



Kansanshi

Location: **Zambia**

Ownership: **80%**

Type of mine: **open pit**

Status: **operating**

Primary metal: **copper**

Secondary metal: **gold**

End products: **cathode
concentrate**

2006 production: **127,179 tonnes**

2006 cash cost: **\$0.91/lb**

2006 total cost: **\$1.09/lb**

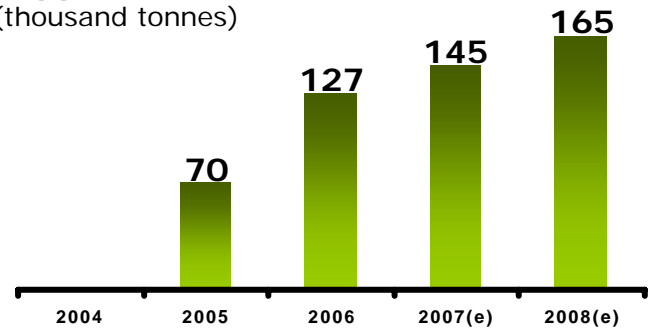
Resource grade: **1.16 % copper
0.16 g/t gold**

Est.mine life: **2005—2035**

Employees: **2,098**

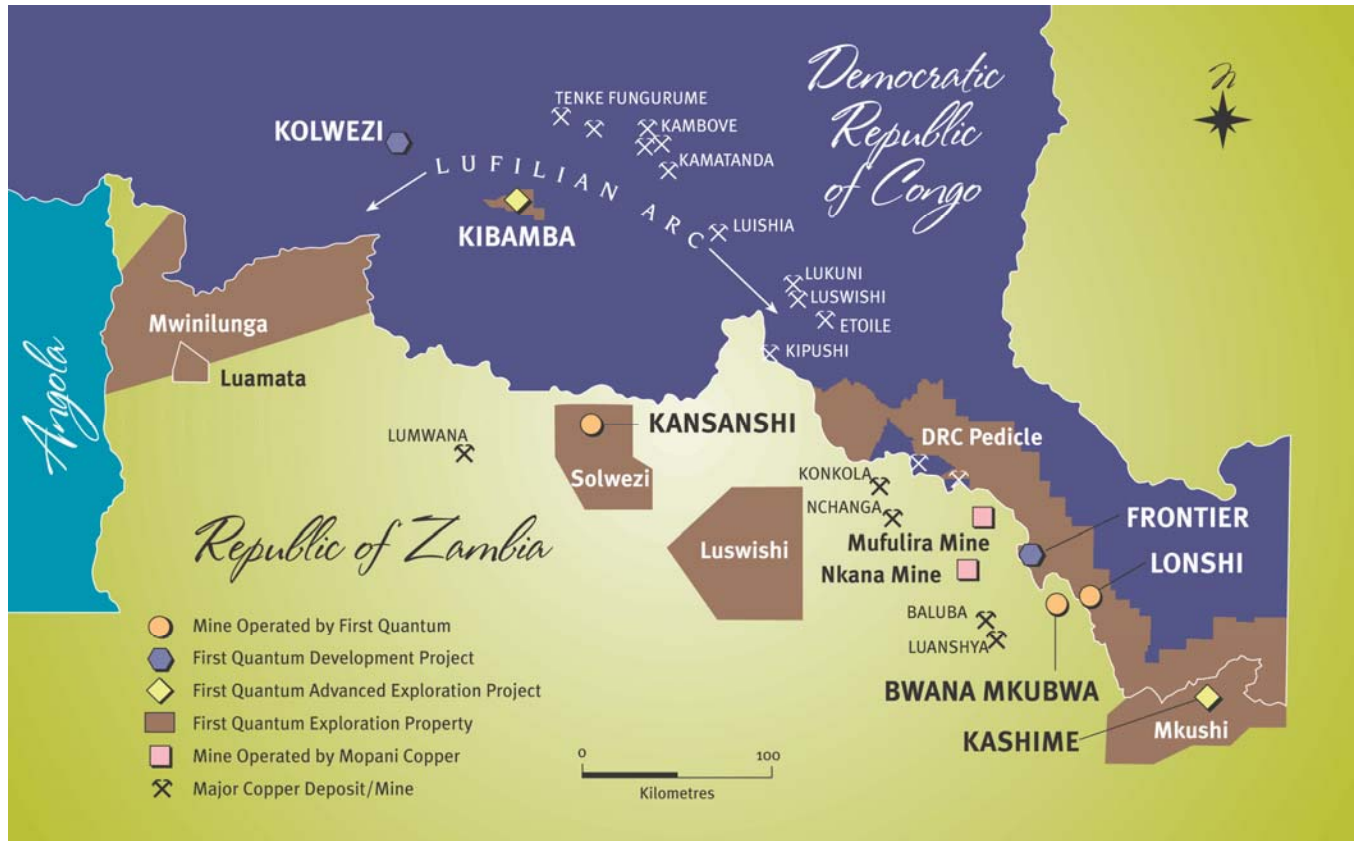


Copper Production Profile
(thousand tonnes)



Overview

The Kansanshi copper-gold mine is located in the North Western Province of Zambia, approximately ten kilometres north of Solwezi and 180 kilometres to the northwest of the Copperbelt town of Chingola.



Mining is carried out using conventional open pit methods employing excavators and a fleet of haul trucks. Ore treatment is flexible to allow for variation in ore type. Sulphide ore is treated via crushing, milling and flotation to produce copper in concentrate which is either treated onsite via high pressure leach (HPL) or shipped to Copperbelt smelters. Oxide ore is treated via crushing, milling, solvent extraction and electrowinning (SX/EW) to produce cathode copper.

In 2001, the Company purchased an 80% interest in Kansanshi from Cyprus Amax, a subsidiary of Phelps Dodge Corporation, for total consideration of US \$27.5 million. In 2002, it was proposed that Kansanshi be developed in two phases and a definitive feasibility study (DFS) was completed for the first phase of 16 years. A second phase of 14 years is supported by the existing resource for a total mine life of approximately 30 years.

The original DFS envisioned the treatment of 4 million tonnes of oxide ore and 2 million tonnes of sulphide ore (40+2S) to produce an average of 85,000 tonnes of finished copper per year. Capital additions carried out to the sulphide milling

