

# BOTSWANA

By George J. Coakley

The Republic of Botswana is a landlocked nation in southern Africa surrounded by Namibia to the west, South Africa to the east and south, and Zambia and Zimbabwe to the north; it covers an area of 600,379 square kilometers. In 2000, it supported a population of 1.65 million. For 1999 (the latest year for which data were available), the per capita gross domestic product (GDP) (based on 1999 purchasing power parity estimates) was \$3,900. Botswana, which has been one of the most successful performing economies in the developing world, averaged more than 9% real economic growth from 1966 to 1997. The diamond sector, which continued to be the mainstay of the economy, accounted for about one-third of the GDP, 45% of Government revenues, and 75% of export earnings. Botswana was the world's largest producer of diamond, by value. Nickel, copper, and soda ash production also played significant though smaller roles in the national economy. The mining and quarrying sector accounted for 14,500 jobs, or about 6% of the total workforce, in 1999 (International Monetary Fund, November 1999, Botswana—Selected issues and statistical appendix, IMF Staff Country Report No. 99/132, accessed June 15, 2001, at URL <http://www.imf.org/external/pubs/ft/scr/1999/cr99132.pdf>).

## Government Policies and Programs

The Ministry of Minerals, Energy and Water Affairs has responsibility for coordinating development and operational activities in the energy, minerals, and water sectors. Specific program responsibilities are carried out by Ministry departments, which include Mineral Promotion, Geological Survey, Mines and Water Affairs, and two parastatal organizations: Botswana Power Corp. and the Water Utilities Corp. Mining was governed by the new Mines and Minerals Act No. 17 of July 1999, which was designed to promote new foreign investment in exploration and mine development. The new act continued to vest all mineral rights in the State but introduced a new "retention license" that guarantees security of tenure from exploration to development but allows a company to retain its rights for a 3-year period, renewable once for no more than 3 years if then-current market conditions are not favorable to exploit the deposit. The act sets out guidelines for prospecting and mining licenses, environmental protection measures, royalties, and mining taxation. The Government retains an option to acquire up to a 15% interest in new ventures on commercial terms, thus abolishing its previous free equity participation (News Africa.com, 2001, Botswana mining—Botswana Mineral Act, accessed June 15, 2001, at URL <http://www.newafrica.com/mining/laws/countries.asp?countryID=7>). Oil and gas exploration and development is governed by the Petroleum (Exploration and Production) Act of May 1983. Investment in diamond mining is subject to a negotiated agreement with the Government. The

Precious and Semi-precious Stones (Protection) Act of 1969 provides for the protection of the precious stones industry and regulates dealings in precious stones and semiprecious stones.

## Production and Trade

The value of mineral production in 2000 was approximately \$2.42 billion, of which diamond accounted for \$2.13 billion, or 88%; copper-nickel-cobalt for \$243 million; and soda ash for \$26 million. For the major commodities, the value of production was approximately equal to the value of mineral exports. Diamond production increased by 6% from that of 1999 because the new Orapa mine expansion came on-stream in May. Copper and nickel production were up slightly by 2%. Heavy rains and flooding of the brine evaporation pans during the year saw salt and soda ash production drop by around 20% each. Production statistics are listed in table 1. United Nations sanctions against so-called conflict diamonds from civil war zones in Angola, the Democratic Republic of the Congo, and Sierra Leone increased the market appeal of diamond from Botswana.

## Structure of the Mineral Industry

The Government maintained an equity position in most of the major mining companies, but the industry was operated, for the most part, on a privately owned free-market basis. In a 50-50 joint partnership with De Beers Centenary AG, the Government owned Debswana Diamond Co. (Proprietary) Ltd., which was the country's largest mining company. Anglo American plc of the United Kingdom and the Government held equity positions in several other major mining companies; these included the nickel-copper-cobalt producers Bamangwato Concessions Ltd. (BCL) (Government 35%; Anglo American, 23%) and Tati Nickel Mining Co. (Pty.) Ltd. (Anglo American, 43.35%; LionOre Mining International Ltd. of Canada, 41.65%; and Government, 15%) and the soda ash company Botswana Ash (Pty.) Ltd. (Government, 50%; Anglo American, 21%). In June, Anglo sold its interest in Morupule Colliery (Proprietary) Ltd., which was the country's only coal mine, for \$2.8 million to Debswana, which then had a 93% controlling interest in Morupule. In addition to these major operations, the mining industry consisted of a number of medium- and small-scale mines that produced agate, aggregates, brickmaking clay, gold, and dimension stone.

