libya	6,200	6,345	5,400	5,400	5,400	7,200	17,000	27,000
Morocco	37	22	39	39	38	36	37	35
Mozambique	--	--	60	60	60	60	1,000	1,000
Nigeria	3,230	5,000	13,000	21,000	21,000	21,000	25,000	32,000
Senegal	110	110	56	56	50	41	33	33
South Africa	--	1,980	2,088	3,000	2,500	2,000	1,900	1,900
Sudan	--	--	--	--	--	10	10	10
Tanzania	--	--	--	--	--	400	800	800
Tunisia	200	250	1,600	1,800	1,800	1,900	2,100	2,300
Total	66,900	85,100	145,000	160,000	158,000	168,000	194,000	224,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 28  
AFRICA: HISTORIC AND PROJECTED CRUDE PETROLEUM, INCLUDING CONDENSATE, PRODUCTION, 1990-2007

(Thousand 42-gallon barrels)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Algeria	444,000	438,730	476,288	475,000	479,000	550,000	600,000	600,000
Angola	174,000	232,800	273,020	270,100	365,000	511,000	571,000	620,000
Benin	1,416	654	365	365	--	--	--	--
Cameroon	64,600	39,400	41,000	39,600	29,000	27,000	24,000	24,000
Chad	--	--	--	--	1	30,000	84,000	84,000
Congo (Brazzaville)	58,800	63,875	95,630	103,000	93,000	92,000	90,000	90,000
Congo (Kinshasa)	10,600	10,087	10,300	11,500	9,700	9,400	9,800	9,800
Cote d'Ivoire	770	2,000	11,700	12,000	2,000	3,000	2,600	2,600
Egypt	319,000	335,800	285,000	277,000	230,000	210,000	220,000	220,000
Equatorial Guinea	--	2,300	39,000	69,000	58,000	65,000	90,000	90,000
Gabon	100,000	133,000	118,625	110,000	124,000	120,000	115,000	115,000
Ghana	--	--	2,555	3,285	2,100	2,300	2,200	4,000
Libya	502,000	509,175	538,000	520,000	530,000	650,000	700,000	700,000
Morocco	114	36	35	35	35	35	35	35
Nigeria	660,000	740,000	783,000	823,000	800,000	1,000,000	1,350,000	1,500,000
Senegal	8	2	1	1	--	--	--	--
South Africa	--	--	6,606	13,870	6,400	20,000	20,000	22,000
Sudan	--	730	67,152	77,755	85,000	101,000	164,000	164,000
Tunisia	36,500	32,690	28,207	26,300	24,000	22,000	18,000	18,000
Total	2,370,000	2,540,000	2,780,000	2,830,000	2,840,000	3,410,000	4,060,000	4,260,000

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 29  
AFRICA: HISTORIC AND PROJECTED URANIUM PRODUCTION, 1990-2007

(Metal content in metric tons)

Country	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Gabon	702	653	--	--	--	--	--	--
Namibia	3,214	2,006	2,714	2,239	2,300	2,300	2,400	2,700
Niger	2,681	2,970	2,895	3,096	3,000	3,000	3,000	3,000
South Africa	2,442	1,443	861	903	850	850	850	850
Total	9,040	7,070	6,470	6,240	6,150	6,150	6,250	6,550

e/ Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 30  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/

(Thousand metric tons of gross weight unless otherwise specified)