circuit during initial construction doubled treatment capacity of sulphide ore to 4 million tonnes per year (4O+4S). A second expansion program completed in early 2006 expanded the sulphide circuit to 8 million tonnes of treatment capacity (4O+8S).

Construction on a third expansion to the sulphide circuit began in late 2006 and is expected to be completed by 2008. This will result in a treatment capacity of 12 million tonnes of sulphide ore (4O+12S). Finished copper production is forecast to be 145,000 tonnes in 2007 and 165,000 tonnes per year thereafter.

The Company has constructed a HPL facility to treat a portion of the increased copper concentrate production. The total capital cost was \$100 million including upgrading the Zesco power supply and working capital requirements. The main components of the HPL facility are two autoclaves, an oxygen plant and an additional 35,000 tonne per annum SX/EW facility. Construction of the HPL facility was completed in 2006 and commercial production is expected to begin in 2007.

As of December 31, 2006, the Company had invested approximately \$411 million at Kansanshi. In 2006, 9.5 million tonnes of ore grading 1.4% copper and 21.9 million tonnes of waste were mined. Copper production was 127,179 tonnes, 73,683 tonnes as copper in cathode and 53,496 as copper in concentrates. The combined cash costs for both cathode and concentrate for 2006 was \$0.91 per pound of copper with a total cost of \$1.09 per pound of copper.

For 2007, Kansanshi is forecast to produce 145,000 tonnes of copper and 40,000 ounces of gold. Cash costs are forecast in the range of \$0.90 to \$0.95 per pound of copper before considering the impact of the accounting change for the removal of deferred stripping.

