



2009 Minerals Yearbook

ZAMBIA

THE MINERAL INDUSTRY OF ZAMBIA

By Philip M. Mobbs

Copper mining and refining were the predominant components of Zambia's mineral industry. Zambia also was a significant producer of cobalt and semiprecious gemstones, such as amethyst, beryl, and emerald. In 2009, Zambia's mines accounted for an estimated 4% of the world's total output of cobalt and copper (Edelstein, 2010; Shedd, 2010).

Minerals in the National Economy

In 2009, mining and quarrying accounted for about 8.9% of the real gross domestic product (at constant 1994 prices) compared with 8.2% in 2008. According to preliminary data, exports of cobalt and copper were valued at \$3.3 billion in 2009 and accounted for 74% of Zambia's merchandise exports (Bank of Zambia, 2010, p. 23, 36).

Government Policies and Programs

The mining sector is regulated primarily by Act No. 7 of 2008 (the Mines and Mineral Development Act of 2008). Uranium exploration and mining are regulated by the Mines and Minerals Development (Prospecting, Mining and Milling of Uranium Ores and Other Radioactive Mineral Ores) Regulations of 2008.

The Income Tax Act (Chapter 323 of the Laws of Zambia) and recent changes, such as the Income Tax (Amendment) Act of 2008 and Income Tax (Amendment) Act no. 27 of 2009, and the Mines and Minerals Development Act of 2008, address capital allowances, mineral royalties, mining development agreements, the variable profits tax, and the windfall tax. Investment in most types of mineral operations are covered by the Zambia Development Agency Act of 2006, although minerals produced for the construction industry, such as clay, sand, and most types of stone, are excluded. The Environmental Protection and Pollution Control Act of 1990 and its 1999 amendment address environmental issues, including those associated with the mining industry. Petroleum exploration and production are regulated by Act No. 10 of 2008 [the Petroleum (Exploration and Production) Act of 2008].

The Government, which was adversely affected by the loss of revenue from royalties and taxes when production was suspended by Luanshya Copper Mines Ltd. (LCM) in December 2008, proposed to increase its interest to 35% (from the current 10% to 15%) in the large copper mining enterprises that were owned primarily by international companies. The Government felt that by having a larger stake in the companies, it would be able to influence company decisions, such as the protection of jobs during temporary suspensions of operations. In March, the Parliament agreed to abolish the 25% windfall tax on the value of produced base metals because of the decrease in international copper prices associated with the global economic crisis. As metals prices increased in 2009, the Government was buffeted by calls by international monetary organizations for the Government to increase taxes on mineral

operations and by mining organizations for it to decrease or let stand existing taxes (Mfula, 2009b; Shacinda, 2009c, d).

Production

Notable increases in production were estimated for cement, copper anode, gemstones, gold, limestone, and silver. Production of cobalt, nickel, and sulfur, however, were estimated to have decreased significantly in 2009. Data on Zambian mineral production are in table 1.

Structure of the Mineral Industry

Many of the country's large mining operations are located in Copperbelt Province in north-central Zambia. The Government retains minority interest in most of the large copper projects through its holding company Zambia Consolidated Copper Mines Investments Holdings Plc (ZCCM-IH). The mining sector is administered by the Geological Survey Department, the Mines Development Department, and the Mines Safety Department of the Ministry of Mines and Minerals Development. The Ministry of Commerce, Trade and Industry oversees the industrial manufacturing sector.

In November, Total S.A. of France sold its 50% interest in the Indeni petroleum refinery to the Government. Copperbelt Energy Corporation Plc, which purchased most of its power from state-owned ZESCO Ltd., distributed electrical power to many of the larger mining operations. Data on the capacity and ownership of selected mineral operations are in table 2.

Commodity Review

Metals

Cobalt.—In late 2008, Chambishi Metals Plc (in which Enya Holdings BV of the Netherlands held 90% interest) suspended operations at the Chambishi cobalt smelter because of the decrease in global metal prices. By February 2009, the company was in discussions with producers in the Democratic Republic of the Congo [Congo (Kinshasa)] and Zambia about securing contracts for a sufficient cobalt-copper concentrate supply that would enable the company to reopen the smelter. Chambishi Metals restarted production in November, leaching cobalt concentrates from Congo (Kinshasa). Chambishi Metals did not resume processing low-grade material from the Nkana slag dump owing to the higher costs associated with cobalt recovery using the smelter's electric arc furnace (Shacinda, 2008; Mfula, 2009a; Thomson Reuters, 2009a).

The installation of Outotec Oyj of Finland's direct blister flash smelting technology enabled Konkola Copper Mines Plc to increase the new Nchanga smelter's capacity to about 3,000 metric tons per year (t/yr) of a cobalt-copper alloy. The Nchanga smelter also produced copper anode (Vedanta Resources plc, 2010b, p. 11).

Copper.—In 2009, Konkola Copper Mines plc (KCM) produced 155,000 metric tons (t) of copper cathode at the Nkana copper refinery compared with 132,000 t in 2008 when a national electrical power failure and lower copper prices contributed to the decline in copper cathode production. Of the total cathode output, 77% was derived from Konkola's ores. The new Nchanga smelter, which was located adjacent to the Nchanga Mines and about 20 kilometers (km) south of the Konkola Deep Mine, allowed increased recovery of cobalt, copper, and sulfur from the ore (Vedanta Resources plc, 2009, 2010c, d).

