

## THE MINERAL INDUSTRY OF

# BOTSWANA

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Botswana's rapid economic growth, which began in the 1970's, continued into 1996. This growth can be attributed to Botswana's successful program of mineral exploration and development. In 1995-96 the mineral industry provided about 80% of the value of national exports, as well as about 50% of Government revenue. Historically, the economy in Botswana has been based on cattle raising and crops. Agriculture today provides a livelihood for more than 80% of the population but supplies only about 50% of food needs and accounts for only 5% of gross domestic product (GDP). The mineral industry was the principal reason the country had a high per capita GDP and a surplus in balance of payments. The mining sector, mostly on the strength of diamonds, accounted for about 33% of the GDP, which was approximately \$4.9 billion<sup>1</sup> in 1995-96. Nickel and copper also played significant, though smaller, roles in the national economy. Other valuable minerals produced included agate, clay, coal, cobalt, gold, salt, sand, silver, soda ash, and stone. Diamond was the most notable target of exploration during 1996. Despite the potential for new diamond mines, the Government of Botswana is seeking to expand into other metals and minerals. According to the Botswana Geological Survey, the potential for the discovery of platinum-group metals in Botswana is good, owing to the likely extension of the Bushveld complex in South Africa into the southern part of Botswana. However, much of Botswana's mineral resources remained unexplored, buried under the sands of Kalahari Desert that covers much of the country.

The current Government's objective is to become less dependent on mining and cattle ranching and concentrate on the development and processing of its raw material resources in Botswana rather than shipping them elsewhere for processing.

By producing downstream products, the Government expects to increase its export trade. An example is the Botswana Ash (Pty.) Ltd., soda ash project which could stimulate local manufacture of detergents, potash, and fertilizers, while the production of copper and nickel could boost local production of electrical components.

Known mineral deposits in Botswana include asbestos, chromite, feldspar, graphite, gypsum, iron, kaolin, talc, and uranium. Also, Botswana has large proven resources of bituminous coal which have not yet been fully exploited.

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<sup>1</sup>Where necessary, values have been converted from Botswana Pula (P) to U.S. dollars at the rate of P2.98=US\$1.00 for 1996.

### Government Policies and Programs

In an effort to convert its diamond wealth into jobs and economic growth, the Government of Botswana was in the process of creating an advanced infrastructure with good roads, communications, and dependable utilities. To encourage investment, it lowered corporate taxes from 35% to 25%. Manufacturing firms had their taxes lowered from 35% to 15%. And, either directly or through parastatals, the Government has invested heavily in foreign and domestic partnerships.

Botswana is a member of the Southern African Customs Union (SACU), which unites Lesotho, Namibia, South Africa, and Swaziland in a customs-free zone. With the exception of certain foodstuffs, import permits are not required for goods entering Botswana from the Common Customs area. SACU applies a common external tariff against goods entering from outside the Customs Union. Exports from Botswana generally do not require permits with the exception of radioactive materials, unpolished diamonds, gold, and some agricultural products.

In 1996, the Government encouraged foreign investment in Botswana. There were no restrictions on reinvestment or repatriation of earnings and capital. Botswana has never nationalized or expropriated any foreign business. It carefully followed its established rules for investment, and its courts repeatedly upheld contracts.

The Ministry of Mineral Resources and Water Affairs had responsibility for the mining sector. The Ministry granted reconnaissance permits (for 1-year general prospecting) and prospecting licenses (for 3 years plus two 2-year extensions with minerals and area specified). It negotiated 25-year mining leases with project plans, financial aspects, and lease extension conditions specified. Subunits of the Ministry also carried out geologic surveys and made mine safety and environmental inspections and collected mineral production information. The Ministry's Department of Mines maintained a register of mineral investment opportunities.

In 1996, the Government of Botswana began legislative initiatives that will make investment in new mining developments more attractive. Amendments to existing mineral statutes are expected to be approved by parliament in the latter part of 1997. If approved, the legislation will allow prospecting license holders to retain rights to a deposit for up to 2 years after expiration where immediate development of a mining operation is impractical. Licensees would also be granted guaranteed mining rights, provided they have the necessary technical and financial capability, and submit an acceptable mining plan.

Most exploration currently takes place under a 3-year prospecting license covering a maximum 1,000 square kilometers, which may be renewed twice for 2-year periods with 50% of the area relinquished each time. In 1996, there were 500 valid exploration licences on issue, most for precious stones. Under the proposed legislation, retention rights would be valid for up to 3 years, renewable once for the same period, and would be issued if no third party offered to mine the area in the meantime. The Government's current entitlement to 15% to 25% free carried interest in any mining project would be replaced by a 15% working interest. Some changes in the fiscal regime are under consideration. The tax rate for small mines has already been reduced to 25%. The proposed changes are designed to increase the security of tenure for investors by removing ministerial discretion, make the progression from prospecting to mining easier, and incorporate modern principles of administrative law.

