

THE MINERAL INDUSTRIES OF KENYA AND UGANDA

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KENYA

The mineral industry in the East African country of Kenya has been chiefly noted for its production of fluor spar, salt, and soda ash. Other industrial minerals produced in recent years have included barite, diatomite, feldspar, gypsum, lime, silica sand, and vermiculite. Building materials produced have included cement, coral, granite, limestone, marble, and shale. Kenya has produced small amounts of metal products, which have included gold and secondary aluminum, lead, and steel. The country also has produced carbon dioxide, gemstones, and refined petroleum products.

In 2000, Kenya's gross domestic product (GDP) fell by 0.3% after rising by 1.4% in 1999 and 1.8% in 1998. Manufacturing accounted for 13.1% of the GDP; building and construction, 2.4%; and mining and quarrying, less than 1%. In 2000, the manufacturing and building and constructions sectors contracted by 1.5% (Central Bank of Kenya, 2001, p. 43-46). In 2000, Kenya's GDP amounted to \$45.6 billion at purchasing power parity. Per capita GDP at purchasing power parity was \$1,500 in 2000 (U.S. Central Intelligence Agency, 2001a).

Commodity Review

Metals

Gold.—Numerous deposits of gold occur in Kenya. Resources at the Migori deposit were estimated to be 1.6 million metric tons (Mt) at a grade of 4.3 grams per metric ton gold. Other deposits were found in greenstone belts in western Kenya. International Gold Exploration AB (IGE), an exploration and mining company based in Sweden, had projects in northwestern and southwestern Kenya. The company increased gold production at its small scale plant in Lolgorien, which was fed with ore from the Teng Teng Mine. IGE has identified eight additional areas nearby with gold potential (Opiyo-Akech, 2000).

Lead.—Although Kenya's only lead mine stopped production in 1996, the country continued to produce secondary lead (table 1). Production of lead amounted to about 1,000 metric tons per year (t/yr), and consumption, 3,000 t/yr (International Lead and Zinc Study Group, 2001, p. 6, 8). Kenya imported lead from China, Malaysia, Nigeria, and South Africa.

Titanium and Zirconium.—Tiomin Resources Inc. held the licenses to four substantial deposits of mineral sands in southeastern Kenya that contain ilmenite, rutile, and zircon. The Kilifi deposit has resources of 1,700 Mt that contain 18.7 Mt ilmenite, 1.7 Mt rutile, and 1.7 Mt zircon. Resources at the Mamburi deposit were estimated to be 700 Mt that contain 14 Mt ilmenite, 0.7 Mt rutile, and 0.7 Mt zircon. The Vipingo deposit has estimated resources of 500 Mt. The Kwale deposit has 200 Mt that contain 4.0 Mt ilmenite, 1.0 Mt rutile, and 0.6

Mt zircon; the ilmenite contains 49% titanium dioxide, and the rutile, more than 95% titanium dioxide (Tiomin Resources, 1999, p. 12; Africa Energy & Mining, 2000a).

Tiomin eventually planned to exploit all these deposits sequentially but decided to focus on the \$137 million Kwale project first owing to its higher grades of economically recoverable minerals. Most of the minerals recovered will be exported. During the first 6 years, output would be more than 300,000 t/yr of ilmenite, 75,000 t/yr of rutile, and 37,000 t/yr of zircon (Africa Energy & Mining, 2000a). Production was expected to begin in the first quarter of 2003 if Tiomin obtained mining licenses in early 2001. In November 2000, parties opposed to the Kwale project on environmental grounds were allowed to apply for an order to stop the Government from awarding licenses to Tiomin. Tiomin's project continued to move forward while the Government considered the petition (Africa Mining Intelligence, 2000).

Industrial Minerals

Cement.—From 1996 to 2000, Kenya's cement production fell by nearly one-half owing to the country's economic difficulties and decreasing export demand. In 2000, cement production fell to 1.07 Mt from 1.2 Mt in 1999, and cement consumption fell to 907,000 metric tons (t) from 1.01 Mt (Central Bank of Kenya, May 2001, Economic growth and real sector activities— Building and construction, Monthly Economic Review, accessed June 11, 2001, at URL <http://home.centralbank.go.ke/MonthlyReviews/ShowReview.asp?DocumentID=1133>). Exports declined to 283,682 t in 1999 from 472,148 t in 1995; about 34% of Kenya's cement was exported from 1995 to 1999. In 1999, France accounted for 40.5% of cement exports; Uganda 39.7%; and Comoros, 10.1%. The value of exported cement amounted to about \$18 million in 1999 compared with \$34.3 million in 1995 (Opiyo-Akech, 2000; International Trade Center and United Nations Statistics Division, 2001).

