

## THE MINERAL INDUSTRY OF

# ZAMBIA

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A landlocked country, Zambia is bordered by seven southern African neighbors and has an area of 752,614 square kilometers, 10.3 million people, and for 2002 a per capita gross domestic product (GDP) (based on purchasing power parity) estimated at \$890.<sup>1</sup> During 2002, the economy had a GDP real growth rate of 3.0%, while inflation declined to 16% by yearend. Total merchandise exports in 2002 were \$916 million, of which copper and cobalt exports accounted for approximately \$566 million; metal export values were down from those of 2001 owing to lower prices for copper and cobalt. Metal sector imports accounted for about 15% of total merchandise imports of \$1,204 million (Bank of Zambia, 2003a§,<sup>2</sup> b§; U.S. Central Intelligence Agency, 2003§). Most recently available mineral production statistics are listed in table 1.

Following the successful privatization of the copper-cobalt mining assets of the state-owned Zambia Consolidated Copper Mines Ltd. (ZCCM) in 2001, the country suffered a major setback in January 2002 when Anglo American plc, which was the owner of Konkola Copper Mines (KCM), announced that they would write off \$350 million in Zambian assets. High operating cost and/or low copper and cobalt prices also affected several other producers and led to some suspension of operations or partial asset write offs in late 2001 and early 2002. The Government, with the assistance of the World Bank and others, was investigating options for preserving revenue flows and employment from this key sector of the economy. The years 2001 and 2002 saw a much needed flow of new capital into mine and plant rehabilitation; copper mine production increased by 25% in 2001 and another 6% in 2002. In its January 2002 announcement, Anglo American, which owned Zambia Copper Investments Limited (ZCI), announced that they would write off \$350 million in losses at KCM and cease operations within 12 months if the sale or transfer of KCM's assets on a going-concern basis could not be arranged. The writedown included \$249 million for KCM, \$58 million for the recently renovated Smelterco copper smelter, and an agreement to pay the Government a \$30 million exit fee and to loan KCM \$28 million to assist with its operating costs during the remainder of 2002. In addition, they stated that the estimated cost to develop the Konkola Deep Mine Project (KDMP) had escalated to more than \$1 billion from \$330 million, which made it difficult to obtain external financing on normal commercial terms. KCM was owned by ZCI (65%), the Government (through ZCCM) (20%), the World Bank's International Finance Corporation (7.5%) and the Commonwealth Development Corporation Group plc (7.5%) and employed 10,000 people. The existing mines at KCM have a relatively short remaining life, and the longer term prospects for KCM were dependent on development of the KDMP. In September 2002, a restructuring agreement was signed changing the ownership of KCM to Anglo American (58%) and ZCCM-Investment Holdings (ZCCM-IH) (42%). The Government and the other KCM partners spent the remainder of 2002 examining options for selling or transferring the assets of KCM to another party or for closure in a socially and environmentally responsible manner (Anglo American plc, 2002a§, b§).

In other major mineral industry activity during 2002, Mopani Copper Mines plc continued rehabilitation work on its Mufalira and Nkana Division operations; overall mine production was increased to 107,000 metric tons (t) from slightly more than 83,000 t in 2001. Minority partner First Quantum Minerals Ltd. reduced its interest in Mopani to 16.9% from 44%, and Glencore International AG increased its equity share to 73.16%. First Quantum also owned (100%) and operated the Bwana Mkubwa Mine near Ndola and held the rights to develop the Kansanshi copper deposit near Solwezi. During 2002, First Quantum completed the expansion of the Bwana Mkuba solvent extraction-electrowinning (SX-EW) plant to 30,000 metric tons per year (t/yr) from 10,000 t/yr of refined copper; this will prepare the plant to handle ore being shipped 36 kilometers across the border from its Lonshi Mine in the Democratic Republic of the Congo [Congo (Kinshasa)]. First Quantum completed a favorable definitive feasibility study on its Kansanshi copper project by yearend 2002. The study proposed a first-phase \$163 million mine and SX-EW plant development that would produce up to 70,000 t/yr of copper concentrates, 60,000 t/yr of copper cathode, and 780 kilograms per year of byproduct gold during a 16-year period. Phase I will be based on proven and probable mining reserves of 142 million metric tons at a grade of 1.43% copper and 0.22 gram per metric ton gold (First Quantum Minerals Ltd., 2003§).

Chibuluma Mines Plc, which was owned by Metorex Ltd. of South Africa, operated the Chibuluma West underground mine near Kalulushi at the rate of 7,600 t/yr of copper. Resource depletion at the mine was expected by mid-2004. The Chibuluma South open pit mine was placed on a care-and-maintenance basis in 2001 pending more favorable commodity prices. NFC Africa Mining Plc. of China was expected to begin production at its new \$200 million Chambishi Mine Project by early 2003. The Chambishi mill will produce 120,000 t/yr of copper concentrates that average 40% copper. Anglovaal Mining Ltd. (Avmin) of South Africa, which owned 90% of Chambishi Metals plc., continued to struggle with operating problems and low cobalt and copper prices and wrote off \$176 million in Chambishi assets in January 2002 and decided to put the Chambishi operations up for sale during 2002. In April 2003, Avmin signed a memorandum of understanding with J&W Holding AG of Switzerland to sell its 90% stake in Chambishi Metals (Anglovaal Mining Ltd., 2002§; 2003§). J&W had also bid on the liquidated assets of Roan Antelope Mining Corp., which included the Baluba and Luanshya Mines and the Muliashi copper-cobalt deposit.