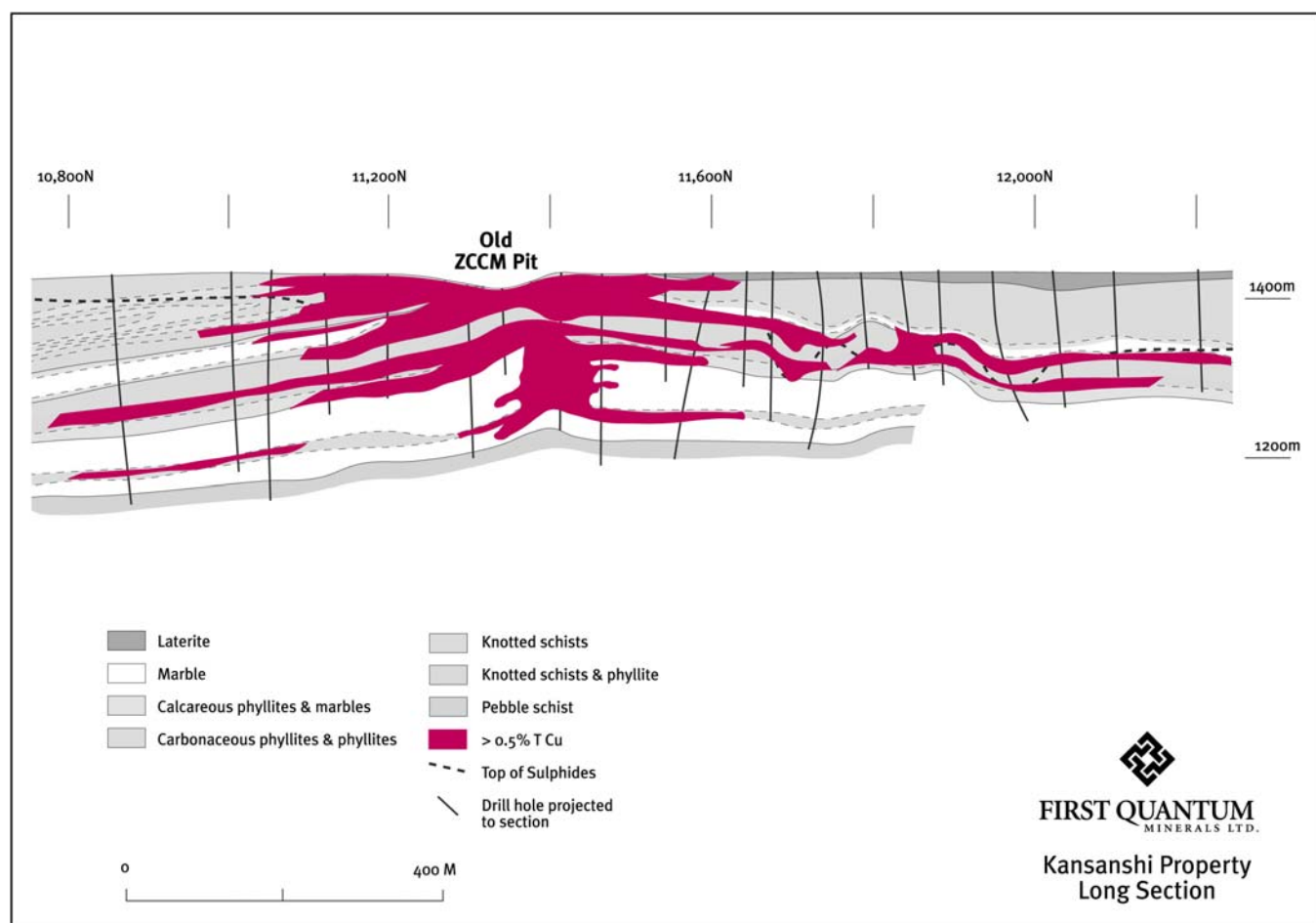
Geology

The Kansanshi deposit occurs within the Lufilian arc, a major tectonic province characterized by broadly north-directed fold and thrust structures, which hosts the world class Central African Copperbelt. The property geology is dominated by the northwest-trending Kansanshi Antiform, which exposes rocks of the Late Proterozoic Kansanshi Mine Formation in the core of a major refolded fold. Copper mineralization occurs both in and between steeply dipping, generally north-south trending quartz-carbonate veins and vein swarms, and as foliation parallel stratabound mineralization, within albite and carbonate altered phyllitic rocks of the Mine Formation.

