

THE MINERAL INDUSTRY OF BOTSWANA

By Philip M. Mobbs

The Republic of Botswana's mineral industry continued to be dominated by diamond production, which also was the mainstay of the national economy. Most of Botswana's diamond production was of gem quality, which resulted in the country's position as the world's leading producer of diamond by value. Copper, nickel, and soda ash production also played significant though smaller roles in the national economy. Mining accounted for about 36% of Botswana's real gross domestic product (GDP). About 50% of Government revenues were derived from mining and mineral-processing activity. As of August 2004, 64 companies held or retained a total of 556 prospecting licenses, of which 432 were for diamond or precious stones. Because of the recent influx of new exploration companies, a Chamber of Mines was expected to be formed by the mining industry in 2005 (Bank of Botswana, 2005, p S-10, S-97; Mining Journal, 2004).

In 2004, the four major mineral-producing companies, which were BCL Ltd., Botswana Ash (Pty.) Ltd. (Botash), Debswana Diamond Co. (Pty.) Ltd., and Tati Nickel Mining Co. (Pty.) Ltd.; quarries; and small mines employed 14,264 people. Mupane Gold Mining (Pty.) Ltd. was expected to add about 350 to the mining sector employment roles (Department of Mines, 2005, p. 15).

Botswana's GDP based on purchasing power parity was estimated to be \$16.2 billion¹ in 2004 with an estimated real growth rate of 4.9% and an inflation rate of 6.6%. The per capita GDP based on purchasing power parity was estimated to be \$10,169. The per capita GDP level was one of the highest in Africa and placed Botswana in the category of upper-middle-income countries (International Monetary Fund, 2005²).

Trade

According to the Bank of Botswana (2005, p. S-83—S-84), the value of all merchandise exports for 2004 was \$3.49 billion. Mineral exports, of which diamond accounted for \$2.82 billion; copper and nickel matte, \$166 million; and soda ash, about \$54 million, represented 87% of total merchandise exports. The provisional value of all merchandise imports through October 2004 was \$2.86 billion. For the 10-month period, fuel imports amounted to \$325 million, and metal and metal products, \$228 million. Because of increased international fuel prices, the value of the fuel imports for the first 10 months of 2004 was nearly triple the value of fuel imported in 2003, which had been revised to \$106 million.

Botswana's 600,379-square-kilometer (km²) area was located in southern Africa, surrounded by Namibia to the west and north, South Africa to the east and south, and Zimbabwe to the

north and east. Most merchandise trade was shipped via rail or truck through South Africa.

Commodity Review

Metals

Copper and Nickel.—The copper and nickel industry in Botswana was dominated by BCL and Tati (a subsidiary of LionOre Mining International Ltd. of Canada). During 2004, BCL mined 2.496 million metric tons (Mt) of ore from its operations at Selebi-Phikwe, and Tati extracted 3.257 Mt of ore from the Phoenix open pit mine. Most of Tati's concentrates were treated at the BCL smelter, which was located about 200 kilometers (km) away. During 2004, the BCL smelter produced 54,448 metric tons (t) of nickel-copper-cobalt matte, which was sold to Centametal AG. Centametal shipped the matte to Norway and Zimbabwe for refining (Department of Mines, 2005, p. 5; LionOre Mining International Ltd., 2005, p. 10-13, 46).

In 2004, LionOre commissioned an 8-metric-ton-per-day-capacity pilot plant that used Western Minerals Technology Pty. Ltd.'s proprietary Activox® hydrometallurgical process to leach concentrate at its Phoenix facility. The plant successfully produced copper and nickel cathode and cobalt precipitate. On-site processing of Tati's ore would result in available processing capacity at the BCL smelter. Exploration projects that were underway, if brought to production, could fill the capacity void (Western Minerals Technology Pty. Ltd., undated\$).

African Copper plc continued its evaluation of the Dukwe copper project and adjacent Matsitama licenses. A prefeasibility study on the Dukwe sulfide deposit, which was located about 130 km northwest of Francistown, was begun in September.

In 2004, Discovery Nickel Ltd. drilled two confirmation holes, contracted out a resource estimate, and initiated an airborne electromagnetic survey of the Dikoloti nickel license, which was located about 45 km from the BCL smelter. Discovery's exploration activity was to earn an 80% interest in the Northeast Botswana Brownfields Nickel Project from joint-venture partner Falconbridge Exploration (Pty.) Ltd. of Botswana.

