



2005 Minerals Yearbook

BOTSWANA

THE MINERAL INDUSTRY OF BOTSWANA

By Philip M. Mobbs

The mineral sector again dominated Botswana's economy, as it has for the past 15 years. Diamond has been the leading component of the mineral sector since large-scale diamond production began 25 years ago. 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, gold, nickel, and soda ash production also has held traditionally significant, though smaller, roles in the national economy. In 2005, mining accounted for about 38% of Botswana's real gross domestic product (GDP), and more than 50% of Government revenues were derived from mining and mineral-processing activity. In 2005, the nominal value of minerals produced in Botswana exceeded that of 2004 by about 20% in terms of the United States (U.S.) dollar. Much of the increase was attributed to higher international mineral prices. Diamond, copper-nickel matte, and gold, in order of value, accounted for most of the increase (Bank of Botswana, 2006, p. S-8, S-90, S-103; Olson, 2006; E. Mkandawire, Department of Mines, August 29, 2006, written commun.).

Botswana's GDP based on purchasing power parity was estimated to be about \$18.1 billion¹ in 2005 with an estimated real growth rate of 6.2% and an inflation rate of 8.6%. The per capita GDP based on purchasing power parity was estimated to be \$11,410. 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, 2006²).

Trade

Botswana encompasses an area of 600,379 square kilometers in southern Africa and is bordered by Namibia, South Africa, and Zimbabwe. Most merchandise trade was shipped via rail or truck through South Africa. According to the Bank of Botswana (2006, p. S-88–S-90), the total value of exports in 2005 was about \$4.66 billion. Mineral exports, of which diamond accounted for \$3.3 billion; copper and nickel matte, about \$461 million; soda ash, about \$65 million; and gold, about \$36 million, represented 83% of total merchandise exports. The provisional value of imports in 2005 was \$3.28 billion.

Commodity Review

Metals

Copper and Nickel.—In eastern Botswana, about 200 kilometers (km) south of Francistown, the smelter operated by BCL Ltd. of Botswana processed copper-nickel concentrate from the company's Selebi-Phikwe Mine. Under an agreement

¹Where necessary, values have been converted from the Botswana pula (BWP) to U.S. dollars at the rate of BWP5.06=US\$1.00 for 2005 and BWP4.66=US\$1.00 for 2004.

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

signed in 2001 by Centametal AG of Switzerland and Falconbridge International Ltd. of Barbados, BCL also toll-smelted concentrate from the Phoenix open pit mine, which was operated by Tati Nickel Mining Co. (a subsidiary of LionOre Mining International Ltd. of Canada). During 2005, the BCL smelter produced 68,637 metric tons (t) of nickel-copper-cobalt matte. Centametal and Falconbridge shipped the nickel matte to the Falconbridge Nikkelverk, AS refinery in Norway and RioZim Ltd.'s Eiffel Flats refinery in Zimbabwe (Department of Mines, 2006, p. 6).

In 2002, BCL and Falconbridge agreed to extend to 2015 the tolling agreement under which BCL-mined nickel matte was refined in Norway. The reserves at the Selebi-Phikwe Mine, however, were expected to be exhausted by 2011 or 2012. In 2005, the Government continued to evaluate proposals to sustain the town of Selebi-Phikwe after the closure of the mine and to minimize the potential negative impact of the closure on operations of the BCL smelter, the Botswana Power Corp., the Botswana Railways, and the Morupule Colliery. The BCL operation accounted for about 60% of Botswana's industrial sector's total energy consumption (Fagbenle, 2000\$).

The output of copper-nickel matte from the BCL smelter traditionally has exceeded the smelter's 40,000-metric-ton-per-year (t/yr) design capacity, often by more than 30% (table 1). Despite the adverse effect of cyclical metals prices during the past two decades and the looming closure of the Selebi-Phikwe Mine, the design capacity of BCL smelter recently was expanded to 60,000 t/yr. In 2005, matte output exceeded the smelter's new design capacity. Because the BCL smelter might shut down with the closure of the Selebi-Phikwe Mine, LionOre had initiated in 2003 a pilot plant project to evaluate the recovery of copper and nickel from the Phoenix Mine by using Western Minerals Technology Pty. Ltd.'s Activox® process. In 2005, a feasibility study of an Activox® plant with an output capacity of 25,000 t/yr of nickel was underway. The study was expected to be completed in mid-2006 (LionOre Mining International Ltd., 2006, p. 12; Malema and Legg, 2006, p. 215).

