

MULTIVARIATE GEOSTATISTICS ESTIMATION OF THE PEÑA COLORADA MINE

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The Peña Colorada skarn of southwestern Mexico is the largest iron mine in the country. The data available consists of 650 vertical drill holes. There is a master variable (magnetic iron), and auxiliary variables: total iron, sulfur, silica, and phosphorus. If the value of magnetic iron is bigger than the cutoff the auxiliary variables are analyzed, but at the end of the concentrate process. A block is said to be of good quality if values of each of these variables lie inside the cutoffs. Our aim is to estimate the quality of the main five variables and the total reserves for the deposit with multivariate geostatistical methods. First, we deal with the structural analysis of the data. We calculated the histograms of each variable, the scatter diagrams of all pairs of variables, the variogram maps, the experimental variograms, and a mathematical model fits to experimental variograms. The consequence of these analyses is the necessity to divide the deposit in two main ore bodies, one located in the upper right and the other in the lower left. What the geostatistical show can be explained by the geology. Secondly, we present the estimation of the upper part of the ore body. In three of the five variables, ordinary kriging was used. Concerning the two variables with good correlation co-kriging was used. Finally, we present the calculation of the tonnage of the deposit with the cutoffs applied to each variable. In this paper, we essentially show how a meticulous geostatistical analysis can help the practitioner in the way to better know his ore bodies.