Tau Mining Botswana (Pty.) Ltd. completed an airborne geophysical survey of its 10-prospecting-license Molopo Farms project, which was located about 175 km west of Gaborone. Previous drilling in the prospect area had discovered polymetallic (copper, nickel, and platinum-group metals) deposit.

WMC Resources Exploration Pty. Ltd. of Australia entered into an exploration and development joint venture with Albidon Ltd. of Australia. Albidon held nine nickel-prospecting licenses; seven were located south of the Selebi and the Pikwe nickel mines, and two, north of Francistown. In 2004, the joint venture of Albidon and Gallery Gold Ltd. of Australia completed a geophysical survey across the Tekwane nickel prospect.

¹Where necessary, values have been converted from the Botswana pula (BWP) to U.S. dollars (US\$) at the rate of BWP4.66=US\$1.00 for 2004 and BWP5.00=US\$1.00 for 2003.

²References that include a section mark (§) are found in the Internet References Cited section.

Gold.—In October, Mupane Gold (a subsidiary of Gallery Gold Ltd. of Australia) began commercial gold operations at the Mupane Mine, which was located about 30 km southwest of Francistown. Ore was sourced from the Tau open pit. Additional reserves were available from the nearby Kwena and Tolo deposits. Gallery Gold proposed to begin ore production from the Map Nora deposit in 2005. Map Nora ore would be processed at the Mupane facility. Gallery Gold continued exploration of other gold occurrences near the Mupane facility; these included the Maitengwe lease, the Golden Eagle and the Kite prospects on the Sashe license, and the Vumba lease. The joint venture of A-Cap Resources Ltd. and Gallery Gold drilled the Jim's Luck gold prospect. Gallery Gold also held two gold exploration licenses in joint venture with Albidon.

Tawana Resources NL of Australia agreed to sell its 85% interest in Joren (Pty.) Ltd. Joren operated the Somerset placer gold facility, which produced 1.27 kilograms (kg) of gold in 2004, compared with 9 kg in 2003 (Department of Mines, 2005, p. 8).

Lead, Silver, Vanadium, and Zinc.—Mount Burgess Mining N.L. drilled the Kihabe base metals project, which was located 700 km northwest of Gaborone. Selected samples of drill cuttings were assayed for copper, lead, silver, and zinc. The assay confirmed lead, silver, and zinc mineralization.

Industrial Minerals

Clay, Gravel, Sand, and Stone.—In 2004, 77 companies employed about 1,000 people in the construction materials sector. Quarries and sand pits, which included operations at Francistown, Gaborone, Ghanzi, Hukuntsi, Jwaneng, Lobatse, Maun, Mabutsane, Molepolole, Selebi-Phikwe, Serow, Takatshawaane, Tsau, Tshabong, and Tsoe, were spread out across the nation, not concentrated along the denser populated strip from Gaborone to Francistown in eastern Botswana. In 2004, Pretoria Portland Cement Co. Ltd. acquired 100% interest in the Kgale Quarry.

Diamond.—Debswana (a 50-50 joint partnership of De Beers Centenary AG and the Government) accounted for all diamond production from its four mines. Despite a strike by mine workers in August, Debswana treated about 30.4 Mt of ore during 2004 to yield 31.1 million carats, which was an increase of 2% compared with carat production in 2003. Debswana's diamond production included 16.070 million carats from the Orapa Mine, 13.683 million carats from the Jwaneng Mine, 1.033 million carats from the Letlhakane Mine, and 339,000 carats from the Damtshaa Mine. In December, the mining license for Jwaneng was renewed for 25 years (Debswana Diamond Co. (Pty.) Ltd., 2005, p. 26).

In April, De Beers (51%) and African Diamonds plc (49%) formed the joint venture Boteti Exploration (Pty.) Ltd. By yearend, the Boteti joint venture had drilled and bulk sampled 2 kimberlites on its Orapa area license and planned to bulk-sample 27 other kimberlites. Kalahari Diamond Ltd. entered a joint venture with African Diamonds to earn 60% of African Diamonds' interest in new discoveries on the Orapa licenses. Sekaka Diamonds (Pty.) Ltd. (formerly Godi (Pvt) Ltd.) (a subsidiary of Kalahari Diamonds) held about 114 prospecting licenses that it had acquired from BHP Billiton Ltd.