Bamburi Cement Ltd. was the largest cement producer in Kenya; its plant was the second largest in Sub-Saharan Africa with a capacity of 1.3 million metric tons per year. East African Portland Cement Co. Ltd. and Athi River Mining Ltd. (ARM) also produced cement (International Cement Review, p. 185).

Diatomite.—Numerous deposits of diatomite occur in the Rift Valley. Small amounts of high-grade diatomite were produced at Soysambu and Kariandusi near Gilgil for domestic and export markets (Opiyo-Akech, 2000).

Fluorspar.—Deposits of fluor spar occur in the Keiro Valley. The resources of these deposits amounted to about 5 Mt at an average grade of about 40% CaF₂ (Kendall, 1997; Miller, 2001). Fluorspar resources were exploited by Kenya Fluorspar Ltd. Exports increased to 83,658 t at a value of \$7.5 million in 1999 from 56,202 t at a value of \$4.7 million in 1995. From 1995 to

1999, Kenya exported about 85% of its fluor spar production, which was mostly used in the manufacture of hydrofluoric acid. In 1999, the Netherlands accounted for 19.3% of exports; the United States, 18.6%; the United Kingdom, 16.2%; India, 12.5%; Italy, 12.4%; and Greece, 10% (Opiyo-Akech, 2000; International Trade Center and United Nations Statistics Division, 2001). Domestic consumers of fluor spar included the cement and glass industries.

Gemstones.—Kenya was a producer of numerous gemstones, such as amethyst, aquamarine, cordierite, green garnet, ruby, sapphire, and tourmaline (table 1). In recent years, the country has produced amethyst from Mbooni Hill; aquamarine from Embu and Nachola; garnet from Lokirima, Mgama-Mindi, and Taita Taveta; ruby from Mangari, Taita Hills, and Thika; sapphire from Don Dol, Kinyiki Hill, Kubi Kano, Samburu, and Thika; and tourmaline from Magadi, Mgama-Mindi, and Osarara (Shigley and others, 2000, p. 311, 313-315, 317, 320, 322).

The largest companies involved in Kenya's gemstone industry were Bridges Exploration Ltd., Gemkit Enterprises Ltd., and Rockland Kenya Ltd. The value of official gemstone exports amounted to about \$3.9 million in 1999; this figure probably represented a small percentage of actual exports owing to the smuggling of gemstones from Tanzania through Kenya. Although a small gem-cutting industry has developed, most of Kenya's gemstone exports were rough stones. In 1999, the value of unworked gemstone exports amounted to \$2.9 million, and worked gemstone exports, about \$1 million. India accounted for 55.1% of Kenya's gemstone exports; Thailand, 10.5%; the United States, 9.3%; and Germany, 8.5% (Opiyo-Akech, 2000; International Trade Center and United Nations Statistics Division, 2001).

Kaolin and Other Clays.—Deposits of kaolin were found in the Nyeri district north of Nairobi. The kaolin resources at Gaithita were estimated to be 10 Mt, and at Karundu, 5 Mt to 10 Mt (Notholt, 1993, p. 184). ARM produced small amounts of kaolin for use in ceramic tiles, paper, paint, and rubber products. The company also mined bentonite at Ndulutu and china clay at Karatina (Athi River Mining Ltd., 2000, Profile—Plants & mining locations, accessed June 11, 2001, at URL http://www.armkenya.com/subsection.php?subsection_id=43&title=Plants+%26+Mining+Locations§ion_id=3&). In 1999, Kenya imported 5,022 t of bentonite, kaolin, and other clays, which was an increase from 4,282 t in 1995. The country also exported small amounts of kaolin (International Trade Center and United Nations Statistics Division, 2001).

Limestone.—Large deposits of dolomite, limestone, and marble occur widely in Kenya. Resources from a limestone deposit near Bamburi and Mombasa were estimated to be more than 50 Mt; these resources were exploited by Bamburi Cement. ARM exploited the resources of the Kajiado deposit southwest of Nairobi and the Kaloleni deposit near Mombasa for use in the Kaloleni cement and lime plant. Resources of travertine from the Umani Crater were estimated to range from 35 to 50 Mt. Marble resources at Mutini were estimated to be 23 Mt (Bosse, 1996, p. 186, 193-194). About 32,000 t/yr of limestone was used for dimension stone (table 1).

Kenya's exports of lime increased to 7,872 t in 1999 from 6,932 t in 1995; during the same period, the value of exports fell to \$545,000 from \$658,000. In 1999, Uganda accounted for

74.6% of lime exports, and Tanzania, 24.2% (International Trade Center and United Nations Statistics Division, 2001).

Salt.—Lake Magadi, which is in the Great Rift Valley, contains notable resources of salt. Magadi Soda Ash Co. Ltd., which was the largest salt producer in Kenya, extracted salt as a byproduct of the soda ash production process. Other salt producers included Krystalline Salt Ltd., Mombasa Salt Works Ltd., and Salt Manufacturers Kenya Ltd.

