

Trending: ● HSE ● Market Data ● Processing



Lumwana Copper Mine



PRODUCER
OF
Copper

LOCATION
North West
province,
Zambia

OWNERSHIP
Barrick Gold
Corporation

GEOLOGY
TYPE
Antiformal
inliers
surrounded
by
metasediments

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Lumwana Mine is an open-cut copper mine project in the North West province of Zambia, 220km west of the Copperbelt and 65km

west of the town of Solwezi. It is reported to be Africa's largest copper mine.

The mine was officially inaugurated in April 2009 by Equinox Minerals. The bulk emulsion manufacturing plant was opened at the Lumwana copper mine in January 2009.

Equinox Minerals was acquired by Barrick Gold Corporation for C\$7.3bn in July 2011.

Barrick Gold announced plans to suspend operations at the mine in December 2014 following the Zambian government's move to raise the royalty rates on open-pit mining operations in the country by more than three-fold. The company plans to put the mine on care and maintenance by the second quarter of 2015.

The mining licence covers 1,355km² and includes two major copper deposits, Malundwe and Chimiwungo, as well as 25 exploration prospects. The licence is valid for 25 years (from January 2004) and is renewable for a further 25 years.

"Barrick Gold's mining licence covers 1,355km² and includes two major copper deposits."

Equinox Minerals secured a long-term (99 years) land title to 35,000ha in May 2008, for its township and mine operation areas.

Copper production started in December 2008 instead of July 2008 due to a fire at the processing plant which affected the main transformer and substation.

In addition to copper, the Lumwana project also contains rich uranium deposits. Equinox completed a uranium feasibility study in 2008 that showed output of 2mlb a year of uranium oxide and 15,000t of copper could be mined simultaneously from the discrete uranium-enriched zones.

Since the commencement of copper production, uranium stock pile on the ROM pad increased to 4.6Mt in the fourth quarter of 2010. The Uranium was,

however, considered as 'waste' to the copper project. Equinox decided to process uranium later when the uranium plant is built.

Development of Lumwana Copper Mine, Zambia

Although Lumwana was discovered in 1961, no serious work was carried out there until Equinox became involved in 1999. At the time, the property was controlled by Phelps Dodge Corp. Equinox formed a joint venture with Phelps in which Equinox could earn 51% of Lumwana by investing \$10m and completing a feasibility study. Later, Equinox bought Phelps out for \$5m, giving Equinox 100% ownership of Lumwana.

Construction of the mine started in earnest in late 2006, and was carried out by about 4,700 local workers. Building it has cost about \$760m. So in 2006, Equinox completed three rounds of equity financing totalling \$250m through a short-form prospectus equity issue managed by an international syndicate of underwriters, a private placement equity issue to ZCCM Investments Holdings managed by the company and a second short-form prospectus equity issue managed by an international syndicate of underwriters.

The company also signed a \$583.8m senior and subordinated project finance debt facility with a group of financial institutions for the completion of development and construction of Lumwana.

Geology of copper mine in North West province, Zambia

The Lumwana deposits of Malundwe and Chimiwungo are hosted within the Mwombezi Dome, a north-east trending basement dome in the western arm of the Neoproterozoic Lufilian Arc thrust-fold belt. The Lufilian Arc is a major tectonic province characterised by broadly north-directed thrust structures and antiformal Basement inliers or domes surrounded by Katangan metasediments, which host the Central African Copperbelt.

Copper mineralisation at Lumwana

The copper mineralisation at Lumwana is hosted almost entirely within high-grade metamorphosed, intensely mylonitised, recrystallised muscovite-phlogopite-quartz-kyanite schists with disseminated sulphides (typically <5%) dominated by chalcopyrite and bornite.

Of the two major deposits, Malundwe is smaller but with higher copper grade and contains discrete zones of uranium and gold mineralisation with occasional sporadic high cobalt (>0.1%).

Chimwungo is much larger and lower in copper grade, but has higher overall cobalt and contains a number of significant high-grade (>0.1%) cobalt zones plus some sporadic uranium mineralisation.

