ALTA 2022 26
20 - 27 May | Perth, Australia | Online

DETERMINATION OF COARSE GANGUE REJECTION AMENABILITY FOR GOLD AND BASE METAL ORES

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ABSTRACT

Coarse gangue rejection has been shown to significantly reduce plant throughput while retaining much of the metal content in the feed for some ores, resulting in an increased feed grade and reduced footprint of downstream processes, leading to capital expenditure and operating cost savings. Rejection of gangue also has the potential to minimise the effect of deleterious elements (i.e., preg-robbing carbonaceous material and clays) as it offers the capability of rejecting these materials early on in the process. Therefore, the characterisation of an ore's coarse gangue rejection amenability can reveal more cost-effective flowsheet opportunities and reduce the treatment complexity of difficult ores by early removal of deleterious elements.

Curtin University has developed a method, the Gangue Rejection Assessment Test (GRAT) for assessing the amenability of gangue rejection in gold ores at a hydraulically pumpable size range (-5 mm). The GRAT has been applied to 11 different gold ore types, varying from porphyry, orogenic, paleo placer, sulfidation epithermal and intrusion-related deposits. The method generated a database to understand the benefits of gangue rejection in gold ores by quantifying the gold upgrade factor for a given mass of gangue rejected by size or density based separations. The research has now focused on benchmarking the gangue rejection responses as a function of ore deposit type.

Researchers at Curtin University have expanded the database to non-gold ores to gather more information on gangue rejection deportment characteristics linked to specific ore deposits and mineralisation styles. The non-gold ores selected for this investigation are a copper ore from Cobar, an orogenic Cu-Au deposit, the lead-zinc from CBH mine West Mineralisation in the Broken Hill deposit, and the nickel-copper-cobalt ore from IGO Nova mine, Nova-Bollinger magmatic Ni-Cu deposits. The non-gold ores were highly amendable to gangue rejection at coarser size than some of the gold ores due to the higher metal content and the valuable metals being associated with dense sulfide minerals. As a result, further research aims to develop a geometallurgical framework to establish an indicator or index to assess early coarse gangue rejection amenability in gold ores.

Keywords: gangue rejection, ore characterisation, gold, copper, lead-zinc, pre-concentration, GRAT, gravity separation