De Beers (51%) and Firestone Diamonds plc (49%) formed a joint venture to explore the 3,200-km² Mopipi project, which is located about 450 km north of Gaborone. At yearend, the joint venture acquired an additional prospecting license near the Orapa Mine, and Firestone acquired six additional prospecting licenses near the Jwaneng and the Orapa Mines.

Numerous other companies were exploring for diamond in Botswana. DiamonEx Ltd. of Australia drilled five kimberlites on the Martin's Drift project, which was located about 90 km southeast of Palapye. Gcwhaba Resources (Pty.) Ltd. (a subsidiary of Tsodilo Resources Ltd.) began a drill program on its seven-license Ngamiland prospect in northwest Botswana. Immediately to the north of the Gcwhaba properties, Newdico (Pty.) Ltd. [a joint venture of Tsodilo (75%) and the Trans Hex Group (25%)] completed a drilling program and geophysical surveys on its 18-license Ngamiland prospect. Helio Resources Corp. agreed to acquire interest in the Lokgwabe licenses, which were located west of Kang, from Jatinga (Pty.) Ltd.

In 2004, Motapa Diamonds Inc. sampled the Central Kalahari, the Khutse, the Lobatse, the Mokubilo, and the Serule licenses; retained 28 prospecting licenses with a combined area of 17,742 km²; and relinquished the Lobatse group licenses. A joint venture of Motapa and AfriOre Botswana (Pty.) Ltd. held seven diamond prospecting licenses. Rio Tinto Mining and Exploration Ltd. and Trivalence Mining Corp. continued their evaluation of the Kokong prospect. Rio Tinto's work earned it a 65% interest in the joint venture, which, in 2004, reduced the size of its license area to 2,272 km² from the original 3,745 km². Tawana Resources sampled diamond prospects on the Seolo license.

In 2003, Debswana sold Teemane Manufacturing Co. (Pty.) Ltd. to Diarough NV. Teemane was a diamond-cutting and polishing company based in Serowe. In 2004, Eurostar Diamond Holdings SA initiated work on a diamond-cutting facility in Gaborone; the plant was expected to reach full operating capacity in 2006. The Star Diamond Group BV also opened a diamond-cutting plant in Gaborone in 2004. Schachter & Namdar Polishing Works, Ltd. operated the diamond-cutting factory in Molepolole. All four firms imported uncut diamond from De Beers Diamond Trading Co.

Soda Ash.—Botswana Development Corp. and the Botswana Export Development and Investment Authority investigated the feasibility of manufacturing glass in Botswana. Soda ash, which was a primary raw material for glass, was produced in Botswana, but except for local sales of about 200 metric tons per year (t/yr), most of Botash's soda ash production was exported. A proposed feasibility study was expected to evaluate silica sand and limestone deposits in Botswana and the potential to export glass; glass consumption by the country's population of 1.56 million was not expected to support a glass manufacturing industry.

Mineral Fuels

Coal.—The Morupule coalfield contains more than 5 billion metric tons of reserves. Debswana operated the Morupule Colliery at Palapye, which was located about 175 km south of Francistown. More than one-half of the company's coal

production was sold to the adjacent Morupule Power Station (MPS) of Botswana Power Corp. (BPC). The Morupule Colliery also supplied coal to the BCL copper-nickel facility, the Botash soda ash operation at Sua Pan, and Makoro Brick and Tile (Pty.) Ltd. In 2004, 916,036 t of coal was mined, which was an 11% increase compared with the total in 2003. Coal sales in 2004 were 897,244 t, which was a 9% increase compared with the total in 2003. Some of the increased production was attributed to the installation of a Joy 12HM31B continuous miner, which replaced conventional cutters and loaders (Debswana Diamond Co. (Pty.) Ltd., 2005, p. 28-29; Joy Global Inc., 2003§; Morupule Colliery Ltd., 2004§).

The MPS supplied about 30% of the country's electrical power demand; the remainder was imported, primarily from South Africa. Increased electricity demand in South Africa could affect Eskom Holdings Ltd.'s sale of surplus electrical power to BPC after the current sales contract expires in 2007. To offset the potential loss of South African power, an expansion of the MPS to 532 megawatts (MW) from 132 MW was proposed. The expansion was expected to triple MPS' coal demand to about 1.2 million metric tons per year by 2009. The Morupule Colliery could be expected to increase production significantly to meet the projected demand from the MPS (United Nations Framework Convention on Climate Change, 2005§).