Country	Aluminum	Bauxite	Cement	Chromite	Coal, anthracite and bituminous	Cobalt, mine Co content (metric tons)
Algeria	--	--	8,300	--	--	--
Angola	--	--	350	--	--	--
Benin	--	--	250	--	--	--
Botswana	--	--	--	--	930	325
Burkina Faso	--	--	50	--	--	--
Burundi	--	--	--	--	--	--
Cameroon	81	--	930	--	--	--
Central African Republic	--	--	--	--	--	--
Chad	--	--	--	--	--	--
Congo (Brazzaville)	--	--	100	--	--	--
Congo (Kinshasa)	--	--	100	--	1	4,700
Cote d'Ivoire	--	--	650	--	--	--
Egypt	189	--	24,500	--	400	--
Equatorial Guinea	--	--	--	--	--	--
Eritrea	--	--	47	--	--	--
Ethiopia	--	--	950	--	--	--
Gabon	--	--	210	--	--	--
Ghana	162	715	1,900	--	--	--
Guinea	--	15,700	300	--	--	--
Kenya	2	--	1,085	--	--	--
Lesotho	--	--	--	--	--	--
Liberia	--	--	15	--	--	--
Libya	--	--	3,000	--	--	--
Madagascar	--	--	54	52	--	--
Malawi	--	--	181	--	34	--
Mali	--	--	40	--	--	--
Mauritania	--	--	110	--	--	--
Morocco	--	--	10,000	--	2	1,300
Mozambique	266	9	265	--	18	--
Namibia	--	--	--	--	--	--
Niger	--	--	40	--	160	--
Nigeria	--	--	3,000	--	35	--
Rwanda	--	--	83	--	--	--
Senegal	--	--	1,000	--	--	--
Sierra Leone	--	--	100	--	--	--
Somalia	--	--	--	--	--	--
South Africa	662	--	9,165	5,502	223,500	550
Sudan	--	--	146	21	--	--
Swaziland	--	--	--	--	380	--
Tanzania	--	--	900	--	78	--
Togo	--	--	800	--	--	--
Tunisia	--	--	5,721	--	--	--
Uganda	--	--	416	--	--	--
Zambia	--	--	350	--	150	8,000
Zimbabwe	--	--	1,000	780	4,064	95
Total 2/	1,360	16,400	76,100	6,360	230,000	15,000
World total	24,400	138,000	1,700,000	12,100	3,910,000	36,700
Share of world total	6%	12%	4%	53%	6%	41%
United States	2,637	NA	90,446	--	941,500	--

See footnotes at end of table.

TABLE 30--Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/

(Thousand metric tons of gross weight unless otherwise specified)

Country	Copper, mine Cu content	Diamond 3/ (thousand carats)	Gold (kilograms)	Graphite	Iron ore	Lead, mine Pb content (metric tons)
Algeria	--	--	300	--	1,500	900
Angola	--	5,159	--	--	--	--
Benin	--	--	500	--	--	--
Botswana	20	26,416	2	--	--	--
Burkina Faso	--	--	1,000	--	--	--
Burundi	--	--	415	--	--	--
Cameroon	--	--	1,000	--	--	--
Central African Republic	--	480	20	--	--	--
Chad	--	--	150	--	--	--
Congo-Brazzaville	--	--	10	--	--	--
Congo-Kinshasa	21	18,200	50	--	--	--
Cote d'Ivoire	--	320	3,100	--	--	--
Egypt	--	--	--	--	2,500	--
Equatorial Guinea	--	--	500	--	--	--
Eritrea	--	--	270	--	--	--
Ethiopia	--	--	5,200	--	--	--
Gabon	--	1	70	--	--	--
Ghana	--	870	68,699	--	--	--
Guinea	--	370	13,000	--	--	--
Kenya	--	--	1,200	--	1	--
Lesotho	--	1	--	--	--	--
Liberia	--	170	1,000	--	--	--
Libya	--	--	--	--	--	--
Madagascar	--	--	--	40	--	--
Malawi	--	--	--	--	--	--
Mali	--	--	42,288	--	--	--
Mauritania	--	--	1,000	--	10,300	--
Morocco	6	--	1,190	--	6	76,747
Mozambique	--	--	25	--	--	--
Namibia	27	1,490	2,851	--	--	13,025
Niger	--	--	1,000	--	--	--
Nigeria	--	--	10	--	--	--
Rwanda	--	--	10	--	--	--
Senegal	--	--	550	--	--	--
Sierra Leone	--	600	30	--	--	--
Somalia	--	--	--	--	--	--
South Africa	142	11,167	394,535	--	34,757	50,771
Sudan	--	--	5,800	--	--	--
Swaziland	--	--	--	--	--	--
Tanzania	3	254	30,088	--	--	--
Togo	--	--	--	--	--	--
Tunisia	--	--	--	--	204	6,820
Uganda	--	--	--	--	1	--
Zambia	312	--	130	--	--	--
Zimbabwe	2	15	18,050	10	361	--
Total 2/	533	65,500	594,000	50	49,600	148,000
World total	13,700	117,000	2,570,000	873	1,060,000	3,080,000
Share of world total	4%	56%	23%	6%	5%	5%
United States	1,340	--	335,000	--	46,192	466,000

