Optimization of mineral processing plant feed at Sarcheshmeh Copper mine by geostatistical methods

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ABSTRACT

Volume-Variance relationship is one of the most important methods to show reserve estimation results, that is so suitable in short time mine programming, especially in quarters which faced with high grade gradient such as porphyry deposits. Main target of this paper is to calculate optimization extraction blocks to achieve to desired grade deviation for mineral processing plant using geostatistical methods in five activated benchmarks in Sarcheshmeh copper mine. Utilized data include blasting boreholes drilled in first six month of 1386 and exploration boreholes which have the same blasted borehole coordinate in five active bench mark of Sarcheshmeh copper mine. They were combined with each other after approved that these two groups' data haven't had any systematic error. For achieving to high accuracy estimation variography was applied to study spatial regression between samples and spherical models were fitted to each theoretical variograms. The sill of variograms in all benches was standstill but the effective radius shifted in various directions. Variogram maps were used to show appropriate anisotropy and residual analysis to study variogram accuracy of fitted model's parameter to each variogram. At last, by calculating the optimized parameters of variogram, loaded tonnage in one shift (30000 tone per shift), volume-variance and selective mining unit variance relationship, the number of optimized extraction blocks for achieving to desired variance (%0.08) was estimated between 80 to 100 blocks.

Keywords: geostatistics, variogram, selective mining unit variance, volume-variance relationship

INTRODUCTION

To obtain the optimum model with the lowest grade difference has been a major discussion in mining circles in recent decades. Non-overlapping grade posts of mine reduce the processing plant efficiency from appropriate processing factory grade. In recent years, the use of kriging that calculated variance estimates in organizing mining projects is most necessary. Using this knowledge can be useful in different situations. Identified deposit genesis, deployment of appropriate variograms, using techniques to achieve anisotropy can be contributed to solve various problems in mining, because the main foundation of geostatistics relations, such as kriging theory must be an accurate calculation of listed parameters. For example, in the Epithermal deposit- Shear gold due to drilling problems and costs, the tendency is to reduce fixed mining and drilling and even reduce the variance estimates. Having knowledge of selective mining unit size of sample space, selective extraction of variance was calculated. Then by using central limit theory the number of blocks necessary to achieve the desired variance was determined [7]. Awareness of average grade level fluctuations in ore for mining engineers design, processing equipment and factories that are feeding these products is a matter of crucial importance. This knowledge can not be achieved concluded directly, so that should be based on samples from the sampling program deposit has been taken about the distribution of the ore deposit. Geostatistics methods for predicting the average grade blocks get valuable information. With a reasonable