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Improving reconciliations through geostatistical resource model updates of Phoenix deposits, Tati Nickel mine

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Abstract

Periodic resource model updates are necessary to bridge the reconciliation variances between the resource model estimates and actual ore mined. As a tool, Mineral Resources reconciliation focuses on identifying, analysing and managing variance between estimated Mineral Resources and actual ore mined. The aim is to minimize the business risk associated with poor resource model estimate performance against actual ore mined at Phoenix Mine.

The Phoenix Mine Mineral Resource model update research project incorporates historical and recently acquired drillhole data, other relevant geological information in the form of geological pit floor and face maps to update the Phoenix Mineral Resource model. Employing appropriate geostatistical estimation methods and improved modelling procedures can highlight and overcome some of the causes of observed reconciliation variances. Each of the five domains of the Phoenix resource was estimated through ordinary kriging and indicator kriging as principal methods. Nearest neighbour (NN) and inverse power of distance (IPD) methods were used as a check and where the above geostatistical methods proved inappropriate.

The comparison between model estimates from these various estimation techniques and raw drill hole data was undertaken. The results indicate areas of both good and poor correlation across the different methods and sections of the resource. Areas where there is good correlation coincides with good sampling coverage where as poor correlation coincides mostly with portions of the resource where there is paucity of sampling data. Subjecting the individual domains' resource estimates from the various estimation methods to a validation check against the sampling data assisted in selecting the estimate that honours the sampling data the most. Such Estimate was selected as the most suitable and reported as the Estimated Resources. Indicator Kriging produced better results compared to the rest of the techniques. In domain four geostatistical methods were unsuccessful thus Inverse power of distance method was used.