In 2009, KCM's Tailings Dam Three copper reclamation project at Chingola started up. The tailings retreatment project was expected to recover about 24,000 t/yr of copper. Also in 2009, mining operations were outsourced at KCM's Nchanga open pit to Moolmans, which was a division of Aveng Ltd. of South Africa. Moolmans also was awarded a contract to restart mining operations at the Fitwaola Mine, which was suspended owing to the global economic crisis, and U&M Mineração e Construção S/A of Brazil received a contract for mining the Chingola open pit A. Vedanta subsequently postponed the resumption of operations at the Chingola open pit A and the Fitwaola Mine until 2011. Also in 2009, the old Nkana smelter was decommissioned and operations at the Nampundwe pyrite mine (which was used to produce sulfuric acid for the smelter) were suspended temporarily (Africa Mining Intelligence, 2009a; Times of Zambia, 2009a; Vedanta Resources plc, 2009; 2010a, p. 14).

In 2009, First Quantum Minerals Ltd. of Canada mined 18.5 million metric tons (Mt) of ore and 20.8 Mt of waste from the Main and the Northwest pits at the Kansanshi Mine compared with 19.1 Mt of ore and 28.7 Mt of waste in 2008. The Kansanshi solvent extraction-electrowinning (SX-EW) plant produced 101,183 t of copper cathode in 2009. In November, First Quantum announced that it planned to acquire Kiwara PLC of the United Kingdom, which held 85% interest in Kalumbila Minerals Ltd., which was exploring for base metals in Zambia (First Quantum Minerals Ltd., 2010, p. 14).

The Bwana Mkubwa SX-EW plant, which had processed copper ore from First Quantum's Lonshi Mine in Congo (Kinshasa) until the border was closed to shipments of copper ore in 2007, remained on care-and-maintenance status in 2009. The border was reopened in November 2009, and First Quantum expected to resume processing of stockpiled ore from Lonshi in 2010. First Quantum also proposed to develop the Fishtie copper project on the Kashime license, which was located north of Mkushi about 200 km southeast of Ndola by road; the project was projected to be able to process 101,000 metric tons per month (t/mo) of ore. First Quantum proposed to rehabilitate the Old Congo Way gravel road from Mkushi to Ndola, which would allow a shorter ore haulage route in the dry season (First Quantum Mining and Operations Ltd., 2009, p. 13, fig. 4.2; First Quantum Minerals Ltd., 2010, p. 7, 19).

Because of the decline in copper prices in 2008, which resulted in the company operating at a loss, LCM (in which Enya Holdings held 90% interest at the time) placed the Baluba copper mine on care-and-maintenance status and suspended the development of the Mulyashi Mine. By mid-March 2009,

the Government announced its intent to have the Baluba Mine reopened by April and suggested that LCM surrender the mining licenses to the Government to allow mining to restart, which would prevent prolonged disruption of the economy of the region around the mine. Because LCM was struggling with the repayment of debts of about \$100 million, several international companies expressed interest in acquiring the Baluba and the Mulyashi assets. To concentrate on other projects in Africa, Beny Steinmetz Group Resources sold its interest in Enya Holdings to partner International Mineral Resources AG at the end of March. After LCM had renegotiated its debts, China Nonferrous Metal Mining Corp. acquired 85% equity interest in LCM from Enya Holdings for about \$50 million. CNMC Luanshya Copper Mines Ltd. resumed production at the Baluba Mine in mid-December. CNMC Luanshya expected to start construction of the Mulyashi open pit mine in 2010 (Africa Mining Intelligence, 2009b; Sinkamba, 2009a, b).

In June, the joint venture of China Nonferrous (60% equity interest) and Yunnan Copper Industry (Group) Co. Ltd. (40%) commissioned a copper smelter at Chambishi that would process about 350,000 t/yr of copper concentrate to produce about 150,000 t/yr of copper anode. By October, the joint venture proposed to increase the smelter's output capacity to 300,000 t/yr of copper anode (Shacinda, 2009a; Thomson Reuters, 2009b; ISAMELT.com, undated).

Lumwana Mining Company Ltd., which was a subsidiary of Equinox Minerals Ltd. of Canada, continued to ramp the project up to full capacity of 20 million metric tons per year (Mt/yr) of ore from which concentrate containing 172,000 t/yr of copper would be produced. In 2008 (the initial year of production), 1.1 Mt of ore was processed to produce 7,205 t of copper in concentrate. In 2009, 13.69 Mt of ore was processed to produce 253,917 t of copper concentrate that contained 109,413 t of copper (Equinox Minerals Ltd., 2010a, p. 5; 2010b, p. 3).

Lumwana Mining's 5-year concentrate offtake agreement with Mopani Copper Mines plc was terminated in April after Mopani refused delivery of copper concentrates from Lumwana owing to alleged high levels of uranium. Copper concentrate was sold instead to China Nonferrous and Yunnan Copper's Chambishi smelter under a 5-year "take or pay" contract for about 230,000 t/yr of copper concentrate, and to domestic and international metal traders. In May, Lumwana Mining signed a 5-year offtake agreement to ship 70,000 to 80,000 t/yr of copper concentrate to KCM's Nchanga smelter (Metal Bulletin, 2009; Equinox Minerals Ltd., 2010a, p. 7).

In early March, Glencore International AG of Switzerland (which was a partner with First Quantum in Carlisa Investments Corp., which owned Mopani with ZCCM-IH) informed the Government that Mopani intended to suspend production from the Mufulira and the Nkana copper mines temporarily owing to monetary losses that had resulted from the decrease in international copper prices. Glencore was asked to return the licenses for the Mufulira and the Nkana Mines to the Government so that the Government could take over mining operations, as the closure of the Mufulira Mine alone was expected to result in the unemployment of 1,400 workers. At the end of April, after an operations review, Mopani announced that the mines would stay open. Mopani subsequently proposed to develop an additional

open pit (Area D) at the Nkana Mine (Shacinda, 2009b; Times of Zambia, 2009d).

