



2015 Minerals Yearbook

BOTSWANA [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF BOTSWANA

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In 2015, Botswana was the world's second-ranked producer of diamond by value and volume, accounting for 23% and 16% of global mined diamond production by value and volume, respectively. Botswana's share of the world's natural soda ash production by volume was nearly 2%. The country also produced cement, clay, coal, cobalt, copper, gold, nickel, platinum-group metals (PGMs), salt, sand and gravel, semiprecious gemstones, and silver. Botswana was not a globally significant consumer of minerals or mineral fuels in 2015 (International Diamond Exchange, 2016; Bolen, 2017; Olson, 2017a, b).

Minerals in the National Economy

In 2015, the mining and quarrying sector accounted for 18.3% of Botswana's gross domestic product, and the manufacturing sector, 5.7%. The value of output in the mining and quarrying sector decreased by 19.7% in 2015 after increasing by a revised 0.5% in 2014. Formal employment in the mining and quarrying sector was reported to be 23,661 workers in 2015 compared with 23,783 in 2014. Employment in the diamond cutting and polishing sector was reported to be 2,224 workers (including 1,939 Botswanan nationals) in 2015 compared with 3,774 workers (including 3,317 Botswanan nationals) in 2014 (Bank of Botswana, 2016, p. S.8, S.10–S.11; Business Weekly, 2016; Kenalemang Charles, Senior Government Mining Engineer, Botswana Department of Mines, written commun., July 25, 2016).

In 2015, Botswana's exports were \$6.33 billion, of which diamond accounted for 82.9%; copper and nickel, 5.9%; and soda ash, 1.4%. National imports were \$7.21 billion in 2015, of which diamond (mostly rough diamond) accounted for 33.4%; fuels, 12.6%; metal and metal products, 4%; and salt, ores, and related products, 2.5% (Bank of Botswana, 2016, p. S.78–S.79, S.82–S.84, S.86).

Botswana's nonfuel minerals sector is governed by the Mines and Minerals Act of 1999. The petroleum subsector is governed by the Petroleum (Exploration and Production) Act of 1981. Botswana is a signatory to the Kimberley Process Certification Scheme, which is a certification system established to reduce the trade in conflict diamond. The cutting and polishing of diamond was regulated by the Diamond Cutting Act of 1979.

Production

In 2015, Botswana's smelter production of cobalt increased by 61%; coal, by 21%; and smelted nickel, by 12%. Silver production decreased by 87%; mined copper, by 76%; mined nickel, by 25%; salt, by 22%; gold, by 21%; and diamond, by 16%. Silver and copper production decreased because of the closure of the Boseto and the Thakudu Mines. Diamond production decreased because of lower output at the Jwaneng and the Orapa Mines (table 1; Bank of Botswana, 2016, p. S.20–S.21; Kenalemang Charles, Senior Government Mining

Engineer, Botswana Department of Mines, written commun., July 25, 2016).

Structure of the Mineral Industry

The Government maintained an equity position in the soda ash mine and the majority of the diamond mines; however, the mineral industry operated mainly on a free-market basis. In mid-October 2014, MMC Norilsk Nickel of Russia agreed to sell its 85% interest in Tati Nickel Mining Co. (Pty) Ltd. (TNMC) to BCL Ltd. (Government, 94%). Norilsk also agreed to sell its 6% interest in BCL, and BCL became 100% Government owned. In April 2015, Norilsk announced the completion of the sale (Mining Review Africa, 2015).

Cement, cobalt, copper, diamond, gold, nickel, PGMs, salt, silver, and soda ash were produced by large-scale mines. The mineral industry also consisted of a number of small-scale mines and artisanal operations that produced agate, aggregates, bricks, dimension stone, and gold. Capacity, location, ownership, and production information were not readily available for these operations (table 2).

Commodity Review

Metals

Cobalt, Copper, Nickel, Platinum-Group Metals, and Silver.—BCL mined and smelted copper and nickel at its Phoenix and Selebi-Phikwe Mines. In 2015, mine production from Selebi-Phikwe decreased because of the difficulty of mining at greater depths. Smelted copper production decreased to 13,888 metric tons (t) in 2015 from 14,628 t in 2014, and smelted nickel production increased to 16,789 t from 14,958 t. Cobalt production increased to 316 t in 2015 from 196 t in 2014. The increase in smelted nickel production was attributable to the use of concentrates from the Nkomati Mine in South Africa as concentrate supplies from Selebi-Phikwe decreased (table 1; Mongwa, 2016).

