

ABSTRACT

The purpose of this research is to generate a refined Mineral Resource model for Tshepong mine by validating and cleaning the sampling data base that has historically been subjected to hard coded grade capping and by harnessing the assay data of check samples. It is standard practice to chip a check sample at the bottom contact of each underground sample section. An additional experimental variogram value at a lag of 8cm was calculated and used in the modelling of the variograms, improving the estimation of the nugget effect.

No recorded reason or justification for the capping was found and the capped values did not have context in current estimations.

It was necessary to revert to the original values prior to the application of hard-coded values resulting in a validated, raw and error free sampling database.

The geological domains were updated based on updated facies plans and a value trend analyses. Exploratory data analyses were performed within the six newly defined geozones confirming that the domaining was effective and the evidence of stationarity within the geozones was deemed acceptable.

Variogram contours maps, at a sampling grid scale as well as at two regularised block grid scales, were used in the modelling of the spatial continuity of the mineralisation within each geozone. Ordinary Kriging is used for estimation into 30m x 30m blocks and kriging neighbourhood analyses were carried out using the sampling grid variogram models. Simple Macro Kriging is used for the estimation into 60m x 60m and 120m x 120m blocks.

The refined estimation model was validated by cross-validations (jack-knifing), and comparisons of the grade distributions and mean grades. Reconciliation between the old and the refined model highlighted differences that are interpreted and accounted for.

This research contributed towards improving the quality of Mineral Resource model for Tshepong mine by delivering a validated assay database and exploiting the available information and knowledge and the inclusion of recommendations for future Mineral Resource model updates.