Salt exports increased to 120,331 t in 1999 from 100,334 t in 1995, although their value fell to \$9.9 million from \$12 million. In 1999, Uganda accounted for 63.5% of Kenya's salt exports; Rwanda, 15%; Tanzania, 9.3%; and the Democratic Republic of the Congo [Congo (Kinshasa)], 8.8%. From 1995 to 1999, salt imports fell to 27,802 t from 38,602 t, and their value fell to \$1.1 million from \$3.7 million. In 1999, about 71% of Kenya's salt imports came from South Africa, and 22%, from Jordan (International Trade Center and United Nations Statistics Division, 2001).

Silica Sand.—ARM exploited deposits of silica sand that occurred at Kaloleni. Silica sand has been used by such Kenyan companies as Central Glass Industries Ltd. to manufacture glass bottles and containers. The value of glass imports fell to \$13.2 million in 1999 from \$14 million in 1995. Kenya imported more than 17,000 t of glass in 1999; imports of float, ground, and polished glass amounted to 13,615 t (International Trade Center and United Nations Statistics Division, 2001). The country also exported small amounts of glass.

Soda Ash.—Substantial resources of trona occur at Lake Magadi. Kenya's trona resources were estimated to be 12.6 Mt, or about 7 Mt of soda ash (Kostick, 2001). Magadi Soda Ash was Kenya's only soda ash producer. Exports increased to 214,429 t in 1999 from 210,805 t in 1995; about 89% of Magadi's production was exported during this period. The value of exported soda ash fell to \$18.8 million in 1999 from \$20.7 million in 1995. In 1999, Thailand accounted for 35.1% of soda ash exports; India, 23.9%; the Philippines, 11.7%; Indonesia, 7.5%; and South Africa, 4.3% (Opiyo-Akech, 2000; International Trade Center and United Nations Statistics Division, 2001). Domestic consumers of soda ash included the caustic soda, detergent, and glass industries.

Sulfur.—Kenya's known deposits of sulfur are small and uneconomic. The country, however, produced about 20,000 t/yr of sulfuric acid for domestic consumption from imported sulfur (table 1). In 1999, Kenya imported 8,042 t of sulfur from Saudi Arabia, Iran, and other countries at a value of \$988,000 (International Trade Center and United Nations Statistics Division, 2001).

Mineral Fuels

Kenya did not produce crude petroleum and relied on imports for its refinery. Imports of crude petroleum fell to about 8.31 million barrels (Mbbbl) in 1999 from 9.96 Mbbbl in 1995. In 1999, the value of imported crude petroleum was \$158.4 million, which was a significant decrease from that of \$232.9 million in 1995. The United Arab Emirates accounted for 90% of Kenya's crude petroleum imports, and Iran, 10% (International Trade Center and United Nations Statistics Division, 2001).

The value of imported petroleum products increased to

\$265.6 million in 1999 from \$167.4 million in 1995. Bahrain, Saudi Arabia, and South Africa were the principal sources of Kenya's imported petroleum products. The value of exported petroleum products increased to \$135.8 million in 1999 from \$102.1 million in 1995. Uganda accounted for about 60% of exports; Rwanda, 13%; and Tanzania, 11% (International Trade Center and United Nations Statistics Division, 2001). Kenya Petroleum Refinery Ltd., which was the country's only refinery, had a capacity of 90,000 barrels per day but has produced only at about 40% capacity in recent years (table 1).

Exploration for petroleum continued in 2000. The National Oil Corporation of Kenya, which was a state-owned company, has begun to review all the geological and geophysical data from the country's sedimentary basins. The company also signed three exploration contracts with the British company Star Petroleum.

In October 2000, Kenya and Uganda agreed to extend the pipeline linking Eldoret and Mombasa in Kenya to Kampala in Uganda. Work could begin in early 2002, but the cost needed to be reassessed. The pipeline would also serve Burundi, Congo (Kinshasa), and Rwanda (Africa Energy & Mining, 2000b).

Infrastructure

Although Kenya had an installed electric power capacity of 1,041 megawatts (MW), actual capacity has been about 600 MW. Hydroelectric plants account for about 75% of installed capacity, thermal, 15%, and geothermal, 10%. A prolonged drought has severely reduced Kenya's ability to generate hydroelectric power. Peak demand exceeded 700 MW of capacity; the resulting power shortages were a significant factor in the country's weak economic performance in the past 3 years (U.S. Embassy, Nairobi, Kenya, 2000). The shortages would have been significantly greater without increased imports of electricity from Uganda.

The Government planned to reduce reliance on hydroelectric power. Two new thermal powerplants and one geothermal plant with a combined capacity of 153 MW were supposed to come on-line in 2000. In 2001, three additional plants were expected to provide an extra 180 MW. Reliance on hydropower was expected to drop to 55% by 2003 and 32% by 2017 (U.S. Embassy, Nairobi, Kenya, 2000).