TNMC operated the Phoenix Mine, which produced copper, nickel, palladium, and platinum. In 2014, the company's copper production decreased to 4,950 t from a revised 6,815 t in 2013 because of lower ore grades and unscheduled closures for maintenance. Nickel production decreased to 6,414 t in 2014 from a revised 8,071 t in 2013; palladium, to 1,120 kilograms (kg) from a revised 1,740 kg; and platinum, to 190 kg from a revised 280 kg. TNMC's production increased slightly in 2015 (MMC Norilsk Nickel, 2015; Business Weekly, 2016).

In 2014, Discovery Metals Ltd. of Australia produced 21,672 t of copper in concentrate at the Boseto Mine compared with about 18,274 t in 2013; silver output decreased to 22,328 kg from 22,590 kg. In early 2015, Discovery placed Boseto on care-and-maintenance status because high stripping ratios resulted in excessive production costs. The company produced

2,801 kg of silver in 2015 before shutting down. Cupric Canyon Capital LP (CCC) of the United States purchased Boseto from Discovery in mid-2015 (Discovery Metals Ltd., 2014, 2015; Modern Mining, 2016).

In 2015, CCC estimated that resources at Zone 5 of the Khoemacau copper-silver project (which was adjacent to the Boseto Mine) were more than 100 million metric tons (Mt) at a grade of 1.95% copper and 20 grams per metric ton silver. CCC planned to start a new mine at Zone 5 by mid-2018; initial planned production was 50,000 metric tons per year (t/yr) of copper and 43,500 kilograms per year (kg/yr) of silver in concentrate. The company could increase production to 89,000 t/yr of copper and 78,000 kg/yr of silver depending on market conditions (Modern Mining, 2016).

African Copper plc of the United Kingdom (Zambia Copper Investments Ltd. of Bermuda, 84%) operated the Thakudu open pit mine and the Mowana processing plant. The company produced 9,951 t of copper in concentrate in fiscal year 2014 (which ran from April 1, 2013, through March 31, 2014) compared with 9,496 t in fiscal year 2013; mining operations were placed on care-and-maintenance status by the end of 2015 (African Copper plc, 2014; Dlodla, 2016).

Gold.—In 2015, Galane Gold Ltd. of Canada produced 756 kg of gold at the Mupane Mine compared with 958 kg in 2014. The company was the only large-scale gold producer in Botswana. Production decreased in 2015 because of reduced ore grades and recovery rates (Galane Gold Ltd., 2016, p. 4, 6).

Industrial Minerals

Diamond.—The distribution arm of De Beers Group of Companies of Luxembourg operated a sorting center in Gaborone from where it shipped its products worldwide. The Government-owned Okavango Diamond Trading Co. was responsible for marketing the Government's portion of Debswana Diamond Co. (Pty) Ltd.'s production. Under the Government's agreement with De Beers, Okavango had the right to market between 10% and 15% of Debswana's production.

The value of Botswana's rough diamond production was estimated to be \$3.85 billion in 2015, the majority of which was exported before any cutting and polishing. Diamond was exported to countries including Belgium, India, and the United States. In 2015, total rough diamond exports were \$5.25 billion, of which \$2.61 billion were reported to be from domestic production (domestic exports may include some reexports from other countries). In 2014, total rough diamond exports were a revised \$7.3 billion, of which \$3.97 billion were reported to be from domestic production. Imports of rough diamond from countries including Canada, Namibia, and South Africa were \$2.32 billion in 2015 compared with a revised \$2.79 billion in 2014, the majority of which was exported before any cutting and polishing (Bank of Botswana, 2016, p. 82–S.83; International Diamond Exchange, 2016).

Debswana produced nearly 20.4 million carats at the Damtshaa, the Jwaneng, the Letlhakane, and the Orapa Mines in 2015 compared with 24.2 million carats in 2014. In 2015, production at Orapa decreased to 9.88 million carats from 12.1 million carats in 2014; at Jwaneng, to 9.76 million carats from 11.3 million carats; at Letlhakane, to 506,000 carats from

548,000 carats; and at Damtshaa, to 221,000 carats from about 303,000 carats. Debswana planned to produce about 20 million carats in 2016, of which 12 million carats would be mined at Jwaneng and 8 million carats would be mined at Letlhakane and Orapa. The Damtshaa Mine was planned to be placed on care-and-maintenance status in 2016 [Debswana Diamond Co. (Pty) Ltd., 2015; Anglo American plc, 2016, p. 183].

