Improving Capricorn Copper Concentrator process performance and the role of process mineralogy and surface chemistry

M. Tayebi-Khorami[1], M. Muller[2], M. Zanin[3], T. Do[4],

1. Process Engineer/ Project Metallurgist, Ausenco, 144 Montague Road, South Brisbane QLD 4101, Australia, Email: Maedeh.tayebi-khorami@ausenco.com
2. Concentrator Manager, Ausenco, Capricorn Copper Concentrator, Gunpowder, QLD 4825, Australia, Email: mmuller@capricorncopper.com
3. Managing Director, MZ Minerals Pty Ltd, 4/2 da Costa Avenue, Prospect, SA 5082, Australia, Email: max.zanin@mzminerals.com
4. Senior Metallurgist, Ausenco, Capricorn Copper Concentrator, Gunpowder, QLD 4825, Australia, Email: tlong@capricorncopper.com

ABSTRACT

Capricorn Copper Mine (CCM) is an underground copper mining operation located 125km north west of Mt Isa in North West Queensland, Australia. The plant restarted operations in late 2017 after being in care and maintenance for a number of years. After plant start up the copper recovery was well below the study expectation. Plant data confirms that the copper recovery is affected by the proportion of pyrite in the ore. This led to an investigation being carried out which found a significant amount of liberated ultrafine chalcocite in the tailings and liberated pyrite in the final concentrate which called attention to a recovery improvement opportunity.

A comprehensive investigation consisted of a full plant survey followed by ToF-SIMS, mineralogy, size-by-size analysis of key streams, as well as batch flotation tests were carried on benchmarking various assumptions for the mode of copper losses into tailings. Plant surveys of pH, pulp potential, Do and EDTA extraction were also performed investigating the effect of pulp chemistry on metallurgical performance. This paper demonstrates the power of combining process mineralogy and surface chemistry analysis in study a flotation circuit. The results are discussed in terms of improving the chalcocite recovery and depressing pyrite flotation.