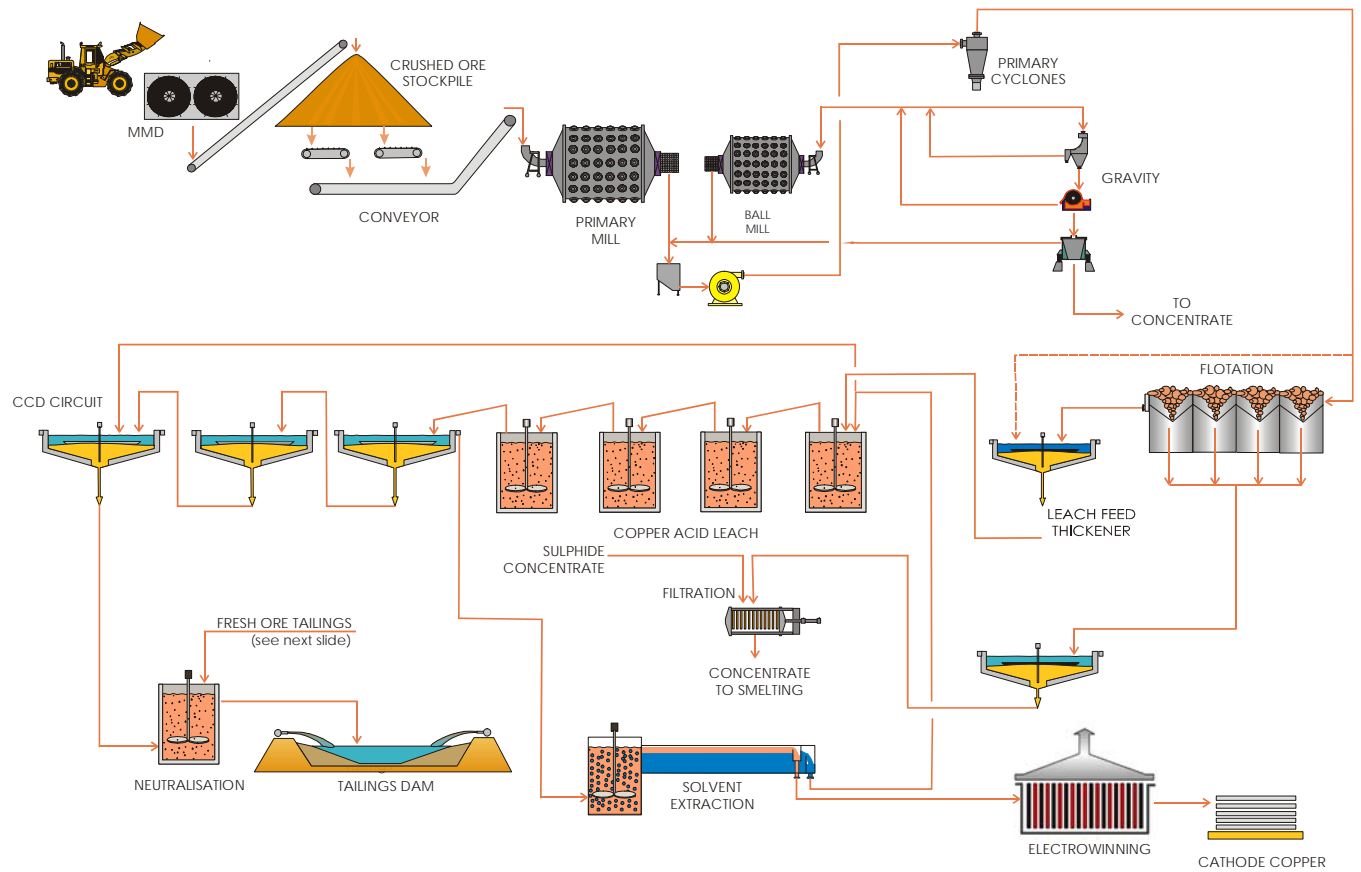
Deep tropical weathering has resulted in supergene enrichment and subsequent partial oxidation of the deposit so that a substantial proportion of the resource occurs as copper oxide and mixed copper oxide/chalcocite mineralization hosted by saprolitized phyllites, decalcified marbles and schists, amenable to recovery by SX/EW methods. This secondary mineralization is underlain by a large tonnage of

primary sulphide mineralization, with chalcopyrite and subordinate bornite as the dominant minerals, treatable by conventional flotation.