See footnotes at end of table.

TABLE 30--Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/

(Thousand metric tons of gross weight unless otherwise specified)

Country	Manganese, mine Mn content	Petroleum, crude (thousand 42- gallon barrels)	Phosphate rock (gross weight)	Steel, crude	Uranium, concentrate U <sub>3</sub> O <sub>8</sub> (metric tons)	Zinc, mine Zn content (metric tons)
Algeria	--	475,000	900	850	--	12,000
Angola	--	270,100	--	--	--	--
Benin	--	365	--	--	--	--
Botswana	--	--	--	--	--	--
Burkina Faso	--	--	--	--	--	--
Burundi	--	--	--	--	--	--
Cameroon	--	39,600	--	--	--	--
Central African Republic	--	--	--	--	--	--
Chad	--	--	--	--	--	--
Congo (Brazzaville)	--	103,000	--	--	--	--
Congo (Kinshasa)	--	11,500	--	80	--	1,014
Cote d'Ivoire	--	12,000	--	--	--	--
Egypt	8	277,000	1,450	3,800	--	--
Equatorial Guinea	--	69,000	--	--	--	--
Eritrea	--	--	--	--	--	--
Ethiopia	--	--	--	--	--	--
Gabon	830	110,000	--	--	--	--
Ghana	260	3,285	--	--	--	--
Guinea	--	--	--	--	--	--
Kenya	--	--	--	--	--	--
Lesotho	--	--	--	--	--	--
Liberia	--	--	--	--	--	--
Libya	--	520,000	--	900	--	--
Madagascar	--	--	--	--	--	--
Malawi	--	--	--	--	--	--
Mali	--	--	--	--	--	--
Mauritania	--	--	--	--	--	--
Morocco	12	35	21,983 5/	5	--	89,339
Mozambique	--	--	--	--	--	--
Namibia	--	--	--	--	2,640	31,803
Niger	--	--	--	--	3,651	--
Nigeria	--	823,000	--	--	--	--
Rwanda	--	--	--	--	--	--
Senegal	--	1	1,990	--	--	--
Sierra Leone	--	--	--	--	--	--
Somalia	--	--	--	--	--	--
South Africa	1,479	13,870	2,420	8,821	1,065	61,221
Sudan	--	77,755	--	--	--	--
Swaziland	--	--	--	--	--	--
Tanzania	--	--	13	--	--	--
Togo	--	--	1,060	--	--	--
Tunisia	--	26,300	8,144	239	--	40,000
Uganda	--	--	--	7	--	--
Zambia	--	--	--	--	--	--
Zimbabwe	--	--	87	156	--	--
Total 2/	2,590	2,830,000	38,000	14,900	7,360	235,000
World total	7,570	24,800,000	126,000	851,000	41,000	8,850,000
Share of world total	34%	11%	30%	2%	18%	3%
United States	--	2,120,000	31,900	90,084	1,717	842,000

NA Not available. -- Negligible or no production.

1/ Table includes data available through January 2003. Totals are rounded to no more than three significant digits.

2/ May not add to totals shown because of independent rounding.

3/ Excludes synthetic diamond.

4/ Less than 1/2 unit.

5/ Includes production from Western Sahara.