## Commodity Review

### *Metals*

**Cobalt, Copper, and Nickel.**—BCL owned the Phikwe, the Selebi, and the Selebi North cobalt-copper-nickel mines and a

smelter at Selebi-Phikwe about 350 kilometers (km) northeast of the capital of Gaborone. In addition to treating its own ore, BCL toll-smelted concentrate and ore for Tati Nickel. In 2000, the BCL smelter produced 62,000 metric tons (t) of matte that contained 20,977 t of copper, 24,218 t of nickel, and 319 t of cobalt compared with 60,500 t of matte that contained 20,960 t of copper, 22,898 t of nickel, and 331 t of cobalt in 1999.

Cobalt-copper-nickel matte was shipped to Norway and Zimbabwe for refining. Combined mine production for 2000 at BCL and Tati Nickel was 5.65 million metric tons (Mt) that averaged 0.68% copper and 0.61% nickel. Mine production at BCL was 3.4 Mt at a grade of 0.66% nickel and 0.76% copper. During 1999 and 2000, BCL developed a new tertiary subincline shaft at its No. 3 shaft.

Tati Nickel operated the Phoenix open pit nickel mine, the Selkirk underground mine, and a magnetic separator plant near Francistown. The company produced 6,483 t of nickel, 2,354 t of copper, and 38 t of cobalt in 2000 after the operation recovered from excessive rains in the first quarter. During 2000, the Phoenix Mine produced 21,324 t of concentrates at a grade of 5.8% nickel and 1.46% copper, and the Selkirk Mine delivered 58,100 t of ore at a grade of 2.6% nickel and 1.64% copper. The company also received byproduct credits for gold, palladium, platinum, and silver (LionOre Mining International Ltd., March 30, 2001, Nickel—Botswana—Tati Nickel, accessed June 12, 2001, at URL <http://www.lionore.com/Nickel/Frameset.html>).

Anglo American announced plans to invest \$62.5 million in doubling refined nickel production at Tati to around 12,500 metric tons per year. The project will involve expansion of the open pit, installation of a 3.6-million-metric-ton-per-year (Mt/yr) wet concentrator, and construction of a 43-km water pipeline from the Shashe Dam to the Phoenix Mine. Subject to securing guarantees on financing and electrical power and water supplies, the project was scheduled for completion early in 2002 (Anglo American plc, March 16, 2000, Tati Nickel to double production, accessed April 2, 2000, at URL <http://www.angloamerican.co.uk/news-detail.asp?news-item-number=63592>).

Reserves and resources as of yearend 2000 were reported at both Botswana operations. BCL's mine life expectancy to 2011 was based on ore reserves pro rated from Anglo American's 23% share, which totaled 27 Mt at a grade of 0.86% copper and 0.84% nickel, plus additional measured and indicated resources estimated to be 33.5 Mt at a grade of 0.76% copper and 0.62% nickel. The remaining 16-year life expectancy at Tati Nickel's Phoenix Mine was based on ore reserves pro rated from Anglo American's 43% share, which totaled 46 Mt at a grade of 0.32% copper and 0.56% nickel (Anglo American plc, March 13, 2001, Reserves and resources—Annual report for 2000, accessed June 20, 2001, at URL <http://www.angloamerican.co.uk/report2000/Report/ReservesResources.html>).

In the second quarter of 2000, Gallery Gold Ltd. of Australia acquired the Tekwane Property from Falconbridge Ltd. of Canada. The property covers the eastern half of the intrusive body that hosts the operating Selkirk nickel mine.

**Gold.**— Gallery Gold continued gold exploration on its Mupane Prospect in the Tati greenstone belt of northeast Botswana. Analysis of 103 holes drilled through yearend 2000

identified an inferred mineral resources of 5.84 Mt of mineralization at a grade of 3 grams per ton equal to 17,300 kilograms (557,000 ounces). Exploration at Mupane will continue during 2001 (Gallery Gold Ltd., March 22, 2001, Mupane gold prospect—Initial resource estimate, accessed June 18, 2001, at <http://www.gallerygold.com.au/announcements/MupaneResources21Mar01.htm>). Trillion Consolidated Resources Ltd. of Canada held a number of gold prospecting licenses but was inactive during 2000.

