

THE INFLUENCE OF DRILLHOLE SPACING, DATA CLUSTERING, NUGGET EFFECT, SKEWNESS OF THE DATA DISTRIBUTION, SHORT-RANGE VARIABILITY AND THE SELECTED ESTIMATION METHOD ON THE FINAL ERROR IN THE GRADE-TONNAGE CURVE

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A mineral resource estimate is usually provided by the geologist or geostatistician to the mining engineer in the form of a dump of the block model or, when recoverable resources are estimated at a series of cut-off grades, as a Whittle-format data file.

The mining engineer should preferably also be supplied with an indication of the degree of uncertainty inherent in the resource model as a result of different input variables: drillhole configuration, characteristics of the input data and characteristics of the spatial model used for describing the grade continuity. The model for the grade continuity should, obviously, closely correspond to the accepted spatial model for the geological continuity.

This paper compares a range of grade-tonnage curves that are based on different data sets representing a low-nugget disseminated gold deposit, a high-nugget vein-hosted gold deposit, a lateritic nickel deposit and a sedimentary phosphate deposit. The curves are produced using Uniform Conditioning and stochastic simulation. The drillhole spacing is varied and the influence of short-range variogram structures is incorporated, as is the influence of missing drillholes and preferentially clustered exploration drillhole data. A total of 100 simulations is completed to produce sufficient information for generating realistic ccpdf curves.

The conditioning datasets are generated by sampling from exhaustive data sets. The actual grade-tonnage curves are therefore known and are used to define the estimation precision.

The influence of drillhole spacing, data clustering, missing drillholes, nugget effect and short range structures on the grade-tonnage curves will be assessed. The performance of Uniform Conditioning for creating 'global' grade-tonnage curves will be compared to the stochastically generated 'local' grade-tonnage

curves. The differences will be translated to dollar values to show the influence of the estimation method on predicted mining profit.