TABLE 31  
AFRICA: GROSS DOMESTIC PRODUCT AT PURCHASING POWER PARITY IN 2001

Country	GDP 1/ (billions)	Population (millions)	Per capita GDP	Real GDP growth rate
Algeria	\$158.68	30.84	\$5,145	2.8
Angola	23.64	13.53	1,747	3.2
Benin	9.78	6.42	1,523	5.0
Botswana	16.76	1.55	10,813	4.9
Burkina Faso	14.19	11.86	1,196	5.7
Burundi	4.79	6.50	737	2.4
Cameroon	34.65	15.20	2,280	5.3
Cape Verde	1.76	0.44	4,000	2.9
Central African Republic	5.98	3.78	1,582	1.0
Chad	8.26	8.14	1,015	8.5
Comoros	0.90	0.73	1,233	1.9
Congo (Brazzavile)	5.60	3.11	1,801	2.9
Congo (Kinshasa)	37.55	52.52	715	-4.4
Cote d'Ivoire	33.09	16.94	1,953	0.1
Djibouti	1.85	0.64	2,891	1.9
Egypt	247.85	67.89	3,651	3.3
Equatorial Guinea	2.33	0.47	4,957	45.5
Eritrea	NA	3.82	NA	9.7
Ethiopia	37.31	65.37	571	7.7
Gabon	9.21	1.24	7,427	2.4
Gambia, The	2.33	1.42	1,641	5.5
Ghana	38.41	19.73	1,947	4.2
Guinea	16.81	8.27	2,033	3.6
Guinea-Bissau	1.28	1.23	1,041	0.2
Kenya	40.87	31.29	1,306	1.2
Lesotho	3.85	2.19	1,758	4.0
Liberia	NA	3.11	NA	NA
Libya	82.84	5.41	15,312	0.6
Madagascar	17.14	16.44	1,043	6.7
Malawi	9.35	11.40	820	-1.5
Mali	9.49	10.40	913	1.5
Mauritania	5.51	2.75	2,004	4.6
Mauritius	14.43	1.20	12,025	7.2
Morocco	112.37	29.17	3,852	6.5
Mozambique	18.04	17.66	1,022	13.9
Namibia	10.30	1.79	5,754	2.5
Niger	10.87	11.23	968	7.6
Nigeria	130.26	116.93	1,114	2.8
Rwanda	7.36	7.95	926	6.7
Sao Tome & Principe	0.19	0.14	1,357	4.0
Senegal	20.41	9.66	2,113	5.6
Seychelles	1.00	0.08	12,500	-8.1
Sierra Leone	2.18	4.59	475	5.4
Somalia	NA	9.16	NA	NA
South Africa	364.35	44.33	8,219	2.2
Sudan	60.24	31.81	1,894	5.3
Swaziland	4.13	0.94	4,394	1.6
Tanzania	22.45	35.97	624	5.6
Togo	7.69	4.66	1,650	2.7
Tunisia	62.66	9.67	6,480	5.0
Uganda	32.04	22.79	1,406	5.6
Zambia	10.87	10.65	1,021	4.9
Zimbabwe	29.29	12.96	2,260	-8.5

NA Not available.

1/ GDP Gross domestic product.

Source: International Monetary Fund and United Nations.