### Environmental Issues

Air pollution and abatement programs were continued in 1996. The Department of Mines' air pollution monitoring stations, deployed throughout the country, were designed to measure sulfur dioxide and total suspended particulates. Three newer stations located at Tonota, Serowe, and Gaborone also measure carbon monoxide, nitrogen oxides, ozone, and hydrocarbons using automatic gas analyzers. Ambient air quality monitoring activities were concentrated in the Selebi-Phikwe area where government air pollution sampling instruments, supported by BCL Ltd.'s, air pollution program, measured the effects of emissions from the copper-nickel smelter. All eight air pollution monitoring stations in the residential area of Selebi-Phikwe recorded annual mean sulfur dioxide concentrations within the Government guideline of 80 micrograms per cubic meter (Republic of Botswana Department of Mines, 1997a).

The Department of Mines continued with a study to address the emissions of greenhouse gases and global warming in collaboration with the Department of Meteorological Services. This project was part of Botswana's response to the United Nations Framework Convention on Climate Change. A draft report titled "Inventory of Emissions by Source and Removal by Sinks of Greenhouse Gases in Botswana" was completed in May 1996. A final report was scheduled to be produced after the second Botswana Climate Change Conference to be held in March 1997 (Republic of Botswana Department of Mines, 1997b).

### Production

Diamonds, copper-nickel-cobalt concentrates, soda ash, coal, and gold were produced in Botswana. The country is Africa's largest and the world's third largest producer of diamonds and second largest producer of gem diamonds. Diamond mining is dominated by Debswana Diamond Co. (Pty.) Ltd., with a total mine output of 17.7 million carats in 1996.

BCL Ltd. milled 3.4 million tons of ore at the Selebi-Phikwe base metal operation, producing 38,800 tons of copper-nickel-cobalt concentrate. This was an increase of 2% over production in 1995. Tati Nickel Mining Co. (Pty.) Ltd. produced an additional 19,150 tons of concentrate for a total of 57,950. The concentrate contained 23,300 tons of copper, 22,900 tons of nickel, and 400 tons of cobalt. Other metals and minerals produced in Botswana include gold (4.5 kilograms), soda ash (119,137 tons), and salt (93,886 tons).

### Trade

Botswana offers a limited market for trade owing to its small population of 1.49 million and GDP of only \$4.9 billion. Botswana's major imports in terms of value for 1996 were fuels, articles of iron and steel, heavy machinery and mechanical appliances, electrical machinery, and vehicles. All petroleum refinery products are imported from neighboring South Africa. Major end-users of off-highway vehicles were the mining and construction sectors. Both sectors continue to perform well, and mining was expected to expand again in fiscal year 1996-97. Growth in these sectors has resulted in increased demand for off-highway trucks. All heavy equipment and machinery were imported as there was no local production or assembly.

In 1996, mineral commodities continued to dominate the country's exports, with Europe being the principal destination. More than 70% of total export value of \$2.1 billion was attributed to diamond shipments in 1996. Cobalt, copper, and nickel content of smelter matte and soda ash contributed about 10% of total export value.

Botswana's motor industry was the second largest net foreign exchange earner after minerals. The Korean automotive manufacturer, Hyundai Motor Distributors, assembled 2,000 vehicles per month in semi-knocked down form mainly for export to neighboring South Africa. It added 250 components in Botswana to qualify for duty-free export to South Africa. Hyundai was the country's largest industrial exporter in 1996, employing 425 people.

### Structure of the Minerals Industry

The Government and Anglo American Corp. of South Africa Ltd. (AAC) were significant partners in Botswana's mineral industry. (See table 2.) De Beers Centenary AG, an AAC-affiliated company, owned one-half of Debswana Diamond Co. (Pty.) Ltd. AAC had an equity interest in Botswana RST Ltd. which was the Government's partner in BCL, the nickel-copper-cobalt producer. AAC holdings also included substantial interests in Tati Nickel Mining Co. (Pty.) Ltd., (TNMC) and Morupule Colliery (Pty.) Ltd. Besides the BCL, Debswana, and Botswana Ash operations, the Botswana industry consisted of a number of medium- and small-scale mines producing agate, aggregates, brick making clay, gold, and dimension stone.