Reserves

Measured and indicated reserves total 322Mt averaging at 0.73% copper (5.2 billion pounds of contained copper) with additional inferred resources totalling 561Mt averaging at 0.63% copper (more than 7.8 billion pounds of contained copper).

Proven and probable reserves are estimated at 299Mt graded at 0.68% Cu (4.5 billion pounds of contained copper).

As of 31 December 2013, copper reserves at the mine stood at 6.6 billion pounds.

Production

The Malundwe and Chimwungo deposits, which are 7km apart, are being mined sequentially by open-pit methods. The ore bodies are 95% sulphide (with only 5% oxide) and very consistent, so large-scale bulk-mining methods are being used. The mine produced 138 million pounds of copper in the first nine months of 2014.

In 2010, Lumwana produced about 146,690t of copper. Barrick Gold plans to produce 227,500t of copper in 2011.

An average of 20Mt of ore a year will be mined to produce an average of 122,000t of copper a year over the 37-year mine life. Because of higher head grades during the first six years of operation; the mine will produce an average of 169,000t of copper a year.

Production involves the use of four hydraulic face shovels for waste and ore and two hydraulic excavators (26m³) plus a smaller unit (15m³) for selective ore mining and 26 large AC-drive haul units (242t). These units are being supported by a fleet of drills, front-end loaders, bulldozers, graders and other ancillary equipment.

Processing

Metallurgical test work indicates greater than 95% recovery of copper by conventional flotation processing. Test work showed that Malundwe will produce a concentrate grading 41%–45% copper and Chimiwungo is expected to produce a concentrate grading 28%–32% copper.

Sulphide ore is processed on-site by conventional flotation to produce copper concentrates for shipment to off-site smelters. Concentrates are smelted and refined into metal at smelters. The copper concentrates produced during the fourth quarter of 2010 were delivered to the Chambishi Copper Smelter and the Konkola Copper Mines Smelter at Nchanga on the Zambian Copperbelt.

"Barrick Gold will mine an average of 20 million tonnes a year over the 37-

Trucks from the mine tip directly into a 400t capacity ROM dump hopper. A primary gyratory crusher crushes the ROM ore from a nominal top size of 1,500mm to less than 200mm. Oversize material is deposited on the ROM pad to be further broken by a mobile rock breaker.

year mine life."

Ore is reclaimed via apron feeders onto a conveyor belt providing direct feed, at a rate of about 2,500t/h, into the 38ft × 18ft SAG mill. The SAG mill trommel undersize discharges into a hopper and is pumped to conventional hydrocyclones, operating in closed circuit with a 26ft × 40ft ball mill. The hydrocyclone overflow (P80 of 280µm) reports to flotation, while the underflow returns to the ball mill.

The flotation plant consists of two parallel trains of rougher/scavenger cells. The rougher/scavenger concentrate reports to the regrind circuit to further liberate the copper minerals. After regrinding, the concentrate is cleaned in a conventional cleaner/recleaner circuit to reach final concentrate grade.

The concentrate is dewatered in a circuit consisting of high-rate thickening followed by pressure filtration to produce a filter cake suitable for transportation. Flotation tailings are thickened and pumped to the tailings dam. Most of the plant water is recovered and recycled from the thickener overflows and tailings dam return water. Fresh make-up water is supplied from a river-water dam as required.

Infrastructure

A key reason Lumwana has not been mined earlier is the limited infrastructure in the region. Although the Northwest Highway, which links the Lumwana region, Solwezi and the Copperbelt, passes within 3km of the project, the Zambian Government has completed a highway upgrade as far as Solwezi and has committed to extend the upgrade to Lumwana. It has also completed a 330kV power line to Solwezi which will be extended to Lumwana.

Contractors

Australian company GRD Minproc was appointed as the front-end engineering and development contractor, while Ausenco International of

Australia and Bateman Minerals and Metals of South Africa Joint Venture was the EPC contractor. Golder Associates was responsible for the resource and some mining aspects, and Knight Piésold for the tailings and water management sections.

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