In 2009, Triple Plate Junction Plc of the United Kingdom sold its Triple Plate Junction (Africa) Ltd. subsidiary (and its liabilities) to a former director for about \$1.60.¹ In 2007, while the company's Ndola smelter was under construction, the planned supply of copper ore from Congo (Kinshasa) was lost when the border was closed to copper ore shipments. Legal proceedings also restrained the development of an ore supply from the company's mining license in Zambia. An occupation of the mining license area, severe weather conditions, the global economic crisis, and the company's subsequent cash flow problems also contributed to the project's demise (Triple Plate Junction Plc, 2007, p. 2; 2009, p. 3-4).

In September, the Government started an investigation of illegal copper smelters because of thefts of copper concentrates in transit from mines to smelters or metal traders. In addition to the larger smelters, about 45 small-scale copper smelters reportedly were operating in Chililabombwe, Chingola, Kitwe, and Ndola. Many of the smaller operations were illegal and unlicensed (Africa Mining Intelligence, 2009c).

Manganese.—Manganese ore primarily was produced by small-scale operations in Luapula Province in northern Zambia. Tycoon Mining Investments of China was exploring for manganese. Red Rock Resources plc of the United Kingdom continued legal efforts to resume exploration on a manganese license in the Chiwefwe area that was occupied by others (Red Rock Resources plc, 2010).

In 2009, Genesis Group of Companies of South Africa and Zambia proposed to build a ferromanganese smelter to process local ore. Genesis Group negotiated with Copperbelt Energy Co. to secure a guarantee of an adequate [18-megawatt (MW)] supply of electricity. In 2005, the lack of electrical power had stymied Monnet Ispat & Energy Ltd. of India's proposal to build a ferromanganese smelter in Luapula (Steelworld, 2007; Lusaka Times, 2009a).

Nickel.—Albidon Ltd. of Australia placed the Munali nickel mine on care-and-maintenance status in March owing to the collapse of the price of nickel in 2008 and ongoing equipment problems. Albidon placed itself into voluntary administration in April. In August, the Jinchuan Group Ltd. of China, which had agreed to acquire 100% of the nickel concentrate produced at the Munali Mine, increased its interest in Albidon to 50.4% from 18%. By late December, underground mining had resumed at Munali and the mill was expected to resume operations in 2010 (Albidon Ltd., 2009; 2010, p. 1-3).

Industrial Minerals

Cement.—Zambian cement production was estimated to have increased by about 57% in 2009, as Lafarge Cement Zambia plc ramped up production from the new Chilanga II dry-process plant, which was located about 15 km south of Lusaka, and with the startup of the Ndola plant of Zambezi Portland Cement Ltd. in October. Lafarge's Chilanga I wet-process cement plant ran at full capacity until March when Lafarge completed the

830,000-t/yr-capacity Chilanga II cement mill and the packing plant. After March, the Chilanga I plant was used to produce specialty cement. A malfunctioning electrostatic precipitator (ESP) on Line 1 of Lafarge's Ndola plant resulted in limited output from the plant until the ESP was repaired in December (Lafarge S.A., 2008; Lafarge Cement Zambia Plc, 2010, p. 6-8).

Legal disputes restrained activity at Zambezi Portland Cement for much of 2009. The company had been building its Ndola plant while in receivership since 2008. Initial cement production was begun in late October, and the plant was expected to be ramped up to full capacity of 1,000 metric tons per day in 2010. Ownership of the company, however, remained a subject of litigation (Laurence Paul Investment Services Ltd., 2009; Lusaka Times, 2010).

Gemstones.—Many of Zambia's small-scale gemstone mining operations were inactive in 2009 owing to the global economic crisis. Gemfields Mining Ltd. and Kagem Mining Ltd., which were Zambian subsidiaries of Gemfields Plc of the United Kingdom (formerly Gemfields Resources Plc), increased production of beryl and emerald to 21.1 million carats in 2009 from 20.9 million carats in 2008. Production in the second half of 2009, however, was 41% less than the first half of the year because of a decrease in ore grade and, owing to the global economic crisis and resultant decrease in the price of gemstones, a decrease in ore mined. In 2009, Gemfields also scaled back operating costs and began a trial underground mining project, which would significantly reduce the volume of rock waste handled at the Kagem Mine (Gemfields Plc, 2009, p. 2; 2010, p. 4; Times of Zambia, 2009b).

Grizzly Mining Ltd. of Zambia, which produced beryl and emerald from its operation located about 50 km southwest of Kalulushi, acquired the adjacent Chimpundu Mine in 2009. Grizzly had increased the capacity of its washing plant to 120 metric tons per hour (t/hr) from 35 t/hr (Morgan-Jarvis, 2010, p. 48).

Mineral Fuels and Related Materials

Coal.—In 2009, much of Zambia's coal again was produced by Collum Coal Mining Industries Ltd., as financial problems continued to plague Maamba Collieries Ltd. Production had been suspended at Maamba in August 2007 after the contract miners (Bell Equipment Ltd. and G and G Services) removed their equipment. There was no coal production at Maamba in 2008. Early in 2009, the consortium of Nava Bharat Proprietary Ltd. of Singapore (which was a subsidiary of Nava Bharat Ventures Ltd. of India) and local Zambian investors indicated its determination to be the preferred bidder for the right to acquire 65% equity interest in Maamba Collieries Ltd. from the Government holding company ZCCM-IH (Zambian Parliament, The, 2009, §97b, §102).