Outlook

The Government's attempt to diversify the economy has yet to be successful. International interest in exploration for diamond and base and precious metals is expected to continue. The country's favorable geologic environment, mineral investment climate, low tax rates, and political stability are expected to continue to make Botswana a target for foreign mineral investment. The Government encourages mineral value-added processing, but the lack of water in landlocked Botswana restricts large-scale industrial development. The country's small domestic market and the additional cost of transportation to ports in South Africa also limit the nation's attractiveness to investment by foreign manufacturers. High fuel costs would continue to impact the cost of transportation of Botswana's imports and exports adversely.

Resumption of commercial gold production will help diversify the mineral industry slightly with the addition of \$40 million to \$50 million per year of nondiamond income, but revenues from diamond operations are expected to continue to be the mainstay of the country's economy for the foreseeable future. Debswana's identified diamond resources will be sufficient to maintain 2004 production levels for at least 25 to 30 years. Nickel and copper, which are jointly mined, also are expected to continue to bring significant foreign exchange into the country. The continued devaluation of the U.S. dollar against the Botswana pula could be a negative factor because dollar-denominated commodity sales would effectively provide mining companies with less local currency to meet domestic operating costs.

The unemployment rate in Botswana is more than 20%. Mineral production companies, which account for about

4% of the national workforce, are not expected to reduce the unemployment rate. The Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) epidemic has adversely affected Botswana. In 2003 (the last year for which data were available), an estimated 22% of the total population was thought to be HIV positive. Many of the companies in the mineral industry maintain HIV/AIDS information and treatment programs that are coordinated with Government programs (Joint United Nations Programme on HIV/AIDS, 2004, p. 190).

Given the country's extensive coal resources and projected regional power demand, Botswana also has the potential to develop and support a small-scale coal-bed methane industry and additional coal-fueled electricity-generating plants that could supply power to the South African Power Pool through its land lines to South Africa.

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Major Sources of Information

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TABLE 1
 BOTSWANA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2000	2001	2002	2003	2004	
Coal, bituminous	946,900	930,374	953,081	822,780	916,036	
Cobalt, smelter output, Co content of matte ^{3,4}	308	325	269	294 ^r	223	
Copper:						
Mine output, Cu content of ore milled ^c	34,600	26,700	27,800	31,380 ^{r,5}	29,460 ⁵	
Smelter output, matte, gross weight ³	48,420	50,999	56,625	51,983 ^r	54,448	
Smelter output, Cu content of matte ^{3,4}	18,722	19,209	21,590	24,292 ^r	21,195	
Diamond ⁶	thousand carats	24,635	26,416	28,397	30,412 ^r	31,125
Gemstones, semiprecious ⁷	kilograms	80,000 ^e	76,000	127,000	102,000	99,000
Gold ⁸	do.	4	2	8	9 ^r	162
Nickel:						
Mine output, Ni content of ore milled	38,420	26,700 ^e	28,600 ^e	38,230 ^r	35,820	
Smelter output, matte, gross weight ³	48,420	50,999	56,625	51,983 ^r	54,448	
Smelter output, Ni content of matte ⁴	21,446	22,454	23,896	27,400 ^r	22,292	
Salt ⁹	184,753	178,646	315,259	229,432 ^r	208,319	
Sand and gravel ¹⁰	thousand cubic meters	93 ^r	207 ^r	2,401 ^r	1,485 ^r	2,330
Soda ash, natural	191,043	251,231	283,197	309,350	263,358	
Stone, crushed	thousand cubic meters	1,070	2,141	1,201	1,060	1,219

^eEstimated; estimated data are rounded to no more than three significant digits. ^rRevised.

¹Table includes data available through October 2005.

²In addition to the commodities listed, platinum, palladium, and silver were produced, and exported in the nickel-copper-cobalt matte; copper and nickel cathodes also were produced at a pilot plant, but information was inadequate to estimate output.

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

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

⁵Reported.

⁶Assumed to contain about 70% gem and near gem.

⁷Principally agate. Reported as sales.

⁸Reported as bullion; historically included silver estimated to be about 2%.

⁹Byproduct of natural soda ash production.

¹⁰Includes clay (for brick and tile).