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GUNPOWDER COPPER: A CASE HISTORY OF COPPER SULPHIDE MINING AND IN-PLACE LEACHING OPERATIONS

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ABSTRACT

The Gunpowder copper mine is located about 115 km north of Mount Isa in north west Queensland. Gunpowder Copper Ltd operated a mining and in-place leaching operation from 1989-1996 based on the the Mammoth orebody. Cathode copper was produced via an SX/EW plant rated initially at 7500 tpa, and later expanded to 13,000 tpa. Heap leaching was also trialled.

Prior to this, previous owner Renison Goldfields Consolidated Ltd trialled heap leaching and in-place leaching of Mammoth ore from 1978-1982 producing cement copper suitable for smelting using launders, and attained a production rate of 4000 tonnes per annum. They undertook a study to produce 10,000 tpa in which SX/EW was shown to improve the economics. However, they decided not to proceed and sold the property.

The host rocks at Mammoth are impure sandstones, arkoses and quartzites. The major copper bearing minerals are chalcocite and chalcopyrite, with minor amounts of bornite, digenite and covellite. Minor quantities of cobalt are present, generally as a nickel cobalt arsenide which tends to 'rim' pyrite grains. In the upper sections of the mine during the in-place mining operations, chalcocite was generally the dominant mineral, but in some areas, particularly towards the north, chalcpyrite predominated. At depth, chalcopyrite became more abundant, and in the lowest parts of the orebcdy was the dominant copper mineral. The pryrite content varied significantly up to 30%, with an average of about 5-10%. The average ore grade at Mammoth and the nearby Esperanza and Mount Oxide deposits in June 1993 was 2.23% Cu.

The presentation briefly reviews and compares the metallurgical performance during the Renison and Gunpowder operations.

Keywords: Gunpowder Copper Mine, North Queensland, Mammoth orebody, In-place leaching, heap leaching, SX/EW, Cementation, Chalcocite, Bornite, Chalcopyrite, Pyrite

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