Maamba Collieries resumed production from the open pit mine in April. Silock Enterprises Ltd. of Zambia removed overburden from the coal bed, and Oriental Quarries, which was a division of Scirocco Enterprises Ltd. of Zambia, provided mining equipment, such as bulldozers, excavators, loaders, and trucks. Unfortunately, the months-long suspension of production operations and the effect of the

¹Where necessary, values have been converted from British pounds (£) to U.S. dollars (US\$) at the rate of £0.63=US\$1.00.

international economic recession of 2008 on the mineral industry of Zambia resulted in the loss of sales contracts for coal, which in turn resulted in additional financial difficulties for Maamba Collieries. ZCCM-IH announced at the end of July that it would not be able to cover what Maamba Collieries owed for the coal processing plant worker's salaries for June and July. Oriental Quarries also was not paid for the coal mined and delivered to the plant. In October, Oriental Quarries removed its equipment (Lusaka Times, 2009b; QFM Radio Ltd., 2009).

Negotiations between the Nava Bharat consortium and the Government continued until December, when a sales and purchase agreement for Maamba Collieries was signed. The consortium agreed to make an initial payment of about \$26 million for a 65% equity interest in Maamba Collieries and agreed to build a 300-MW electricity-generating powerplant at the mouth of the mine. At yearend, negotiations continued on the resolution of Maamba's debts, which were estimated to be more than \$50 million, and the determination of the value of Maamba's taxable assets (Nava Bharat Ventures Ltd., 2009; Times of Zambia, 2009c).

Oil.—In 2009, the Government solicited bids for 23 blocks in Zambia's initial petroleum licensing round. Crude oil exploration licenses were awarded to three domestic and four international companies for 11 blocks. Interest in the potential for crude oil occurrences in Zambia had been raised after traces of oil were discovered in soil samples in 2007.

In November, the Government acquired 100% interest in Indeni Petroleum Refinery Ltd., which was the country's sole crude oil refiner. Total, which was the former co-owner, had indicated its intent to dispose of its 50% interest in the refining company in 2007 and had advised the Government that it had found a buyer in 2008. The Government, however, had preemptive rights over the sale of Total's shares, and began negotiations to acquire Total's interest. The negotiations continued into 2009, when the Government acquired Total's 50% holdings for about \$5.5 million. By yearend, the Government proposed to retain 50% interest in the refinery and to spin off 50% interest to private investors (Zinyama and Bupe, 2009).

Uranium.—African Energy Resources Zambia Ltd., which was a subsidiary of African Energy Resources Ltd. of Australia, was involved in a number of uranium exploration projects. On the Chirundu license, Africa Energy's joint venture with Albidon continued a bankable feasibility study of the development of the Gwabe and the Njame prospects and drilled the Gwabe South, the Njame South, and the Siamboka prospects in 2009. The Kariba Valley joint venture of Africa Energy and Albidon was exploring the Namakande prospect. Africa Energy also explored the Sitwe prospect on the Northern Luangwa Valley license and signed an agreement with Aldershot Resources Ltd. of Canada to explore the Lake Kariba PL LS.310 and the Sinazongwe LPL/32/07 licenses.

Denison Mines Zambia Ltd., which was a subsidiary of Denison Mines Corp. of Canada, completed a resource estimate and prepared an environmental impact statement for the development of the Dibwe and the Mutanga prospects on the Mutanga license.

In January, Lumwana Mining Company Ltd., which was a subsidiary of Equinox Minerals, deferred the construction of a uranium treatment plant at the Lumwana copper mine owing to the lack of available financing and the decrease in uranium prices. Lumwana Mining stockpiled uranium-bearing ore that also was produced at the copper mine. At yearend, the stockpile held about 2.5 Mt of ore with an average grade of 0.1% uranium (Thom, 2009; Equinox Minerals Ltd., 2010b, p. 3).

In October 2008, Zambezi Resources Ltd. of Australia divested its interest in Lithic Metals and Energy Ltd. of Bermuda. Zambezi Resources, which had been battered financially by the global economic crisis in 2008 and 2009, spent the year refinancing and reorganizing. Rio Tinto Mining and Exploration Ltd. withdrew from the joint venture with Zambezi Resources on the Mulofwe prospect (Zambezi Resources Ltd., 2009, 2010).

In early 2009, Lithic completed a sampling program on the Mpande uranium license, and Chalimbana Resources, which was Lithic's joint venture with Zambezi Resources, acquired additional uranium prospecting licenses. In December, Lithic Metals changed its name to AfNat Resources Ltd.

Outlook

In 2009, the Zambian mineral industry began to recover from the disruptions that were caused by the dramatic decline in international mineral prices (especially copper and nickel) that was associated with the global economic crisis in late 2008. In the coming years, the global economic crisis of 2008 and associated mineral price declines are not expected to dampen investor interest significantly in the exploration for and development of economic deposits of metal, industrial minerals and mineral-related commodities, and mineral fuels and related materials. Despite the fallout from the 2005 explosion and associated fatalities at NFC Africa's BGRIMM Explosives (Zambia) Ltd. plant in Kitwe and other opposition, Chinese investment in the Zambian mineral industry is expected to increase and to diversify from the recent practice of acquiring existing mining operations to grassroots exploration activity (International Mining, 2010, p. 32; Mfula, 2010).

Zambia has many deposits and occurrences of metals; historically, the country's mining industry has been dominated by the copper sector. Landlocked Zambia faces several internal and external obstacles to successful diversification of its mineral resources; these include the availability of electrical energy and fuel supplies, cyclical world commodity prices, high transportation costs, limited national infrastructure, and the threat that high HIV/AIDS rates in the region pose to maintaining a skilled labor force. The Government is expected to continue to encourage the expansion of electricity-generating capacity and mineral exploration activity. The Government planned to promote the development of industrial parks to support the manufacture of industrial supplies for the mining industry, the manufacturing of industrial mineral- and metal-based products, and the value-added processing of dimension stone, ferroalloys, gemstones, and other industrial minerals (Mwale, 2009, p. 8-9, 22-23).