Several copper and nickel exploration projects were underway. African Copper plc continued its evaluation of the Dukwe copper project, which was located about 130 km northwest of Francistown, and the adjacent Matsitama licenses. African Copper successfully completed a feasibility study of an open pit, heap leach, and solvent extraction/electrowinning operation to process the oxidized ore at Dukwe and started a feasibility study of the underground development of the sulfide zone at Dukwe. African Copper proposed to begin a 10,000-meter infill drill program at Matsitama in 2006.

In 2005, Discovery Nickel Ltd. continued its exploration drilling on the Northeast Botswana Brownfields nickel project, which included the Dikoloti, the Dikoloti North, the Kima, and the Lentswe prospects. In 2005, Discovery Nickel acquired seven prospecting licenses in northwest Botswana that formed the Maun copper project.

Tau Mining Botswana (Pty.) Ltd. [a subsidiary of African Platinum plc (Afplats) of the United Kingdom] completed a preliminary evaluation of its Molopo Farms prospect, which was located about 175 km west of Gaborone. Because of higher priority projects in southern Africa, Afplats decided to divest its interest in the Molopo Farms prospect.

WMC Resources Exploration Pty. Ltd. of Australia was acquired by the BHP Billiton Group in 2005. The WMC/BHP Billiton joint venture with Albidon Ltd. of Australia conducted airborne and ground electromagnetic surveys, mapping, and soil sampling on its Selebi-Phikwe nickel project. Activity on the Tati nickel project, which was a joint venture of Albidon and Gallery Gold Ltd. of Australia, included the completion of a reconnaissance drilling program on the Kismet and the Tekwane nickel prospects.

Gold.—Mupane Gold (a subsidiary of Gallery Gold) operated the Mupane Mine, which was located about 30 km southwest of Francistown. In 2005, ore was sourced from the oxide and transition zones of the Tau open pit and, after mid-year, the oxide zone of the Tholo pit. At the Mupane plant, Mupane Gold commissioned a ball mill, installed a flotation plant to handle sulfide and transition zone gold ore, and upgraded the oxygen plant. Gallery Gold continued exploration of other gold occurrences near the Mupane facility; these included the Jim's Luck prospect; the Maitengwe lease; the Golden Eagle, the Lady Mary 2, and the Map Nora prospects on the Sashe license; the Ratomo and the Signal Hill prospects in the Tati Belt; and the Vumba lease. At yearend IAMGOLD Corp. of Canada proposed to acquire Gallery Gold and Gallery Gold's Botswana operations.

Industrial Minerals

Diamond.—Debswana (a 50-50 joint partnership of De Beers Centenary AG and the Government) accounted for all diamond production in Botswana from its four mines. Debswana continued its recovery from the labor unrest that had resulted in a 2-week strike in 2004. In 2005, Debswana treated about 31.2 million metric tons (Mt) of ore to yield 31.89 million carats, which was an increase of more than 2% compared with carat production in 2004. Debswana's diamond production included 14.890 million carats from the 34-year-old Orapa Mine, which was a 7% decline compared with 2004; 15.6 million carats from the 23-year-old Jwaneng Mine, which was a 14% increase compared with 2004; 1.097 million carats from the 20-year-old Letlhakane Mine, which was a 6% increase compared with 2004; and 246,278 carats from the 2-year-old Damtshaa Mine, which was a 27% decline from that of 2004. The production decline at Orapa was attributed to the loss of a haul road because of a ramp failure and a fire, which destroyed a loading shovel (Debswana Diamond Co. (Pty.) Ltd., 2006, p. 12-16).

De Beers and the Government agreed that some of De Beer's Diamond Trading Company's operations would move from London, United Kingdom, to Gaborone, Botswana. Local marketing of domestically produced gemstones was expected to help the local diamond cutting and polishing companies.

Numerous other companies were exploring for diamond in Botswana. Active exploration operations included those

of Boteti Exploration (Pty.) Ltd., which was a joint venture between De Beers (51%) and African Diamonds plc (49%); Gcwihaba Resources (Pty.) Ltd. (a subsidiary of Tsodilo Resources Ltd.); Helio Resources Corp.; Newdico (Pty.) Ltd., which was a joint venture of Tsodilo (81%) and the Trans Hex Group (19%); Tawana Resources N.L.; and the joint ventures of De Beers and Firestone Diamonds plc; Motapa Diamonds Inc. and Stornoway Diamond Corp.; and Rio Tinto Mining and Exploration Ltd. and Trivalence Mining Corp. In addition, DiamonEx Ltd. of Australia started a reevaluation of the Martin's Drift prospect, which was a 5-kimberlite deposit that had been trial mined by Tswapong Mining Co. from 1997 to 2001, and Petra Diamonds Ltd. of the Channel Islands acquired Kalahari Diamond Ltd. and its Botswana-based subsidiary Sekaka Diamonds (Pty.) Ltd.

