ABSTRACT

The economic viability of any mine is underpinned by its Mineral Resource estimation. Crucial to this is the utilisation of all relevant and available data, to ensure that the resource evaluation process is comprehensive and carried out to the highest standard possible. There is always the case, where, in the initial development stages of a mine project limited data is available however, as the project progresses information regarding the orebody usually also increases. The increase in information opens an opportunity to assess whether the existing estimation method remains suitable and also allows for the modification of the current estimation method to better suit the behaviour of the orebody based on the additional new information.

Standard procedure when carrying out a Mineral Resource estimate is to split the orebody into zones that show statistical and geostatistical homogeneity i.e. similar characteristics for example grade and or reef thickness. Of course, when data is limited this privilege might not be possible. The reason being that geostatistics rely of an assumption of second order stationarity which means that the mean and co-variance is consistent irrespective of the location within the orebody, an assumption that cannot be validated with limited data.

In recent years the Amandelbult UG2 reef database increased in terms of both surface borehole intersections and underground channel sampling. Splitting the UG2 orebody into homogeneous zones for resource estimation using statistics as well geostatistics is outlined in this research report. Statically the orebody thickness, density and platinum grade show variation

across the area of interest, this allowed for subdivision of the orebody into several homogeneous geozones. Both the descriptive statistics and graphical data summaries confirmed local variation in these three variables. The geostatistical analysis involved the creation of two sets of variograms, one for each identified geozone and a global variogram ignoring the individual identified geozones within the project area. Ordinary kriging was used to estimate the UG2 orebody thickness, density and platinum grade using these variograms. A comparison was conducted to check if the quality of the estimates improved by comparing the true values and estimated values and the correlation coefficient of the two indicated that the estimates were improved when using individual variograms rather than a global variogram. Additionally, comparisons of the errors from the true values and estimated values indicate that the Mean Absolute Error and Root Mean Error are reduced when using separate variograms rather than using a global variogram when solving the kriging solutions. In conclusion this research study has shown that by delineating the orebody into homogeneous zones for thickness, density and platinum grade and applying ordinary kriging using the relevant individual geozone variograms resulted in improved block estimates for Amandelbult UG2 reef.