TABLE 32  
THE ROLE OF MINERAL EXPORTS IN SELECTED AFRICAN ECONOMIES IN 2001 1/

Country	Value of mineral exports (millions)	Minerals as a percentage of total exports	Major exports
Nigeria	\$18,400	98	Crude oil.
Libya	11,000	98	Crude oil and natural gas.
Algeria	18,000	95	Crude oil, natural gas, and petroleum products.
Equatorial Guinea	900	95	Crude oil and methanol.
Congo (Brazzaville)	2,500	90	Crude oil.
Guinea	700	90	Aluminum, bauxite, diamond, and gold.
Sierra Leone	75	90	Bauxite, diamond, and titanium.
Angola (1999)	5,630	89	Crude oil and diamond.
Gabon	2,100	86	Crude oil and manganese.
Botswana	2,210	85	Diamond, nickel, and soda ash.
Sudan	1,430	84	Crude oil, petroleum products, and gold.
Congo (Kinshasa)	1,600	75	Diamond, crude oil, copper, and cobalt.
Zambia	590	68	Copper, cobalt, and gemstones.
Mozambique	410	58	Aluminum and petroleum products.
Mali	287	55	Gold.
Cameroon	1,100	50	Crude oil and aluminum.
Ghana	940	47	Gold, aluminum, diamond, bauxite, and manganese.
Rwanda	41	47	Columbium (niobium)-tantalum, tin, and tungsten.
Zimbabwe	720	42	Platinum, gold, nickel, and lithium.
South Africa (2000)	13,400	41	Platinum, gold, coal, aluminum, iron ore, and ferroalloys.
Tanzania	312	40	Gold, diamond, and gemstones.
Egypt	1,600	39	Crude oil and petroleum products.
Namibia	653	38	Diamond, uranium, copper, and gold.
Morocco	1,500	19	Phosphate, copper, lead, zinc, and iron ore.
Uganda	70	11	Gold, cobalt, columbium (niobium)-tantalum, tin, and tungsten.
Kenya (2000)	195	11	Trona, fluorite, gold, cement, and petroleum products.
Tunisia	595	9	Cement, fertilizer, phosphate rock, and zinc.
Madagascar (2000)	47	6	Chromite, mica, gemstones, and petroleum products.
Total	87,000		

1/ Data for 2001 unless otherwise noted.

Source: U.S. Geological Survey from Government and international development bank reports.

TABLE 33  
SELECTED SIGNIFICANT AFRICAN EXPLORATION SITES IN 2001 1/

Location	Type 2/	Site	Commodity	Company	Resource 3/	Exploration 4/
Algeria	E	Amesmesssa	Au	Societe d'Exploration des Mines d'Or	1.6 Moz Au	\$10 million budget.
Botswana	P	Phoenix	Ni, Cu	LionOre Mining International Ltd.	484,000 t Ni, 283,000 t Cu	Extensive drilling.
Mali	P	Morila	Au	Randgold Resources Ltd.	Data not released	Do.
Do.	F	Tabakoto	Au	Nevsun Resources Ltd.	550,000 oz Au	Do.
South Africa	F	Everest North/South	PGE, Au	Aquarius Platinum Ltd.	7.7 Moz PGE and Au	Feasibility drilling.
Do.	D	Winnaarshoek	PGE, Au	Impala Platinum Holdings Ltd.	68.3 Moz PGE and Au	Extensive drilling.
Tanzania	P	Bulyanhulu	Au	Barrick Gold Corp.	14.2 Moz Au	Do.
Do.	E	Tulakawa	Au	do.	743,000 oz Au	Feasibility drilling.
Zambia	F	Kansanshi	Cu, Au	First Quantum Minerals Ltd.	3.4 Mt Cu, 1.4 Moz Au	Extensive drilling.
Do.	F	Lumwana	Cu, Au, U, Co	Equinox Resources Ltd.	4.8 Mt Cu	Feasibility drilling.
Zimbabwe	F	Murowa/Zvishavane	Diamond	Rio Tinto Zimbabwe	14.8 million carats of diamond	Feasibility study.

1/ Abbreviations used for commodities in this table include the following: Au--gold, Co--cobalt, Cu--copper, Ni--nickel, PGE--platinum-group elements, and U--uranium. Abbreviations used for units of measurement include the following: Moz--million troy ounces, Mt--million metric tons, oz--troy ounces, and t--metric tons.

2/ D--Approved for development; E--Active exploration; F--Feasibility work ongoing/completed; P--Exploration at producing site.

3/ Resources reported where available based on data from various public sources. Data have not been verified by the U.S. Geological Survey.

4/ Sites where extensive (+10,000 meters) drilling or significant (+\$4 million) expenditure have been reported.

Source: Resource data reflect unverified public information reported by trade journals as reported in May 2002 Mining Engineering.