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A guide for managing the resource model of the copper block-cave at Palabora Mining Company

Bezuidenhout, Johannes Jacobus

2018

https://hdl.handle.net/10539/25961

Bezuidenhout, Johannes Jacobus, (2018) A guide for managing the resource model of the copper block-cave at Palabora Mining Company, University of the Witwatersrand, Johannesburg, https://hdl.handle.net/10539/25961

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ABSTRACT:

The renowned PMC's copper open pit operation transitioned from surface copper operations to an underground operation in 2002. An exploration shaft from within the open pit, having an exploration tunnel below the open pit bottom served ideally for downward resource exploration drilling. Palabora Underground Mining Project was a first to cave in very competent lithology rock types which utilised the crinkle cut method at its undercut level. Unfortunately, the inadequate underground exploration drilling limited the resource classification and confidence levels since the vast footprint of the block cave area remained poorly represented. Consequently, the head grade and the modelled grade required annual revisions. The head grade and modelled grades diverted from each other more than once, despite all the numerous studies with minor and significant model improvements. The block model refinements included adjustments made to the block sizes, draw column alignments with blocks and additions such as the dolerite dilution representation within blocks. The resource model revision pointed firstly to the grade change between the mill grades and predicted modelled grade, and secondly to the identified geometric change and rectification thereof. Significant technical studies refined the resource model to satisfactory levels of confidence. However, the elusive cave behaviour encouraged more studies and refinements as new information became available over time. The copper open pit's north wall failure occurred in 2004, and this material contributed to significant resource losses. The importance of the many approaches and models which predicted or assumed the possible block cave's life after the failure characterised the PMC block cave uniquely. Some of the significant studies over time, encapsulated in this project report sketch a realistic timeline of the copper block cave at Palabora Mining Company. The initial resource losses became somewhat redeemed during the 2015 resource study where some of the copper gains resulted from the failure's glacial flow and resource management. The processes resulted in some additional years to the life of the block cave.