Employment in the domestic mining industry was about 13,000 employees, slightly more than 5% of a total formal (wage-earning) employment of about 250,000. Major mines,

such as the BCL and Botswana Ash operations, were situated in regions with few job opportunities. This, coupled with the state's ownership interest in the companies, resulted in the Government's active support of the operations.

## Commodity Review

### Metals

**Cobalt, Copper, and Nickel.**—Selebi-Phikwe is the center of Botswana's copper-nickel-cobalt mining industry. The industry is dominated by BCL, one of the largest private sector employers with over 4,800 employees. About 40,000 tons per year of copper-nickel matte was produced for refining in Norway Zimbabwe. The Selebi-Phikwe operation, which produces about 2% of the world supply of nickel, is a complex with three underground mines equipped with modern technology for flash smelting and the production of high-grade matte. The company has struggled for much of its existence against the volatility of international metal prices. Production of copper-nickel concentrates by TNMC for toll-smelting by BCL was expanded following commissioning of the open pit Phoenix mine in early 1995. Movable reserves at Phoenix were upgraded by TNMC to 15.2 million tons at a grade of 0.65% nickel and 0.31% copper. TNMC applied for assistance to help fund further exploration at depth during 1997. During 1996, BCL agreed to increase its treatment contract for TNMC concentrates by 20,000 tons per year to 160,000 tons per year.

**Gold.**—Gold production was predominantly from the Monarch Mine, with some production provided by Minerals Holdings Botswana (Pty.) Ltd.'s tailings dump retreatment and Kudu Mining Co. (Pty.) Ltd.'s Rainbow Mine. Southern Africa Joint Venture, a consortium of Australian companies, began test mining of the oxide ore of the Golden Eagle open pit in February 1995 and was reprocessing tailings from the Map Nora Mine, which Phelps Dodge Mining Co. of the United States had operated from 1989 to 1991.

Production of gold bullion in Botswana decreased from 86 kilograms in 1995 to 4.5 kilograms in 1996. Suspension of operations at Monarch Mine in 1995 and serious shortage of water supply at the other small mining operations contributed to the sharp decline in gold production. The reopening of Monarch Goldfields' Golden Eagle Mine in October 1996 provided some hope of sustained gold production in the Francistown area. Also, Sigmor Mines (Pty.) Ltd. made preparations to develop its Signal Hill gold deposit located 55 kilometers southeast of Francistown. The deposit was discovered in the late 1980's but economic conditions have, until now, precluded the mining of the deposit. Sigmor Mines planned to extract the ore through open pit mining methods and heapleach the ore to recover gold. Production startup was expected during the second half of 1997.

### Industrial Minerals

**Diamonds.**—De Beers Prospecting Botswana (Pty.) Ltd. continued its countrywide prospecting. It processed samples

from prospects in the Gope area in conjunction with Falconbridge of Canada. Debswana increased the processing capacity at the Jwaneng Mine with the addition of a fourth treatment line. Output from Jwaneng, Orapa, and Letlhakane mines was 11.166 million, 5.644 million and 0.897 million carats respectively. De Beers planned to increase production at its Orapa Mine, lifting output to more than 11.5 million carats per year by 2000, at a cost of \$290 million (Northern Miner, 1996).

A number of international mining companies were actively exploring for diamonds. AfriOre Ltd. of Canada, formerly Amarado Resources Ltd., was involved in a joint venture on the Kokong West property operated by a local subsidiary of Gencore of South Africa. BHP Minerals International Exploration Inc.'s exploration activity was earning BHP 51% interest in AfriOre's Gope diamond prospect. Auridium Consolidated NL of Australia continued its evaluation of three diamondiferous kimberlite pipes in the Orapa area.

Lazare Kaplan Botswana (Pty.) Ltd. (Lazare Kaplan International Inc. of the United States, 60%; Botswana Development Corp., 34.9%; and Government of Botswana, 5.1%) operated a diamond cutting and polishing plant in Molepolole. The operation, opened in 1993, concentrated on production of smaller stones (less than 0.18 carat).

Five small kimberlites located near Martins Drift in eastern Botswana are to be mined by a new Debswana subsidiary, Tswapong Mining. The Government holds a 15% interest in the company, which was granted a short-term mining lease. Underground bulk sampling and large-diameter drilling programs were completed by Debswana on the two Gope kimberlite pipes in central Botswana held in partnership with Falconbridge of Canada (Mining Journal, 1997).

