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Local sampling information requirement for Grade Control in the Infiernillo area Los Bronces

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ABSTRACT

Introduction: ore control is a critical activity in the mining extraction process that aims to classify the materials into ore and waste and destinations to process. Ore control is based on geological and geometallurgical information and blast hole data.

The standard approach is to sample cuttings from blast-holes generated by down-the-hole hammer drills. The spacing of the holes is defined for blasting purposes but with no consideration of the geological and grade variability; therefore, without addressing the information required for the classification performance of the ore control.

In mining projects, it is common to carry out drill-hole spacing studies to support mineral resource classification based on the relationship of drilling spacing and the uncertainty of tonnage, metal content, and grades over large production volumes.

The study discusses the difference of the drilling optimization purpose and criteria between mining projects versus mining production and explores alternatives of advanced ore control drilling and sampling level of blast-hole data.

Methodology: This paper presents a case study which estimate the local sampling requirement in a production scenario to evaluate the probability of correctly classifying the ore and waste and the errors in metal content, given different sampling schemes over a daily production volume of 150 Ktpd.

The approach includes the generation of conditional simulation of geology and copper grades, generation of synthetic samples and remodeling, and the application of mining extraction restrictions to assess the relationship between errors and sampling schemes (Figure 1). As input data for modeling 708.449 Blast holes and 206.257 drill-hole composites were used.

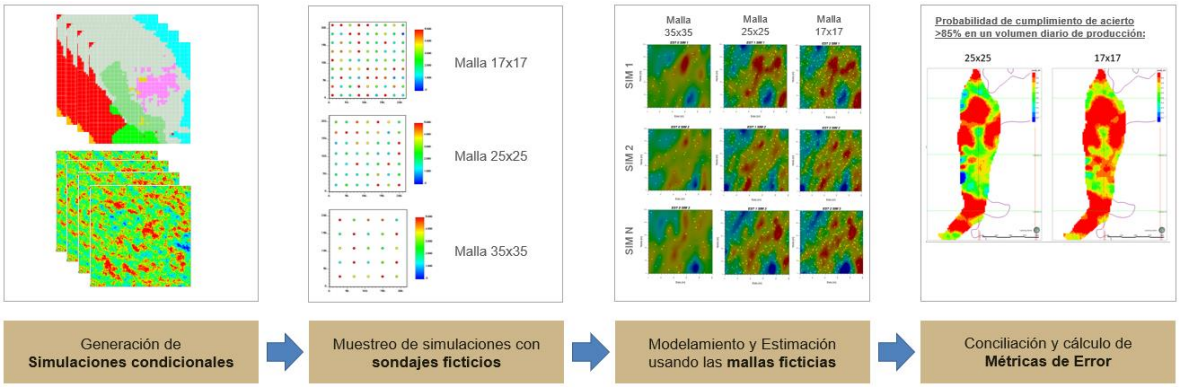

Figure 1 Steps used in the proposed approach

Results and conclusion: the conditional simulation results identify low-risk and high-risk areas of ore-waste misclassification, quantified as the probability of a correct match over 85% of a daily production volume in a moving window (Figure 2). The drilling spacing results show areas where the sampling level requirement differs from the blast-holes current sampling scheme and shows an opportunity to optimize the drilling budget by introducing the practice of a locally variable drilling pattern opposite to the traditional homogeneous hole spacing.

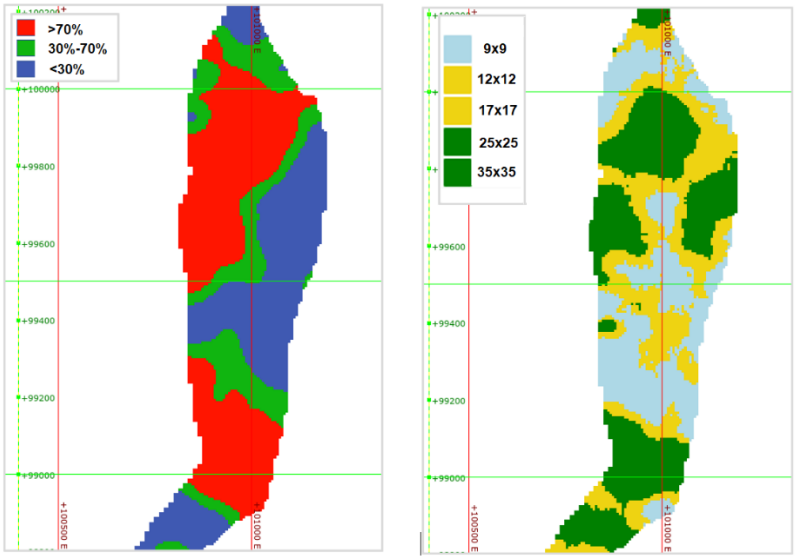

Figure 2 Probabilityof being ore (Left) and local sampling requirement, expressed as DH spacing, to achieve at least 85% classification match with a 90% probability over a daily production volume (Right).