In November 2014, Debswana started reprocessing tailings at Jwaneng. The company planned to produce 900,000 carats per year during the next 20 years from tailings. Debswana also planned to extend the life of the open pit mining operations to allow for more than 100 million carats of additional diamond production through 2028 with the Jwaneng Cut-8 project (van Wyngaardt, 2015).

Lucara Diamond Corp. of Canada operated the Karowe Mine, which produced diamond from the AK6 kimberlite. In 2015, Lucara mined about 366,000 carats at Karowe compared with about 430,000 carats in 2014. The company planned to produce more than 350,000 carats at Karowe in 2016 (Lucara Diamond Corp., 2015, 2016).

Gem Diamonds Ltd. of the United Kingdom started production at the new underground Ghaghoo Mine in 2014; the company produced 91,000 carats in 2015. Production was likely to be reduced in 2016 because of decreased diamond prices on world markets. Resources at Ghaghoo were estimated to be more than 20 million carats of contained diamond (Gem Diamonds Ltd., 2016, p. 2, 27).

In September 2013, Kimberley Diamonds Ltd. of Australia purchased the Lerala Mine, which was on care-and-maintenance status, from Mantle Diamonds Ltd. of the United Kingdom. Kimberley planned to reopen Lerala in February 2016. During the estimated 7-year life of the mine, planned production was about 357,000 carats per year. Resources were estimated to be about 4.86 million carats of contained diamond, of which 3.01 million carats were reserves (Kimberley Diamonds Ltd., 2015, p. 3, 7; 2016).

In the fourth quarter of 2015, Pangolin Diamonds Corp. of Canada announced the discovery of additional diamonds and diamond indicator minerals from its soil sampling program at Malatswae. Botswana Diamonds plc of the United Kingdom and Alrosa Group of Russia completed a drilling program for diamond on License PL 210 near Orapa in 2015. Tsodilo Resources Ltd. of Canada planned to start a drilling program at the BK16 kimberlite, which is located about 37 kilometers from the Orapa Mine, in 2016 (Inside Mining, 2015; Tsodilo Resources Ltd., 2016, p. 7–8).

National net exports of polished diamond were \$355 million in 2015 compared with a revised \$700 million in 2014. As of early 2014, the domestic diamond cutting and polishing industry had 21 licensed plants. A number of companies closed and diamond cutting and polishing employment decreased by 41% by the end of 2015. Plant closures were attributable to the decrease in polished diamond prices on world markets and production costs that were between \$40 and \$60 per carat compared with about \$10 per carat in India and \$17 per carat in China (Weldon and Shor, 2014, p. 99–100, 109–110; Bank of Botswana, 2016, p. S.82–S.83; Business Weekly, 2016; International Monetary Fund, 2016, p. 14).

Potash, Salt, Soda Ash, and Sodium Sulfate.—Botswana Ash (Pty.) Ltd. (BotAsh) had a capacity of 650,000 t/yr of salt and 300,000 t/yr of soda ash at Sua Pan. The company's soda ash production decreased to 243,369 t in 2015 from 268,529 t in 2014, and salt, to 404,295 t from 515,311 t (Great Quest Fertilizer Ltd., 2014; Bank of Botswana, 2016, p. S.20–S.21).

In February 2014, Great Quest Fertilizer Ltd. of Canada announced that tailings from BotAsh's soda ash mining were prospective for potash. Great Quest announced plans to sign an agreement with BotAsh and start a preliminary economic assessment on recovering potash from tailings. In early 2015, Great Quest was considering the production of 1.45 million metric tons per year (Mt/yr) of salt, 252,000 t/yr of sodium sulfate, and 71,000 t/yr of potassium sulfate (Great Quest Fertilizer Ltd., 2014; 2015, p. 13).

Mineral Fuels and Related Materials

Coal.—In 2015, production at the Morupule Mine increased to nearly 2.07 Mt of coal from 1.71 Mt in 2014. Coal from the Morupule Mine was used at the Morupule B power station. Morupule B was not operating at its full capacity of 600 megawatts (MW) in 2015; the Government planned to complete refurbishment of the plant by the fourth quarter of 2016. The Government also planned to complete the first phase of the expansion of Morupule B's capacity by 2018 and to have Morupule A and B operating at sufficient capacity to avoid power shortages by 2019 (Batlotleng, 2015; Bank of Botswana, 2016, p. S.20–S.21; International Monetary Fund, 2016, p. 18).