References Cited

- Africa Mining Intelligence, 2009a, KCM prioritises Nchanga copper mine: Africa Mining Intelligence, no. 203, May 20, p. 3.
- Africa Mining Intelligence, 2009b, Luo Tao: Africa Mining Intelligence, no. 201, April 15, p. 4.
- Africa Mining Intelligence, 2009c, Lusaka—Inquiry into illegal smelters: Africa Mining Intelligence, no. 210, September 16, p. 2.
- Albidon Ltd., 2009, Business update: West Perth, Australia, Albidon Ltd., 4 p.
- Albidon Ltd., 2010, Quarterly activities report for the period ended 31 December 2009: West Perth, Australia, Albidon Ltd., 11 p.
- Bank of Zambia, 2010, Annual report 2009: Lusaka, Zambia, Bank of Zambia, 155 p.
- Edelstein, D.L., 2010, Copper: U.S. Geological Survey Mineral Commodity Summaries 2010, p. 48-49.
- Equinox Minerals Ltd., 2010a, Annual information form for the year ended December 31, 2009: Toronto, Ontario, Canada, Equinox Minerals Ltd., March 15, 67 p.
- Equinox Minerals Ltd., 2010b, Equinox releases results for year ended December 31, 2009—Records first annual operating profit of \$195.7 million: Toronto, Ontario, Canada, Equinox Minerals Ltd., March 10, 12 p.
- First Quantum Minerals Ltd., 2010, Annual information form: Vancouver, British Columbia, Canada, First Quantum Minerals Ltd., March 31, 85 p.
- First Quantum Mining and Operations Ltd., 2009, Environmental impact statement—Fishtie Mine at Kashime copper project: Ndola, Zambia, Environmental Council of Zambia, February, 257 p.
- Gemfields Plc., 2009, Report and financial statements—Year ended 30 June 2009: London, United Kingdom, Gemfields Plc, 74 p.
- Gemfields Plc., 2010, Interim report—Six months ended 31 December 2009: London, United Kingdom, Gemfields Plc, 14 p.
- International Mining, 2010, The dragon is miners' friend: International Mining, v. 67, no. 2, February, p. 32-42.
- ISAMELT.com, [undated], Installations: Xstrata Technology, 2 p. (Accessed September 29, 2010, at http://www.isasmelt.com/index.cfm?action=dsp_content&contentID=28.)
- Lafarge Cement Zambia Plc., 2010, 2009 annual report: Lusaka Zambia, Lafarge Cement Zambia Plc, 77 p.
- Lafarge S.A., 2008, Lafarge inaugurates a new cement plant in Zambia: Paris, France, Lafarge S.A. press release, December 1, 1 p.
- Laurence Paul Investment Services Ltd., 2009, Zambezi Portland Cement begins operations: Lusaka, Zambia, Laurence Paul Investment Services Ltd., November 13, 1 p.
- Lusaka Times, 2009a, Power outages affect Genesis Group of Companies expansion in Luapula: Lusaka Times [Lusaka, Zambia], September 25. (Accessed May 24, 2010, at <http://www.lusakatimes.com/?p=18196>.)
- Lusaka Times, 2009b, ZCCM-IH suspends salaries for Maamba workers: Lusaka Times [Lusaka, Zambia], July 28. (Accessed January 2, 2010, at <http://www.lusakatimes.com/?p=15854>.)
- Lusaka Times, 2010, Zambezi Portland directors win back status: Lusaka Times [Lusaka, Zambia], April 22. (Accessed September 23, 2010, at <http://www.lusakatimes.com/?p=25601>.)
- Metal Bulletin, 2009, Equinox delivers concs to Chambishi—Traders rather than MCM: Metal Bulletin, March 16, p. 7.
- Mfula, Chris, 2009a, Weak cobalt prices delays Chambishi furnace restart: Mineweb Holdings Ltd., November 26. (Accessed November 27, 2009, at <http://www.mineweb.com/mineweb/view/mineweb/en/page72102?oid=93622&sn=Detail>.)
- Mfula, Chris, 2009b, Zambia faces uncertain mining outlook: Thomson Reuters, December 8. (Accessed December 10, 2009, at <http://communities.thomsonreuters.com/BaseMetals/1pages/print/posts/?bid=e6f29304-ca42-43e0-b02e-fcf3e7e8cb35&mode=Full>.)
- Mfula, Chris, 2010, Sata accuses China and Malaysia investors of slavery: Lusaka Times [Lusaka, Zambia], January 21. (Accessed September 30, 2010, at <http://www.lusakatimes.com/?p=23264>.)
- Morgan-Jarvis, Louella, ed., 2010, Zambia review 2010 (11th edition): Lusaka, Zambia, Directory Publishers of Zambia Ltd., 108 p.
- Mwale, M.M.B, 2009, Investment opportunities in the mineral sector in Zambia: Ministry of Mine and Mineral Development presentation, 33 p. (Accessed February 3, 2010, at http://www.jogmec.go.jp/mric_web/koenkai/090722/briefing_090722_1.pdf.)
- Nava Bharat Ventures Ltd., 2009, Nava Bharat Singapore acquires 65% equity stake in Maamba Collieries Limited: Hyderabad, India, Nava Bharat Ventures Ltd. press release, December 21, 2 p.
- QFM Radio Ltd., 2009, Maamba Collieries operations ground to a halt: QFM Radio Ltd., October 2. (Accessed September 22, 2010, at http://www.qfmzambia.com/blog_details.php?id=972.)
- Red Rock Resources plc, 2010, Half-yearly report—Six months ended 31 December 2009: London, United Kingdom, Red Rock Resources plc, March 10, 1 p.
- Shacinda, Shapi, 2008, Zambia's Luanshya copper mine halts operations—CEO: Thomson Reuters, December 20, 1 p. (Accessed December 23, 2008, at http://communities.thomsonreuters.com/BaseMetals/168463?utm_source=2008.)
- Shacinda, Shapi, 2009a, Chinese to invest at least \$400 million in Zambian copper/cobalt ops: Mineweb Holdings Ltd., June 8. (Accessed June 8, 2009, at <http://www.mineweb.com/mineweb/view/mineweb/en/page36?oid=84499&sn=Detail>.)
- Shacinda, Shapi, 2009b, Zambia asks Glencore to surrender two copper mines: Thomson Reuters, March 10. (Accessed March 11, 2009, at <http://af.reuters.com/article/zambiaNews/idAFLA72395220090310?sp=true>.)
- Shacinda, Shapi, 2009c, Zambian parliament to abolish mining windfall tax: Mineweb Holdings Ltd., March 28. (Accessed April 1, 2009, at <http://www.mineweb.com/mineweb/view/mineweb/en/page72068?oid=80994&sn=Detail>.)
- Shacinda, Shapi, 2009d, Zambia to raise stake in copper mines: Thomson Reuters, March 20. (Accessed March 24, 2009, at <http://www.reuters.com/article/company/NewsAndPR/idAUSLKG63839520090320>.)
- Shedd, K.B., 2010, Cobalt: U.S. Geological Survey Mineral Commodity Summaries 2010, p. 46-47.
- Sinkamba, Kapembwa, 2009a, China Non Mining Corporation Mulyashi plant on schedule: Steel Guru, December 11. (Accessed February 16, 2010, at http://steelguru.com/news/index/2009/12/12/MTI0NDIy/China_Non_Mining_Corporation_Mulyashi_plant_on_schedule.html.)
- Sinkamba, Kapembwa, 2009b, Zambian president commission Luanshya copper mine: Steel Guru, December 23. (Accessed February 16, 2010, at http://steelguru.com/news/metals_news/MTI2MTcO/Zambian_president_commission_Luanshya_copper_mine.html.)
- Steelworld, 2007, Global mergers and acquisitions—Monnet Ispat plans acquisitions in Africa—East Europe: Steelworld, January, p. 29-30. (Accessed August 6, 2009, at <http://www.steelworld.com/analysis007.pdf&ei=kayXTIGvMIa0lQflr9ChBg&usg=AFQjCNEtt0oSKg4qq9Aan1PX9TWcKuQzMQ>.)
- Thom, Khosie, 2009, Equinox defers Lumwana uranium project: Mineweb Holdings Ltd., January 8. (Accessed January 9, 2009, at <http://www.mineweb.com/mineweb/view/mineweb/en/page36?oid=76354&sn=Detail>.)
- Thomson Reuters, 2009a, Zambia's largest cobalt producer resumes output: Thomson Reuters, November 9. (Accessed November 9, 2009, at <http://communities.thomsonreuters.com/BaseMetals/pages/print/posts/?bid=d9a44ba3-929f-4457-8bab-cd866-e23c3b2&mode=Full>.)
- Thomson Reuters, 2009b, Zambia smelter to double capacity to 300,000 t: Thomson Reuters, October 19. (Accessed October 20, 2009, at <http://communities.thomsonreuters.com/BaseMetals/pages/print/posts/?bid=d9e4484e-c732-43ci-910b-1ce8e4d237ba&mode=Full>.)
- Times of Zambia, 2009a, KCM to re-ignite Fitwaola Mine: Southern Africa Resource Watch, October 8. (Accessed September 27, 2010, at <http://www.sarwatch.org/headline-news-for-zambia/182-mining-and-politics-in-zambia/871-zambia-kcm-to-reignite-fitwaola-mine.html>.)
- Times of Zambia, 2009b, Local gemstone miners cry foul: AllAfrica Global Media, July 1. (Accessed September 2, 2009, at <http://allafrica.com/stories/20090710765.html>.)
- Times of Zambia, 2009c, State sells 65 per cent Maamba Collieries shares: Times of Zambia [Lusaka, Zambia], December 19. (Accessed March 22, 2010, at <http://www.times.co.zm/news/viewnews.cgi?category=4&id=1261205949>.)
- Times of Zambia, 2009d, 1,400 jobs at risk as Mufulira Mine closes April 14: AllAfrica Global Media. (Accessed September 28, 2009, at <http://allafrica.com/stories/2009/04/030252.html>.)
- Triple Plate Junction Plc, 2007, Annual report and accounts 2007: London, United Kingdom, Triple Plate Junction Plc, 27 p.
- Triple Plate Junction Plc, 2009, Preliminary results for the year ended 31 March 2009 and restoration of trading: London, United Kingdom, Triple Plate Junction Plc, 25 p.
- Vedanta Resources plc, 2009, Production release for the fourth quarter and full year ended 31 March 2009: London, United Kingdom, Vedanta Resources plc, April 9, 4 p.