Kenya had about 63,800 kilometers (km) of roads, of which approximately 8,900 km were paved; the rail network covered 2,700 km. Pipelines for petroleum products covered about 480 km. Lake Victoria was a major waterway for internal commerce. Ports and harbors were Kisumu, Lamu, and Mombasa (U.S. Central Intelligence Agency, 2000a). In August 2000, the Government announced its intention to privatize the container terminal at the major port of Mombasa.

UGANDA

In recent years, the East African country of Uganda has been known to produce cobalt, gold, limonite and other iron ore, niobium, steel, tantalum, tin, and tungsten. Uganda has also produced industrial minerals, such as apatite, gypsum, kaolin and other clays, lime, and salt, and building materials, such as cement, limestone, and pozzolanic materials.

During the fiscal year ending in June 2000 (fiscal year 1999-2000), Uganda's GDP rose by 5.1% after increasing by 7.4% in fiscal year 1998-99 and 5.4% in fiscal year 1997-98. In fiscal

year 1999-2000, the construction sector grew by 8.5%; electricity and water, 11.1%; manufacturing, 8.6%; and mining and quarrying, 5%. From fiscal years 1995-96 to 1999-2000, the mining sector grew by 20.6% per year. In fiscal year 1999-2000, the manufacturing sector accounted for 10% of the GDP; construction, 8.1%; electricity and water, 1.1%; and mining and quarrying, 0.7% (Uganda Ministry of Finance, Planning & Economic Development, 2000, p. 9). The U.S. Central Intelligence Agency (2001b) estimated that Uganda's GDP amounted to \$26.2 billion at purchasing power parity in 2000. Per capita GDP at purchasing power parity was \$1,100.

Commodity Review

Metals

Cobalt and Copper.—The Kilembe cobalt and copper deposits have proven resources of more than 5 Mt at a grade of 1.7% copper and 0.18% cobalt (Tuhumwire, 1996; Uganda Ministry of Energy & Mineral Development, 2001a, p. A4.1). Resources from a stockpile of cobaltiferous concentrate at the abandoned Kilembe copper mine amounted to more than 900,000 t at a grade of 1.34% cobalt. The mine's tailings were estimated to contain an additional 5.5 Mt at a grade of 0.114% cobalt (Banff Resources Ltd., 1997a, b).

Kasese Cobalt Co. Ltd. (KCCL) recovered cobalt from the Kilembe stockpile through bioleaching and solvent extraction-electrowinning. The company also planned to recover cobalt from the tailings. KCCL was a joint venture between Banff Resources Ltd. of Canada and Kilembe Mines Ltd., which was owned by the Ugandan Government. In the fourth quarter of 2000, the Kasese plant operated at 53% of capacity and produced cobalt that averaged 99.8% purity (African Mining Bulletin, 2001). Problems with the bioleaching process and obtaining adequate power supplies caused the plant to operate at an unprofitably low capacity.

The value of cobalt produced in Uganda amounted to about \$2.53 million in 1999 and \$13.55 million in 2000. Exports amounted to 67 t at a value of \$2.29 million in 1999 and 395 t at a value of \$13.03 million in 2000 (Uganda Ministry of Energy & Mineral Development, 2001a, p. 38-40, A4.1). Uganda exported about 95% of its cobalt production in 1999 and 2000 (table 1).

Columbium (Niobium) and Tantalum.—Uganda's deposits of columbium and tantalum at Nyakasopu, Nyanga, and Rugomera were mined during the 1930s and 1960s. Small-scale production from reworking the Nyanga tailings resumed in 2000. Companies that held exploration licenses included Marubeg Co. Ltd., Shinda Ltd., and Sphere Resources Ltd. In 2000, the Canadian company Uganda Gold Mining Ltd. was evaluating the remaining resources. Additional resources of 6 Mt of pyrochlore occur at the Sukulu carbonatite deposit. The value of columbium and tantalum concentrates produced in Uganda amounted to about \$13.56 million in 2000. Exports of columbium and tantalum concentrates amounted to nearly 70 t in 1999 (Uganda Ministry of Energy & Mineral Development, 2001a, p. 37, 39-40, A4.3, A5.4).

A report issued by the United Nations Security Council accused the Ugandan Government officials, military officers, and businessmen of illegally exploiting columbium, diamond, gold, and tantalum from Congo (Kinshasa) to enrich themselves and to finance their country's military presence in Congo

(Kinshasa). The Ugandan Government denied the accusations. Others accused of using their military presence to exploit Congolese mineral resources included rebel forces operating in Congo (Kinshasa) and the Governments of Namibia, Rwanda, and Zimbabwe (United Nations Security Council, 2001a, p. 16-21, 25, 29-37; 2001b, p. 6-11, 16-23).