### *Industrial Minerals*

**Diamond.**—Debswana recovered diamond from the Jwaneng, the Letlhakane, and the Orapa Mines. Diamond production increased by 6% to more than 24.2 million carats compared with that of 1999. Production was sold through the De Beers Diamond Trading Company (formerly the Central Selling Organization). Debswana owned subsidiaries for diamond sorting and valuation (Botswana Diamond Valuing Co.) and for value-added cutting and polishing diamond (Teemane Manufacturing Co.). Teemane exported 8,195 polished carats in the form of 125,537 stones in 1999. Jwaneng, which was the richest diamond mine in Africa and is located 120 km west of Gaborone, treated 9.24 Mt of ore and recovered 11.52 million carats at an average value of \$108 per carat in 2000. Total reserves and resources located in three main kimberlite pipes at Jwaneng were reported to be 287.6 Mt at a grade of 143.6 carats per hundred metric tons. The Letlhakane Mine, which is located 190 km west of Francistown, treated 3.51 Mt of ore and recovered 960,000 carats at an average value of \$191 per carat. Total reserves and resources located in three main kimberlite pipes at Letlhakane were reported to be 62.6 Mt at a grade of 26 carats per hundred tons. The Orapa Mine, which is located 240 km west of Francistown, treated 14.68 Mt of ore and recovered 12.17 million carats at an average value of \$47 per carat. Total reserves and resources located at Orapa were reported to be 652.9 Mt at a grade of 49 carats per hundred tons (De Beers Consolidated Mines Ltd., 2001, Debswana—Operations, accessed June 15, 2001, at URL <http://www.debeersgroup.com/debswana/debsOperations.asp>).

Debswana completed its \$300 million expansion of the Orapa Mine during 2000. The 4-year construction project was designed to double Orapa's production to 12 million carats per year from 6 million by mining and treating an additional 8.9 Mt/yr of ore. The project included installation of a new diamond treatment plant, a new primary crusher, a completely automated recovery plant (CARP), and related infrastructure. The CARP is a high-security, 15-story building in which ore flows from top to bottom. Only x-ray technology is used to recover the diamonds; no human picking or sorting is done. The expansion will allow for production from the Orapa open pit for 30 years with the potential of extending the mine life by another 20 or 30 years by shifting to underground mining (Tassel, 2000).

A number of international mining companies held diamond licenses, for example, the joint venture of AfriOre (Botswana) (Pty.) Ltd. [a subsidiary of AfriOre (Mauritius) Ltd.] and Billiton plc of the United Kingdom, and Gope Exploration Co. [the joint venture of De Beers Prospecting Botswana (Pty.) Ltd. and the Botswana subsidiary of Falconbridge Ltd. of Canada].

**Salt and Soda Ash.**—After having recovered from the disastrous floods, financial liquidation, and restructuring of the late 1990s, Botash continued to operate its brine mining and treatment facility at Sua Pan, which is 173 km northwest of Francistown. Affected by heavy rains early in 2000, production of salt declined to 184,755 t from 233,069 in 1999, and that of soda ash, to 191,043 t from 233,643 t in 1999. Botash pumped salt brines from nearly 100 wells to nearby large evaporation ponds at a rate of about 2,400 cubic meters per hour. More than 300 metric tons per day of carbon dioxide recovered from an associated coal cogeneration plant was used in carbonation of the brines to produce the soda ash. Finished products were railed to Francistown for shipment to markets in South Africa, Zambia, and Zimbabwe.

In February 2001, the South Africa Competition Commission ruled in favor of Botash in a long standing trade dumping case against the America Natural Soda Ash Corp. (Ansac), which was a joint venture of a number of U.S. soda ash producers that were selling into the South Africa market. Botash claimed that Ansac was selling soda ash into South African markets below the price charged to U.S. consumers and that this contributed to the financial liquidation of its predecessor company in 1995. Ansac will appeal the ruling (Tim Cohen, Glassbytes, February 27, 2001, United States found to be contravening South Africa competition laws, accessed June 18, 2001, at URL <http://glassbytes.com/022701africa.htm>).