- Vedanta Resources plc, 2010a, Full year results for the year ended 31 March 2010: London, United Kingdom, Vedanta Resources plc, May 6, 67 p.
- Vedanta Resources plc, 2010b, Konkola Copper Mines Plc—Investor update: London, United Kingdom, Vedanta Resources plc, January, 29 p.
- Vedanta Resources plc, 2010c, Production release for the fourth quarter and year ended 31 March 2010: London, United Kingdom, Vedanta Resources plc, April 8, 5 p.
- Vedanta Resources plc, 2010d, Production release for third quarter and nine months ended 31 December 2009: London, United Kingdom, Vedanta Resources plc, January 27, 6 p.
- Zambezi Resources Ltd., 2009, Rio Tinto Mining and Exploration Ltd. withdrawn from Mulofwe uranium jv: West Perth, Australia, Zambezi Resources Ltd., March 12, 2 p.
- Zambezi Resources Ltd., 2010, December 2009 quarterly cash flow results: West Perth, Australia, Zambezi Resources Ltd., January 29, 1 p.
- Zambian Parliament, The, 2009, Debates—Tuesday, 10th February, 2009: The Zambian Parliament, February 13. (Accessed September 22, 2010, at http://www.parliament.gov.zm/index.php?option=com_content&task=view&id=862&Itemid=86&limit=1&limitstart=1.)
- Zinyama, Fridah, and Bupe, Florence, 2009, Expert urges govt to address question of Indeni's relevance: The Post Online [Lusaka, Zambia], November 10. (Accessed February 3, 2010, at http://www.postzambia.com/post-read_article.php?articleid=1634.)