Gold.—Numerous deposits of gold were found in Uganda. In 2000, several gold exploration companies had prospecting licenses granted or renewed; these included Anglo-Ugandan Corporation plc and Nabisoga Mining Ltd. in the Mubende district and New Ensign Resources Ltd. and Roraima Mining Company Ltd. in the Busia district. Other companies that held prospecting or mining licenses in 2000 included Busitema Mining CIE Ltd. in the Tororo district, Gold Empire Ltd. in the Bushenyi and the Mbarara districts, Lincoln Resources Ltd. in the Busia district, and Muhindo Enterprises in the Bushenyi district. The value of gold produced in Uganda amounted to \$477,000 in 2000. Exports amounted to 7,303 kilograms (kg) with a value of \$62.23 million in 2000 compared with 5,558 kg with a value of about \$51.87 million in 1999 (Uganda Ministry of Energy & Mineral Development, 2001a, p. 38-40, A5.1-A5.3, A5.8).

Iron Ore and Steel.—Uganda's deposits of iron ore were located at Kyanyamuzinda, Metuli, Mugabuzi, Muko, Sukulu, and Wambogwe. Resources at Sukulu were estimated to be 45.7 Mt at an average grade of 62% iron. The Muko deposit has resources of 30 Mt at a grade of 61% to 67% iron. The Kyanyamuzinda deposit has resources of 2.37 Mt of ore, and the Wambogwe deposit, 2 Mt of ore (Uganda Ministry of Energy & Mineral Development, 2001a, p. A4.2). Resources at Mugabuzi totaled 1 Mt of ore indicated and 0.8 Mt of ore inferred (Uganda Investment Authority, 2001b, p. 6).

The Muko deposit was worked by artisanal miners. In January 2000, the Muko Iron Ore Development Co. Ltd. (MIDECO) was developed to exploit the Muko deposit on a commercial basis. MIDECO planned to use the direct reduction process to produce sponge iron that could be used in the Ugandan steel industry. The company was considering the use of Tanzanian coal in the production process (Opio, 2000). Exploitation of Muka and other iron deposits would allow Uganda to meet its rapidly increasing demand for steel products. Uganda's demand for steel products was estimated to be 80,000 t/yr, but production was only 7,000 t/yr (table 1). Demand was expected to grow at an annual rate of about 10% from 2000 to 2005. Substantial increases in domestic production could deplete the national steel scrap bank in 3 to 5 years (Uganda Investment Authority, 2001b, p. 9).

Tin.—Numerous deposits of tin occur in Uganda. Edith Krall Investments Ltd. held a mining license for the Kyamugashe deposit in the Ntungamo district. Uganda's production of tin was limited by weak local demand.

Tungsten.—Deposits of wolframite occur at Bahati, Buyaga, Kirwa, Mpororo, Nyamulilo, Ruhizha, and Rushanga. Total inferred resources were estimated to be 20 Mt at a grade of 1% to 4% WO₃. Krone Uganda Ltd. held a mining license for the Nyamulio deposit, where production was small scale in 2000. Other companies that held tungsten mining licenses included Kirwa Wolfram Mines Ltd. and Ruhizha Mines Ltd. Exports of tungsten ore amounted to 78 t in 2000 and 35 t in 1999 (Uganda

Ministry of Energy & Mineral Development, 2001a, p. 40, A4.4, A5.7-A5.8).

Industrial Minerals

Cement.—Uganda's cement production sharply increased in recent years (table 1) owing to rapid growth in the construction sector. Cement was exported to Congo (Kinshasa), Rwanda, and Tanzania. Uganda imported cement and clinker from India, Indonesia, Japan, and Kenya. Housing accounted for 45% of the demand for cement; infrastructure and public works, 20%; and industry, 15% (International Cement Review, 2001, p. 296).

Two local factories supplied Uganda's cement market. Hima Cement Industries Ltd., which was located in southwestern Uganda, exported an estimated 15% to 18% in 2000 and 13% of its sales in 1999. Tororo Cement Industries Ltd. was engaged in capacity expansion that was designed to increase production by about 37,000 t/yr (International Cement Review, 2001, p. 296).

Clay.—Numerous deposits of brick clay are known to exist throughout Uganda. The most substantial resources occur at Kajansi and Namanve; resources at Namanve were estimated to be 855,000 t (Uganda Ministry of Energy & Mineral Development, 2001a, p. A4.1). The rapid expansion of the construction sector has led to increased demand for brick clay. Uganda's production of clay bricks and tiles increased to 32,504 t in 1999 from 15,817 t in 1995. The country's total production capacity for clay bricks and tiles was 50,000 t/yr. Clay and Allied Products, Kiwa Industries Ltd. AEF, and Uganda Clays Ltd. were involved in the production of bricks and tiles (Uganda Investment Authority, 2001a, p. 5, 24).