**Gemstones.**—Masa Precious Stones (Pty.) Ltd. and Agate Botswana (Pty.) Ltd. remained the only two licensed dealers of semiprecious stones in 1996. The former is located in Bobonong and prepares stones for direct export or to supply Agate Botswana, which processed the stones further. Agate Botswana (Pty.) Ltd., located in Pilane, processed both raw materials produced in Botswana plus some imported stones. A total of 35 tons of stones were sold in 1996.

**Soda Ash.**—Botswana Ash (Pty.) Ltd., acquired the assets and business of Soda Ash Botswana (Pty.) Ltd. in October 1995. The Botswana Ash plant, designed to produce 300,000 tons of soda ash per year, is located at Sua Pan, 180 kilometers from Francistown. In early 1996, operations at the plant were suspended following exceptionally heavy rain in the Nata River Basin area. The resulting flood caused a breach in a protective wall separating the Pan and the solar ponds. This resulted in an 11 week suspension of production operations while repairs to the damaged infrastructure were performed. Production resumed during the second quarter of 1996 at a reduced rate, with pre-flood levels of soda ash production being achieved during the second half of 1996. AAC, one of the shareholders in the project, an adequate stockpile of soda ash enabled the company to meet its sales commitment during the first 2 weeks

of the shutdown. In order to maintain deliveries during the remaining 9 weeks of the shutdown, Botash was forced to buy more than 27,000 tons of soda ash from a competitor, American Natural Soda Ash Corporation (U.S. Embassy, 1996).

### **Mineral Fuels**

Morupule Colliery (Pty.) Ltd. was the sole coal producer in Botswana. Coal production continued to be constrained by less than expected demand by major consumers, especially Botswana Ash. The Government of Botswana received inquiries during 1996 from local and foreign companies regarding the potential development of Mmamabula coal reserves. Although no plans were finalized by yearend, some companies were conducting feasibility studies with the possibility of starting up mining operations in the near future.

### **Infrastructure**

Transportation facilities were good on the eastern fringe of the country. The main routes are served by well maintained tarmac roads, including the main north-south route between Ramatlabama and Ramokgwebana, the routes north from Francistown to Maun and Kasane, and across the border near Gaborone to Johannesburg and Pretoria. A Trans-Kgalagadi highway linking Gaborone with the Namabian port of Walvis Bay via Ghanzi and Mmamuno was in the final stage of construction. A single-track railway, operated by Botswana Railways, runs from north to south through the eastern part of the country, linking South African and Zimbabwean networks. Branch lines serve the major mining operations at Morupule, Selebi Phikwe, and Sua Pan. The national airline, Air Botswana, is based at the small but modern Sir Serestse Khama Airport serving Gaborone.

Electric generating capacity consisted of the 132-megawatt (MW) Morupule coal-fired plant and the 60-MW coal-fired plant at Selebi-Phikwe. About two-thirds of the power generated was consumed by the mining industry, most notably BCL and Debswana.

Water is a scarce commodity in Botswana. Urban centers receive a reliable supply of potable water based on surface reservoirs operated by the Water-Utilities Corporation, while rural areas are serviced by the Department of Water Affairs, largely through development of ground water resources. A newly constructed dam at Letsibogo in the northeast will provide a water source to feed a north-south pipeline extending 400 kilometers to the south (Magang, 1997).

### **Outlook**

Heavy exploration activity was expected to continue in the short term, and this may result in new commercial mineral operations. The country's favorable geologic environment and

mineral investment climate should continue to make Botswana a target for foreign mineral investment.

Botswana's long-term economic prospects must be viewed in context of the southern African region. Although Botswana's economy grew at an annual rate of over 10% in the 1980's, even as South Africa's politically isolated economy suffered, Botswana's economic fate is closely intertwined with that of its larger neighbor. Apart from minerals, Botswana's "engines of growth"—manufacturing and assembly for regional export, tourism, and offshore financing—are all contingent on the health of the South African economy.

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- 1997b, 1996 Annual report: Republic of Botswana Department of Mines, p. 21.
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### **Major Sources of Information**

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Department of Geological Survey

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Mbendi, Information Services, Internet address:  
<http://wwwmbendi.co.za/indy/mingbo.htm>

### **Major Publications**

Department of Mines Annual Report. Republic of Botswana, Gaborone, annual.

U.S. Department of State. Country Commercial Guide: American Embassy, Botswana, annual.