<sup>1</sup>Where necessary, values have been converted from Zambian kwacha (K) to U.S. dollars at the rate of K4,307=US\$1.00 for 2002 and K3,573=US\$1.00 for 2001.

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

By yearend 2002, Equinox Resources Ltd. of Australia had progressed enough on its \$14 million bankable feasibility study on the Lumwana Copper Project to earn a 51% interest in the project from its joint-venture partner Phelps Dodge Corp. The feasibility study was expected to be completed by late 2003. Lumwana is located 230 kilometers west of the Copperbelt in northwest Zambia. Additional coverage of the mineral industry of Zambia can be found in the 2000 and 2001 Minerals Yearbook, volume III, Mineral Industries of Africa and the Middle East.

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## Major Sources of Information

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TABLE 1  
ZAMBIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1998	1999	2000	2001	2002
<b>METALS</b>					
<b>Cobalt:</b> <sup>2</sup>					
Mine output, Co content	11,900	5,640	4,600	8,000 <sup>e</sup>	10,000 <sup>e</sup>
Metal, Co content	4,837	4,236	3,342	4,657	6,144
<b>Copper:</b> <sup>2,3</sup>					
Mine output, Cu content:					
By concentration or cementation	258,000	213,000	184,100	233,000	251,100
Leaching, electrowon	57,000	67,000	65,000	79,000	78,900
Total	315,000	280,000	249,100	312,000 <sup>3</sup>	330,000
<b>Metal:</b>					
Smelter, primary:					
Electrowon, low grade	51,736	25,000	25,000	25,100	NA
Other	206,871	217,600	180,000	215,000	NA
Total	258,607	242,600	205,000	240,100	253,500
Refinery, primary:					
Electrowon	57,000	67,000	65,000	79,000	83,700
Other	245,820	201,400	162,400	217,000	253,100
Total	302,820	268,400	227,400	296,000	336,800
Gold <sup>2</sup> kilograms	765	700	600 <sup>e</sup>	-- <sup>r</sup>	--
Selenium, refined, gross weight <sup>2</sup> do.	14,670	11,620	9,370 <sup>e</sup>	-- <sup>r</sup>	--
Silver <sup>2</sup> do.	8,363	5,840 <sup>e</sup>	4,710 <sup>e</sup>	-- <sup>r</sup>	--
<b>INDUSTRIAL MINERALS</b>					
Cement:	351,000	300,000	380,000	215,470 <sup>r</sup>	230,379
Clays: <sup>e</sup>					
Brick	3,000	3,000	3,000	3,000	3,000
Building, not further specified	30,000	30,000	30,000	30,000	30,000
China and ball	200	200	200	200	200
Gemstones: <sup>e</sup>					
Amethyst kilograms	800,000	800,000	800,000	1,145,029 <sup>r</sup>	1,064,606 <sup>4</sup>
Beryl do.	2,000	4,000	4,000	1,567 <sup>r</sup>	8,551 <sup>4</sup>
Emerald do.	7,000	7,000	7,000	764 <sup>r</sup>	1,860 <sup>4</sup>
Garnet do.	3,000	3,000	3,000	NA <sup>r</sup>	NA <sup>4</sup>
Tourmaline do.	--	2,000	2,000	25,619 <sup>r</sup>	25,755 <sup>4</sup>
Gypsum <sup>e</sup>	11,000	11,000	11,000	--	--
Lime, calcined thousand tons	156 <sup>r</sup>	125 <sup>r</sup>	142 <sup>r</sup>	117 <sup>r</sup>	151 <sup>4</sup>
Limestone, for cement and lime do.	273 <sup>r</sup>	188 <sup>r</sup>	177 <sup>r</sup>	61 <sup>r</sup>	330 <sup>4</sup>
Limestone, crushed aggregate <sup>e</sup> do.	700	700	700	700	700
Sand and gravel, construction <sup>e</sup> do.	200	200	200	200	200
<b>Sulfur:</b>					
Gross weight:					
Pyrite concentrate	72,366	65,000	50,000	199,400 <sup>r</sup>	225,870
Sulfuric acid <sup>5</sup>	134,000	119,000	110,000	63,000	10,000 <sup>e</sup>
Sulfur content:					
Pyrite concentrate (42% S)	30,394 <sup>5</sup>	27,300	21,000	83,752 <sup>r</sup>	94,900 <sup>5</sup>
Sulfuric acid (32.6% S)	43,684	38,800	35,800	20,500	32,600 <sup>e</sup>
Total, S content	74,078	66,100	56,800	102,252	127,500 <sup>e</sup>
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal, bituminous	185,717	127,854	168,000	210,884 <sup>r</sup>	64,212 <sup>5</sup>
Petroleum, refinery products <sup>e,2</sup> thousand 42-gallon barrels	5,000	1,700	--	--	--

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. NA Not available. -- Zero.

<sup>1</sup>Table includes data available through November 1, 2003.

<sup>2</sup>Data for 1998-99 are for year beginning April 1 of year stated. Calendar year data shown for 2000-02.

<sup>3</sup>Terms are used as defined by the International Copper Study Group.

<sup>4</sup>Reported figure.

<sup>5</sup>From the Nkana and Chambishi acid recovery plants.

Sources: U.S. Geological Survey Minerals Questionnaire completed by Zambia Mines Development Department and company reports. Data estimated by the U.S. Geological Survey.