African Energy Resources Ltd. of the United Kingdom and First Quantum Minerals of Canada were engaged in the development of a new mine and coal-fired power station at the Sese project, which had estimated resources of 2.5 billion metric tons (Gt). The initial planned capacity of the mine was 1.5 Mt/yr of thermal coal, and the power station, 300 MW. As of September 2015, the Environmental Impact Assessment and water allocation for the mine had been approved. The companies planned to start the power station no later than 2019 (Cornish, 2014; African Energy Resources Ltd., 2015).

In May 2014, African Energy completed a prefeasibility study with favorable results on a new mine at the Mmamabula West project. The company planned to complete a feasibility study by the end of 2016. Depending on the results of the study, the new mine at Mmamabula West could produce 3 Mt/yr of thermal coal during an estimated 20-year life. Resources were estimated to be 2.4 Gt of coal. In 2015, African Energy was modifying its Environmental Impact Assessment of Mmamabula West to include power stations with a total capacity of 600 MW (African Energy Resources Ltd., 2015; Dickinson, 2015).

In 2015, African Energy signed an agreement to sell its Mmamantswe coal project to a South African company. The sale was contingent upon the development of new coal-fired power stations with a total capacity of 2,500 MW that would use coal mined at Mmamantswe (Dickinson, 2015).

In 2014, Walkabout Resources Ltd. of Australia was engaged in a prefeasibility study on the Takatokwane project, which had indicated resources of 748 Mt and inferred resources of 7 Gt of coal. The company was considering the development of four new mines at Takatokwane that could produce a total

of 20 Mt/yr of thermal coal. Depending on the results of the prefeasibility and feasibility studies, production could start in 2020. As of September 2015, the project was on hold because of low coal prices and Walkabout's plans to focus on developing a graphite mine in Tanzania (Walkabout Resources Ltd., 2014; Piper, 2015).

A-Cap Resources Ltd. of Australia completed its feasibility study on a new mine at its Mea project in the fourth quarter of 2014. In the first quarter of 2015, A-Cap concluded that an open pit mine would be subeconomic. The company suspended drilling at Mea. A-Cap also was engaged in a scoping study at its Bolau project in 2015; coal resources were estimated to be 144 Mt (A-Cap Resources Ltd., 2015a, p. 12–14).

Uranium.—In August 2015, A-Cap applied for a mining license at its Letlhakane uranium project. The company planned to complete its feasibility study on a new mine at the Letlhakane uranium project by the end of 2016. Depending on the results of the study, A-Cap could start construction at Letlhakane in the first quarter of 2018 and mining in the first quarter of 2019. Initial production would be about 1,700 t/yr of uranium oxide (U₃O₈); the estimated life of the mine was 18 years. Resources were estimated to be 822 Mt at a grade of 0.02% U₃O₈ (A-Cap Resources Ltd., 2015b).

Outlook

Mined diamond production is expected to remain nearly unchanged through at least 2019. Increased output at the Jwaneng Mine and the reopening of the Lerala Mine would be offset by decreased output from the Letlhakane and the Orapa Mines and the closure of the Damtshaa Mine. The diamond cutting and polishing industry is likely to be constrained by high production costs. Coal production is expected to increase between 2018 and 2020 as the Sese project opens and the Morupule Mine reaches full capacity. Copper output is likely to decrease in 2016 because of the shutdown of the Boseto and the Thakudu Mines and to increase between 2018 and 2021 because of the commissioning of the Khoemacau project. Uranium mining was planned to start in 2019. Salt production also could increase and potash and sodium sulfate production could start in the near future at Sua Pan.

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TABLE 1
BOTSWANA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2011	2012	2013	2014	2015	
METALS						
Cobalt, smelter output, Co content of matte ³	149	195	248	196	316	
Copper:						
Mine output, Cu content of ore milled ⁴	31,929	35,768	51,254	38,000	9,126	
Smelter output, Cu content of matte ³	16,105	17,625	21,300	14,628	13,888	
Gold ⁵	kilograms	1,562	1,522	1,205	958	756
Nickel:						
Mine output, Ni content of ore milled ⁴	17,000 ^r	19,000 ^r	24,000 ^r	16,000 ^r	12,000	
Smelter output, matte, gross weight ³	53,000	52,000	52,000	36,000 ^e	37,000 ^e	
Smelter output, Ni content of matte ³	15,675 ^r	17,948 ^r	22,848 ^r	14,958 ^r	16,789	
Platinum-group metals:						
Palladium	kilograms	2,115	2,613	1,740	1,120	1,200 ^e
Platinum	do.	373	435	280	190	200 ^e
Silver	do.	--	8,670	22,597	22,328	2,801
INDUSTRIAL MINERALS						
Cement ^{e,6}		260,000	260,000	260,000	260,000	260,000
Clay, brick ^{e,6}		170,000	170,000	170,000	170,000	170,000
Diamond ⁷	thousand carats	22,903	20,550	23,190	24,677	20,824
Gemstones, semiprecious ^{e,8}	kilograms	80,000	85,000	90,000	90,000	90,000
Salt ⁹		446,525	389,481	521,306	515,311	404,295
Soda ash, natural		257,851	248,629	227,913	268,529	243,369
MINERAL FUELS AND RELATED MATERIALS						
Coal, bituminous		787,729	1,454,724	1,495,653	1,711,555	2,065,775

^eEstimated; estimated data are rounded to more than three significant digits. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through August 1, 2016.