TABLE 1
ZAMBIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity ³	2005	2006	2007	2008	2009
METALS					
Cobalt:					
Mine output, Co content	9,300	8,000	7,500	6,900	2,300
Metal, Co content	5,422 ⁴	4,665 ⁴	4,335 ⁴	3,991 ^{r,4}	1,500
Copper:⁵					
Mine output, Cu content:					
By concentration or cementation	341,000	370,000	340,000	383,000	547,000
Leaching, electrowon	106,000	124,000 ^r	168,000 ^r	163,000 ^r	150,000
Total	447,000	494,000 ^r	508,000 ^r	546,000 ^r	697,000
Metal:					
Smelter, primary, includes low-grade electrowon	270,000	290,000	224,000	232,000 ^r	330,000
Refinery, primary:					
Electrowon	155,000	178,000	200,000 ^r	175,000 ^r	155,000
Other	244,000	240,000	230,000	240,000	250,000
Total	399,000	418,000	430,000 ^r	415,000 ^r	405,000
Gold kilograms	440	956	1,270	1,930	3,100
Lead, metal, secondary	1,000	1,000	1,000	1,000	1,000
Manganese:					
Gross weight	--	--	1,400	1,500	1,500
Mn content	--	--	644	700	700
Nickel	--	--	--	750	280
Silver kilograms	2,000	3,000	3,500	4,000	6,000
INDUSTRIAL MINERALS					
Cement	580,000 ^r	550,000 ^r	540,000 ^r	560,000 ^r	880,000
Clays:					
Brick	3,300	3,300	3,300	3,000 ^r	3,000
Building, not further specified	33,000	33,000	33,000	30,000 ^r	30,000
China and ball	200	200	200	200	200
Gemstones:					
Amethyst kilograms	1,100,000	1,500,000 ^r	1,300,000 ^r	900,000 ^r	1,400,000
Beryl do.	5,000 ^r	5,000 ^r	5,000 ^r	4,000 ^r	6,000
Emerald do.	2,100 ^r	2,100 ^r	2,100 ^r	1,600 ^r	2,500
Tourmaline do.	26,000	27,000	25,000 ^r	15,000 ^r	21,000
Lime, calcined thousand metric tons	150	160 ^r	165 ^r	135 ^r	130
Limestone:					
For cement and lime do.	750	1,200	1,200	1,300	2,000
Crushed aggregate do.	650	700	700	700	750
Sand and gravel, construction do.	220	300	300	300	320
Sulfur:					
Gross weight:					
Pyrite concentrate	285,000	290,000	290,000	290,000	100,000
Sulfuric acid ⁶	12,000	15,000	15,000	15,000	15,000
Sulfur content:					
Pyrite concentrate (42% S)	120,000	122,000	123,000	123,000	42,000
Sulfuric acid (32.6% S)	3,910	4,890	4,900	4,900	4,900
Total, S content	124,000	127,000	128,000	128,000	47,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous	240,000	210,000	220,000	220,000	200,000
Petroleum, refinery products thousand 42-gallon barrels	5,000	5,000	4,400	4,500	4,500

^rRevised. do. Ditto. -- Zero.

¹Estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through September 29, 2010.

³In addition to the commodities listed, palladium, platinum, and selenium may be produced, but information is inadequate to estimate output.

⁴Reported figure.

⁵Terms used are as defined by the International Copper Study Group.

⁶From the Chambishi and the Nkana acid recovery plants.