Gypsum.—Uganda has several notable gypsum deposits. The Muhokya gypsum deposit was estimated to contain 3.2 Mt of gypsiferous clays. Resources at Kibuku were estimated to be 1.2 Mt at a grade of 10% gypsum, and Mburo, 1.1 Mt at a grade of 60% to 70% gypsum (Uganda Ministry of Energy & Mineral Development, 2001a, p. A4.2). Although Uganda's gypsum resources have been used in the cement industry, most of the country's gypsum demand has been met by imports from Kenya in recent years.

Kaolin.—Deposits of kaolin were found at Buwambo, Kisai, Kilembe, Kuluva, Lunyenye, Mutaka, and Namasera. The Uganda Ministry of Energy & Mineral Development (2001a, p. A4.2) indicated that proven resources at Mutaka amounted to 760,000 t of kaolin. Muse Mining Co. Ltd. held a license for the Kisai deposit. At Buwambo, a local company mined and processed kaolin for use in manufacturing paint. Uganda's kaolin may also be used to manufacture floor and wall tiles in the future.

Limestone.—Uganda's deposits of limestone were used by the cement industry. Hima was the largest known deposit; resources were estimated to be more than 25 Mt. The Tororo Hill deposit has resources of 16.3 Mt; only 3 Mt is higher grade limestone. Resources at Bukiribo were estimated to be 4.8 Mt. Other deposits were found at Dura and Gweri Hill. Mining licenses were held by such companies as Busongora Lime Ltd., Hima Cement Industries, Rwenzori Lime Co. Ltd., Tororo Cement Industries, and Uganda Lime Products Ltd. The value of limestone produced amounted to about \$12.73 million in 2000 and \$6.48 million in 1999 (Uganda Ministry of Energy & Mineral Development, 2001a, p. 39, A4.3, A5.7-A5.8).

Marble.—Notable deposits of marble occur in Uganda. Resources at Forest Reserve amount to 5.7 Mt, and those at Tank Hill, 4.2 Mt. Other deposits occur at Katikekakile and Rupa. Rupa Investments & Technology, which held an exploration license in the Rupa area, conducted limited exploration activities in 2000. The Saudi Marble Company Ltd. held similar licenses in the Karamoja area, but was unable to explore because of regional instability (Uganda Ministry of Energy & Mineral Development, 2001a, p. 38, A4.3).

Phosphate.—Uganda has substantial resources of phosphate rock. The Sukulu deposit in Eastern Uganda has resources of 230 Mt at a grade of 13% P₂O₅, and the Bukusu deposit, 8.5 Mt at a grade of 13% P₂O₅ (Uganda Ministry of Energy & Mineral Development, 2001a, p. A4.4). The Government granted the French company Rhodia Chimie SA a license to mine phosphates from the Sukulu deposit. Local company Madhvani International SA will join Rhodia in the \$300 million project. Rhodia and Madhvani hoped to produce 100,000 t/yr of phosphate fertilizers and 1 Mt/yr of phosphate rock. By 2005, the two companies planned to produce sodium tripoly phosphate detergent (Africa Energy & Mining, 2000c).

Pozzolanic Materials.—Deposits of pozzolanic materials in the Kabele and the Kisoro districts were exploited for use in pozzolanic cement by Hima Cement Industries. The value of pozzolanic materials produced amounted to about \$414,000 in 2000 compared with \$249,000 in 1999 (Uganda Ministry of Energy & Mineral Development, 2001a, p. 36, 39).

Salt.—Resources at Lake Katwe were estimated to be 22.3 Mt at a grade of 8% NaCl (Uganda Ministry of Energy & Mineral Development, 2001a, p. A4.1). A feasibility study funded by the African Development Bank recommended constructing a plant at Lake Katwe to produce 50,000 t/yr of table salt. Most of Uganda's salt has been imported in recent years.

Silica Sand.—Deposits of silica sand occur in the Masaka and the Mukono districts. In the Masaka district, the Bukakata, the Diimu, and the Kome Island deposits have a combined resource of more than 3 Mt. In the Mukono district, the Nalumuli deposit has resources of 200,000 t, and the Nyimu deposit, 5,000 t (Uganda Ministry of Energy & Mineral Development, 2001a, p. A4.1). Resources at the Bukakata and the Diimu deposits grade 99% to 99.3% SiO₂. The Government and private companies have studied the feasibility of using these sands to produce container glass, sheet glass, and tableware. Proposals included the revival of glass production at East African Glass Works Ltd. (Uganda Investment Authority, 1997). From 1995 to 1999, Uganda's imports of glass increased from \$8 million to \$8.2 million.