²Silver was produced and exported in the nickel-copper-cobalt matte. Dimension stone and sand and gravel also were produced, but available information was inadequate to make reliable estimates of output.

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

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

⁵Reported as bullion; historically included silver estimated to be about 2%.

⁶Based on production capacity.

⁷Assumed to contain about 70% gem and near gem.

⁸Principally agate.

⁹Byproduct of natural soda ash production.

TABLE 2
BOTSWANA: STRUCTURE OF THE MINERAL INDUSTRY IN 2015

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Cement	Portland Pretoria Cement Botswana (Pty) Ltd.		Plant at Gaborone	400,000.
Do.	Matsiloje Portland Cement Co.		Plant at Matsiloje, 45 kilometers southeast of Francistown	36,000.
Clay ¹	Makoro Brick and Tile (Pty.) Ltd.		Makoro, 10 kilometers south of Palapye	100,000. ^c
Do.	Lobatse Clay Works (Pty.) Ltd. (Botswana Development Corp. and Interkiln Corp. joint venture)		Lobatse, 70 kilometers south-southwest of Gaborone	70,000. ^c
Coal	Morupule Colliery (Pty) Ltd. [Debswana Diamond Co. (Pty.) Ltd., 100%]		Morupule Mine, 14 kilometers west of Palapye	3,200,000.
Diamond	thousand carats	Debswana Diamond Co. (Pty.) Ltd. (Government, 50%, and De Beers Centenary AG, 50%)	Jwaneng Mine near Jwaneng	30,000.
Do.	do.	do.	Orapa Mine near Orapa	20,000.
Do.	do.	do.	Letlhakane Mine near Letlhakane	1,000.
Do.	do.	do.	Damtshaa Mine, 220 kilometers west of Francistown	670.
Do.	do.	Lucara Diamond Corp.	Karowe Mine in Boteti Sub-District	460. ^e
Do.	do.	Kimberley Diamonds Ltd.	Lerala Mine near Lerala ²	400.
Do.	do.	Gem Diamonds Ltd.	Ghaghoo Mine	210.
Gemstones, semiprecious	kilograms	Agate Botswana (Pty.) Ltd.	Processing plant at Pilane, 45 kilometers north of Gaborone	70,000. ^c
Do.	do.	Masa Semi-Precious Stones (Pty.) Ltd.	Bobonong, east of Selebi-Phikwe	20,000. ^c
Gold	do.	Galane Gold Ltd.	Mupane Mine, 30 kilometers southeast of Francistown	2,000.
Nickel-copper-cobalt	BCL Ltd. (Government, 100%)		Selebi-Phikwe Mines, 350 kilometers northeast of Gaborone	3,000,000 ore matte content (of which 30,000 nickel, 25,000 copper, 400 cobalt).
Do.	Tati Nickel Mining Co. (Pty.) Ltd. (BCL Ltd., 100%)		Phoenix and Selkirk ² Mines, 23 kilometers east of Francistown	5,000,000 ore matte content (of which 21,000 nickel, 12,500 copper, 800 cobalt, 4,400 kilograms palladium, 700 kilograms platinum).
Do.	Cupric Canyon Capital LP (CCC)		Boseto Mine ²	36,000 copper.
Do.	African Copper plc (Zambia Copper Investments Ltd., 84%)		Thakudu Mine ²	10,000 ^c copper.
Salt	Botswana Ash (Pty.) Ltd. (BotAsh) (Government, 50%, and Chlor Alkali Holdings, 50%)		Sua Pan, 450 kilometers north of Gaborone	650,000.
Silver	kilograms	Cupric Canyon Capital LP (CCC)	Boseto Mine ²	34,000.
Soda ash	Botswana Ash (Pty.) Ltd. (BotAsh)		Sua Pan	300,000.

^cEstimated. Do., do. Ditto.

¹For brick and tiles.

²Not operating at the end of 2015.