### **Mineral Fuels**

**Coal.**—The Morupule Colliery, which was the only coal mine in the country, had an annual production capacity of about 1 Mt. Most of its output fed the nearby Botswana Power thermal powerplant at Morupule, which supplied more than 50% of Botswana's electricity requirements, or about 1,060 kilowatt hours of energy. Other customers included the nickel and soda ash companies. Coal is extracted underground from a 12-foot seam by using mechanized room-and-pillar mining, is sent to the surface on shuttle cars on an inclined ramp, and is then conveyed to the Morupule powerplant. Reserves in the Morupule field were estimated to be 8 billion metric tons of steam coal with 18% to 24% ash and a calorific value of 23 to 25 megajoules per kilogram (Ministry of Minerals, Energy and Water Affairs, December 1999, Mining investment opportunities in Botswana—Mineral promotion, accessed June 18, 2001, at URL [http://www.gov.bw/government/ministry\\_of\\_minerals\\_energy\\_and\\_water\\_affairs.html#mineral\\_promotion](http://www.gov.bw/government/ministry_of_minerals_energy_and_water_affairs.html#mineral_promotion)).

### **Infrastructure**

Transportation facilities were good on the eastern fringe of the country. In 1998, the 850-km Trans-Kalahari highway was

opened from Gaborone, Botswana, to Gobabis, Namibia. Highways also connected landlocked Botswana with South Africa and Zimbabwe. A single-track railroad, which was operated by Botswana Railways, runs from north to south through the eastern part of the country and connects with the South African and the Zimbabwean rail systems.

### **Outlook**

Revenues from diamond mining and cutting should continue to be the mainstay of the economy for the foreseeable future. The country's favorable geologic environment, mineral investment climate, political stability, and low tax rates should continue to make Botswana a target for foreign mineral investment. Incentives provided in the new Mining Law of 1999 were aimed at helping the Government diversify the national economy and reduce its reliance on the diamond industry.

### **Reference Cited**

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### **Major Sources of Information**

Ministry of Minerals, Energy, and Water Affairs

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### **Major Publications**

Carney, J.M., Aldiss, D.T., and Lock, N.P., 1994, The geology of Botswana: Gaborone, Botswana, Geology Survey Department, 113 p.  
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TABLE 1  
BOTSWANA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1996	1997	1998	1999	2000
Coal, bituminous	763,240	776,920	928,100	945,316 r/	950,000 e/
Cobalt, smelter output, Co content of matte 3/ 4/	408	334	335 r/	331 r/	319
Copper:					
Mine output, Cu content of ore milled	25,275	22,840	25,043	37,604 r/	38,420
Smelter output, Cu content of matte 3/ 4/	20,980	19,820	22,124	20,960 r/	20,977
Diamond 5/ thousand carats	17,388	20,111	19,772	22,898 r/	24,218
Gemstones, semiprecious 6/ kilograms	35,000	54,000	38,000 r/ 3/	84,000 r/	80,000 e/
Gold 7/ do.	5	28	1	2 r/	4
Nickel:					
Mine output, Ni content of ore milled	21,910	19,860	21,700	33,733 r/	34,465
Smelter output, matte, gross weight 3/	58,910	50,570	56,732	60,500 r/	62,000
Smelter output, Ni content of matte 4/	22,095	20,157	22,851	22,898 r/	24,218
Salt 8/	93,886	184,530	214,700	233,069 r/	184,755
Sand, construction 9/ cubic meters	100,000	110,000	90,000 e/	90,000 e/	100,000 e/
Soda ash, natural	119,137	199,990	189,700 r/	233,643 r/	191,043
Stone, crushed cubic meters	845,526	1,091,880	997,244	1,466,100 r/	1,050,700

e/ Estimated. r/ Revised.

1/ Table includes data available through June 2001.

2/ In addition to commodities listed, clay (for brick and tile) and silver were produced, but information was inadequate to estimate output.

3/ Smelter product was granulated nickel-copper-cobalt matte.

4/ Included some product from direct smelting ore; that is, ore not reported as milled.

5/ Assumed to contain about 70% gem and near gem.

6/ Principally agate. Reported as sales.

7/ Reported as bullion; historically included silver estimated to be about 2%.

8/ From natural soda ash production.

9/ Additional production of sand and gravel from small local operations was periodically reported, but information was inadequate to estimate output.

Source: U.S. Geological Survey Minerals Questionnaire for 1999-2000, prepared by Botswana Department of Mines