Mineral Fuels

Coal.—Debswana operated the Morupule Colliery at Palapye, which is located about 175 km south of Francistown. Much of the company's coal production was sold to the adjacent Morupule Power Station (MPS) of Botswana Power Corp. (BPC). Record coal sales in 2005 were 967,242 t, which was an 8% increase compared with the total in 2004. A coal washing plant was under construction (Debswana Diamond Co. (Pty.) Ltd., 2006, p. 17).

In 2005, Coal Investment Corp. (CIC) of the British Virgin Islands and Meepong Investments (Pty.) Ltd. of Botswana entered into a joint venture to reevaluate the Mmamabula coal project. Mmamabula previously had been explored extensively by a number of organizations, which included AMAX Exploration Inc. of the United States, Anglo American Corp. of South Africa, the coal division of British Petroleum Ltd. of the United Kingdom, Charbonnages de France International Botswana, the Geological Survey of the Bechuanaland Protectorate, the Geological Survey of Botswana, and Shell Coal Botswana Ltd. Mmamabula's inland location and lack of process water had thwarted the prospect's development as a coal export project in the early 1980s. In 2005, CIC's local subsidiary, Meepong Resources (Pty) Ltd., proceeded with a feasibility study of the Mmamabula license, and the U.S. Trade and Development Agency awarded a contract to Delphos International, Ltd. of the United States to provide financial advisory assistance to the Botswana Ministry of Minerals, Energy, and Water Resources for the development of a 1,200-megawatt coal-fired powerplant at Mmamabula (Connor, 1983; U.S. Trade and Development Agency, 2005§).

Outlook

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 foreign mineral investment magnet. The Government encourages mineral value-added processing, but the paucity of water in landlocked Botswana has deterred large-scale industrial development. The country's small domestic

market, the cost of transportation to ports in South Africa, and the rampant Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) epidemic also limit the nation's attractiveness to investment by foreign manufacturers. High fuel costs would continue to affect the cost of transportation of Botswana's imports and exports adversely.

Revenues from diamond operations are expected to continue to be the mainstay of the country's economy for the foreseeable future, although Debswana has scheduled lower production volumes. Copper, gold, nickel, and soda ash production and processing also are expected to continue to be notable factors in the country's economy.

Given the country's extensive coal resources and projected regional power demand, Botswana 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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TABLE 1
BOTSWANA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2001	2002	2003	2004	2005 ^p
Coal, bituminous	930,374	953,081	822,780	913,087 ^r	984,876
Cobalt, smelter output, Co content of matte ^{3,4}	325	269	294	223	326
Copper:					
Mine output, Cu content of ore milled	26,700 ^e	27,750	31,380	29,460	31,300 ^e
Smelter output, matte, gross weight ³	50,999	56,625	51,983	54,448	68,637
Smelter output, Cu content of matte ^{3,4}	19,209	21,590	24,292	21,195	26,704
Diamond ⁵ thousand carats	26,416	28,397	30,412	31,125	31,890
Gemstones, semiprecious ⁶ kilograms	76,000	127,000	102,000	99,000	165,000
Gold ⁷ do.	2	8	9	161 ^r	2,709
Nickel:					
Mine output, Ni content of ore milled	26,700 ^e	28,600 ^e	38,230	35,163 ^r	39,305
Smelter output, matte, gross weight ³	50,999	56,625	51,983	54,448	68,637
Smelter output, Ni content of matte ⁴	22,454	23,896	27,400	22,292	28,212
Salt ⁸	178,646	315,259	229,432	208,319	243,945
Sand and gravel ⁹ thousand cubic meters	207	2,401	1,485	2,330	2,110
Soda ash, natural	251,231	283,197	309,350	263,358	279,085
Stone, crushed thousand cubic meters	2,141	1,201	1,060	1,219	1,100

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

¹Table includes data available through October 31, 2006.

²In addition to 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 is inadequate to estimate output.

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

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

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

⁶Principally agate. Reported as sales.

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

⁸Byproduct of natural soda ash production.

⁹Includes clay (for brick and tile).