TABLE 2
ZAMBIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement	Lafarge Cement Zambia plc (Pan African Cement Ltd., ¹ 50%, and Financiere Lafarge S.A., ¹ 34%)	Chilanga II plant at Lusaka	830,000.
Do.	do.	Ndola plant	450,000.
Do.	do.	Chilanga I plant at Lusaka	200,000.
Do.	Zambezi Portland Cement Ltd.	Ndola	330,000.
Coal, bituminous	Maamba Collieries Ltd. (Nava Bharat Proprietary Ltd. consortium, 65%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 35%)	350 kilometers south of Lusaka in the Kanzie and the Izuma Basins	NA.
Do.	Collum Coal Mining Industries Ltd.	Near Sinazongwe	240,000.
Copper and cobalt:			
Ore and concentrate	Lumwana Mining Company Ltd. (Equinox Minerals Ltd., 100%)	Lumwana Mine (Malundwe pit)	20,000,000 ore.
Do.	Kansanshi Mining plc (Kansanshi Holdings Ltd., ² 79.4%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 20.6%)	Kansanshi Mine, north of Solwezi	12,000,000 sulfide ore, 6,000,000 oxide ore.
Do.	Konkola Copper Mines plc (Vedanta Resources plc., 79.4%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 20.6%)	Chingola open pit A and Nchanga open pit, Chingola	4,500,000 ore.
Do.	do.	Nchanga underground mine, Chingola	2,800,000 ore.
Do.	do.	Konkola Mine, Chililabombwe	2,400,000 ore.
Do.	do.	Fitwaola open pit, Chingola	NA. ³
Do.	do.	Reprocessing material from the TD3a, the TD3b, the TD5, and the TD7 tailings dams, Chingola	NA.
Do.	Mopani Copper Mines plc (Carlisa Investments Corp., ⁴ 90%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 10%)	Nkana Mine, includes the Central, the Mindola North, the Mindola Sub-vertical, and the South Ore Body shafts for underground operations, and the Area A, the Area E, and the Mindola open pits	5,500,000 ore.
Do.	do.	Mufulira Mine	2,500,000 ore.
Do.	CNMC Luanshya Copper Mines Ltd. (NFC Africa Mining plc, 100%)	Baluba underground mine	1,800,000 ore. ³
Do.	NFC Africa Mining plc (China Nonferrous Metal Mining Corp., 85%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 15%)	Chambishi Mine	800,000 ore, which yields about 50,000 copper in concentrate.
Do.	Chibuluma Mines plc (Metorex Ltd., 85%, and Zambia Consolidated Copper Investments Holdings Plc, 15%)	Chibuluma South Mine, about 20 kilometers from Kitwe	600,000 ore, which yields about 16,000 copper in concentrate. ⁵
Do.	Albidon Ltd.	Munali nickel mine, about 60 kilometers south of Lusaka	1,200,000 ore, which yields about 1,700 copper and 500 cobalt coproduct.
Metal	Konkola Copper Mines plc (Vedanta Resources plc., 79.4%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 20.6%)	Tailings leach plant at Chingola	80,000 copper cathode.
Do.	do.	Nchanga copper smelter, Chingola	311,000 copper anode (blister copper), 3,000 copper-cobalt alloy.
Do.	do.	Nkana copper smelter	240,000 copper anode (blister copper). ⁶
Do.	do.	Nkana copper refinery, Kitwe	180,000 copper cathode.

See footnotes at end of table.

TABLE 2—Continued
ZAMBIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Copper and cobalt—Continued			
Metal—Continued	Mopani Copper Mines plc (Carlisa Investments Corp., ⁴ 90%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 10%)	Mufulira in situ leach and solvent extraction-electrowinning ⁶ plant	17,000 copper cathode.
Do.	do.	Mufulira (ISASMELT) smelter	200,000 copper anode.
Do.	do.	Mufulira refinery	275,000 copper cathode.
Do.	do.	Nkana solvent extraction plant	15,000 copper cathode.
Do.	do.	Nkana cobalt plant	2,500 cobalt metal.
Do.	Chambishi Metals plc (Enya Holdings BV, ⁷ 90%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 10%)	Chambishi cobalt plant	27,000 copper cathode, 3,400 cobalt metal.
Do.	Chambishi Copper Smelting Company, Ltd. (China Nonferrous Metal Mining Corp., 60%, and Yunnan Copper, 40%)	Chambishi copper smelter	150,000 copper anode (blister copper).
Do.	First Quantum Mining and Operations Ltd. (First Quantum Minerals Ltd., 100%)	Bwana Mkubwa solvent extraction-electrowinning plant, near Ndola	52,000 copper cathode. ³
Do.	Sable Zinc Kabwe Ltd. (Metorex Ltd., 100%)	Sable copper leach and electrowinning plant at Kabwe	14,000 copper cathode, 600 cobalt carbonate.
Do.	Sino-Metals Leach Zambia Ltd. (China Nonferrous Metals Mining Co. Ltd., Sino-Africa Mining Investments Ltd., NFC Africa Mining Plc, and China Hainan Construction Co. Ltd.)	Chambishi	8,000 copper cathode.
Gold, content of ore kilograms	Kansanshi Mining plc (Kansanshi Holdings Ltd., ² 79.4%, and Zambia Consolidated Copper Mines Investments Holdings Plc, 20.6%)	Kansanshi Mine	3,200.
Lead, metal, secondary	Pagrik Zambia Ltd. (Gravita Group, 100%)	Lusaka	1,000.
Lime, quicklime	Ndola Lime Company Ltd. (Zambia Consolidated Copper Mines Investment Holdings Plc, 100%)	Ndola	300,000. ⁸
Manganese	Small-scale miners	Luapula	250.
Nickel, Ni content of ore	Albidon Ltd.	Munali Mine, about 60 kilometers south of Lusaka	10,500.
Petroleum, refined 42-gallon barrels	Indeni Petroleum Refinery Ltd. (Government, 100%)	Indeni refinery at Ndola	3,500,000.
Sulfur:			
Pyrite ore, gross weight	Konkola Copper Mines Plc	Nampundwe Mine, 48 kilometers west of Lusaka	300,000. ^{3,4}
Sulfuric acid	do.	Nchanga acid plant	675,000.
Do.	First Quantum Minerals Ltd.	Bwana Mkubwa acid plant, near Ndola	350,000.

⁶Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

¹Subsidiary of Lafarge S.A.

²Subsidiary of First Quantum Minerals Ltd.

³Suspended.

⁴Carlisa Investments Corp. is owned by Glencore International AG, 81.2%, and First Quantum Minerals Ltd., 18.8%.

⁵Also includes some cobalt content.

⁶Closed in 2009.

⁷Enya Holdings BV is owned by International Mineral Resources AG.

⁸Plant has the capacity to produce up to 5,000 metric tons of hydrated lime (slaked) from quicklime.