Vermiculite.—The Namekhela vermiculite deposit has resources of 5 Mt. A comprehensive environmental impact assessment of mining this deposit was conducted by Canmine Resources (U) Corp. (Uganda Ministry of Energy & Mineral Development, 2001a, p. 38, A4.4). In December 2000, the Government awarded a mining lease to Canmine, which planned to produce 40,000 t/yr of vermiculite and to export to European and Middle Eastern countries. The Namekhela vermiculite is a high-quality material well suited to insulation and horticultural applications (Industrial Minerals, 2001).

Mineral Fuels

Uganda did not have production facilities for crude petroleum or petroleum products. In 2000, Uganda consumed about 3.25 Mbbl of petroleum products, which was a modest decrease from 3.42 Mbbl in 1999. Consumption of gasoline amounted to 1.2 Mbbl; diesel, 1.17 Mbbl; kerosene, 353,000 barrels (bbl); jet fuel, 259,000 bbl; fuel oil, 220,000 bbl; lubricants, 30,000 bbl; liquified petroleum gas, 18,000 bbl; and asphalt, 3,300 bbl. Since 1995, the country has increased its consumption of petroleum products by 32% (Uganda Ministry of Energy & Mineral Development, 2001, Petroleum products consumption, accessed August 1, 2001, at URL http://www.energyandminerals.go.ug/pet_cons.htm). The value of imported petroleum products amounted to \$139.25 million in fiscal year 1999-2000 and \$107.78 million in fiscal year 1998-99 (Uganda Ministry of Finance, Planning & Economic Development, 2000, p. 32).

In July 1998, Heritage Oil and Gas Ltd. conducted a seismic survey of the Semliki Basin where it had found resources of petroleum. The company planned to drill on the shores of Lake Albert in late 2000. The Government indicated that geologic mapping in the Pakwach Basin has also obtained favorable results.

Infrastructure

Uganda's electricity production increased to 1,555 gigawatt hours (GWh) in 2000 from 1,342 GWh in 1999 and 1,057 GWh in 1995. After electricity losses of 461.3 GWh, domestic electricity sales amounted to 843 GWh, of which more than 99% came from hydroelectric power sources. Total installed capacity increased to 263 MW in 2000 from 183 MW in 1999. Although total electricity demand was 260 MW of capacity in 2000, peak demand was 280 MW of capacity. Uganda exported 251.3 GWh of electricity in 2000, which was a 44% increase compared with that of 1999 (Uganda Ministry of Energy & Mineral Development, 2001, Uganda electricity data, accessed August 1, 2001, at URL http://www.energyandminerals.go.ug/elec_cons.htm).

In December 2000, the African Development Bank granted the Uganda Electricity Board (UEB) a \$25 million loan to help reduce the considerable power losses owing to inadequacies in the distribution grid and theft of transmission equipment. Total expenses needed to upgrade Uganda's distribution and transmission systems and keep up with power consumption growth of at least 7% per year were estimated to be \$300 million. Uganda's hydroelectric capacity was expected to increase to 380 MW in 2002 and 630 MW in 2004 (Africa Energy Intelligence, 2000, 2001).

The UEB had contracts to sell Kenya 30 MW of capacity; Tanzania, 9 MW; and Rwanda, 5 MW. Exports of electricity to Kenya were suspended during peak consumption periods in Uganda. In 2000, Uganda discussed increasing the total capacity exported to Kenya, Rwanda, and Tanzania to 65 MW in 2005 and 80 MW in 2006 (Uganda Ministry of Energy & Mineral Development, 2001b, p. 10).

The Government of Uganda planned to privatize the UEB in 2001. The UEB would be split into three companies—one handling production; the second transmission; and the third marketing. Marketing and production would be open to competition, and the transmission network would remain under public control (Uganda Ministry of Energy & Mineral

Development, 2001b, p. 10).

The hydroelectric power potential of Uganda was estimated to be about 2,000 MW, most of which is on the Nile River. Geothermal resources were estimated at about 450 MW in the Ugandan Rift System (Uganda Ministry of Energy & Mineral Development, 2001b, p. 9, 16).

Uganda had about 27,000 km of roads, of which approximately 1,800 km were paved; the rail network covered about 1,240 km. Pipelines for petroleum products covered about 480 km. Lake Albert, Lake George, Lake Edward, Lake Kyoga, Lake Victoria, the Albert Nile, and the Victoria Nile were the country's principal waterways. Ports and harbors were Entebbe, Jinja, and Port Bell (U.S. Central Intelligence Agency, 2001b).

