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Enhance South deep variography by including flat inclined boreholes in the local direct estimation methodology

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ABSTRACT

The research project presented relates to the Mineral Resource evaluation of South Deep Gold Mine in Westonaria, South Africa. The aim of the project is to establish the impact of the inclusion of the samples from flatly inclined boreholes (FIBs) in the variography and Mineral Resource estimation of the individual Elsburg top conglomerate reef (ECT). The samples from FIB boreholes are traditionally excluded from the estimation process to reduce the possibility of smearing grade as stated in the Mine's Code of Practice. These are boreholes with a dip of greater than -55° or less than 55°. These boreholes provide the highest resolution into the orebody and thus the highest level of de-risking of the orebody and are therefore used for geological modelling. Although the addition of the samples from FIBs in brings a substantial increase in the number of samples in some geostatistical domains they do not introduce outliers. Adding the FIBs resulted in improved variogram models. Simple Kriging models considered are one using the Au (g/t) samples from the steeply inclined holes only and the other using the combined dataset. These Kriging models were post-processed through Local Direct Conditioning (LDC) and the results were compared. Reconciliation indicates that the model remains stable with 1% change at Mineral Resource and Mineral Reserve cut-off of 3.2g/t Au following the addition of Au (g/t) samples from FIBs in the mineral resource estimation. It is therefore concluded that adding the flatly inclined boreholes in the mineral resource estimation increases the confidence in Kriging and improves variogram models.