TABLE 1  
BOTSWANA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1992	1993	1994	1995	1996	
Coal, bituminous	901,452	890,000	900,298	898,383	763,240	
Cobalt: Smelter output, Co content of matte 3/ 4/	208	205	225	270	406	
Copper:						
Mine output, Cu content of ore milled	24,400	25,100	27,500 e/	24,700 e/	28,000 e/	
Smelter output, Cu content of matte 3/ 4/	20,413	20,132	22,780	20,500	23,299	
Diamond: 5/	thousand carats	15,946	14,730	15,550	16,802	17,707
Gemstones, semiprecious 6/	39 r/	40 r/	67	20	35	
Gold 7/	kilograms	165	192	234 r/	86 8/	5
Manganese ore (e/ 45% Mn) 9/	1,318	3,700	--	--	--	
Nickel:						
Smelter output, matte, gross weight 3/	48,071	50,780	51,488	49,931	58,000 e/	
Smelter output, Ni content of matte 4/	18,873	21,621	19,041	18,100	22,900	
Salt 10/	53,708	98,000	186,000	208,126	93,886	
Sand, construction 11/	cubic meters	190,305	150,000	140,000	112,000	NA
Soda ash, natural	123,593	126,000	174,000	201,657 r/	119,137	
Stone, crushed	cubic meters	804,242	760,000	572,000	860,737	845,526

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

1/ Table includes data available through May 26, 1997.

2/ In addition to commodities listed, the following were produced, but information was inadequate to reliably estimate output: silver and clay for brick and tile.

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

4/ Figures also used for recoverable mine output in world production tables appearing in Volume I of the Minerals Yearbook. Included some product from direct smelting ore, i.e., ore not reported as milled.

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

6/ Presumably, principally agate. Reported as sales.

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

8/ Monarch Mine placed on care and maintenance during May 1995; reopened in Oct. 1996.

9/ Production commenced in 1992 and ceased in Nov. 1993.

10/ From natural soda ash production.

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

TABLE 2  
BOTSWANA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Clay 1/	Lobatse Clay Works (Proprietary) Ltd. (Botswana Development Corp./Interkiln Corp. joint venture)	Lobatse, 70 kilometers south-southwest of Gaborone	50,000 e/
Do.	Makoro Brick and Tile (Pty.) Ltd.	Makoro, 10 kilometers south of Palapye	20,000 e/
Coal	Morupule Colliery (Pty.) Ltd. (Anglo American Corp. of South Africa Ltd. (AAC) and related firms, 93.3%)	Morupule, 270 kilometers north-southwest of Gaborone	1,000,000
Cobalt 2/	BCL Ltd., (Government, 30%; Botswana RST Ltd. (BRST), 70%)	Selebi-Phikwe, 350 kilometers northeast of Gaborone	500
Copper 2/	BCL Ltd., (Government, 30%; BRST, 70%)	do.	25,000
Copper ore	Tati Nickel Mining Co. (Pty.) Ltd. (AAC, 21%; De Beers, 22%; Francistown Mining and Exploration Ltd., 42%; Government, 15%)	Selkirk Mine, 23 kilometers east of Francistown	80,000 3/
Diamond	million carats Debswana Diamond Co. (Pty.) Ltd. (Government, 50%; De Beers Centenary AG, 50%)	Orapa, Letlhakane, and Jwaneng, respectively 375 kilometers north, 350 kilometers north, and 115 kilometers north of Gaborone	18 e/
Gemstones, semiprecious	kilograms Agate Botswana (Pty.) Ltd.	Processing plant at Pilane, 45 kilometers north of Gaborone	60,000
Do.	do. Masa Precious Stones (Pty.) Ltd.	Bobonong, east of Selebi-Phikwe	4,000
Gold bullion 4/	do. Monarch Goldfields Botswana (Pty.) Ltd. (Gallery Resources NL of Australia, 100%)	Monarch Mine, just north of Francistown	600 5/
Nickel 2/	BCL Ltd., (Government, 30%; BRST, 70%)	Selebi-Phikwe, 350 kilometers northeast of Gaborone	23,000
Nickel ore, in concentrate	Tati Nickel Mining Co. (Pty.) Ltd. (AAC, 21%; De Beers, 22%; Francistown Mining and Exploration Ltd., 42%; Government, 15%)	Selkirk Mine, near Francistown Phoenix Mine, near Francistown	60,000 6/ 80,000
Salt	Botswana Ash (Pty.) Ltd. (Government, 50%; Anglo-American 50%)	Sua Pan, 450 kilometers north of Gaborone	650,000
Soda ash	do.	do.	300,000

e/ Estimate.

1/ For brick and tiles.

2/ In nickel-copper-cobalt smelter matte.

3/ Copper content estimated at 2%.

4/ Botswana bullion typically had silver content estimated at 2%.

5/ Mine placed on care and maintenance during May 1995; reopened in Oct. 1996.

6/ Nickel content estimated at 2.4%.