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A Geometallurgical Study of the Mineralized Footwall Underlying the Brakspruit Facies of Merensky Reef at the Lonmin Karee Pt Mine, Bushveld Complex, South Africa

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The geological and mineralogical characteristics as well as the metallurgical (flotation) response of mineralised footwall [platinum group elements (PGE), gold (Au), sulphur (S), copper (Cu), nickel (Ni)] to Merensky Reef at the Karee Mine of Lonmin PLC, was investigated. A grade of ~3.5 g/t 6PGE is encountered in the mineralised footwall, which compares with a grade of ~6.5 g/t 6PGE in the overlying Merensky Reef. The nature of this style of mineralisation is very poorly understood, resulting in a lack of predictive capability when dealing with this ore type in processing.

Various geological and metallurgical parameters such as mineralogy, grain size distribution, liberation upon milling, and flotation response, were determined, and compared to the overlying Merensky Reef (the Brakspruit facies type). Base metal sulphides in the footwall (the likely host of the platinum group elements) comprise of dominant pyrrhotite, along with pentlandite and chalcopyrite. These are finer grained in the footwall than in the Merensky Reef.

Footwall mills faster than Merensky Reef (in order to achieve a target grind of 60% passing 75 micron, commonly used throughout the Bushveld Complex for the processing of Merensky Reef [1]). Liberation of sulphides upon milling is lower for the footwall than for the Merensky Reef. The flotation efficiency is lower in footwall than for Merensky Reef (i.e. lower concentrate grades are encountered in the initial stages of flotation) (Figure 1), which is likely a consequence of the lower level of liberation of the footwall upon milling, relative to Merensky Reef.

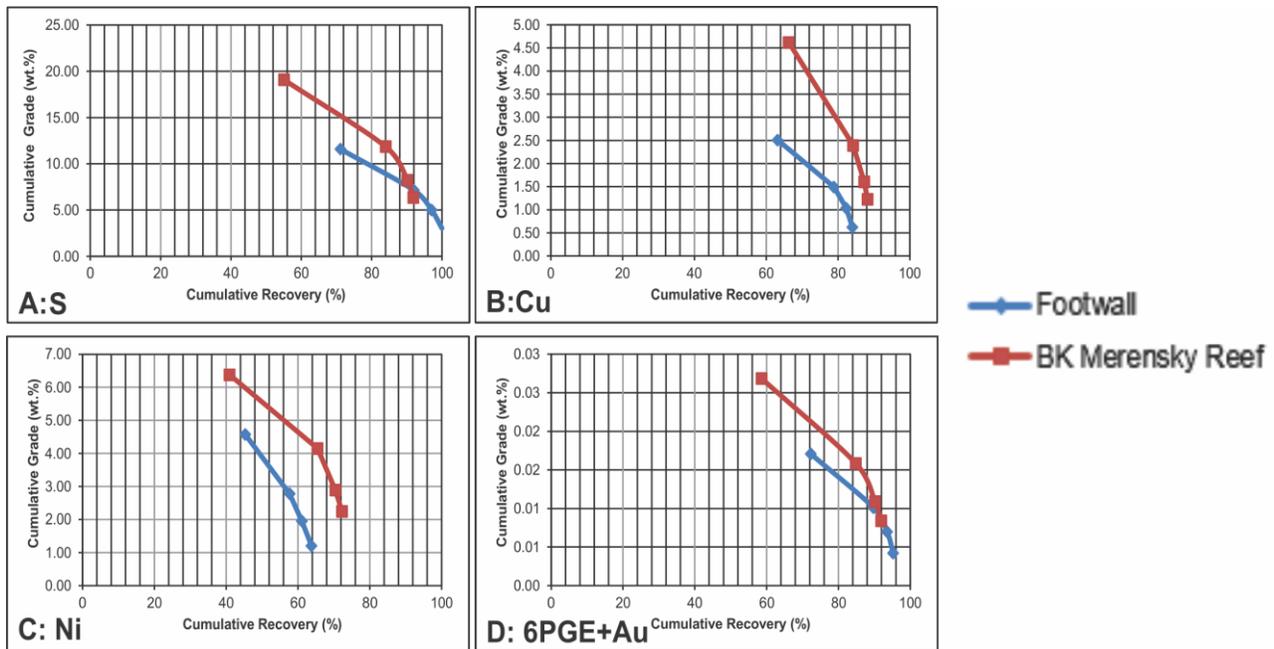


Figure 1: Cumulative concentrate grades (wt.%) as a function of cumulative recovery (%) for bench top flotation tests conducted on mineralised footwall and Merensky Reef.

References

[1] Wiese et al. (2005) Minerals Engineering 18: 189-198.