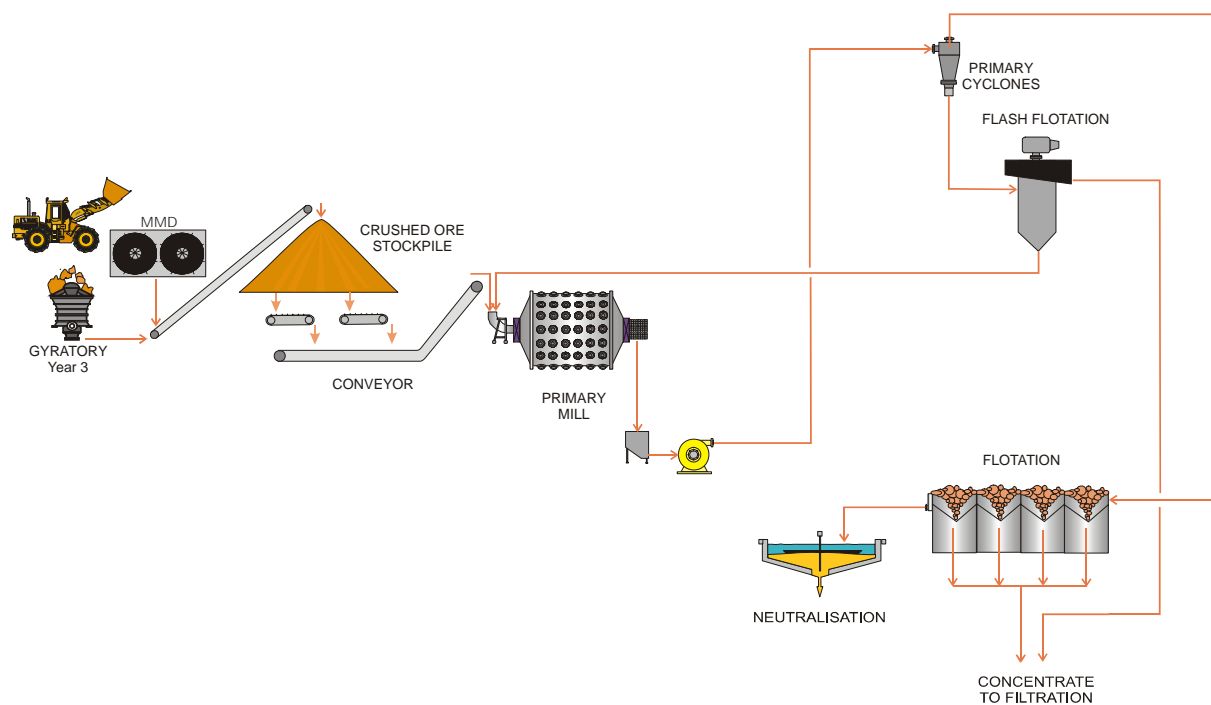
Oxide and mixed oxide/sulphide copper mineralization grading plus 0.5% copper occurs principally within two essentially flat lying orebodies, separated by a mostly barren marble unit. In some areas, the marble unit has been completely decalcified during weathering and in these cases the two ore bodies are combined. Deeper primary sulphide mineralization occurs in other discrete flat lying phyllite units.



Process Flow Sheet—oxide & mixed ore



Process Flow Sheet—sulphide ore



High Pressure Leach (HPL)

The sulphide flotation concentrate treated by the HPL autoclaves will contain a nominal 29% copper and 8 grams/tonne gold. The concentrate is oxidised utilising two autoclaves and copper is recovered from the autoclave effluent via the existing and expanded SX/EW circuits at Kansanshi.

The HPL process results in near total oxidation (+90%) of the copper sulphide concentrate converting the sulphide sulphur to sulphates of copper and iron. This additional sulphate will replace acid currently produced for the atmospheric leach circuit, with one significant difference. The autoclave can also provide a source of ferric sulphate that will leach residual secondary copper sulphates not readily leachable by acid alone in the current circuit design. Basic ferric sulphate provides a source of ferric ions for the atmospheric leach circuit to dissolve secondary copper sulphides. The total pressure oxidation process also provides significant waste heat that will be used to increase the atmospheric leach temperature, improving copper leach kinetics and ultimately increasing copper recovery levels.

The production rate from the HPL project is limited to that of two autoclaves running at approximately 66% of maximum rated capacity in the current design configuration approximately 105,000 tonnes of concentrate; this limit is imposed by the capacity of the oxygen plant. Engineering design has moved forward on the basis that the autoclave systems will be designed for the maximum throughput capability approximately 200,000 tonnes of concentrate



HPL Process Flow Sheet