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TABLE 1
KENYA AND UGANDA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Country and commodity	1996	1997	1998	1999	2000 e/
KENYA 3/					
Aluminum, secondary e/	2,400	2,400	2,000	2,000	2,000
Barite e/	20	20	10	10	10
Carbon dioxide gas, natural	9,119	9,214	8,498	10,006	10,000
Cement, hydraulic thousand tons	1,816	1,506	1,426 r/	1,204 r/	1,071 4/
Clays, kaolin e/	595 4/	500	500	500	500
Diatomite	415	297	468	507	500
Feldspar e/	100	100	100	100	100
Fluorspar (acid grade)	83,000	68,700	60,854	93,602	90,000
Gemstones, precious and semiprecious:					
Amethyst e/ kilograms	300	104 5/	166 5/	170	170
Aquamarine e/ do.	50	12 5/	15 5/	15	15
Cordierite (Iolite) e/ do.	15	19 5/	34 5/	30	30
Garnet e/ do.	120	18,181 5/	5,186 5/	5,000	5,000
Ruby do.	1,200 e/	5,175	4,001	4,490	4,490
Sapphire e/ do.	2,300	615 5/	3,313 5/	3,300	3,300
Tourmaline do.	250 e/	6,969	3,790	3,800 e/	3,800
Gold, mine output, Au content do.	492 r/	440 5/	388 5/	990	990
Gypsum and anhydrite e/	1,000	1,000	1,000	1,000	980
Lead:					
Mine output, Pb content	5 e/	--	--	--	--
Refined, secondary	2,000	1,000	1,000	1,000	1,000 4/
Lime e/	15,000	15,000	16,000	15,000	15,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	2,555	2,555	2,555	2,550 e/	2,570
Jet fuel do.	2,190	2,190	1,825	1,810 e/	1,820
Kerosene do.	730	730	730	730 e/	740
Distillate fuel oil do.	3,285	3,285	3,285	3,270 e/	3,290
Residual fuel oil do.	3,650	3,650	3,650	3,650 e/	3,670
Liquified petroleum gas do.	365	365	365	360 e/	370
Other do.	730	730	730	730 e/	740
Total do.	13,505 r/	13,505 r/	13,140 r/	13,100 r/ e/	13,200
Salt, crude	41,000	6,280	21,742	44,886	44,900
Soda ash	223,000	257,640	242,910	245,680	246,000
Steel, crude e/ thousand tons	30	33	25	25	25
Stone, sand and gravel:					
Coral e/ do.	1,000	500	500	500	490
Granite for dimension stone e/	100	500 5/	1,619 5/	1,600	1,570
Limestone for cement thousand tons	600	700	700	700 e/	690
Limestone for dimension stone	31,935 r/	32,935 r/	32,000	32,000	31,500
Marble for dimension stone	100	966 5/	84 5/	100 e/	95
Sand, industrial (glass) e/	13,000	13,000	12,000	12,000	11,800
Shale e/	120,000	200,000	180,000	180,000	177,000
Sulfuric acid e/	20,000	20,000	20,000	20,000	20,000
Vermiculite	734	1,418	353	164	160
UGANDA 6/					
Cement, hydraulic	175,046 r/	289,560 r/	321,329 r/	347,274 r/	380,000
Cobalt	--	--	--	77	411 4/
Columbium-tantalum kilograms	-- r/	-- r/	-- r/	-- r/	2,712 4/
Gold, mine output, Au content do.	3 r/	6 r/	8 r/	5 r/	56 4/
Gypsum	2,281 r/	-- r/	2,000 e/	256	-- 4/
Iron ore:					
Limonite	NA	NA	NA	3,169	2,231 4/
Other	200	2,432	300 e/	61	2,401 4/
Kaolin	NA	NA	NA	198	14 4/
Lime, hydrated and quick e/	1,000	1,000	1,000	900	900
Limestone	159,479 r/	919,353 r/	300,000 e/	121,524 r/	253,032 4/
Phosphate minerals, apatite	--	--	(7) e/	(7) e/	(7)
Pozzolanic materials	NA	NA	NA	20,213	35,603 4/
Salt e/	10	10	5	5	5
Steel e/	12,000	15,000	15,000	15,000	7,000
Tin, mine output, Sn content	(7)	2 r/	1 r/	(7)	(7) 4/
Tungsten, mine output, W content kilograms	--	--	--	(7) r/	-- 4/

See footnotes at end of table.

TABLE 1--Continued
KENYA AND UGANDA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

e/ Estimated. r/ Revised. NA Not available. -- Zero.

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

2/ Includes data available through August 6, 2001.

3/ In addition to the commodities listed, a variety of minerals and construction materials [brick clays, coal, gravel, iron ore, kyanite, meerschaum, mica, murrum (laterite), crushed rock, and construction sand] may be produced, but quantities are not reported, and information is inadequate to make estimates of output.

4/ Reported figure.

5/ Reported exports.

6/ In addition to the commodities listed, the following are presumably produced but information is inadequate to estimate output: clay, copper content of slag, corundum, garnet, gemstones, gravel, marble, ruby, sand, and vermiculite.

7/ Less than 1/2 unit.